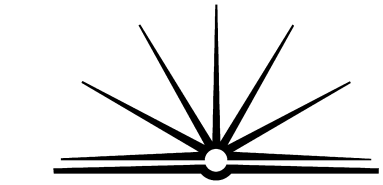

Design and Technology
Years 7–10

Syllabus

June 2003

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1 Introduction

1.1 The K–10 Curriculum

This syllabus has been developed within the parameters set by the Board of Studies NSW in its *K–10 Curriculum Framework.* This framework ensures that K–10 syllabuses and curriculum requirements are designed to provide educational opportunities that:

- engage and challenge all students to maximise their individual talents and capabilities for lifelong learning
- enable all students to develop positive self-concepts and their capacity to establish and maintain safe, healthy and rewarding lives
- prepare all students for effective and responsible participation in their society, taking account of moral, ethical and spiritual considerations
- encourage and enable all students to enjoy learning, and to be self-motivated, reflective, competent learners who will be able to take part in further study, work or training
- promote a fair and just society that values diversity
- promote continuity and coherence of learning, and facilitate the transition between primary and secondary schooling.

The framework also provides a set of broad learning outcomes that summarise the knowledge, understanding, skills, values and attitudes essential for all students to succeed in and beyond their schooling. These broad learning outcomes indicate that students will:

- understand, develop and communicate ideas and information
- access, analyse, evaluate and use information from a variety of sources
- work collaboratively with others to achieve individual and collective goals
- possess the knowledge and skills necessary to maintain a safe and healthy lifestyle
- understand and appreciate the physical, biological and technological world and make responsible and informed decisions in relation to their world
- understand and appreciate social, cultural, geographical and historical contexts, and participate as active and informed citizens
- express themselves through creative activity and engage with the artistic, cultural and intellectual work of others
- understand and apply a variety of analytical and creative techniques to solve problems
- understand, interpret and apply concepts related to numerical and spatial patterns, structures and relationships
- be productive, creative and confident in the use of technology and understand the impact of technology on society
- understand the work environment and be equipped with the knowledge, understanding and skills to evaluate potential career options and pathways
- develop a system of personal values based on their understanding of moral, ethical and spiritual matters.

The ways in which learning in the *Design and Technology Years 7–10 Syllabus* contributes to the curriculum and to the student's achievement of the broad learning outcomes are outlined in the syllabus rationale.

In accordance with the *K–10 Curriculum Framework*, the *Design and Technology Years 7–10 Syllabus* takes into account the diverse needs of all students. It identifies essential knowledge, understanding, skills, values and attitudes. It enunciates clear standards of what students are expected to know and be able to do in Years 7–10. It provides structures and processes by which teachers can provide continuity of study for all students, particularly to ensure successful transition through Years 5 to 8 and from Year 10 to Year 11.

The syllabus also assists students to maximise their achievement in Design and Technology through the acquisition of additional knowledge, understanding, skills, values and attitudes. It contains advice to assist teachers to program learning for those students who have gone beyond achieving the outcomes through their study of the essential content.

1.2 Students with Special Education Needs

In the K–6 curriculum, students with special education needs are provided for in the following ways:

- through the inclusion of outcomes and content in syllabuses which provide for the full range of students
- through the development of additional advice and programming support for teachers to assist students to access the outcomes of the syllabus
- through the development of specific support documents for students with special education needs
- through teachers and parents planning together to ensure that syllabus outcomes and content reflect the learning needs and priorities of students.

Students with special education needs build on their achievements in K–6 as they progress through their secondary study and undertake courses to meet the requirements for the School Certificate.

It is necessary to continue focusing on the needs, interests and abilities of each student when planning a program for secondary schooling. The program will comprise the most appropriate combination of courses, outcomes and content available.

Life Skills

For most students with special education needs, the outcomes and content in sections 6 and 7 of this syllabus will be appropriate but for a small percentage of these students, particularly those with an intellectual disability, it may be determined that these outcomes and content are not appropriate. For these students the Life Skills outcomes and content in section 8 and the Life Skills assessment advice below can provide the basis for developing a relevant and meaningful program.

Access to Life Skills outcomes and content in Years 7–10

A decision to allow a student to access the Design and Technology Years 7–10 Life Skills outcomes and content should include parents/carers and be based on careful consideration of the student's competencies and learning needs.

The decision should establish that the outcomes and content in sections 6 and 7 of the *Design and Technology Years 7–10 Syllabus* are not appropriate to meet the needs of the student. Consideration should be given to whether modifications to programs and to teaching, including adjustments to learning activities and assessment, would enable the student to access the syllabus outcomes and content.

As part of the decision to allow a student to access the Design and Technology Years 7–10 Life Skills outcomes and content, it is important to identify relevant settings, strategies and resource requirements that will assist the student in the learning process. Clear time frames and strategies for monitoring progress, relevant to the age of the student, need to be identified and collaborative plans should be made for future needs.

It is not necessary to seek permission of the Office of the Board of Studies for students to undertake the Design and Technology Years 7–10 Life Skills outcomes and content, nor is it necessary to submit planning documentation.

Life Skills assessment

Each student undertaking a Design and Technology Years 7–10 Life Skills course will have specified outcomes and content to be studied. The syllabus content listed for each outcome forms the basis of learning opportunities for students.

Assessment should provide opportunities for students to demonstrate achievement in relation to the outcomes and to generalise their knowledge, understanding and skills across a range of situations or environments including within the school and in the wider community.

Students may demonstrate achievement in relation to Design and Technology Years 7–10 Life Skills outcomes independently or with support. The type of support will vary according to the particular needs of the student and the requirements of the activity. Examples of support may include:

- the provision of extra time
- physical and/or verbal assistance from others
- the provision of technological aids.

2 Rationale

People interpret and alter their environments in an attempt to improve the quality of their lives. Technologies constantly evolve and are developed to the extent that they have an impact on the environment and on most aspects of our daily lives. As well as contemporary technological skills, capacities to adapt to rapid change, to collaborate, and to develop and express creative ideas are becoming the new foundations of design and technology learning. These foundations provide the capabilities to thrive in the emerging Australian and international economies and the lifestyle challenges that may present themselves.

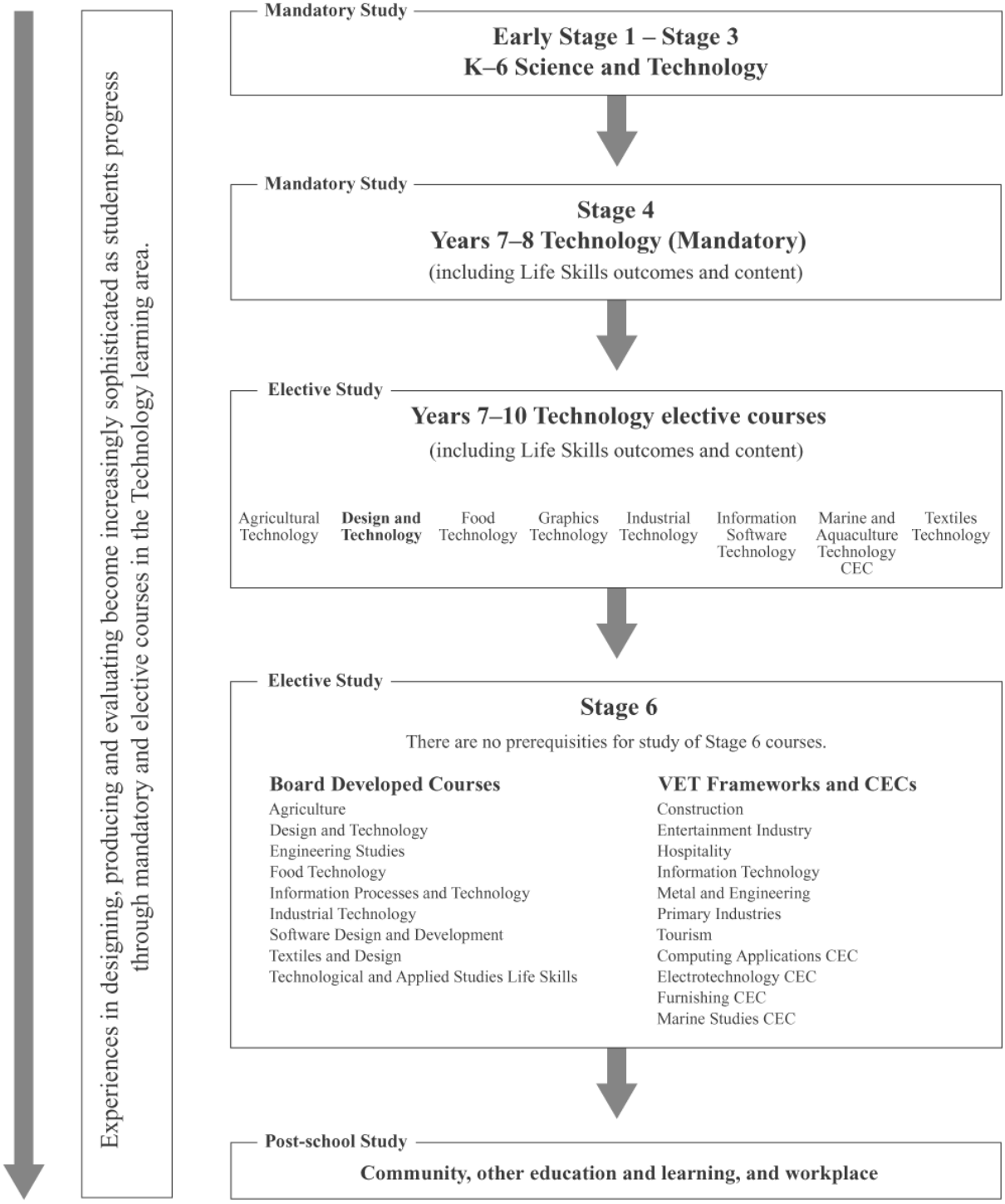
Australia needs future generations who understand the holistic nature of design and technology and who can apply design processes, develop, communicate and justify solutions, create systems and use technologies to meet identified needs and opportunities. Student projects related to real-life contexts provide a rich setting for individuals and groups to develop holistic solutions and to discover underlying principles for quality design applications. They can investigate processes of design and technology in a responsible, safe, ethical and collaborative manner and in a range of design fields. Present and emerging technologies, innovation, enterprise and exploring preferred futures are considered in relation to their impact on society and environments.

Design and Technology provides broad experience in a range of contexts and builds on the know-how and know-why developed in Science and Technology K–6 and the foundation Technology (Mandatory) course. The design and development of quality projects gives students the opportunity to identify problems and opportunities, research and investigate existing solutions, analyse data and information, generate, justify and evaluate ideas, and experiment with technologies to manage and produce design projects. The diversity of approaches to design projects provides the scope to develop high order thinking, future thinking and understanding of conceptual principles. The design process caters for a variety of student needs, abilities and interests. The flexible and creative consideration of parameters encourages students to take intellectual risks and experiment with resources when developing projects.

The development of functional and aesthetic design solutions allows students to be innovative and creative in their thinking and application. Students will develop the skills necessary for the safe use and maintenance of a variety of technologies in the production of their design projects. Information and Communication Technologies (ICT) are vital tools for this course. They are used to develop, communicate and research design solutions, communicate students' design ideas and facilitate interactions with the wider community.

The study of *Design and Technology Years 7–10 Syllabus* will assist students to appreciate and be informed about a range of careers in design and technological innovation. Students will learn to critically analyse and reflect on the implications of design in order to develop understanding of why some designs, technologies and processes perform better than others in meeting their intended purpose. Students will develop knowledge, appreciation and applied skills for understanding the interrelationships of design, technology, society, the individual and the environment for an increasingly knowledge-based economy and lifestyle.

3 The Place of the Design and Technology Years 7–10 Syllabus in the Technology K–12 Curriculum



4 Aim

The aim of the *Design and Technology Years 7–10 Syllabus* is to engage students in technological innovation and the world of design while exploring the impact on individuals, society and environments.

5 Objectives

Knowledge, understanding and skills
Students will develop:

1 knowledge and understanding of design concepts and processes
2 understanding and appreciation of the impact of past, current and emerging technologies on the individual, society and environments
3 knowledge and understanding of the work of designers and the issues and trends that influence their work
4 knowledge and understanding of and skills in innovation, creativity and enterprise
5 skills in communicating design ideas and solutions
6 knowledge and understanding of and skills in managing resources and producing quality design solutions.

6 Outcomes

Objectives Students will develop:	**Stage 4 Outcomes** A student:	**Stage 5 Outcomes** A student:
1 knowledge and understanding of design concepts and processes	4.1.1 identifies and describes a range of design concepts and processes	5.1.1 analyses and applies a range of design concepts and processes
	4.1.2 describes and follows a process of design when developing design ideas and solutions	5.1.2 applies and justifies an appropriate process of design when developing design ideas and solutions
2 understanding and appreciation of the impact of past, current and emerging technologies on the individual, society and environments	4.2.1 describes the impact of past, current and emerging technologies on the individual, society and environments	5.2.1 evaluates and explains the impact of past, current and emerging technologies on the individual, society and environments
3 knowledge and understanding of the work of designers and the issues and trends that influence their work	4.3.1 describes the work and responsibilities of designers and the factors affecting their work	5.3.1 analyses the work and responsibilities of designers and the factors affecting their work
	4.3.2 describes designed solutions that consider preferred futures, the principles of appropriate technology and ethical and responsible design	5.3.2 evaluates designed solutions that consider preferred futures, the principles of appropriate technology and ethical and responsible design
4 knowledge and understanding of and skills in innovation, creativity and enterprise	4.4.1 identifies innovative, enterprising and creative design ideas and solutions	5.4.1 develops and evaluates innovative, enterprising and creative design ideas and solutions
5 skills in communicating design ideas and solutions	4.5.1 communicates design ideas and solutions using a range of techniques	5.5.1 uses appropriate techniques when communicating design ideas and solutions to a range of audiences
6 knowledge and understanding of and skills in managing resources and producing quality design solutions	4.6.1 uses management strategies when developing design solutions	5.6.1 selects and applies management strategies when developing design solutions
	4.6.2 applies risk management practices and works safely in developing quality design solutions	5.6.2 applies risk management practices and works safely in developing quality design solutions
	4.6.3 uses a range of technologies appropriately and safely in the development of quality design solutions	5.6.3 selects and uses a range of technologies competently in the development and management of quality design solutions

Stage 4 outcomes have been provided to assist the assessment and reporting of student achievement in those schools that choose to begin elective study before Year 9. Teachers are advised to select from the syllabus content to target the specific needs of students who commence study in Stage 4.

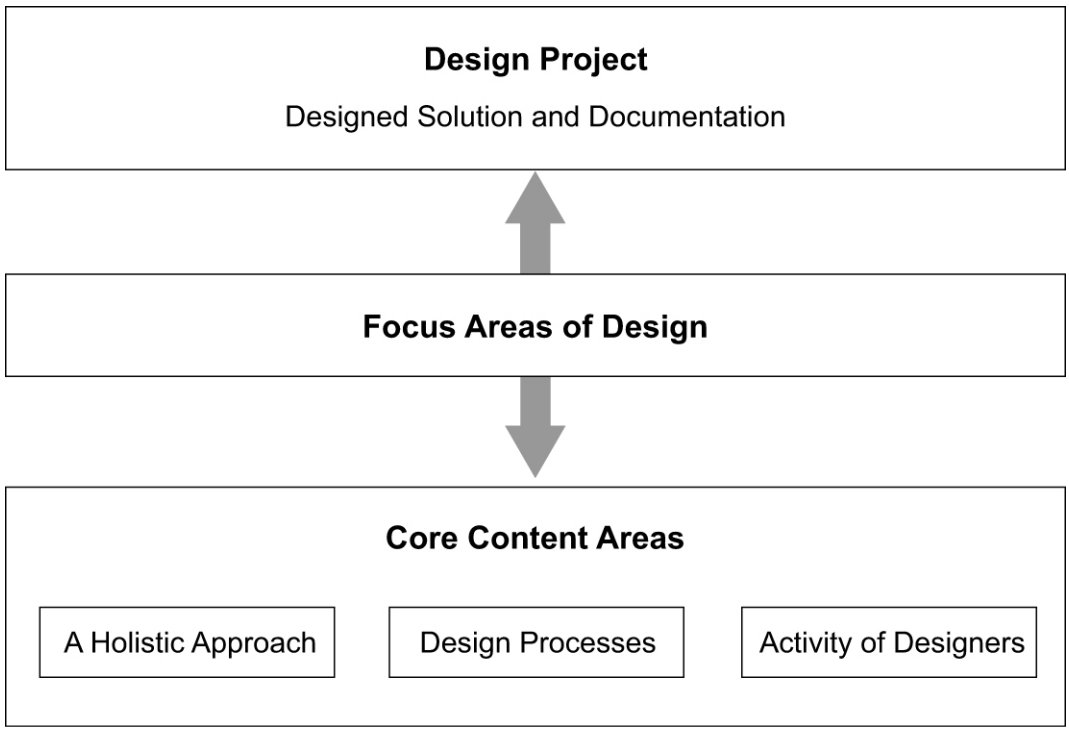
Life Skills

For some students with special education needs, particularly those students with an intellectual disability, it may be determined that the above outcomes are not appropriate. For these students, Life Skills outcomes and content can provide the basis for the development of a relevant and meaningful program — see section 8.

7 Content

7.1 Organisation of Content

Design and Technology involves designing, producing and evaluating quality designed solutions. Students engage in a range of practical activities during the development of a design project.



Units of work
Teachers are required to develop units of work. A unit of work integrates core content areas and project work through the focus area of design and results in the creation and documentation of designed solutions. The needs and interests of students should be addressed when developing units of work.

Students undertaking the 100-hour course are required to complete a minimum of two and a maximum of four units of work that address at least two focus areas of design. Students studying the 200-hour course are required to complete a minimum of three and a maximum of six unit of work that address at least three focus areas of design.

Essential content
Teachers of the 100-hour and 200-hour courses must ensure all outcomes are addressed by the completion of the course. For the 100-hour course teachers will select from the core content areas the specific essential content necessary to meet the course outcomes and which is appropriate to the project and focus areas of design. Students undertaking the 200-hour course must complete all essential content.

Additional content
Students can move beyond the essential content in order to broaden and deepen their knowledge, understanding and skills and to extend their interest in particular aspects of Design and Technology. Additional content is suggested for the core content areas of Design Processes and Activity of Designers.

Core content areas
Core content is divided into areas that must be integrated when developing units of work. The areas are:

- a holistic approach
- design processes
- activity of designers.

Design project
A design project is the main learning activity of students during a unit of work and culminates in the designed solution and documentation. The design project should be relevant to student needs and interests. It is expected that there will be increasing challenge offered to students in successive design projects to enhance the development of knowledge, understanding and skills.

Documentation of student work is used as a tool for student learning. The documentation provides the student with a means of recording all aspects of the design process used and the reasons for the decisions made as well as any relevant case studies. The documentation will provide evidence of the investigation and research undertaken, experimentation, development and justification of ideas, the process of realisation and design project evaluation.

Focus areas of design
The focus areas of design provide meaningful contexts for design project work and support the development of knowledge and understanding of the various stages in the approach to designing, producing and evaluating. The study of a minimum of two focus areas is required for a 100-hour course and a minimum of three focus areas for a 200-hour course.

The focus areas of design include:

- accessory
- aeronautical
- agricultural
- architectural
- communication systems
- digital media
- engineering
- environmental
- fashion
- food
- furniture
- graphical
- industrial
- information systems
- interior
- jewellery
- landscape
- marine
- medical
- packaging
- promotional
- software
- structural
- transport systems
- student-negotiated focus area of design.

A student-negotiated focus area of design provides for flexibility and allows students to develop a design project of interest and to work independently.

Life Skills

Life Skills outcomes and content are in section 8.

Cross-curriculum content

Cross-curriculum content assists students to achieve the broad learning outcomes defined in the Board of Studies *K–10 Curriculum Framework*. It is incorporated in the content of the *Design and Technology Years 7–10 Syllabus* in the following ways:

Information and Communication Technologies (ICT)

ICT will assist students to achieve outcomes more efficiently and with greater quality through the development of analytical, organisational and problem-solving skills necessary to cope with expanding access to computerised/digital information. This is consistent with advances in ICT in all aspects of workplaces and the community.

Students are required to engage with ICT throughout the Design and Technology Years 7–10 course. They will utilise ICT in the context of core content and within each design project. Students will integrate a variety of ICT applications including:

- word processing and desktop publishing to record and present documentation of design ideas, solutions and project work
- databases to interpret and manipulate data when problem-solving and developing information solutions
- spreadsheets to analyse, calculate, sort, filter and present numerical data when developing information solutions
- multimedia to create presentations of designed solutions
- graphics in the form of existing and created images in design development and presentation
- electronic communication in the researching of information.

Work, Employment and Enterprise

The processes of design, innovation and enterprise are embedded in the outcomes and content, promoting development of desirable employment skills. Knowledge and understanding are developed through research, analysis and evaluation of the work practices of designers. Themes include the work of past and current designers from a range of focus areas, workplace legislation and the changing nature of work. Employment and enterprise skills are developed through self-evaluation, individual and team projects and practical activities.

Aboriginal and Indigenous

During the design process, students consider the appropriateness of a range of designs for different groups, including Aboriginal and Torres Strait Islanders and other Indigenous peoples. Students are given the opportunity to study the influence of cultural perspectives and to apply these influences to their own work.

Civics and Citizenship

In studying the role and responsibility of designers, students learn their individual role as responsible designers. They are better prepared to become active members of a society driven by change, the increasing application of new and emerging technologies, and developments in communication and information. Students will demonstrate an awareness and understanding of the relationship between Design and Technology and civics through a growing recognition of their own values and ethics, and factors in relation to technological choices and decisions.

Difference and Diversity

Design and Technology students develop an appreciation for the opinions and ideas of other members of society, and learn to make informed decisions that encompass difference and diversity. Students are helped to do this by learning about Anti-discrimination legislation and Equal Employment Opportunity principles. They also learn these skills as they respond to identified needs through design projects. Many problem-solving tasks demand a high level of negotiation, collaboration and respect for others. Design and Technology Years 7–10 activities provide opportunities for students to relate to others and work cooperatively.

Environment

Design and Technology Years 7–10 students develop an appreciation of technologies through a study of a range of design focus areas of design. They consider environmental impacts of technologies, encouraging them to become globally aware, and committed to protecting the environment. Designers need to consider costs, resources and ecological impacts of their decisions. Technology plays an important role in environmental sustainability and students engage with these issues in the development of ethical and responsible designed solutions.

Gender

Students of Design and Technology Years 7–10 consider issues such as access to and interest in design and technological activities for all. The design situations provided should be gender-inclusive and accessible to all students. Design and Technology provides a context for challenging stereotypes for masculinity and femininity. It does this through providing students with an understanding of the contributions and different roles played by males and females in the design industry.

Key Competencies

Design and Technology Years 7–10 provides a defined context within which to develop general competencies considered essential for the acquisition of effective, higher-order thinking skills necessary for further education, work and everyday life. Students will:

- source, select and sequence information with regard to design research and idea generation, developing competence in ***collecting, analysing and organising information***
- debate, describe, discuss and explain design-related issues in written, graphical and oral form, developing competence in ***communicating ideas and information***
- work as individuals and as members of groups to conduct investigations and analysis, developing competence in ***planning and organising activities***
- cooperate with individuals and groups, developing competence in ***working with others***
- design, implement and evaluate solutions to broad-based problems, developing competence in ***solving problems***
- plan, develop and modify design projects in areas including costing, quantities, measurement and time, developing competence in ***using mathematical ideas and techniques***
- experiment with a range of tools, materials and techniques, developing competence in ***using technology***.

Literacy

In Design and Technology Years 7–10 students are provided with opportunities to develop literacy skills, particularly information and technological literacy, in the recording and documenting of design ideas as they work through their design projects. Students will be engaged in using oral, written and visual language in responding to problems and the ideas of others. Students learn to include subject-specific vocabulary to describe, classify and interpret meaning, to develop and present designed solutions using a range of computing technology including word processing and desktop publishing. They evaluate information and construct text for specific audiences at various stages of design development.

Multicultural

Design and Technology students engage in design activities that often involve them in researching material from a variety of cultures, enhancing their appreciation of contributions from people of all backgrounds. The *Design and Technology Years 7–10 Syllabus* acknowledges and values cultural diversity and the contributions of the various groups.

Numeracy

In the development of solutions to design problems, students use numeracy concepts, such as size, proportion and measurement, as tools to assist in the communication of design ideas. Students in Design and Technology will draw on a range of mathematical concepts and skills as they survey, graph and describe trends and preferred futures. They will collate and interpret statistical information, and will also estimate, measure and calculate quantities, time and costs in relation to the project work.

7.2 Content for Years 7–10

A note to teachers about practical experiences
To satisfy the requirements of the syllabus, students must undertake a range of practical experiences that occupy the majority of course time. Practical experiences will be used to develop knowledge and understanding of and skills in designing, producing and evaluating. Student capability, confidence and expertise at their current stage of development is an important consideration in determining the teaching and learning sequences in the course.

In developing and delivering teaching programs, teachers should be aware of and adopt relevant guidelines and directives of their education authorities and/or schools. Teaching programs should recognise and reflect relevant State and Commonwealth legislation, regulations and standards, including Occupational Health and Safety, Chemical Safety in Schools and Animal Welfare guidelines. Teachers need to be aware of activities that may require notification, certification, permission, permits and licences.

Core: A holistic approach
A holistic approach to design and technology provides a framework for the understanding of the concepts of design, and for design decisions and reflection. An awareness of the interdisciplinary nature of design gives students a broader perspective of the interrelationship of design with other areas of study.

Outcomes
A student:
5.1.1 analyses and applies a range of design concepts and processes
5.3.1 analyses the work and responsibilities of designers and the factors affecting their work

Students learn about:	**Students learn to:**
The concepts of design	
• nature and definitions of design, technology and appropriate technology	• define design, technology and appropriate technology • apply design, technology and appropriate technology principles in the process of developing quality design solutions
• purposes of design	• identify the purpose of design across a number of focus areas of design
• interdisciplinary nature of design which draws on disciplines such as mathematics, sciences, fine art and humanities	• identify the dependencies of design on other disciplines when designing solutions • analyse a case study that demonstrates the interdisciplinary nature of design • outline, reflect and apply collaborative methods when developing a design solution
• interrelationship of design with technology	• analyse a designed solution and identify how it was affected by the technologies and tools used in its development
• principles of design when transferred to new situations and contexts	• reflect on and report the learning of the principles used in design and applied in new situations and contexts • document using written communication techniques to provide feedback on their learning

Students learn about:	**Students learn to:**
Factors affecting a holistic approach to design and production • design purpose and setting factors – function – form – aesthetics – end user aspirations and context – time factors: historical, contemporary and future considerations – quality – trends • human, technical and environmental factors – human capital (knowledge, skills and techniques) – ergonomics – safety, values and ethics – industrial and workplace legislation – appropriateness of technology choices and design decisions – social and environmental sustainability – resource choices and availability (tools, materials, time, finance)	• describe factors affecting the design and production of design ideas and solutions from selected focus areas of design • analyse and report on the factors that affect the decisions taken in the development of design ideas and solutions • apply a holistic approach by considering the factors affecting design and production in a design project

Core: Design processes

This area of core content provides a framework for the application of an appropriate design process, to produce quality designed solutions. Each phase of the design process should be applied in varying depths appropriate to the design project.

Outcomes

A student:

5.1.2 applies and justifies an appropriate process of design when developing design ideas and solutions

5.4.1 develops and evaluates innovative, enterprising and creative design ideas and solutions

5.5.1 uses appropriate techniques when communicating design ideas and solutions to a range of audiences

5.6.1 selects and applies management strategies when developing design solutions

5.6.2 applies risk management practices and works safely in developing quality design solutions

5.6.3 selects and uses a range of technologies competently in the development and management of quality design solutions

Students learn about:	**Students learn to:**
Identification of needs and opportunities	
• opportunities for new and better solutions	• identify opportunities for new and better solutions
• requirements of end users and stakeholders	• identify the needs of the end users and other stakeholders in their settings
• design considerations	• establish and document the requirements and design considerations for the design project
Creative and innovative idea-generation using	
• brainstorming • concept sketches and maps • modelling • interaction of hand and mind • observation • research • collaboration	• use idea-generation techniques when developing creative design ideas • use research and information when generating creative design ideas • collaborate when developing design ideas and solutions
Research and exploration	
• access information and data	• use electronic communication tools to research information • identify and summarise information from a range of sources for the design project • interpret and manipulate data to develop information solutions using ICT applications including spreadsheets and databases • research appropriate materials, processes and production methods for the design project

Students learn about:	**Students learn to:**
• market research techniques	• use market research techniques for a targeted group of end users to develop and test design ideas
• criteria for success	• establish the criteria for success for the design project
• resource requirements	• investigate and calculate resource requirements for the design project
• appropriate technology	• analyse costs and benefits including social, financial and environmental
	• evaluate the long-term and short-term consequences of particular design ideas
Experimentation	
• testing and experimenting	• assess the suitability of design ideas by testing and experimenting
	• refine design ideas to address needs and opportunities
	• experiment to optimise design solutions for student project work
Management	
• project management strategies when implementing and evaluating a process of design	• prepare and implement time and action plans in design projects • estimate financial costs in design projects • manage materials, tools and techniques when developing the design project • evaluate the role of project management when developing the design project
• Occupational Health and Safety legislation and risk management practices • anti-discrimination legislation, Equal Employment Opportunity principles	• apply risk management practices in each design project
• safe work practices and safe environments	• demonstrate safe work practices when producing design projects
Communication and presentation techniques	
• visual • graphical • written • oral • digital	• outline a range of communication techniques appropriate to various audiences • apply appropriate communication techniques when documenting and presenting design ideas and solutions • use ICT applications such as multimedia communication devices, computer-generated graphics, word processing and desktop publishing for presentation of documentation • construct and use models or computer-generated simulations to communicate design ideas and solutions • use appropriate ICT applications when designing and producing solutions

Students learn about:	**Students learn to:**
Realisation of design ideas using technologies including	
• tools and equipment • materials • techniques	• identify a range of tools and equipment, materials and techniques and calculate requirements for each design project • select and use tools and equipment when designing and producing each project • justify the selected resources used for each design project • select and use a variety of appropriate techniques when designing and producing each design project • select and use appropriate materials when designing and producing each design project
Evaluating	
• criteria for success • evaluation techniques	• document and evaluate decisions made throughout the design process using specified criteria for success • self-assess and peer-assess designed solutions • justify and document decisions made during the development of designed solutions • reflect on their learning in the design project

Additional content	
Students learn about:	**Students learn to:**
• the impact of resource selection on – final solution – individual – society – environments	• analyse the impact of the selected resources used in the design project on the final solution, the individual, society and environments
• marketing strategies	• develop, present and justify a marketing strategy for the designed solution using multimedia presentation software

Core: Activity of designers

This area of core content examines the activities of designers over time and across a range of focus areas. The interrelationship of enterprising activity with innovation is explored to give insights into trends and preferred futures. Problem-solving techniques that are used by designers can be applied by students to their designed solutions. The impact of technologies is investigated and evaluated as they impact on individuals, society and environments.

Outcomes

A student:

5.2.1 evaluates and explains the impact of past, current and emerging technologies on the individual, society and environments

5.3.1 analyses the work and responsibilities of designers and the factors affecting their work

5.3.2 evaluates designed solutions that consider preferred futures, the principles of appropriate technology and ethical and responsible design

5.4.1 develops and evaluates innovative, enterprising and creative design ideas and solutions

Students learn about:	**Students learn to:**
The work of past and current designers across a range of settings	
• cultural • commercial • industrial • historical • contemporary, including Aboriginal and Torres Strait Islanders and other Indigenous peoples and the contributions of males and females to design industries	• examine and describe the work of past and current designers across a range of settings and from a range of focus areas of design
• careers in design and manufacture	• explore career opportunities and pathways in design and manufacture for males and females
Trends in technology and design • in history • across contemporary cultures	• recognise trends of designed solutions in history and across contemporary cultures • identify ICT applications used by designers and the impact on their work
Creativity and problem-solving techniques used by designers	
• needs and opportunity analysis (SWOT — strengths, weaknesses, opportunities and threats) • constraints analysis • collaboration • research and exploration	• identify creativity and problem-solving techniques used by designers in their work
Enterprising activity	• define and describe enterprising activity • initiate and manage action to successful completion in response to needs and opportunities when developing design projects • recognise enterprising activity as related to designers and their work within a focus area of design

Students learn about:	**Students learn to:**
Ethical and responsible design	• research an example of ethical and responsible design in a focus area of design • analyse how designers respond ethically and responsibly to design issues and appropriate technology when they develop design ideas and solutions • discuss issues relating to ethical and responsible design • explain the need for ethical, responsible design and appropriate technology when developing design ideas and solutions
Preferred futures	• identify visions for preferred futures in design and technology • identify what is achievable given the constraints of our current thinking, available technology and resources • justify designed solutions with consideration of preferred futures • analyse some exemplary designed solutions and predict directions in selected focus areas
Innovation • types of innovation • examples of innovation	• define and describe innovation • identify a variety of past, current and emerging technologies and innovations across a range of focus areas • identify what changes would need to occur to achieve particular visions • assess the impact of past, current and emerging technologies and innovation on society and environments • demonstrate design ideas and solutions that are innovative and enterprising
Impact of technologies on: • the individual • society (different cultural groups, including Aboriginal and Torres Strait Islanders and other Indigenous peoples) • environments	• evaluate and explain the impact of past, current and emerging technologies on the individual, society and environments

Additional content	
Students learn about:	**Students learn to:**
• work of contemporary designers	• plan and prepare a word-processed report on non-traditional careers in design and technology
• preferred futures in design and technology	• identify specific examples of preferred futures • predict future directions for a designed solution

Life Skills

For some students with special education needs, particularly those students with an intellectual disability, it may be determined that the above content is not appropriate. For these students, Life Skills outcomes and content can provide the basis for the development of a relevant and meaningful program — see section 8.

8 Life Skills Outcomes and Content

The Board of Studies recognises that a small percentage of students with special education needs may best fulfil the mandatory curriculum requirements for Design and Technology by undertaking Life Skills outcomes and content. (Requirements for access to Life Skills outcomes and content are detailed in section 1.2.)

Life Skills outcomes will be selected on the basis that they meet the particular needs, goals and priorities of each student. Students are not required to complete all outcomes. Outcomes may be demonstrated independently or with support.

In order to provide a relevant and meaningful program of study that reflects the needs, interests and abilities of each student, schools may integrate Design and Technology Life Skills outcomes and content across a variety of school and community contexts.

8.1 Outcomes

Objectives Students will develop:	**Outcomes** A student:
1 knowledge and understanding of design concepts and processes	LS 1.1 recognises that a process is used to develop design solutions LS 1.2 considers factors that influence design
2 understanding and appreciation of the impact of past, current and emerging technologies on the individual, society and environments	LS 2.1 explores the impact of past, current and emerging technologies
3 knowledge and understanding of the work of designers and the issues and trends that influence their work	LS 3.1 evaluates the work of designers in terms of the benefits to the individual, society and environments
4 knowledge and understanding of and skills in innovation, creativity and enterprise	LS 4.1 develops innovative design solutions
5 skills in communicating design ideas and solutions	LS 5.1 gathers and uses information to generate design solutions LS 5.2 uses a variety of techniques to present design solutions
6 knowledge and understanding of and skills in managing resources and producing quality design solutions	LS 6.1 selects and uses appropriate processes and techniques in the context of producing design projects LS 6.2 participates in producing design projects LS 6.3 demonstrates safe practices in the use of equipment and the implementation of techniques LS 6.4 cares for materials, tools and equipment

8.2 Content

The content forms the basis for learning opportunities. Content will be selected on the basis that it meets the needs, goals and priorities of each student. Students are not required to complete all of the content to demonstrate achievement of an outcome.

The examples provided are suggestions only.

Outcome LS1.1: A student recognises that a process is used to develop design solutions.	
Students learn about:	**Students learn to:**
• the steps in a design process • communicating throughout the design process • management throughout the design process	• recognise the steps in a design process including: – identifying a need – exploring ideas – choosing a preferred idea – planning steps for producing the design project – selecting tools, equipment and materials – producing the design project – evaluating the design project – compiling a design folio to document steps throughout the design process

Outcome LS1.2: A student considers factors that influence design.	
Students learn about:	**Students learn to:**
• factors that influence design	• consider the factors that influence design in the context of a design project, eg function, aesthetics, available resources (tools, materials, time and finance), cultural and social appropriateness, environmental impact, ergonomics, sustainability

Outcome LS2.1: A student explores the impact of past, current and emerging technologies.	
Students learn about:	**Students learn to:**
• impact of technologies, past, current and emerging, on individuals, society and environments	• recognise the impact of current technologies on individuals, society and environments, eg information and communication technology • explore the impact of emerging technologies on individuals, society, environments, eg alternate energy sources, medical research

Outcome LS3.1: A student evaluates the work of designers in terms of the benefits to the individual, society and environments.	
Students learn about: • the work of designers • evaluating designs	**Students learn to:** • explore the career opportunities and pathways in design and manufacture for males and females • evaluate a variety of products in terms of costs and benefits, eg – function: chair — comfort versus appearance – aesthetics: fashion versus climate – environmental impact: packaging convenience versus biodegradability – ethical issues: stairs versus wheelchair access – responsible design: child's toy—child appeal versus safety • take ethical issues and responsible design into account when designing projects, eg ensure design for child's toy does not have sharp edges or easily ingestible parts

Outcome LS4.1: A student develops innovative design solutions.	
Students learn about: • strategies for developing innovative design projects	**Students learn to:** • use strategies to develop innovative design projects, eg – identify and clarify a need – modify successful designs to develop individualised solutions – apply risk management practices in design projects – explore techniques to produce an innovative design – make and test prototypes – evaluate and modify if necessary – make and evaluate design project

Outcome LS5.1: A student gathers and uses information to generate design solutions.	
Students learn about: • obtaining information from a variety of sources	**Students learn to:** • access sources of information including electronic media, newspapers, libraries, the internet, CD-ROMs, eg collect pictures from advertising brochures to inspire jewellery design, visit a craft shop to investigate materials suitable for a jewellery design, access a variety of sources to find designs and materials suitable for a ring or pendant (Jewellery Design)

Outcome LS5.2: A student uses a variety of techniques to present design solutions.	
Students learn about:	**Students learn to:**
• a variety of communication techniques	• use techniques to communicate ideas including pictures, photographs, digital camera, video, computer graphics, discussions, scale models/prototypes, folios, surveys, eg make a collage of appealing snack food packages, present survey results to indicate classmates' preferences from a range of snack food packages, present a folio showing development of designed solution for a snack food package

Outcomes A student: **LS6.1** selects and uses appropriate processes and techniques in the context of producing design projects **LS6.2** participates in producing design projects.	
Students learn about:	**Students learn to:**
• producing a design project	• participate in producing a design project, eg decoupage a container for kitchen utensils (Interior Design), use papier-mâché to construct a mask and decorate using Indigenous influences (Fashion Design), use recycled materials to make a kitchen note holder that will adhere to a refrigerator (Industrial Design) • follow the steps to complete a design project, eg design and produce a magazine rack – explore ideas: location, dimensions, functionality, portability, aesthetics, materials, stability – document idea development in design folio – plan: timeline and date for completion, acknowledge and refine skills, resources — cost, materials, select tools and equipment, choose and list requirements such as fabrics, timber, metal, finishes – document plans in design folio – check availability of tools/machinery – organise purchase of materials – document final selections in design folio – produce project: prepare materials, use appropriate techniques to make design project – document steps, progress and modifications in design folio – evaluate design project: consider such things as usefulness, portability, visual impact, quality of construction – document evaluation in design folio
• techniques used to develop projects across a range of technologies	• use techniques to produce design projects across a variety of technologies

Outcome LS.6.3: A student demonstrates safe practices in the use of equipment and the implementation of techniques.	
Students learn about: • the application of Occupational Health and Safety practices in relation to – handling and using a variety of materials – handling and using hand tools, power tools and appliances – handling and using machines and computer equipment – safe lifting practices	**Students learn to:** • identify properties of materials, equipment and tools that make them dangerous • recognise safety labelling • carry and transfer materials, tools and equipment safely • use materials, tools and equipment safely in the context of projects • consider weight, size and bulk when lifting objects

Outcome LS.6.4: A student cares for materials, tools and equipment.	
Students learn about: • routines for care of materials, tools and equipment	**Students learn to:** • store materials, tools and equipment appropriately • regularly maintain tools and equipment • keep workplaces clean and tidy

9 Continuum of Learning in Design and Technology K–10

9.1 Stage Statements

Stage statements illustrate the continuum of learning in the *Design and Technology Years 7–10 Syllabus* and are summaries of the knowledge, understanding, skills, values and attitudes that have been developed by students as a consequence of achieving the outcomes for the relevant stage of learning.

Early Stage 1 – Science and Technology

Students who have achieved Early Stage 1 show a growing awareness of, and interest in, the natural and made environments. They demonstrate confidence in proposing ideas for designs they develop through play and modelling. They demonstrate curiosity about artefacts, events, phenomena, places and living things around them.

Early Stage 1 students use play to explore ideas, manipulate materials and trial solutions. They develop and begin to refine their understanding of environments, materials, equipment and other resources through trial and error. They ask questions, suggest ideas, propose their own explanations and are able to report verbally and graphically on their actions and observations.

Students in this stage use their senses to observe features of their immediate environment and to explore the properties of a range of common materials. They identify and group living and non-living things according to some common characteristics.

Students explore and identify the needs of people and other living things. They recognise the use of some forms of energy and their ideas about it are beginning to develop as they experience energy in different contexts.

Students generate their own ideas, using make-believe, and express these verbally, pictorially and through modelling. They are unlikely to perceive the steps in a designing and making process as they often work in situations where these aspects occur at the same time. They identify what they like or dislike about their designs or explorations.

Students in Early Stage 1 recognise that information can come from a variety of sources, including other people and from different media, for example, books and videos. They demonstrate an awareness of a range of uses for computer-based technology as well as showing an emerging confidence in their ability to explore and use computer-based technologies, with assistance, to create text, images and play games.

Students show growing awareness of the appropriate use and maintenance of a range of classroom equipment. They give reasons for safe working practices and organisational procedures related to the use of equipment, resources and materials. Students develop ideas through the use and manipulation of concrete materials as a means of progressing towards abstract thought.

Stage 1 – Science and Technology

Students who have achieved Stage 1 are developing an awareness of the wider world and are applying their scientific and technological understanding to new and different situations. They are starting to develop the social skills required to investigate, design and make products and services.

Students are starting to appreciate the interdependence of living things and their environments. They recognise that people create products, services and environments to meet their own needs. They build on their existing understanding of some of the forms of energy.

Students are able to interpret information and make predictions based on their own observations. They are better able to accept that the result of a test may be different from what was originally expected.

Students are able to recognise the purpose of an investigation and seek further information as a result of their own curiosity. They begin to see that an investigation is a series of orderly steps. They use their senses to identify similarities and differences. Students show curiosity about natural and made environments and seek explanations that allow them to interpret their observations.

Using plans, drawings and models, Stage 1 students begin to generate and select ideas to best meet design task objectives, and give simple explanations of why they have chosen a certain idea. Students in this stage can draw plans for a design and can explain some of the features and materials to be used. They can write labels and simple explanations when creating images.

Students recognise and discuss with others some of the strengths and limitations of what they have done and identify some changes that could be made to improve plans or models, for example in appearance. They make comparisons about what they like and dislike about familiar products, systems or environments.

Students effectively manipulate materials that are available in the classroom environment, and show a growing awareness of the different properties of such materials and how they affect the way in which the materials are used. They recognise that some materials occur naturally, while others are made.

Students have a developing awareness of a range of media and information products. They are able to use computer technology to start and open files or applications, save and shut down. They are able to use computer-based technologies where appropriate for a given task.

They are able to identify the different forms of technology in their immediate environments and explain how they help us. They safely use, maintain and store equipment such as scissors, magnifying glasses, computers and disks.

Stage 2 – Science and Technology

Students who have achieved Stage 2 are able to initiate their own investigations as a result of something that has aroused their curiosity. They ask perceptive questions and respond to design tasks in innovative ways. They identify ways of improving their own scientific and technological activities by considering issues such as how well something works, its appearance and how it might affect the environment.

Students develop the capacity to ask questions to clarify understanding. They predict outcomes by proposing explanations and testing to see if their predicted outcomes eventuate. As students develop skills in predicting, testing, recording results and drawing conclusions, they begin to form understanding about 'fair testing' that takes into account the need for consistent conditions combined with one variable, in order to ensure accurate results.

Students who have achieved Stage 2 are able to explore ideas for investigations and their design proposals in order to identify where decisions still need to be made, and to suggest possible courses of action. Students may suggest modifications to improve their initial proposals, including the selection of different solutions to arrive at a suitable outcome.

Students are able to explore the properties, capabilities and working characteristics of both natural and manufactured materials and components. They recognise that materials are varied and have different properties that affect their use. They can select, maintain and safely use classroom tools and equipment, hardware and software, and justify their selection for particular tasks.

Students give consideration to issues such as function and aesthetics when designing and evaluating products, services and environments. They can identify some limitations when carrying out a design task. Students develop plans that show some consideration of the types and quantities of materials required and an awareness of the need for accuracy in a plan for production purposes.

Students recognise the function of some hardware and software and are able to select and use these to meet the requirements of a task. They can discuss the possibilities and limitations of using a range of technology including computer-based technology.

Students are developing a capacity to understand relationships in the natural world. They can identify and describe some aspects of the structure and function of living things and some of the ways living things interact. They can also identify and describe some of the interactions of the Earth with other parts of the solar system. Students in this stage devise systems that inform or utilise their understanding of some forms of energy.

Students also demonstrate a greater understanding of and control over a design process. They recognise the importance of evaluation throughout a design cycle.

Stage 3 – Science and Technology

Students who have achieved Stage 3 are able to undertake investigations independently in order to satisfy their own curiosity. They demonstrate a willingness to initiate their own investigations; this might include designing appropriate fair tests to evaluate a range of possible explanations for the results of their investigations.

Students select and use appropriate language, structures and media and demonstrate skills in critically examining and communicating scientific and technological ideas and issues. Students can relate their scientific and technological understanding to new tasks or different situations.

Students research and investigate to identify phenomena and processes that have influenced Earth over time. They build on their existing understanding of forms of energy.

Students are aware of the skills and processes involved in designing and making, investigating and using technology. They manage the design process including aspects of time management, design constraints and needs of the target audience. At this stage, they can make decisions involving some conflicting interests or issues, for example ethical, aesthetic, environmental and cultural.

Students use two- and three-dimensional drawings and models to develop and modify their design ideas and to communicate details to others. They recognise and use some conventions and symbols related to developing plans and diagrams, such as measurements and some use of scale. They can observe the form and detail of objects carefully in order to produce accurate drawings from different views and they reflect on their drawings, sketches or computer models.

Students are aware of a range of issues related to scientific and technological achievements. They are capable of acquiring information from a variety of sources and are able to experiment with new techniques and skills as technologies change. Students identify emerging trends by using data, diagrams and a range of tools and equipment to assist with observations.

Students recognise that computer-based technologies have a wide range of applications in society and can identify and describe some of the effects of such technologies on individuals and communities. Students who have achieved Stage 3 can confidently and competently use a range of computer-based hardware and applications. Students at this stage can identify alternative uses and can be creative in adapting available software to the requirements of a task.

Students reflect on the methods used and positive and negative results of technological and scientific activity both throughout their own projects and in personal, local and global contexts.

Stage 4 – Technology (Mandatory)

Students at Stage 4 are able to independently initiate design projects and investigations that reflect an understanding of needs and opportunities. They demonstrate the ability to research and extract information from a variety of sources and a willingness to use experiments and tests to enhance the development of a design project. They describe factors that influence design.

Students select and use a broad range of media and method and appropriate language and structures to accurately communicate design ideas to a diverse audience. This may include recounting the process of designing, producing and evaluating used when developing design projects. Students are aware of the skills and processes involved in designing and are able to generate and communicate design ideas and solutions. They develop knowledge and understanding of a range of design processes, roles of designers and associated work opportunities. They can identify what makes good design and are able to creatively develop quality design projects.

Students responsibly, safely, confidently and accurately apply a range of contemporary and appropriate tools, materials and techniques and understand the implications and applications of these in the wider community. Students demonstrate competence when using a range of ICTs and have the ability to select and use them appropriately in developing design projects.

Students recognise the importance of safety, quality and management in the design and production of design projects. They learn to manage their own time by sequencing processes of designing, producing and evaluating to plan ahead. They work collaboratively and learn to work safely with others in technological environments.

Throughout the design process students reflect on and evaluate their design projects. They consider the impact of innovation and emerging technology on society and the environment and identify and explain ethical, social, sustainability and environmental considerations related to design projects.

Stage 4 – Design and Technology

Students explain how designers respond ethically and responsibly to design issues when developing design solutions. They describe designed solutions with consideration of trends and preferred futures. They demonstrate creativity when developing and realising their own design solutions.

Stage 5 – Design and Technology

Students at Stage 5 are able to investigate, analyse and apply a range of design concepts and design processes. They apply and justify an appropriate process of design when developing design ideas and solutions. When engaged in project work they manage time as they sequence, produce and evaluate in relation to a design process.

Students have knowledge, understanding and appreciation of the relationship between past, present and emerging technologies and innovation activities, and are able to evaluate and explain the impact of these on the individual, on society and on environments.

Students demonstrate knowledge and understanding of the work and responsibilities of Australian and overseas designers and are able to analyse the factors that affect their work. Students have a futures perspective and a disposition to take responsibility for their actions and decisions as they evaluate designed solutions that consider preferred futures, the principles of appropriate technology and ethical and responsible design.

Students demonstrate skills in innovation and enterprise in their project work. They use appropriate techniques when communicating designed solutions to a range of audiences. They are competent in a range of ICT skills and have the ability to select appropriate ICT applications to develop documentation for project work and communicate designed solutions.

Students are able to apply risk management strategies and work safely when selecting and using a range of appropriate technologies to competently develop quality design solutions.

10 Assessment

10.1 Standards

The Board of Studies *K–10 Curriculum Framework* is a standards-referenced framework that describes, through syllabuses and other documents, the expected learning outcomes for students.

Standards in the framework consist of two interrelated elements:
- outcomes and content in syllabuses showing what is to be learnt
- descriptions of levels of achievement of that learning.

Exemplar tasks and student work samples help to elaborate standards.

Syllabus outcomes in Design and Technology contribute to a developmental sequence in which students are challenged to acquire new knowledge, understanding and skills.

The standards are typically written for two years of schooling and set high, but realistic, expectations of the quality of learning to be achieved by the end of Years 2, 4, 6, 8, 10 and 12.

Using standards to improve learning
Teachers will be able to use standards in Design and Technology as a reference point for planning teaching and learning programs, and for assessing and reporting student progress. Standards in Design and Technology will help teachers and students to set targets, monitor achievement, and, as a result, make changes to programs and strategies to support and improve each student's progress.

10.2 Assessment for Learning

Assessment for learning in Design and Technology is designed to enhance teaching and improve learning. It is assessment that gives students opportunities to produce the work that leads to development of their knowledge, understanding and skills. *Assessment for learning* involves teachers in deciding how and when to assess student achievement, as they plan the work students will do, using a range of appropriate assessment strategies including self-assessment and peer assessment.

Teachers of Design and Technology will provide students with opportunities in the context of everyday classroom activities, as well as planned assessment events, to demonstrate their learning.

In summary, *assessment for learning:*
- is an essential and integrated part of teaching and learning
- reflects a belief that all students can improve
- involves setting learning goals with students
- helps students know and recognise the standards they are aiming for
- involves students in self-assessment and peer assessment
- provides feedback that helps students understand the next steps in learning and plan how to achieve them
- involves teachers, students and parents in reflecting on assessment data.

Quality Assessment Practices

The following *Assessment for Learning Principles* provide the criteria for judging the quality of assessment materials and practices.

Assessment for learning:

- **emphasises the interactions between learning and manageable assessment strategies that promote learning**
  In practice, this means:
  - teachers reflect on the purposes of assessment and on their assessment strategies
  - assessment activities allow for demonstration of learning outcomes
  - assessment is embedded in learning activities and informs the planning of future learning activities
  - teachers use assessment to identify what a student can already do.

- **clearly expresses for the student and teacher the goals of the learning activity**
  In practice, this means:
  - students understand the learning goals and the criteria that will be applied to judge the quality of their achievement
  - students receive feedback that helps them make further progress.

- **reflects a view of learning in which assessment helps students learn better, rather than just achieve a better mark**
  In practice, this means:
  - teachers use tasks that assess, and therefore encourage, deeper learning
  - feedback is given in a way that motivates the learner and helps students to understand that mistakes are a part of learning and can lead to improvement
  - assessment is an integral component of the teaching-learning process rather than being a separate activity.

- **provides ways for students to use feedback from assessment**
  In practice, this means:
  - feedback is directed to the achievement of standards and away from comparisons with peers
  - feedback is clear and constructive about strengths and weaknesses
  - feedback is individualised and linked to opportunities for improvement.

- **helps students take responsibility for their own learning**
  In practice, this means:
  - assessment includes strategies for self-assessment and peer assessment emphasising the next steps needed for further learning.

- **is inclusive of all learners**
  In practice, this means:
  - assessment against standards provides opportunities for all learners to achieve their best
  - assessment activities are free of bias.

10.3 Reporting

Reporting is the process of providing feedback to students, parents and other teachers about students' progress.

Teachers can use evidence gathered from assessment to extend the process of *assessment for learning* into their *assessment of learning*. In a standards-referenced framework this involves teachers in making professional judgements about student achievement at key points in the learning cycle. These may be at the end of a year or stage, when schools may wish to report differentially on the levels of knowledge, understanding and skills demonstrated by students.

Descriptions of levels of achievement for Stage 4 and Stage 5 in Design and Technology have been developed to provide schools with a useful tool to report consistent information about student achievement to students and parents, and to the next teacher to help to plan the next steps in the learning process. These describe observable and measurable features of student achievement at the end of a stage, within the indicative hours of study. Descriptions of levels of achievement provide a common language for reporting.

At Stage 5 there are six levels of achievement. Level 6 describes a very high level of achievement in relation to course objectives and outcomes. Level 2 describes satisfactory achievement, while the level 1 description will help identify students who are progressing towards the outcomes for the stage.

At the end of Year 10, teachers of Design and Technology Years 7–10 will make an on-balance judgement, based on the available assessment evidence, to match each student's achievement to a level description. This level will be reported on the student's School Certificate Record of Achievement.

At Stage 4 there are four levels of achievement. Level 4 describes a very high level of achievement; levels 2 and 3 describe satisfactory and high achievement that should provide a solid foundation for the next stage of learning. The level 1 description will help identify students who are progressing towards the outcomes for the stage.

For students undertaking Life Skills outcomes and content in Years 7–10, the content listed for each identified Life Skills outcome forms the basis of the learning opportunities for these students. It also provides examples of activities on which teachers can base judgements to report student progress in relation to individual learning goals.

10.4 Choosing Assessment Strategies

Planning for assessment is integral to programming for teaching and learning. In a standards-referenced framework, teachers assess student performance on tasks in relation to syllabus outcomes and make on-balance judgements about student achievement. Assessment relies on the professional judgement of the teacher and is based on reliable data acquired in a fair and challenging environment, from multiple performances in a variety of contexts. Assessment is fundamental for furthering student learning.

In planning programs, teachers, individually and collaboratively, review the syllabus and standards materials. They use these materials to describe for themselves what students should know and be able to do at a particular stage, and they consider the kinds of evidence their students could produce to show they have learnt what they needed to learn.

Students are provided with a description of the learning expected to be accomplished, opportunities to discuss the criteria on which judgements will be based, time to learn, and where possible, examples of what that learning looks like.

Assessment is used to determine the students' initial knowledge, understanding and skills, to monitor student progress and to collect information to report student achievement. The assessment cycle is continuous; students receive and give themselves feedback on what they have learnt, and what needs to be done to continue their learning. Students gain information about their learning through feedback from teachers and from self-assessment and peer assessment. The challenge and complexity of assessment tasks increase to enable students to develop evaluative independence as they assess their own knowledge, understanding and skills, and determine ways to improve their learning.

Teachers of Design and Technology should employ a range of assessment strategies to ensure that information is being gathered regarding the knowledge and understanding that are being acquired, and the skills that are being developed. Strategies should be appropriate to the outcomes being addressed, be manageable in number and be supportive of the learning process. Teachers could work collaboratively in planning appropriate assessment strategies. Working collaboratively leads teachers to develop a shared understanding of the syllabus standards and also supports teachers in making consistent and comparable judgements of student achievement in relation to these standards.

In planning for assessment in Design and Technology it is important for teachers to consider:

- the requirements of the syllabus
- the accessibility of the proposed activity in terms of language requirements
- the appropriateness of the challenge presented to individual students
- resource availability
- how the task will be administered
- the way in which feedback will be provided.

In planning for assessment, teachers of Design and Technology need to consider how results will be recorded, with a view to ensuring that there is sufficient and appropriate information collected for making an on-balance holistic judgement of the standard achieved by the student at the end of the stage. The evidence collected should enable teachers of Design and Technology to make consistent judgements to meet the various reporting requirements that the system, school and community may have.

Teachers working collaboratively can plan teaching and learning programs that incorporate appropriate assessment strategies for different projects.

Design and Technology particularly lends itself to the following assessment techniques, keeping in mind that a range of strategies should be used to assess the outcomes of the course.

As a design project is the main learning activity engaged in by students during the course of a unit of work, it follows that much of the assessment for this course will take place in the context of design projects. A design project involves the design, production, documentation and evaluation of solutions.

Assessment activities related to the design, production and evaluation of designed solutions could be used to assess students on their ability to:

- produce solutions that respond to needs and opportunities either self-generated or presented by the teacher
- experiment to optimise solutions for student project work
- prepare and implement time and action plans
- select, manage and use appropriate tools, materials and techniques
- apply risk management practices and work safely
- develop design solutions within a limited time frame.

Assessment activities related to the development of a design folio provide the opportunities for students to record aspects of project work. When assessing the design folio students could be assessed on their ability to:

- record the development and decisions made throughout the design process
- draw, sketch and model design ideas
- communicate design ideas and solutions appropriate to various audiences
- use appropriate ICT applications when designing and producing solutions and to communicate design ideas.

Observations

When students are working on design projects in class, the teacher has the opportunity to observe aspects of student learning. Students could be assessed on their ability to:

- use idea generation techniques when developing creative solutions
- apply risk management practices
- manage time effectively
- use tools, materials and techniques competently and safely
- identify and implement appropriate OHS strategies.

Research activities

Research activities form part of the design process. They might include using information drawn from the library and Internet searches to support the processes of designing, producing and evaluating.

When students undertake research tasks, they could be assessed on their ability to:

- choose appropriate research methods that are suitable to obtain the information required
- select, interpret, manipulate and evaluate data to develop solutions
- present information in a logical manner
- analyse case studies.

Presentations
Assessment activities might include prepared and impromptu oral presentations, role-plays, poster presentations, prepared video and audio tapes and displays in relation to design projects. When this technique is used for assessment purposes students could be assessed on their ability to:

- select and apply researching and experimenting techniques
- present information in a creative and logical manner
- apply ICT skills to communicate design ideas and solutions to a range of audiences
- use drawings, plans and models to communicate design ideas and solutions.

Written responses and reports
These may include listening and viewing tasks, eg responses to taped stories, film and television programs about designers; surveys; evaluation reports; and interviews. When students produce written responses and reports, they could be assessed on their ability to:

- summarise key points
- use appropriate detail
- justify design ideas
- report on ethical issues.

Written and practical tests
Written and/or practical tests can be used to determine if students have the necessary skills, can use correct techniques and can recall, interpret, comprehend and apply knowledge at a level that is appropriate for them to move on to the next step in the learning process. Tests can provide information prior to commencing a unit of work, or along the way, about students' understanding of concepts and allow the teacher to plan further learning activities. It is important that feedback is provided on test performance in order to enhance student learning.

Peer assessment
Design and Technology encourages the active involvement of students in the learning process. Opportunities exist for individual and collaborative work. Activities involving peer assessment might include evaluating the contribution of individuals to a group task, and reflecting on a peer presentation.

Self-assessment
In Design and Technology students are encouraged to acquire basic skills to become self-directed learners. Opportunities exist for students to reflect on their progress towards the achievement of the syllabus outcomes. This reflection provides the basis for improving their learning. Developing self-assessment skills is an ongoing process, becoming increasingly more sophisticated and self-initiated as a student progresses.
By self-assessing students can:

- identify their own personal development over time
- identify key indicators and evidence of their own learning.