Australian CURRICULUM Review

TECHNOLOGIES

CONSULTATION CURRICULUM

Design and Technologies – All elements F–6

AUSTRALIAN CURRICULUM, ASSESSMENT AND REPORTING AUTHORITY

acara

TABLE OF CONTENTS

F–10 AUSTRALIAN CURRICULUM: TECHNOLOGIES

ABOUT THE LEARNING AREA

Introduction

The Australian Curriculum: Technologies Foundation to Year 10 comprises two subjects:

- Design and Technologies, in which students use design thinking and technologies to generate and produce designed solutions for authentic needs and opportunities
- Digital Technologies, in which students use computational thinking and information systems to define, design and implement digital solutions for authentic problems.

The Australian Curriculum: Technologies is written on the basis that all students will study the two subjects from Foundation to the end of Year 8.

In Years 9 and 10, student access to Technologies subjects will be determined by state and territory authorities or individual schools. Subjects may continue with Design and Technologies and Digital Technologies, as outlined in the Australian Curriculum: Technologies, or subjects relating to specific aspects of the curriculum such as technologies contexts or digital specialisations.

The curriculum for each of Design and Technologies and Digital Technologies describes the distinct knowledge, understanding and skills of the subject. Students will have the opportunity to develop a comprehensive understanding of traditional, contemporary and emerging technologies. There is flexibility for schools to develop teaching programs that integrate both Technologies subjects and other learning areas. This may be particularly important for primary school programs.

Rationale

Technologies enrich and impact on the lives of people and societies globally. They can play an important role in transforming, restoring and sustaining societies and natural, managed and constructed environments. Australia needs enterprising individuals who can make discerning decisions about the development and use of technologies, and who can independently and collaboratively develop solutions to complex challenges and contribute to sustainable patterns of living.

The Australian Curriculum: Technologies ensures that all students benefit from learning about and working with traditional, contemporary and emerging technologies that shape the world in which we live. By applying their knowledge and practical skills and processes when using

technologies and other resources students will create innovative solutions. They will work independently and collaboratively to develop knowledge, understanding and skills to respond creatively to current and future needs and opportunities.

The practical nature of the Technologies learning area engages students in critical and creative thinking, including understanding interrelationships in systems when solving complex problems. A systematic approach to experimentation, problem-solving, prototyping and evaluation instils in students the value of planning and reviewing processes to realise ideas.

All young Australians should develop capacity for action and a critical appreciation of the processes through which technologies are developed and how technologies can contribute to societies. Students need opportunities to consider the use and impact of technological solutions on equity, ethics, and personal and social values. In creating solutions, as well as responding to the designed world, students consider desirable sustainable patterns of living, and contribute to preferred futures for themselves and others.

Aims

The Australian Curriculum: Technologies aims to develop the knowledge, understanding and skills to ensure that, individually and collaboratively, students:

- investigate, design, plan, manage, create and evaluate solutions
- are creative, innovative and enterprising when using traditional, contemporary and emerging technologies, and understand how technologies have developed over time
- make informed and ethical decisions about the role, impact and use of technologies in their own lives, the economy, environment and society for a sustainable future
- engage confidently with and responsibly select and manipulate appropriate technologies − materials, data, systems, components, tools and equipment − when designing and creating solutions
- analyse and evaluate needs, opportunities or problems to identify and create solutions.

Organisation of the learning area

Content structure

The Australian Curriculum: Technologies is presented in two-year band levels from Year 1 to Year 10, with Foundation being presented as a single year.

Band level descriptions

Band level descriptions provide an overview of the learning that students should experience at each level. They highlight the important interrelationships of the content strands and of the content strands to the core concepts for each band level.

Achievement standards

Achievement standards describe the expected quality of learning that students should typically demonstrate by the end of each band. To provide flexibility for schools an achievement standard has been written for the Technologies learning area, Foundation to Year 8, as well as for each subject. Some schools may wish to report holistically on Technologies learning in Foundation to Year 8, while others may prefer to report on each subject.

Content descriptions

Content descriptions specify the essential knowledge, understanding and skills that young people are expected to learn, and that teachers are expected to teach, in each band. The content descriptions are organised into strands and sub-strands.

Content elaborations

Content elaborations provide teachers with suggestions and illustrations of ways to teach the content descriptions. They are optional material only; they are not a set of complete or comprehensive content points that all students need to be taught. They illustrate and exemplify content descriptions with a diverse range of examples.

Strands and sub-strands

Content in Design and Technologies and Digital Technologies is organised under two related strands:

- Knowledge and understanding
- Processes and production skills.

Under each strand, curriculum content is further organised into sub-strands.

Table 1 shows the strand and sub-strand structure for the two subjects in the Technologies learning area.

Students apply skills from the processes and production skills strand to the content from the knowledge and understanding strand. The similar strand structure supports an integrated approach to teaching Technologies.

Table 1: Design and Technologies and Digital Technologies content structure

Technologies		
	Design and Technologies	**Digital Technologies**
Strand	**Knowledge and understanding**	
Sub-strands	Technologies and society	
	Technologies contexts:	Digital systems
	Engineering principles and systems	
	Materials and technologies specialisations	
	Food and fibre production	
	Food specialisations	
		Data representation
Strand	**Processes and production skills**	
Sub-strands		Acquiring, managing and analysing data
	Creating designed solutions by:	*Creating digital solutions by:*
	Investigating and defining	Investigating and defining
	Generating and designing	Generating and designing
	Producing and implementing	Producing and implementing
	Evaluating	Evaluating
	Collaborating and managing	Collaborating and managing
		Considering privacy and security

Core concepts

Core concepts are the big ideas, understandings, skills or processes that are central to the Technologies curriculum. They give clarity and direction about what content matters most in the learning area. In the curriculum development process, core concepts help identify the essential content students should learn to develop a deep and increasingly sophisticated understanding of Technologies across the years of schooling. They ensure content is connected within and across the strands, building in sophistication across the year/band levels.

The word 'technology' comes from the ancient Greek word *techne*, meaning to make or to do. Technologies involves the practical application of knowledge, understanding and skills to respond to needs, opportunities or problems. Learning in Technologies is about: creating solutions for preferred futures using systems and data; design thinking, systems thinking and computational thinking; and technologies processes and production skills, project management skills, and enterprise skills and innovation; taking into account interactions impact.

All content descriptions in the Technologies curriculum help develop at least one core concept, and in most cases multiple core concepts. The core concepts for Technologies flow through into subject-specific core concepts as shown in Figure 1.

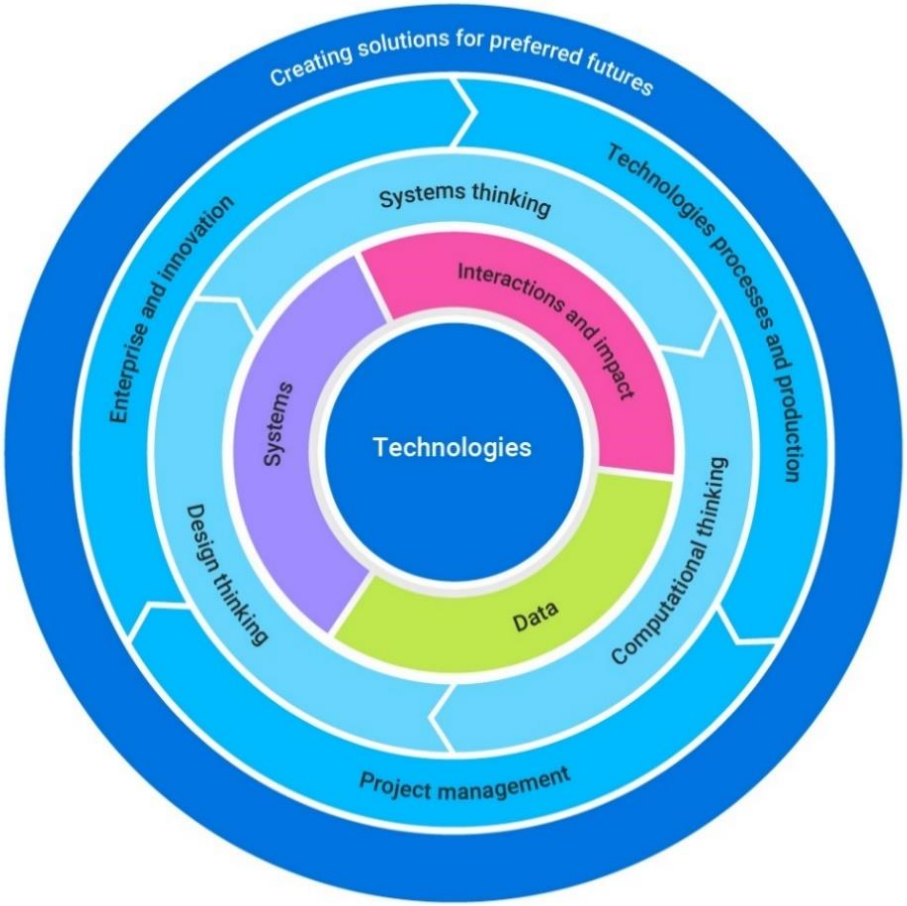

Figure 1: Overview of Technologies core concepts

Read more

Descriptions for the learning area core concepts are provided below. Descriptions for the subject core concepts are provided in the introductory sections of each subject.

- **Creating solutions for preferred futures** is the overarching core concept and involves identifying compelling visions of the future and making considered design decisions taking into account ethics and economic, environmental and social sustainability factors. This is developed through the following core concepts.
- **Systems** comprise the structure, properties, behaviour and interactivity of people and components (inputs, processes and outputs) within and between natural, managed, constructed and digital environments.
- **Data** can be collected, interpreted and represented to help inform decision-making and can be manipulated, stored and communicated by digital systems.
- **Interactions and impact** need to be considered when creating solutions; this involves examining the relationships between components of systems and the effect of design decisions.
- **Systems thinking** helps people to think holistically about the interactions and interconnections that shape the behaviour of systems.
- **Computational thinking** helps people to organise data logically by breaking down problems into parts; defining abstract concepts; and designing and using algorithms, patterns and models.
- **Design thinking** helps people to empathise and understand needs, opportunities and problems; generate, iterate and represent innovative, user-centred ideas; and analyse and evaluate those ideas.
- **Technologies processes and production skills** help people to safely create solutions for a range of purposes and involve investigating and defining, generating and designing, producing and implementing, evaluating, and collaborating and managing.
- **Project management skills** help people to successfully and efficiently plan, manage and complete projects to meet identified criteria for success.
- **Enterprise skills and innovation** help people to identify opportunities to take action and create change; follow through on initiatives; and generate new ideas, processes and solutions.

Key connections

General capabilities

In the Australian Curriculum, general capabilities equip young Australians with the knowledge, skills, behaviours and dispositions to live and work successfully. General capabilities are developed through learning area content; they are not separate learning areas, subjects or isolated skills.

Opportunities to develop general capabilities in learning area content vary. The general capabilities of most relevance and application to Technologies are Digital Literacy, Critical and Creative Thinking, Personal and Social capability and Ethical Understanding.

Literacy and numeracy are fundamental to all learning. While literacy and numeracy development are core to the curriculum in English and Mathematics, literacy and numeracy skills are required and applied in all learning areas, including Technologies.

General capabilities are identified in content descriptions when they are developed or applied through learning area content. They are also identified in content elaborations when they offer opportunities to add depth and richness to student learning.

Read more

Literacy

Learning in Technologies requires students to apply literacy knowledge and skills to listen to, interpret, evaluate, respond to and create a range of increasingly challenging procedural, explanatory and persuasive texts, including design tasks, manuals and instructions, patterns and recipes and specifications.

In Technologies students integrate and evaluate content presented in diverse media and formats, interpret, analyse, and assess descriptions, reports and data and navigate texts to locate information and assess complex visual text. Students recognise and appropriately use technical symbols, icons and key terms which may have generic uses as well as context-specific uses in technical topics.

Students create clear and coherent informative, explanatory and persuasive texts using precise vocabulary and terminology, appropriate structures and formats and a range of visual and diagrammatic elements. Their texts will be developed and organised using a format and style appropriate to particular tasks and audiences. They will produce and publish a range of texts where information and ideas are accurate, relevant to the context, supported by evidence and examples and cited, where needed, including annotated engineering or technical drawings, software instructions and programs, project outlines, briefs and management plans.

Digital Literacy

The Australian Curriculum: Digital Technologies explicitly supports the systematic development of Digital Literacy across the curriculum. Digital literacy is context dependent and involves students developing the knowledge and skills needed to learn effectively within the digital world. Effective development of digital literacy allows students to operate and manage digital systems and practise digital safety and wellbeing while investigating, creating and communicating. While specific elements of Digital Literacy are typically addressed in Digital Technologies learning programs, concepts and skills are consolidated and extended across all subjects.

Together, Digital Literacy and Digital Technologies provide the opportunity for students to become discerning users, productive creators, critical analysts and effective developers of digital solutions.

Critical and Creative Thinking

Students develop critical and creative thinking as they imagine, generate, iterate and critically evaluate ideas. They develop reasoning and the capacity for abstraction through challenging problems. Students analyse problems, refine concepts and reflect on the decision-making process by engaging in systems, design and computational thinking. They identify, explore and clarify technologies information and use that knowledge in a range of situations.

Students think critically and creatively about possible, probable and preferred futures. They consider how data, information, systems, materials, tools and equipment (past and present) impact on our lives, and how these elements might be better designed and managed. Experimenting, drawing, modelling, designing and working with equipment and software helps students to build their visual and spatial thinking and to create solutions, products, services and environments.

Personal and Social capability

Students develop personal and social capability as they engage in project management and design and production activities in a collaborative workspace. They direct their own learning, plan and carry out investigations, and become independent learners who can apply design thinking, and technologies understanding and skills when making decisions. Students develop social skills through working cooperatively in teams, sharing resources and processes, making group decisions, resolving conflict and showing leadership. Designing and innovation involve a degree of risk-taking, and as students work with the uncertainty of sharing new ideas, they develop resilience.

Students consider past and present impacts of decisions on people, communities and environments and develop social responsibility through understanding of, empathy with and respect for others. They develop an understanding of diversity by researching and identifying user needs.

Students reflect on the impact that digital tools and environments such as social media can have on their personal well-being and apply appropriate strategies in face-to-face and digital environments.

Numeracy

Students develop the capacity to interpret and use mathematical knowledge and skills in a range of real-life situations. They use number to calculate, measure and estimate; interpret and draw conclusions from statistics; measure and record throughout the process of generating and iterating ideas; develop, refine and test concepts; and cost and sequence when making products and managing projects. In using software, materials, tools and equipment, students work with the concepts of number, geometry, scale, proportion, measurement and volume. They use 3-dimensional models, create accurate technical drawings, work with digital models and use computational thinking in decision-making processes when designing and creating best-fit solutions.

Ethical Understanding

Students develop the capacity to understand and apply ethical and socially responsible principles when collaborating with others and creating, sharing and using technologies. Using an ethical lens, they investigate past, current and future local, national, regional and global technological priorities. When engaged in systems thinking, students evaluate their findings against criteria that include ethical issues. They explore complex issues associated with technologies and consider possibilities and ethical implications.

Students learn about safe and ethical procedures for investigating and working with people, animals, data and materials. They consider the rights of others and their responsibilities in using sustainable practices that protect the planet and its life forms. They learn to appreciate and value the part they play in the social and natural systems in which they live.

Students consider their own roles and responsibilities as discerning citizens and learn to detect bias and inaccuracies. Understanding the protection of data, intellectual property and individual privacy helps students to be respectful creators.

Cross-curriculum priorities

Cross-curriculum priorities support the Australian Curriculum to be a relevant, contemporary and engaging curriculum that reflects regional, national and global contexts. Cross-curriculum priorities are incorporated through learning area content; they are not separate learning areas or subjects. They provide opportunities to enrich the content of the learning areas where most appropriate and authentic, allowing students to engage with and better understand their world.

Opportunities to apply cross-curriculum priorities to learning area content vary. The cross-curriculum priorities of most relevance and meaning to the Technologies learning area are Sustainability and Aboriginal and Torres Strait Islander Histories and Cultures.

The cross-curriculum priority of Sustainability is embedded in content descriptions where it is core to the delivery of the content in Design and Technologies and Digital Technologies.

The Aboriginal and Torres Strait Islander Histories and Cultures cross-curriculum priority is identified in content elaborations in Design and Technologies and Digital Technologies where it offers opportunities to add depth and richness to student learning.

Read more

Sustainability

When students identify and analyse a problem, need or opportunity; generate ideas and concepts; and create solutions in Technologies, they give consideration to sustainability by anticipating and balancing economic, environmental and social impacts. The curriculum focuses on the knowledge, understanding and skills necessary to design for effective sustainability action, taking into account issues such as resource depletion and climate change. The learning area gives students opportunities to explore their own and competing viewpoints, values and interests. Understanding systems enables students to work with complexity, uncertainty and risk; make connections between disparate ideas and concepts; self-critique; and propose creative solutions that enhance sustainability. Students learn to appreciate local and global impact of design decisions. They reflect on past and current practices and assess new and emerging technologies from a sustainability perspective.

Aboriginal and Torres Strait Islander Histories and Cultures

In Design and Technologies students can explore the design and technologies of the oldest continuous living cultures in the world. Through varied and engaging contexts students learn how proven designed solutions from long ago endure today and can at times inspire contemporary solutions.

The engineering principles and systems employed by Aboriginal and Torres Strait Islander Peoples today, and in the past, provide culturally relevant and engaging contexts for all students to investigate how First Nations Australians have been successful at sustaining the world's oldest continuous living cultures. Students can investigate how Aboriginal and Torres Strait Islander Peoples' knowledges of natural materials have developed over millennia and have culminated in deep knowledge of their properties and performance. Likewise, students can explore successful systems that Aboriginal and Torres Strait Islander Peoples have developed to join materials for the design and production of a diverse range of essential, effort-reducing technologies. Students can investigate the diverse food and fibre production techniques developed by Aboriginal and Torres Strait Islander communities before colonisation and see how this capacity has sustained Aboriginal Australia for at

least 60,000 years and through numerous major climatic and environmental shifts. They can explore how First Nations Australians have long successfully developed complete diets that meet nutritional requirements and see how foods were and continue to be investigated for their nutritional and medicinal qualities. They can also investigate techniques used to improve palatability and remove toxins; and nutritional, environmental and economic benefits of developing traditional Aboriginal food and fibre sources.

Through Digital Technologies students can gain insights into how Aboriginal and Torres Strait Islander Peoples are often at the forefront of adopting digital systems, and also learn how they often endure the inequities of digital system performance and capabilities, especially when living on Country/Place far from the nation's city centres. Students can explore how many Aboriginal and Torres Strait Islander communities are embracing digital tools as a means to maintain, control, protect and further develop culture through the digitisation of cultural expressions. They can examine the complexities of data and the need for ethical protocols when using systems to acquire, manage and analyse data. Students can explore how Aboriginal and Torres Strait Islander ranger groups use computational thinking in their contributions to preferred futures such as restoring damaged environments and the monitoring and protection of endangered and vulnerable species. Through the context of material culture production techniques such as weaving, students can be introduced to designing algorithms and exploring how such practices can be converted into programmable automation.

Learning area connections

The Australian Curriculum: Technologies provides opportunities to integrate or connect content to other learning areas or subjects, in particular:

- Digital Technologies with Mathematics and Media Arts
- Design and Technologies with Science and Health and Physical Education.

Read more

Digital Technologies and Mathematics

Digital Technologies has a strong connection to the Mathematics learning area, in particular a shared focus on data. For example, data collection and interpretation across Foundation to Year 6, which include numeric data such as data counted in whole numbers and categorical data such as symbols and charts.

Data representation refers to the way data is symbolised, visually treated or provided in audio. The connections with Mathematics support students to gain the knowledge, understanding and skills that underpin patterns and data visualisation, while Digital Technologies focuses on how digital systems represent data.

Digital Technologies and Media Arts

Digital Technologies and Media Arts share a focus on user experience and user interface. Creating spoken, print, graphic or electronic communications for an audience is important in the design process for both subjects. These activities often involve numerous people in their construction and are usually shaped by digital systems used in their production. While there is no direct link between content descriptions, Media Arts provides an appropriate area for application of the knowledge and skills taught across Digital Technologies.

Design and Technologies and Science

Design and Technologies and Science share a focus through the Design and Technologies knowledge and understanding sub-strand: technologies contexts, and the Science understanding sub-strands. The relationships are:

- engineering principles and systems to physical sciences
- materials and technologies specialisations to chemical sciences
- food and fibre production to biological sciences
- food specialisations to chemical sciences.

Design and Technologies and Health and Physical Education

Aspects of food and nutrition are addressed in the Health and Physical Education focus area of food and nutrition. In the Design and Technologies sub-strand, technologies context: food specialisations, students learn about preparing food for healthy eating and the technologies associated with processing food for human consumption.

Key considerations

Safety

Identifying and managing risk in the Technologies learning area addresses the safe use of technologies as well as risks that can affect project timelines. It covers all necessary aspects of health, safety and injury prevention and, in any technologies context, the use of potentially dangerous materials, tools and equipment. It includes ergonomics, online safety, data security, and ethical and legal considerations when communicating and collaborating online.

Technologies learning experiences may involve the use of potentially hazardous substances and hazardous equipment. It is the responsibility of the school to ensure that duty of care is exercised in relation to the health and safety of all students and that school practices meet the requirements of the *Work Health and Safety Act 2011* and Work Health and Safety Regulation 2017, in addition to relevant state or territory health and safety guidelines.

In implementing projects with a focus on food, care also must be taken with regard to food safety and specific food allergies that may result in anaphylactic reactions. The Australasian Society of Clinical Immunology and Allergy has published guidelines for prevention of anaphylaxis in schools, preschools and childcare. Some states and territories have their own specific guidelines that should be followed.

When state and territory curriculum authorities integrate the Australian Curriculum into local courses, they will include more specific advice on safety. For more information about relevant guidelines, contact your state or territory curriculum authority.

Privacy and security

Identifying and managing the implications of and concerns related to the collection and generation of data through automated and non-automated processes addresses the risks that can affect secure engagement with digital systems.

Privacy includes recognising the risks that are faced online and the mitigation strategies involved in managing them. In Australia, guidance on best practice for privacy is informed by the Australian Privacy Principles, the cornerstone of the privacy protection framework in the *Privacy Act 1988*. Thirteen principles govern standards, rights and obligations around:

- the collection, use and disclosure of personal information
- accountability
- integrity of personal information
- the right of individuals to access their personal information.

For more information visit: https://www.oaic.gov.au/privacy/australian-privacy-principles/

Security covers the development of appropriate technical, social, cognitive, communicative and decision-making skills to address online and network security risks. It includes data security, and ethical and legal considerations when working with and designing digital systems. When engaging with and designing digital systems, identifying and managing security threats and mitigation in a data-intensive world is paramount.

For more information about relevant guidelines, contact your state or territory curriculum authority.

Animal ethics and biosecurity

Any teaching activities that involve caring for, using or interacting with animals must comply with the Australian code of practice for the care and use of animals for scientific purposes 2013, the Australian Animal Welfare Standards and Guidelines, the National Livestock Identification System and other biosecurity measures, in addition to relevant state or territory guidelines. The Australian Government and state and territory governments may have extra legislation for animal ethics, protection of native animals and biosecurity that could affect how schools use animals.

When state and territory curriculum authorities integrate the Australian Curriculum into local courses, they will include more specific advice on the care and use of, or interaction with, animals. Schools must ensure they are aware of and comply with all state, territory and Commonwealth legislation or regulation about the use of animals in schools. For more information about relevant guidelines or to access your animal ethics committee, contact your state or territory curriculum authority.

Australian code of practice for the care and use of animals for scientific purposes,

www.nhmrc.gov.au/about-us/publications/australian-code-care-and-use-animals-scientific-purposes

Australian Animal Welfare Standards and Guidelines www.animalwelfarestandards.net.au

National Livestock Identification System www.nlis.com.au

Information correct as at 7 April 2021

DESIGN AND TECHNOLOGIES F–10

Rationale

In an increasingly technological and complex world, it is important to develop knowledge and confidence to analyse and creatively respond to design challenges. Knowledge, understanding and skills involved in the design, development and use of technologies are influenced by and can play a role in enriching and transforming societies and our natural, managed and constructed environments.

The Australian Curriculum: Design and Technologies enables students to become creative and responsive designers. When they consider ethical, legal, aesthetic and functional factors and the economic, environmental and social impacts of technological change, and how the choice and use of technologies contributes to a sustainable future, they are developing the knowledge, understanding and skills to become discerning decision-makers.

Design and Technologies actively engages students in creating quality designed solutions for identified needs and opportunities across a range of technologies contexts. Students manage projects independently and collaboratively from conception to realisation. They apply design and systems thinking and design processes to investigate, generate and refine ideas; and plan, produce and evaluate designed solutions. They develop a sense of pride, satisfaction and enjoyment from their ability to develop innovative designed products, services and environments.

Design and Technologies gives students authentic learning challenges that foster curiosity, confidence, persistence, innovation, creativity, respect and cooperation. It motivates young people and engages them in a range of learning experiences that are transferable to family and home, constructive leisure activities, community contribution and the world of work.

Aims

The Australian Curriculum: Design and Technologies aims to develop the knowledge, understanding and skills to ensure that, individually and collaboratively, students:

- develop confidence as critical users of technologies and designers and producers of designed solutions
- investigate, generate and analyse ethical and innovative designed solutions for sustainable futures
- use design and systems thinking to generate design ideas and communicate these to a range of audiences
- produce designed solutions suitable for a range of technologies contexts by selecting and manipulating a range of materials, systems, components, tools and equipment creatively, competently and safely; and managing processes

- evaluate processes and designed solutions and transfer knowledge and skills to new situations
- understand the roles and responsibilities of people in design and technologies occupations and how they contribute to society.

Organisation

Content structure

Content in the Australian Curriculum: Design and Technologies is organised under two related strands:

- Knowledge and understanding – the use, development and impact of technologies and design ideas across a range of technologies contexts
- Processes and production skills – the skills needed to create designed solutions.

Together, the two strands provide students with knowledge, understanding and skills through which they can safely and ethically design, plan, manage, produce and evaluate products, services and environments. Teaching and learning programs should balance and integrate both strands. Students learn about technologies and society through different technologies contexts (knowledge and understanding) as they create designed solutions (processes and production skills).

The knowledge and understanding strand comprises five sub-strands. One sub-strand focuses on technologies and society and the other four are technologies contexts. The band level descriptions show how many times each prescribed technologies context is addressed. Schools decide which technologies contexts are addressed in Years 9 and 10 (elective subject).

The processes and production skills strand comprises five sub-strands: investigating and defining, generating and designing, producing and implementing, evaluating, and collaborating and managing.

Table 2 shows the strand and sub-strand structure for Design and Technologies. Figure 2 illustrates the relationship between the Design and Technologies strands and the sub-strands.

Table 2: Design and Technologies content structure

Strand	**Knowledge and understanding**
Sub-strands	Technologies and society
	Technologies contexts:
	Engineering principles and systems
	Materials and technologies specialisations
	Food and fibre production
	Food specialisations
Strand	**Processes and production skills**
Sub-strands	*Creating designed solutions by:*
	Investigating and defining
	Generating and designing
	Producing and implementing
	Evaluating
	Collaborating and managing

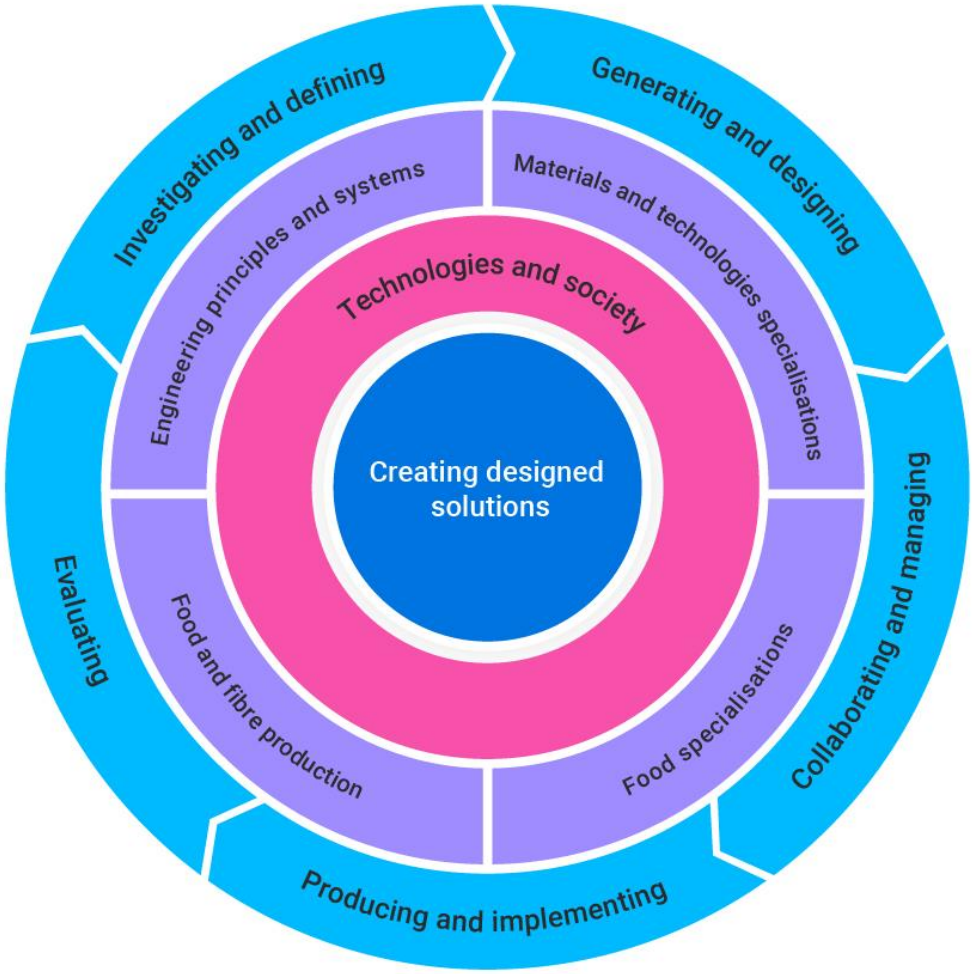

Figure 2: Relationship between the Design and Technologies strands and sub-strands

Technologies contexts and types of designed solutions

Students should have the opportunity to produce three types of designed solutions (products, services and environments). These different types of designed solutions have been specified to give students opportunities to engage with a broad range of design thinking and production skills. The combination of technologies contexts and types of designed solutions is a school decision.

In Foundation students will have the opportunity to produce at least one type of designed solution.

Across Years 1 to 4 students will have the opportunity to produce at least three types of designed solutions (products, services and environments) through the prescribed technologies contexts.

Across Years 5 to 8 students will have the opportunity to produce at least three types of designed solutions (products, services and environments) through the prescribed technologies contexts for each band.

Technologies contexts Foundation to Year 10

Foundation

In Foundation the technologies context is selected by the school. From Year 1 to Year 8 students will have the opportunity to create designed solutions at least once in each of the prescribed technologies contexts at least once in each band.

Years 1 and 2

By the end of Year 2 students will have had the opportunity to create designed solutions at least once in each of the two combined technologies contexts:

- Engineering principles and systems; Materials and technologies specialisations
- Food and fibre production; Food specialisations.

Years 3 and 4

By the end of Year 4 students will have had the opportunity to create designed solutions at least once in each of the two combined technologies contexts:

- Engineering principles and systems; Materials and technologies specialisations

- Food and fibre production; Food specialisations.

Years 5 and 6

By the end of Year 6 students will have had the opportunity to create designed solutions at least once in each of these three technologies contexts:

- Engineering principles and systems
- Materials and technologies specialisations
- Food and fibre production; Food specialisations.

Years 7 and 8

By the end of Year 8 students will have had the opportunity to create designed solutions at least once in each of the four technologies contexts:

- Engineering principles and systems
- Materials and technologies specialisations
- Food and fibre production
- Food specialisations.

Years 9 and 10

By the end of Year 10 students will have had the opportunity to create designed solutions for one or more of the four technologies contexts.

Strands and sub-strands

Read more

Knowledge and understanding strand

This strand focuses on developing the underpinning knowledge and understanding of technologies (materials, systems, components, tools and equipment) across technologies contexts and the relationship between technologies and society.

Content is further organised into five sub-strands.

Sub-strand: Technologies and society

The technologies and society sub-strand focuses on how people use and develop technologies taking into account sustainability (social, economic, environmental), ethical, legal, aesthetic and functional factors and the impact of technologies on individuals; families; local, regional and global communities; the economy; and the environment – now and into the future.

Technologies contexts

Technologies contexts provide a framework within which students can gain knowledge and understanding about the characteristics and properties of technologies and systems and how they can be used to create innovative designed solutions.

The prescribed technologies contexts for Years 1 to 8 are described below.

Sub-strand: **Engineering principles and systems**

Engineering principles and systems is focused on how forces can be used to create light, sound, heat, movement, control or support in systems. Knowledge of these principles and systems enables the design and production of sustainable engineered solutions.

Students need to understand how sustainable engineered products, services and environments can be designed and produced as some resources diminish. They will progressively develop knowledge and understanding of how forces and the properties of materials affect the behaviour and performance of designed engineering solutions.

Sub-strand: **Materials and technologies specialisations**

Materials and technologies specialisations focus on a broad range of traditional, contemporary and emerging materials and specialist areas that typically involve extensive use of technologies. We live in and depend on the constructed environment for communication, housing, employment, healthcare, recreation and transport; however, we also face increasing concerns related to long-term sustainability.

Students need to develop the confidence to make decisions about processes and solutions that are ethical and sustainable. They can do this by learning about and working with materials and production processes. Students will progressively develop knowledge and understanding of the characteristics and properties of a range of materials, either when investigating particular materials or through producing designed solutions for a technologies specialisation; for example, architecture, electronics, fashion or graphics technologies.

Sub-strand: Food and fibre production

Food and fibre are the human-produced or harvested resources used to sustain life and are produced in managed environments such as farms, gardens and plantations or harvested from wild populations. Challenges for world food and fibre production include an increasing world population and an uncertain climate and competition for resources such as land and water.

Students need to engage in these challenges by understanding the processes of food and fibre production and by investigating innovative and sustainable ways of supplying agriculturally produced raw materials. They will progressively develop knowledge and understanding about the managed systems that produce food and fibre through creating designed solutions.

Sub-strand: Food specialisations

Food specialisations includes the application of nutrition principles (as described in Health and Physical Education) and knowledge about the characteristics and properties of food; food technologies; food selection and preparation; and contemporary technology-related food issues. There are increasing community concerns about food issues, including the nutritional quality of food and the environmental impact of food manufacturing processes.

Students need to understand the importance of a variety of foods, have sound understanding of nutrition principles and food safety, and develop skills in food preparation when making food decisions to help better prepare them for their future lives. They will progressively develop knowledge and understanding about food and food safety, and how to make informed and appropriate food preparation choices when experimenting with and preparing food sustainably.

Processes and production skills strand

The processes and production skills strand is based on design thinking, design processes and production processes and skills. This strand reflects a process of design and would typically be addressed through identifying needs or opportunities and may involve developing a design brief.

It focuses on creating designed solutions by:

- Investigating and defining
- Generating and designing
- Producing and implementing
- Evaluating
- Collaborating and managing.

These are the skills that students will use throughout a design project and they form the sub-strands for this strand. If students have been taught content from these sub-strands in one context, the students do not need to be taught the same content again using a different technologies context but rather they apply their skills to a different technologies context.

Sub-strand: Investigating and defining

Investigating and defining involves students analysing, exploring and investigating information, needs and opportunities. As creators and citizens they will critically reflect on the intention, purpose and operation of technologies and designed solutions. Analysing encourages students to examine values, and question and review processes and systems. Students reflect on how decisions they make may have implications for the individual, society and the local and global environment, now and in the future. Students explore and investigate technologies, systems, products, services and environments as they consider needs and opportunities. They progressively develop effective investigation strategies and consider the contribution of technologies to their lives and make judgements about them. Students develop criteria for success in response to needs and opportunities and may respond to or develop design briefs.

Sub-strand: Generating and designing

Generating and designing involves students in developing and communicating design ideas for a range of audiences. Students generate ideas, make choices, weigh up options, consider alternatives and document various design ideas and possibilities. They use critical and creative thinking strategies to generate, evaluate and document ideas to meet needs or opportunities that have been identified by an individual, a group

or a wider community. Generating creative and innovative ideas involves thinking differently; it entails proposing new approaches to existing solutions and identifying new design opportunities considering preferred futures. Generating and developing ideas involves identifying various competing factors that may influence and dictate the focus of the idea. Students evaluate, justify and synthesise what they learn and discover. They use graphical representation techniques when they draw, sketch, model, simulate and design ideas that focus on well- considered designed solutions.

Sub-strand: Producing and implementing

Producing and implementing involves students learning and applying a variety of skills and techniques to make designed solutions designed to meet specific purposes and user needs. They apply knowledge about components, materials and their characteristics and properties to ensure their suitability for use. They learn about the importance of adopting safe work practices. They develop accurate production skills to achieve quality designed solutions. Students develop the capacity to select and use appropriate materials, systems, components, tools and equipment; and use work practices that respect the need for sustainability. The use of modelling and prototyping to accurately develop simple and complex simulated or physical models supports the production of successful designed solutions.

Sub-strand: Evaluating

Evaluating involves students evaluating and making judgements throughout a design process and about the quality and effectiveness of their designed solutions and others' solutions. They identify criteria for success for needs or opportunities in the investigating and defining stage and then use these criteria to consider the implications and consequences of actions and decision-making. They determine effective ways to test and judge their ideas, concepts and, finally, their designed solutions. They reflect on processes and transfer their learning to other design needs or opportunities.

Sub-strand: Collaborating and managing

Collaborating and managing involves students learning to work collaboratively and to manage time and other resources to effectively create designed solutions. Progressively, students develop the ability to communicate and share ideas throughout the process, negotiate roles and responsibilities and make compromises to work effectively as a team. Students work individually and in groups to plan, organise and monitor timelines, activities and the use of resources. They progress from planning steps in a project through to more complex project management activities that consider various factors such as time, cost, risk assessment and management and quality control.

Core concepts

Core concepts are the big ideas, understandings, skills or processes that are central to the Design and Technologies curriculum. They give clarity and direction about what content matters most in Design and Technologies. In the curriculum development process, core concepts help identify the essential content students should learn to develop a deep, and increasingly sophisticated, understanding of Design and Technologies across the years of schooling.

Underpinning the Design and Technologies curriculum are the core concepts of the Technologies learning area. The core concepts that are specific to Design and Technologies make up the four sub-strands related to the four technologies contexts:

- **engineering principles and systems:** to design and create engineered solutions involves knowledge and understanding of forces, motion and energy and the properties and performance of materials.
- **materials and technologies specialisations:** to design and create solutions involves knowledge and understanding of characteristics and properties of a range of materials and production technologies.
- **food and fibre production:** to design and create food and fibre production solutions to support current and future access to food and fibre products involves knowledge and understanding of the sustainable management of the environments in which they are produced.
- **food specialisations:** to design and create solutions to maintain and enhance individual, community and planet health involves knowledge and understanding of food to make informed and healthy food selection and preparation choices.

Table 3 outlines the alignment between the Design and Technologies strands and sub-strands to the learning area and subject-specific core concepts.

Table 3: Relationships between Design and Technologies strands and sub-strands and core concepts (Denotes subject-specific core concepts)*

Content strands and sub-strands		Related core concepts
Strand	**Knowledge and understanding**	Creating solutions for preferred futures
Sub-strands	Technologies and society	Enterprise skills and innovation
	Technologies contexts:	Systems
	Engineering principles and systems	Engineering principles and systems*
	Materials and technologies specialisations	Materials and technologies specialisations*
	Food and fibre production	Food and fibre production*
	Food specialisations	Food specialisations*
Strand	**Processes and production skills**	Creating solutions for preferred futures
Sub-strands	*Creating designed solutions by:*	
	Investigating and defining	Technologies processes and production skills
	Generating and designing	Design thinking
	Producing and implementing	Systems thinking
	Evaluating	Computational thinking
	Collaborating and managing	Enterprise skills and innovation
		Interactions and impact
		Project management skills

CURRICULUM ELEMENTS

Foundation

Level description
Learning in Design and Technologies builds on the Early Years Learning Framework, revisiting, strengthening and extending skills as needed. By the end of Foundation students will have had the opportunity to explore technologies – materials and equipment – through play experiences and to make a solution using familiar technologies for a school-selected context. The context may be one of the Technologies contexts or one identified by the school. There are rich connections to other learning areas, including Science. In Foundation students explore and use technologies and develop an awareness of how people design familiar products, services and environments. They explore a school-selected context which might include working with materials such as cardboard, fabric and other common household items; exploring placement of plants in a school garden; using equipment such as scissors, glues, trowels and utensils; and learning techniques to safely make solutions for their needs.
Design and Technologies achievement standard
By the end of Foundation students explore familiar products, services and environments. They use materials and equipment to safely make a solution for a school-selected context.
Technologies learning area achievement standard*
By the end of Foundation students identify familiar products, services and environments and develop familiarity with and show confidence in using digital systems. They use materials and equipment to safely make a solution for a school-selected context and show how digital systems can be used to solve problems. Students use objects, pictures and symbols to represent data. They identify if data is personal and owned by them. * To provide flexibility for schools an achievement standard has been written for the Technologies learning area, Foundation to Year 8, as well as for each subject. Some schools may wish to report holistically on Technologies learning in Foundation to Year 8, while others may prefer to report on each subject.

Strand	Sub-strand	Content description *Students learn to:*	Content elaboration *This may involve students:*
Knowledge and understanding	Technologies and society	explore how local products, services and environments are designed by people (AC9TDEFK01)	identifying how Aboriginal and Torres Strait Islander Peoples have long designed and produced domestic items including clothing, tools and shelter, for example hydration packs, similar to those used in endurance activities today, that are known as nil-pa as made by the Pitta Pitta Peoples (AC9TDEFK01_E1)
			exploring how local delivery services meet different needs of people, for example describing how gift packages can be sent to and from people who live in different locations and how online shopping items arrive at a person's home (AC9TDEFK01_E2)
			exploring how an environment such as a local playground may have shade structures to protect users (AC9TDEFK01_E3)
			describing how community gardens, public swimming pools and parks are designed to help people stay healthy (AC9TDEFK01_E4)
			asking questions about the design of products from the local store, for example why certain packaging materials might have been selected, and how people design the text and images on the packaging to attract people's attention (AC9TDEFK01_E5)
	Technologies contexts	By the end of Foundation students will have had the opportunity to design and make a solution for a school-selected context.	

Processes and production skills	Generating and designing	generate ideas and manipulate materials and equipment to safely make a solution for a purpose (AC9TDEFP01)	identifying a purpose for designing and making a solution, for example the sand keeps blowing out of the sandpit or the birds keep flying into the waste bin and taking food scraps (AC9TDEFP01_E1)
			exploring ideas by drawing or modelling, for example designs for bee hotels to attract native bees to the school garden (AC9TDEFP01_E2)
	Producing and implementing		exploring how everyday materials can be used or re-used in construction play, for example using blocks and rain gutters or cardboard to make a ramp to roll a ball or toy car down (AC9TDEFP01_E3)
			practising a range of technical skills safely using equipment, for example joining techniques when making a product from materials, such as a simple greenhouse to keep a seedling warm (AC9TDEFP01_E4)
			assembling components of systems and checking they function as planned, for example making and testing a simple bowling or stacking or obstacle game with discarded food containers or packaging (AC9TDEFP01_E5)
	Evaluating		evaluating what they have made using personal preferences, for example using a smiley face Likert scale (AC9TDEFP01_E6)

Years 1 and 2

Band level description

By the end of Year 2 students will have had the opportunity to create designed solutions at least once in these two technologies contexts:

- Engineering principles and systems; Materials and technologies specialisations
- Food and fibre production; Food specialisations.

Students should have opportunities to experience designing and producing products, services and environments. There are rich connections to other learning areas, including Science and Health and Physical Education.

Students explore and investigate technologies – materials, systems, components, tools and equipment – including their purposes and how they meet personal and social needs within local settings. Students develop an understanding of how society and environmental sustainability factors influence design and technologies decisions. They evaluate designed solutions using questions such as: How does it work? What purpose does it meet? Who will use it? What do I like about it? How can it be improved? They begin to consider the impact of their decisions and of technologies on others and the environment. They reflect on their participation in a design process. This involves students developing new perspectives and engaging in different forms of evaluating and critiquing products, services and environments based on their personal preferences.

Using a range of technologies including a variety of graphical representation techniques to communicate, students draw, model and explain design ideas; label drawings; draw objects as two-dimensional images from different views; draw products and simple environments; and verbalise design ideas.

They plan simple steps and follow directions to complete their own or group design ideas and projects and manage their own role in team projects. Students are aware of others around them and the need to work safely and collaboratively when making designed solutions.

Design and Technologies achievement standard

By the end of Year 2 students identify the purpose of familiar products, services and environments. For each of the two prescribed technologies contexts they explore the features and uses of technologies and create designed solutions. Students evaluate their ideas based on their personal preferences. They communicate design ideas using models and simple drawings and follow sequenced steps to safely produce designed solutions.

Technologies learning area achievement standard*

By the end of Year 2 students describe the purpose of familiar products, services and environments and use basic computational thinking to create simple digital solutions to known problems or opportunities. For each of the two prescribed technologies contexts they identify the features and uses of technologies and create designed solutions. They evaluate their ideas, based on their personal preferences. Students communicate design ideas using models and simple drawings, describe and represent algorithms that involve repetition and decisions, and follow sequenced steps to safely produce designed solutions. They identify examples of personal data that may be stored online.

* To provide flexibility for schools an achievement standard has been written for the Technologies learning area, Foundation to Year 8, as well as for each subject. Some schools may wish to report holistically on Technologies learning in Foundation to Year 8, while others may prefer to report on each subject.

Strand	Sub-strand	Content description *Students learn to:*	Content elaboration *This may involve students:*
Knowledge and understanding	Technologies and society	identify how people design and produce familiar products, services and environments and consider sustainability to meet personal and local community needs (AC9TDE2K01)	exploring how Aboriginal and Torres Strait Islander Peoples have long understood their dependence on living systems to meet their local and community needs, for example exploring the material culture of the Ngarrindjeri Peoples who sustainably make woven items from a grass-like sedge (AC9TDE2K01_E1)
			exploring how particular services meet different needs of people in the community, for example describing why doctors provide medical care to people in many ways including by phone, video conference, plane, car or outdoor clinic (AC9TDE2K01_E2)
			asking questions about the design of a range of shelters provided for the public and how they meet the needs of people in the community, for example the structures of a school or local sportsground (AC9TDE2K01_E3)
			exploring how local products are designed, for example brainstorming the materials and processes needed to create a costume for a school or community event including using recycled clothing or components to minimise waste (AC9TDE2K01_E4)

	Technologies contexts	By the end of Year 2 students will have had the opportunity to create designed solutions at least once in each of the two combined technologies contexts.	
	Technologies context: Engineering principles and systems; Materials and technologies specialisations	explore how technologies including materials affect movement in products (AC9TDE2K02)	investigating Aboriginal and Torres Strait Islander Peoples' instructive toys and how such toys are designed and made to produce movement, for example propeller toys made from pandanus across northern Australia (AC9TDE2K02_E1)
			selecting materials to show how material properties are appropriate for particular designed solutions, for example materials that enable sliding or floating (AC9TDE2K02_E2)
			exploring how to manipulate materials using a range of tools, equipment and techniques to create movement, for example when constructing a toy boat that floats and moves (AC9TDE2K02_E3)
			exploring a system such as a marionette or Indonesian wayang kulit shadow puppet to see that by combining materials with forces movement can be created (AC9TDE2K02_E4)
	Technologies context: Food and fibre production; Food specialisations	explore how plants and animals are grown for food, clothing and shelter (AC9TDE2K03**)**	exploring how Aboriginal and Torres Strait Islander Peoples grow plants and animals for food, for example how land is transformed through the construction of terraces at Wagadagam on Mabuiag Island in the Torres Strait, or how the Kombumerri Peoples of South East Queensland developed an important aquaculture industry farming mangrove worms (AC9TDE2K03_E1)
			exploring which plants and animals can provide food or materials for clothing and shelter, for example comparing the farming techniques and volume of water needed to grow rice in countries across Asia with Australian rice production (AC9TDE2K03_E2)
			identifying products that can be designed and produced from plants and animals, for example food products, paper and wood products, fabrics and yarns, and fertilisers (AC9TDE2K03_E3)

			considering a range of tools and equipment needed to grow plants for a purpose and their suitability, for example describing tools needed to cultivate or mulch a home vegetable garden by hand or to produce a large non-food crop, such as cotton on a farm (AC9TDE2K03_E4)
		explore how food can be selected and prepared for healthy eating (AC9TDE2K04)	identifying a wide range of foods, categorising them into food groups and describing their nutritional value and the methods, tools and equipment needed to prepare them for healthy eating (AC9TDE2K04_E1)
			exploring how people including from countries across Asia design and produce food for healthy eating based on the available plants and animals in their region and their culture, beliefs and perspectives including any specific tools and equipment needed (AC9TDE2K04_E2)
Processes and production skills	Generating and designing	generate, develop and record design ideas through describing, drawing or modelling (AC9TDE2P01)	comparing and contrasting features of existing products to develop new ideas, for example designing and making a simple puppet with a movable part after experimenting with other toys with several movable parts (AC9TDE2P01_E1)
			communicating design ideas by modelling or producing and labelling 2-dimensional drawings using a range of technologies, for example designing a new environment such as a cubbyhouse or animal shelter and showing different views (top view and side view) with descriptions of materials and features (AC9TDE2P01_E2)
	Producing and implementing	use materials, components, tools, equipment and techniques to safely make designed solutions (AC9TDE2P02)	exploring how everyday materials can be used or re-used in construction play, for example using used wrapping paper and gift cards to design and make decorations or signage for the classroom or a school event to minimise waste (AC9TDE2P02_E1)
			practising a range of technical skills using tools and equipment safely, for example joining techniques when making products, watering and mulching gardens, preparing food (AC9TDE2P02_E2)
			assembling components and checking they function as planned, for example containers, contents and joining materials when making musical shakers (AC9TDE2P02_E3)

	Evaluating	evaluate the success of design ideas and solutions based on personal preferences and including care for the natural environment (AC9TDE2P03)	recording a judgement about design ideas with teacher guidance, for example expressing own likes and dislikes about a design idea or describing how design ideas meet the needs of those who will use the solution using audio-recording or video-recording software (AC9TDE2P03_E1)
			reflecting on the environmental impacts of the production of a solution and considering alternative approaches that would minimise future negative impacts, for example identifying the negative environmental impacts of different food packaging and how these could be minimised (AC9TDE2P03_E2)
			reflecting on the processes and challenges of designing and producing a solution and recording these reflections, for example when growing a food product, designing a structure to take a load or making a nutritious snack (AC9TDE2P03_E3)
			discussing design strengths and weaknesses, for example explaining how the equipment in a playground might be unsuitable for some children to use and suggesting areas for design improvement (AC9TDE2P03_E4)
	Collaborating and managing	sequence steps for making designed solutions (AC9TDE2P04)	using lists or storyboarding when planning and making, for example when creating an electronic planting calendar (AC9TDE2P04_E1)
			recording the procedure for making a product, for example the ordered steps for making a salad or instructions for making a container (AC9TDE2P04_E2)

Years 3 and 4

Band level description

By the end of Year 4 students will have had the opportunity to create designed solutions at least once in these two technologies contexts:

- Engineering principles and systems; Materials and technologies specialisations
- Food and fibre production; Food specialisations.

Students should have opportunities to experience designing and producing products, services and environments. There are rich connections to other learning areas, including Science and Health and Physical Education.

Students investigate technologies – materials, systems, components, tools and equipment – developing a sense of self and ownership of their ideas and thinking about their peers and communities and as consumers. They consider the purpose of technologies and how they meet needs. Students explore and learn to harness their creative, innovative and imaginative ideas and approaches to achieve designed products, services and environments. They do this through planning and awareness of the characteristics and properties of materials and the use of tools and equipment. They learn to reflect on their actions to refine their processes and develop their decision-making skills. Students examine social and environmental sustainability implications of existing products and processes to raise awareness of their place in the world. They compare their predicted implications with real-world case studies including those from the Asia region and recognise that designing and technologies can affect people and their environments. They become aware of the role of those working in design and technologies occupations and how these people think about the way a product might change in the future.

Students clarify and present ideas, using a range of technologies and graphical representation techniques, for example drawing annotated diagrams and modelling objects as 3-dimensional images from different views by visualising rotating images and using materials. Students recognise techniques for documenting design and production ideas such as basic drawing symbols and use simple flow diagrams and charts.

Students become aware of appropriate ways to manage their time and focus. They identify and list criteria for success including in relation to preferred futures. Students list the major steps needed to complete a design task. They show an understanding of the importance of planning when designing solutions, in particular when collaborating. Students identify safety issues and learn to follow simple safety rules when producing designed solutions.

Design and Technologies achievement standard

By the end of Year 4 students describe how people design products, services and environments to meet the needs of people and consider sustainability. For each of the two prescribed technologies contexts they describe the features and uses of technologies and create designed solutions. Students evaluate ideas against criteria for success. They use models and drawings including annotations and symbols to plan, sequence and communicate steps in design and production. Students use technologies and techniques to safely produce designed solutions.

Technologies learning area achievement standard*

By the end of Year 4 students describe how people design products, services and environments to meet the needs of people, including sustainability, and use computational thinking to create scaffolded digital solutions. They recognise different types of data and identify how they are transmitted by digital systems. For each of the two prescribed technologies contexts they describe the features of technologies and create designed solutions. Students evaluate ideas against identified criteria for success. They define problems and identify opportunities, then design and implement solutions using algorithms and visual programming that involve decision-making, repetition and user input. Students use models and drawings including annotations and symbols to plan, sequence and communicate major steps in design and production. They use technologies and techniques to safely produce solutions. Students use passphrases and agreed behaviours to safely access and explore digital systems, tools and online or networked environments independently and with others.

* To provide flexibility for schools an achievement standard has been written for the Technologies learning area, Foundation to Year 8, as well as for each subject. Some schools may wish to report holistically on Technologies learning in Foundation to Year 8, while others may prefer to report on each subject.

Strand	Sub-strand	Content description *Students learn to:*	Content elaboration *This may involve students:*
Knowledge and understanding	Technologies and society	describe design and technologies occupations and explore factors including sustainability	exploring how in many Aboriginal and Torres Strait Islander communities people were and continue to be recognised for their specialist skills and abilities in designing and producing products made from local materials and providing related services, using sustainable practices to ensure future access to meet community needs, for example traditional adhesives and medicines (AC9TDE4K01_E1)

		that impact on the design of products, services and environments to meet community needs (AC9TDE4K01)	exploring how design and technologies occupations in the local area (suburban, rural or regional areas) meet community needs, for example farmers, seafood industry workers, mechanics, bakers, builders and radiographers (AC9TDE4K01_E2)
			examining the suitability of a service or everyday system and proposing improvements, for example a water-saving system for a bathroom at home or school, traffic management systems to reduce traffic jams, remote and regional services including medical services (AC9TDE4K01_E3)
			examining products and environments to discover the factors that may have influenced the design, choice of materials and technologies used, for example discussing energy-efficient cooking with a wok, or sustainable wood products for home use including furniture made from plantation timbers, bamboo toothbrushes or coconut shell bowls (AC9TDE4K01_E4)
	Technologies contexts	By the end of Year 4 students will have had the opportunity to create designed solutions at least once in each of the two combined technologies contexts.	
	Technologies context: Engineering principles and systems; Materials and technologies specialisations	describe how forces and the properties of materials affect function in a product or system (AC9TDE4K02)	investigating how Aboriginal and Torres Strait Islander Peoples consider buoyant forces as they select materials for watercraft, for example making bark or dugout canoes (AC9TDE4K02_E1)
			looking at models to identify how materials are used and movement is created, for example in the design of a toy with wheels or moving parts (AC9TDE4K02_E2)
			exploring through play how movement can be started by combining materials and using forces, for example releasing a wound rubber band to propel a model boat, how different materials may impact a marble roll speed, or how various surfaces from grass to bitumen might affect a robot's movement (AC9TDE4K02_E3)
			deconstructing a product or system to identify how motion and forces affect performance, for example in a puppet such as a Japanese *bunraku* puppet or a model windmill with moving sails (AC9TDE4K02_E4)

			identifying engineered systems and experimenting with available local materials, tools and equipment to solve problems, for example designing a container or parachute that will keep an egg intact when dropped from a height, a pop-up card, a tower or a vehicle (AC9TDE4K02_E5)
	Technologies context: Food and fibre production; Food specialisations	describe the ways of producing food and fibre (AC9TDE4K03)	investigating food and fibre production techniques and technologies developed by Aboriginal and Torres Strait Islander Peoples, such as burning, tilling, planting, transplanting, watering, irrigating, weeding, thinning, cropping, storing and trading food (AC9TDE4K03_E1)
			describing tools, equipment and procedures to improve plant and animal production, for example when growing vegetables in the school garden and producing environments such as a greenhouse or animal housing including safe bird shelters (AC9TDE4K03_E2)
			identifying production techniques and areas in Australia and Asia where major crops are grown or animals are bred, for example the wheat and sheep belt or beef industry areas, plantation and native forest areas or where sugar cane or rice are grown (AC9TDE4K03_E3)
		describe the ways food can be selected and prepared for healthy eating (AC9TDE4K04)	investigating how Aboriginal and Torres Strait Islander Peoples have long considered the nutrient content of seasonal foods as a means of maintaining a balanced diet (AC9TDE4K04_E1)
			recognising the benefits food technologies provide for health and food safety and ensuring that a wide variety of food is available and can be prepared for healthy eating, for example pasteurisation of milk for food safety and freezing of vegetables to retain nutrients (AC9TDE4K04_E2)
			discovering the differences between fresh food and processed food by investigating nutrient content of fresh food and examining food labels of processed foods for ingredients or nutritional value (AC9TDE4K04_E3)
			considering creative ways foods can be prepared for maximum taste and appeal, for example locating and discussing images online that show fun ways to present food that might encourage healthy eating (AC9TDE4K04_E4)
			describing foods using the senses, for example describing the colour, aroma, sound, texture and taste of the ingredients in a salad or stir fry and how our senses influence what we select to eat (AC9TDE4K04_E5)

Processes and production skills	Investigating and defining	explore needs or opportunities for designing, and test materials, components, tools, equipment and processes needed to create designed solutions (AC9TDE4P01)	exploring the designs and performance of models of Aboriginal and Torres Strait Islander Peoples' watercraft, and the opportunities for their designs to inform water sports equipment such as paddleboards (AC9TDE4P01_E1)
			examining the structure and production of everyday products, services and environments to enhance their own design ideas, for example discussing the processes and systems that might be used to distribute hot food to a large number of people at a community event (AC9TDE4P01_E2)
			selecting and making judgements about appropriate joining techniques for materials to produce designs, prototypes, structures or working models, for example joining fabric, paper or cardboard in various ways (AC9TDE4P01_E3)
			exploring and testing a range of materials under different conditions for suitability including sustainability considerations, for example the compostability of paper-based materials or the strength and durability of natural materials (AC9TDE4P01_E4)
			exploring the different uses of materials in a range of products, including those from countries across Asia, for example in shelters, boats, handmade tools, baskets, wooden items, musical instruments, clothing and fabric (AC9TDE4P01_E5)
	Generating and designing	generate, develop and communicate design ideas and decisions using technical terms and graphical representation techniques (AC9TDE4P02)	visualising innovative design ideas by producing thumbnail drawings, models and labelled drawings to explain features and modifications, for example drawing one or more designs for a machine to collect waste, and including labels and descriptions explaining materials used, their properties and the intended function of components or the whole system (AC9TDE4P02_E1)
			planning, sharing and documenting creative designs, ideas and processes using digital tools and appropriate terms and privacy considerations, for example a class blog or collaborative document that has been selectively shared with peers (AC9TDE4P02_E2)
			labelling diagrams with technical terms, for example labelling the chassis, axle, wheels and steering on a diagram for a pushcart (AC9TDE4P02_E3)

	Producing and implementing	select and use materials, components, tools, equipment and techniques to safely make designed solutions (AC9TDE4P03)	exploring ways of joining, connecting and assembling components that ensure success including the impact digital tools have on these processes, for example using virtual reality or simulations to experience the use of assembling materials or using tools (AC9TDE4P03_E1)
			using tools and equipment accurately when measuring, marking and cutting, for example when creating a template, measuring ingredients in a recipe or sowing seeds (AC9TDE4P03_E2)
			explaining the importance of safe, responsible and cooperative work practices when designing and making, for example when handling sharp equipment such as knives and scissors (AC9TDE4P03_E3)
			selecting and using materials, components, tools, equipment and processes with consideration of the environmental impact at each stage of the production process, for example considering how packaging and offcuts could be recycled or used for other purposes before choosing materials for a project (AC9TDE4P03_E4)
	Evaluating	develop criteria for success including care for the environment to evaluate design ideas and solutions (AC9TDE4P04)	comparing the amount of waste that would be produced from different design and development options and the potential for recycling waste, for example exploring the choice of materials to construct a simple toy and whether these materials are repairable or able to be recycled once the toy breaks or is no longer wanted (AC9TDE4P04_E1)
			reflecting on designed solutions to critique and assess suitability, sustainability and enterprise opportunities and determine how well they meet criteria for success, for example gathering relevant data to support a discussion and make judgements about a school or community fundraising event in relation to waste reduction, attendance and funds raised, and consider how these aspects could be handled in future events (AC9TDE4P04_E2)
	Collaborating and managing	sequence steps to individually and collaboratively make designed solutions (AC9TDE4P05)	determining planning processes as a class, for example recording when parts of a project need to be completed on a timeline, in a spreadsheet, calendar or list (AC9TDE4P05_E1)
			discussing the importance of managing time and resource allocation throughout production, for example discussing the roles different people might take in a team and identifying the tasks they will complete and the resources they will each need (AC9TDE4P05_E2)

	identifying the steps in a mass production process, for example drawing a flowchart or video recording a procedure for packing identical boxes of food for community members in need, where each student in a group has a separate task as part of the production process (AC9TDE4P05_E3)

Years 5 and 6

Band level description

By the end of Year 6 students will have had the opportunity to create designed solutions at least once in three technologies contexts:

- Engineering principles and systems
- Materials and technologies specialisations
- Food and fibre production; Food specialisations.

Students should have opportunities to experience designing and producing products, services and environments. There are rich connections to other subjects, including Science, Humanities and Social Sciences and Health and Physical Education.

Students critically examine technologies − materials, systems, components, tools and equipment − that are used in the home and in local, national, regional or global communities, with consideration of society, ethics and social and environmental sustainability factors. Students consider why and for whom technologies were developed. They engage with ideas beyond the familiar, exploring how design and technologies and the people working in technologies occupations contribute to society. They seek to explore innovation and establish their own design capabilities for designing products, services and environments. Students are given new opportunities for clarifying their thinking, creativity, analysis, problem-solving and decision-making. They explore trends and data to imagine what the future will be like and suggest design decisions that contribute positively to preferred futures.

Using a range of technologies including a variety of graphical representation techniques to communicate, students represent objects and ideas in a variety of forms such as thumbnail sketches, models, drawings, diagrams and storyboards to illustrate the development of designed solutions. They use a range of techniques such as labelling and annotating sequenced sketches and diagrams to illustrate how products function; and recognise and use a range of drawing symbols in context to give meaning and direction.

Students work individually and collaboratively to identify and sequence steps needed for a design task. They negotiate on, develop and follow plans to complete design tasks safely, adjusting when necessary. Students identify and maintain safety standards and practices when making designed solutions.

Design and Technologies achievement standard

By the end of Year 6 students explain how people design products, services and environments to meet the needs of communities, including sustainability. For each of the three prescribed technologies contexts they explain how the features of technologies impact on design decisions and they create designed solutions. Students evaluate ideas and solutions against criteria for success. They use technical terms and graphical representation techniques to communicate ideas to an audience. Students develop project plans including production processes and select appropriate technologies and techniques to safely produce designed solutions.

Technologies learning area achievement standard*

By the end of Year 6 students describe how people design products, services and environments to meet the needs and opportunities of communities, including sustainability. For each of the three prescribed technologies contexts students explain how the features of technologies impact on design decisions and they create designed solutions. They use computational thinking to design and create digital solutions by developing algorithms to address problems or opportunities and implement them as visual programs. They evaluate ideas and solutions against criteria for success. Students use technical terms and graphical representation techniques to communicate ideas to an audience. They record project plans, including production processes, and select appropriate technologies and techniques to safely produce designed solutions. Students understand and describe how data is transmitted, how behaviours and ethics help protect data and describe what effect supplied data can have on their digital footprint.

* To provide flexibility for schools an achievement standard has been written for the Technologies learning area, Foundation to Year 8, as well as for each subject. Some schools may wish to report holistically on Technologies learning in Foundation to Year 8, while others may prefer to report on each subject.

Strand	Sub-strand	Content description *Students learn to:*	Content elaboration *This may involve students:*
Knowledge and understanding	Technologies and society	explain how people in design and technologies occupations consider competing factors including sustainability in the design of products, services and	investigating how Aboriginal and Torres Strait Islander Peoples have long considered competing factors especially those related to sustainability in the design of fish harvesting technologies, for example fish traps and fish poisons that allow for selective harvesting and release of bycatch, as compared with high-yield, non-selective harvesting practices such as trawling (AC9TDE6K01_E1)
			describing the impact and sustainability implications of designed products, services or environments on local, regional and global communities, including countries in the Asia region,

		environments for current and future use (AC9TDE6K01)	for example explaining the impact of sending redundant technologies to other countries for recycling or disposal (AC9TDE6K01_E2)
			explaining the importance of aesthetics, function and sustainability in product design, for example a textile product that gives UV protection and is appealing; a motor that moves a vehicle and uses a sustainable power source; a modification to a home to reduce environmental impact; restoring a natural environment and enabling low-impact access for the public such as boardwalks in fragile wet heath or swamp ecosystems (AC9TDE6K01_E3)
			identifying the components of a service that contribute to its success and assessing potential risk or failure, for example a community service announcement to communicate a message in the school or to a wide audience; a service that manages an aspect of the environment such as Clean Up Australia Day in different communities (AC9TDE6K01_E4)
	Technologies contexts	By the end of Year 6 students will have had the opportunity to create designed solutions at least once in each of these three technologies contexts.	
	Technologies context: Engineering principles and systems	explain how electrical energy can be transformed into movement, sound or light in a product or system (AC9TDE6K02)	investigating how much of the coastal regions of northern Australia are either owned or co-managed by Aboriginal and Torres Strait Islander Peoples, and where automated, labour-saving photovoltaic systems are expected to provide opportunities for First Nations Australians to expand their aquaculture industries (AC9TDE6K02_E1)
			explaining how sun tracking of solar panels assists renewable energy production in remote communities (AC9TDE6K02_E2)
			describing the process needed to carefully plan and select components for a system to perform a specific task, for example planning the arrangement of switches, light globes and a power source in a simple lighting design (AC9TDE6K02_E3)
			producing models using materials, tools and equipment to show how to control movement, sound or light, for example constructing a simple automaton or lifting system including a pulley to raise a bucket or toy (AC9TDE6K02_E4)

			deconstructing a product or system to discover how movement, sound or light can be controlled, for example taking apart a torch or buzzer, or exploring circuit design in a security system and investigating the properties of materials to solve problems including the amount of light reflected from different surfaces to control a sensor (AC9TDE6K02_E5)
	Technologies context: Materials and technologies specialisations	explain how characteristics and properties of materials, systems, components, tools and equipment affect their use when producing designed solutions (AC9TDE6K03)	investigating how Aboriginal and Torres Strait Islander Peoples have long used material science knowledge to identify materials and preparation techniques to meet performance needs, for example twining techniques of string and rope fibres to ensure suitability for use in wet, dry, freshwater and saltwater applications (AC9TDE6K03_E1)
			identifying and describing the properties of materials for the design and construction of a household product or system to improve household sustainability, for example a product for storing harvested water or reducing energy consumption (AC9TDE6K03_E2)
			describing the materials and systems used in public places and facilities that positively affect the way people live, for example a community exercise environment, arts facility, water treatment plant or garbage collection service (AC9TDE6K03_E3)
			comparing and describing the tools, equipment and techniques used to manufacture products in factories with those used by local and regional enterprises including cost and impacts, for example clothing made in factories compared with local handmade garments (AC9TDE6K03_E4)
			comparing the design and production of products, services or environments in Australia and a country in the Asia region, for example comparing the availability and properties of preferred materials and the design of public shelters and housing in Indonesia and Australia (AC9TDE6K03_E5)

Technologies context: Food and fibre production/ Food specialisations	explain how and why food and fibre are produced in managed environments (AC9TDE6K04)	exploring how prior to colonisation, Aboriginal and Torres Strait Islander Peoples lived in discrete communities that cared for, protected and sustainably harvested food and fibre resources, some of which are now cultivated to meet domestic and international demand, for example bunya nuts, macadamia and finger limes (AC9TDE6K04_E1)
		investigating and experimenting with different tools, equipment and methods of preparing soil and the effect on soil quality and sustainability including conserving and recycling nutrients, for example when designing a sustainable school vegetable garden or cropping area (AC9TDE6K04_E2)
		describing the relationship between plant types and animal breeds and their environmental suitability when selecting suitable plants or animals for an environment (AC9TDE6K04_E3)
		sequencing the process of converting on-farm food or fibre products into a product suitable for retail sale, for example creating a digital flowchart to record a paddock-to-plate supply chain, or a procedure for making yarn or fabric from fibre (AC9TDE6K04_E4)
	explain how the characteristics of foods influence selection and preparation for healthy eating (AC9TDE6K05)	using current food guidelines and government-endorsed food policies to plan food choices, for example describing and planning a healthy meal or lunchbox for a particular individual with recommended serving sizes using the Australian Dietary Guidelines to inform choices and explaining the characteristics of selected foods (AC9TDE6K05_E1)
		experimenting with tools, equipment, ingredients and techniques to design and make food products or meals for selected groups for healthy eating taking into consideration environmental impacts and nutritional benefits, for example experimenting with preserving techniques including pickling, air drying or sun drying and presenting information on the benefits for an audience (AC9TDE6K05_E2)
		investigating how Aboriginal and Torres Strait Islander Peoples have long selected and prepared foods for healthy eating, for example based on their nutritional value, availability, spoilage, preparation and processing requirements (AC9TDE6K05_E3)

			exploring a variety of tastes and how they may influence the selection or preparation of food, for example the sour, salty, sweet, spicy and umami flavours of many foods from countries across Asia (AC9TDE6K05_E4)
Processes and production skills	Investigating and defining	analyse needs or opportunities for designing, and investigate the materials, components, tools, equipment and processes needed to create designed solutions (AC9TDE6P01)	investigating Aboriginal and Torres Strait Islander Peoples' traditional fibre sources as potential commercial solutions for biodegradable string or rope, and researching the materials, systems, components, tools and equipment required (AC9TDE6P01_E1)
			surveying people in the school community about their needs in order to design an appropriate product, service or environment that addresses the need, for example planning the requirements for a community meal, creating more shade in the school by determining where trees could be planted or designing a security system for the community garden (AC9TDE6P01_E2)
			investigating designed solutions from around the world to make suitable, quality decisions that meet needs or opportunities, for example locating information online about small-space gardening ideas from different countries and making a judgement about their suitability for the local environment (AC9TDE6P01_E3)
			identifying the importance of complementary parts of working, everyday systems by deconstructing the components, structure and purpose of products, services or environments, for example labelling a diagram of a robotic weeder or vacuum cleaner (AC9TDE6P01_E4)
			testing a range of materials, components, tools and equipment to determine the appropriate technologies needed to make products, services or environments, for example the materials for a product such as a rubber-band-powered vehicle or item of protective clothing (AC9TDE6P01_E5)
			investigating how to minimise material use and manage waste by critiquing the environmental and social impacts of materials, components, tools and equipment, for example deciding to repurpose an old item of clothing to create an apron or carry bag or using vegetable scraps to make a healthy soup (AC9TDE6P01_E6)

	Generating and designing	generate, develop and communicate design ideas, decisions and processes using technical terms and graphical representation techniques (AC9TDE6P02)	generating a range of design ideas for products, services or environments using prior knowledge, skills and research, for example a security system for a community garden, a product made from a repurposed item of clothing, a permaculture vegetable patch or a healthy meal for a family picnic (AC9TDE6P02_E1)
			analysing, modifying and developing design ideas to enhance and improve the sustainability of the product, service, environment or system, for example analysing eco-friendly alternatives to non-recyclable decorations for a community event or replacing paper-based newsletters with online formats (AC9TDE6P02_E2)
			representing and communicating design ideas using modelling and drawing standards including the use of digital tools, for example including scale, symbols and codes in plans and diagrams; using pictorial maps and aerial views; and using digital mapping applications or infographics to present research and ideas to others (AC9TDE6P02_E3)
			experimenting with materials, tools and equipment to refine design ideas, for example considering the selection of materials and joining techniques to suit the purpose of a product, such as a pop-up book, a fabric bag or an electric circuit (AC9TDE6P02_E4)
	Producing and implementing	select suitable materials, components, tools, equipment and techniques and use safe procedures to make designed solutions (AC9TDE6P03)	matching material and joining techniques to the design intention, for example accurately and safely cutting and sewing the fabric pieces to make a community banner or joining components to produce an electric circuit (AC9TDE6P03_E1)
			using appropriate personal protective equipment required for the use of some tools and equipment, for example protective eyewear and working safely, responsibly and cooperatively to ensure safe work areas, for example the safe use of equipment when making a water-resistant, floating craft (AC9TDE6P03_E2)
			choosing appropriate materials, tools, equipment and techniques for a specific purpose, for example when safely and hygienically preparing food, cultivating garden beds or constructing electronic products (AC9TDE6P03_E3)

			identifying work practices that show an understanding of nutrition, environmental considerations, hygiene and food safety when designing and making a food product, for example washing fruit and vegetables carefully to remove residues, safe disposal of cooking oils to avoid environmental damage, refrigerated storage of highly perishable foods (AC9TDE6P03_E4)
	Evaluating	develop criteria for success collaboratively that include sustainability to evaluate design ideas, processes and solutions (AC9TDE6P04)	identifying criteria for success, processes and planning of a designed solution collaboratively, for example using a visual representation such as a flowchart (AC9TDE6P04_E1)
			developing criteria for success with others to evaluate the suitability of materials, tools and equipment for specific purposes, for example considering the most suitable fabric, tools and equipment required to make beeswax wraps (AC9TDE6P04_E2)
			reflecting on how well their designed solution ensures safety and wellbeing of users and meets the needs of communities and different cultures, for example reviewing and discussing the choice of fabrics used to make re-usable bags and how they could be made more appealing to all cultural groups by considering modifications to style (AC9TDE6P04_E3)
			evaluating their designed solutions including considering the benefits and costs of production processes and the environmental impact, for example for the production of an animal shelter (AC9TDE6P04_E4)
			considering the social values and ethics of clients when designing an environment, for example interviewing users of a space or seeking permission to use designs or images created by others including respect of intellectual property (AC9TDE6P04_E5)

	Collaborating and managing	develop project plans that include consideration of resources to individually and collaboratively make designed solutions (AC9TDE6P05)	setting milestones for production processes and allocating roles to team members, for example using a cloud-based or server-based document or spreadsheet to list tasks, deadlines and roles for team members working on a project collaboratively, including setting document sharing permissions with selected people (AC9TDE6P05_E1)
			identifying the human resources, materials, tools and equipment that will be needed to make the designed solution as part of the project plan and specifying when these will be needed, for example access to a wildlife expert at the planning stage and scheduling access to shared tools when building a habitat for local animals (AC9TDE6P05_E2)
			outlining and reviewing the planning and production steps needed to produce a product, service or environment using digital tools, for example making a flowchart or using a digital planner to record the sequence of tasks and deadlines required to complete a project (AC9TDE6P05_E3)