The Australian Curriculum
Technologies

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Table of Contents

Rationale and Aims

Rationale

Technologies enrich and impact on the lives of people and societies globally. 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. Technologies can play an important role in transforming, restoring and sustaining societies and natural, managed, and constructed environments.

The Australian Curriculum: Technologies describes two distinct but related 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.

The Australian Curriculum: Technologies will ensure that all students benefit from learning about and working with traditional, contemporary and emerging technologies that shape the world in which we live. This learning area encourages students to apply their knowledge and practical skills and processes when using technologies and other resources to create innovative solutions, independently and collaboratively, that meet current and future needs.

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.

This rationale is extended and complemented by specific rationales for each Technologies subject.

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 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
- critique, analyse and evaluate problems, needs or opportunities to identify and create solutions.
- These aims are extended and complemented by specific aims for each Technologies subject.

Organisation

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

- Design and Technologies
- Digital Technologies

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 Year 9 and 10, student access to technologies subjects will be determined by school authorities. These could include Design and Technologies and/or Digital Technologies as outlined in the Australian Curriculum: Technologies and/or subjects relating to specific technologies contexts, determined by state and territory school authorities or individual schools.

The curriculum for each of Design and Technologies and Digital Technologies describes the distinct knowledge, understanding and skills of the subject and, where appropriate, highlights their similarities and complementary learning. This approach allows students to develop a comprehensive understanding of traditional, contemporary and emerging technologies. It also provides the flexibility – especially in the primary years of schooling – for developing integrated teaching programs that focus on both Technologies subjects and other learning areas. Figure 1 shows the relationship between the overarching idea, key ideas and subjects of the Technologies learning area.

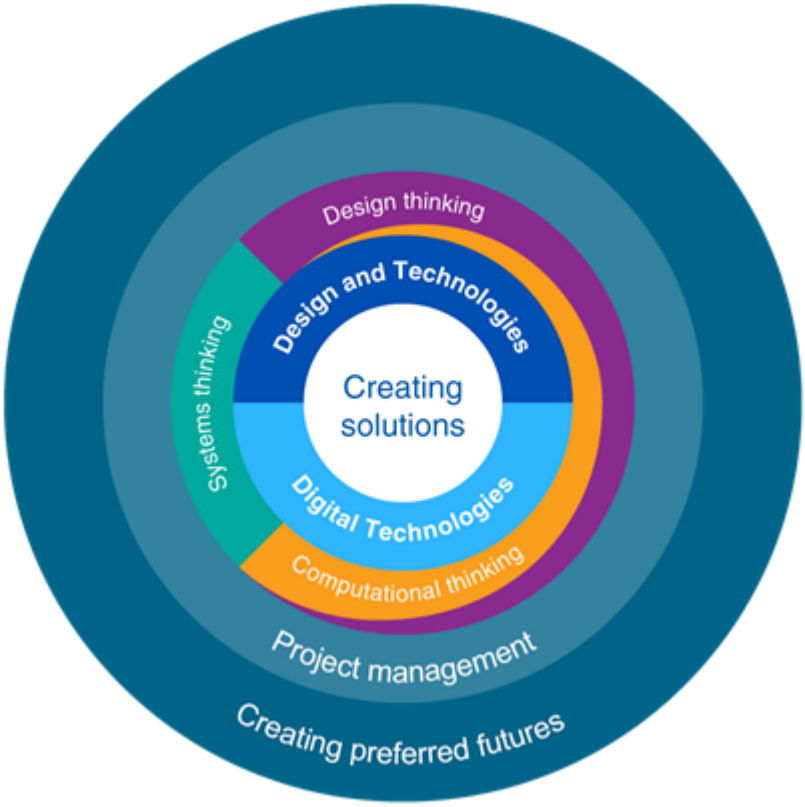

Figure 1 : Relationship between key ideas and Technologies subjects

The curriculum for each Technologies subject is written in bands of year levels:

- Foundation –Year 2

- Years 3 and 4
- Years 5 and 6
- Years 7 and 8
- Years 9 and 10.

Strands

Knowledge, understanding and skills in each subject are presented through two related strands:

- Knowledge and understanding
- Processes and production skills.

Table 1 outlines the focus of knowledge, understanding and skills across the Technologies learning area Foundation to Year 10.

Design and Technologies	Digital Technologies
Knowledge and understanding	**Knowledge and understanding**
Technologies and society • the use, development and impact of technologies in people's lives ***Technologies contexts*** • technologies and design across a range of technologies contexts	***Digital systems*** • the components of digital systems: hardware, software and networks and their use ***Representation of data*** • how data are represented and structured symbolically
Processes and production skills	**Processes and production skills**
Creating designed solutions by: • investigating • generating • producing • evaluating • collaborating and managing	***Collecting, managing and analysing data*** ***Creating digital solutions by***: • defining • designing • implementing • evaluating • collaborating and managing

Table 1: Design and Technologies and Digital Technologies content structure

Teachers can select technologies-specific content from the ***Knowledge and understanding*** strand and students can apply skills from the ***Processes and production skills*** strand to that content.

The common strand structure provides an opportunity to highlight similarities across the two subjects that will facilitate integrated approaches to teaching.

Key ideas in the Technologies curriculum

Overarching idea: Creating preferred futures

The Technologies curriculum provides students with opportunities to consider how solutions that are created now will be used in the future. Students will identify the possible benefits and risks of creating solutions. They will use critical and creative thinking to weigh up possible short and long term impacts.

As students progress through the Technologies curriculum, they will begin to identify possible and probable futures, and their preferences for the future. They develop solutions to meet needs considering impacts on liveability, economic prosperity and environmental sustainability. Students will learn to recognise that views about the priority of the benefits and risks will vary and that preferred futures are contested.

Project management

Students will develop skills to manage projects to successful completion through planning, organising and monitoring timelines, activities and the use of resources. This includes considering resources and constraints to develop resource, finance, work and time plans; assessing and managing risks; making decisions; controlling quality; evaluating processes and collaborating and communicating with others at different stages of the process.

Students are taught to plan for sustainable use of resources when managing projects and take into account ethical, health and safety considerations and personal and social beliefs and values.

Thinking in Technologies

Systems thinking

A system is an organised group of related objects or components that form a whole. Systems thinking is a holistic approach to the identification and solving of problems where the focal points are treated as components of a system, and their interactions and interrelationships are analysed individually to see how they influence the functioning of the entire system.

In Design and Technologies the success of designed solutions includes the generation of ideas and decisions made throughout design processes. It requires students to understand systems and work with complexity, uncertainty and risk. Students recognise the connectedness of and interactions between people, places and events in local and wider world contexts and consider the impact their designs and actions have in a connected world.

Participating in and shaping the future of information and digital systems is an integral part of learning in Digital Technologies. Understanding the complexity of systems and the interdependence of components is necessary to create timely solutions to technical, economic and social problems. Implementation of digital solutions often has consequences for the people who use and engage with the system, and may introduce unintended costs or benefits that impact the present or future society.

Design thinking

Design thinking involves the use of strategies for understanding design needs and opportunities, visualising and generating creative and innovative ideas, planning, and analysing and evaluating those ideas that best meet the criteria for success.

Design thinking underpins learning in Design and Technologies. Design processes require students to identify and investigate a need or opportunity; generate, plan and realise designed solutions; and evaluate products and processes. Consideration of economic, environmental and social impacts that result from designed solutions are core to design thinking, design processes and Design and Technologies.

When developing solutions in Digital Technologies, students explore, analyse and develop ideas based on data, inputs and human interactions. When students design a solution to a problem they consider how users will be presented with data, the degree of interaction with that data and the various types of computational processing. For example, designing a maze; writing precise and accurate sequences of instructions to move a robot through the maze or testing the program and modifying the solution.

Computational thinking

Computational thinking is a problem-solving method that is applied to create solutions that can be implemented using digital technologies. It involves integrating strategies, such as organising data logically, breaking down problems into parts, interpreting patterns and models and designing and implementing algorithms.

Computational thinking is used when specifying and implementing algorithmic solutions to problems in Digital Technologies. For a computer to be able to process data through a series of logical and ordered steps, students must be able to take an abstract idea and break it down into defined, simple tasks that produce an outcome. This may include analysing trends in data, responding to user input under certain preconditions or predicting the outcome of a simulation.

This type of thinking is used in Design and Technologies during different phases of a design process when computation is needed to quantify data and solve problems. Examples include when calculating costs, testing materials and components, comparing performance, or modelling trends.

Band descriptions

Band descriptions provide information about the learning contexts that apply to the content descriptions and achievement standards in each Technologies subject in each band. They also emphasise the interrelated nature of the two strands and the expectation that planning will involve integration of content from across the strands.

Content descriptions

Content descriptions at each band describe the knowledge, understanding and skills that teachers are expected to teach and students are expected to learn. A concept or skill introduced in one band may be revisited, strengthened and extended in later bands as needed. Content descriptions do not prescribe approaches to teaching.

Content descriptions in each subject across the bands focus on similar organising elements that present a developmental sequence of concepts, skills and processes.

Content elaborations

Content elaborations are provided for each content description in Foundation to Year 10 to illustrate content. They are intended to help teachers in developing a shared understanding of the content descriptions. They are not intended to be comprehensive content points that all students need to be taught nor do they encompass every aspect of a content description.

Achievement standards

Across Foundation to Year 10, achievement standards indicate the quality of learning that students should typically demonstrate by a particular point in their schooling. An achievement standard describes the quality of learning (the depth of conceptual understanding and the sophistication of skills) that would indicate the student is well-placed to commence the learning required at the next level of achievement.

The sequence of achievement standards in each Technologies subject describes progress in the subject, demonstrating a broad sequence of expected learning by the end of the band. This sequence provides teachers with a framework for development in each Technologies subject.

The achievement standards for Technologies reflect the distinctive practices of each subject along with aspects of learning that are common to the Technologies subjects. Subject-specific terms and organisation reflect the essential characteristics of learning in each subject.

The achievement standards also reflect differences in the nature and scope of the learning in each subject, as well as the relationship between the interrelated strands: ***Knowledge and understanding*** and ***Processes and production skills***.

Achievement standards will be accompanied by portfolios of annotated student work samples that illustrate the expected learning and help teachers to make judgments about whether students have achieved the standard.

Glossary

A glossary is provided to support a shared understanding of key terms used in the curriculum.

The Australian Curriculum: Design and Technologies (F–10) comprises two related strands:

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

In Design and Technologies, creating designed solutions is also expressed as 'designing and producing' or 'design and produce' as a means of abbreviating the skills needed to create designed solutions by investigating, generating, producing, evaluating, and collaborating and managing.

Table 2 outlines the focus of expected knowledge, understanding and skills in Design and Technologies F–10 and Figure 2 illustrates the relationship between the Design and Technologies strands.

Design and Technologies	
Design and Technologies knowledge and understanding	**Design and Technologies processes and production skills**
Technologies and society • the use, development and impact of technologies in people's lives ***Technologies contexts*** • technologies and design across a range of technologies contexts	***Creating designed solutions by:*** • investigating • generating • producing • evaluating • collaborating and managing

Table 2: Design and Technologies content structure

Figure 2: Relationship between the Design and Technologies strands

Relationship between the strands

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).

Design and Technologies knowledge and understanding

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

Technologies and society

The Technologies and society content descriptions focus on how people use and develop technologies taking into account 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

The Technologies contexts content descriptions provide a framework within which students can gain knowledge and understanding about technologies and design across a range of technologies contexts. These content descriptions focus on the characteristics and properties of technologies and how they can be used to create innovative designed solutions.

The technologies contexts provide a progression of learning from Foundation – Year 8 and optionally to Year 9–10 or lead to more specialised Technologies subjects in Year 9 and 10. They also reflect national priorities including workforce needs, food security and sustainable food and fibre production and health and wellbeing priorities.

The prescribed technologies contexts for Foundation – Year 8 are described below. The band descriptions show how many times each technologies context is addressed in a band.

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 resources diminish. Students will progressively develop knowledge and understanding of how forces and the properties of materials affect the behaviour and performance of designed engineering solutions.

Food and fibre production

Food and fibre are the human-produced or harvested resources used to directly sustain human life and are produced in managed environments such as farms and plantations or harvested from wild stocks. Challenges for world food and fibre production include an increasing world population, 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. Students will progressively develop knowledge and understanding about the managed systems that produce food and fibre through creating designed solutions. (***Food and fibre production*** includes ***Food specialisations*** from F–4.) See also: Australian Curriculum connections − Food and fibre production in the Australian Curriculum.

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 to 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, sound nutrition principles and food preparation skills when making food decisions to help better prepare them for their future lives. Students will progressively develop knowledge and understanding about the nature of food and food safety, and how to make informed and appropriate food preparation choices when experimenting with and preparing food in a sustainable manner. See also: Australian Curriculum connections – Food and nutrition in the Australian Curriculum.

Materials and technologies specialisations

Materials and technologies specialisations is focused 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 human-made environment for communication, housing, employment, medicine, recreation and transport; however, we also face increasing concerns related to sustainability. Students need to develop the confidence to make ethical and sustainable decisions about solutions and the processes used to make them. 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 discretely in the development of products or through producing designed solutions for a technologies specialisation, for example architecture, electronics, graphics technologies or fashion.

Types of designed solutions

Across each band from Foundation – Year 8, students will have the opportunity to produce at least three types of designed solutions (product, service and environment) through the technologies contexts identified for a band.

These different designed solutions have been specified to give students opportunities to engage with a broad range of design thinking and production skills. For example, in Year 5−6 students may design and produce an engineered product, a food and fibre production environment, a food specialisations service and a materials or technologies specialisations product. Whereas in another school students may design and produce an engineered environment, a food and fibre production service, a food specialisations product and a materials and technologies specialisation product. The combination of contexts and types of designed solutions is a school decision.

Figure 3 outlines the relationship between technologies contexts and types of designed solutions.

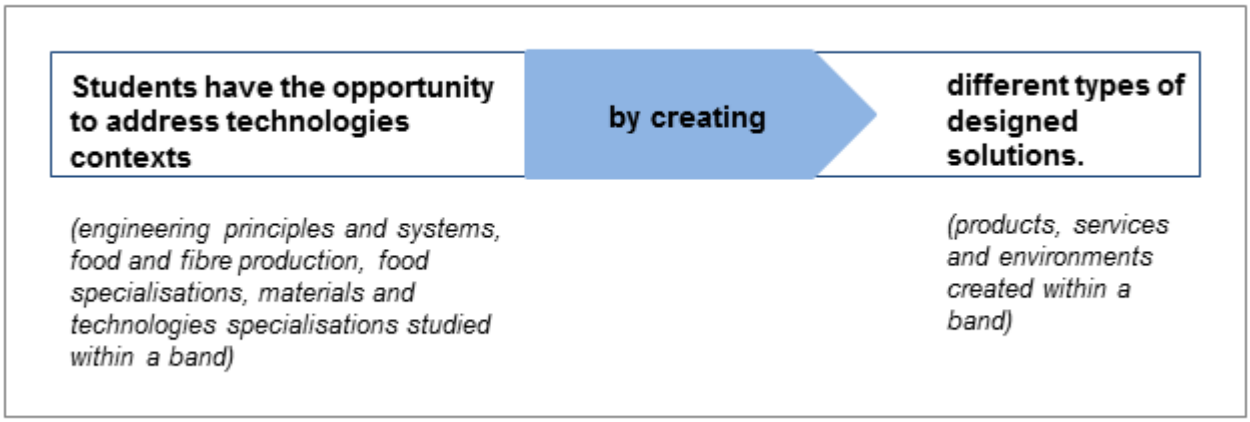

Figure 3: Relationship between technologies contexts and types of designed solutions

Design and Technologies processes and production skills

The Design and Technologies processes and production skills strand is based on the major aspects of design thinking, design processes and production processes. The content descriptions in this strand reflect a design process and would typically be addressed through a design brief.

The Design and Technologies processes and production skills strand focuses on creating designed solutions by:

- investigating
- generating
- producing
- evaluating
- collaborating and managing.

The processes and production skills that students will use throughout a design project are described below.

Investigating

Investigating involves students critiquing, exploring and investigating needs, opportunities and information. As creators and consumers they will critically reflect on the intention, purpose and operation of technologies and designed solutions. Critiquing encourages students to examine values, analyse, 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 the needs of society. They progressively develop effective investigation strategies and consider the contribution of technologies to their lives and make judgments about them. Students may respond to design briefs or develop design briefs in response to needs and opportunities.

Generating

Generating involves students in developing and communicating ideas for a range of audiences. Students create change, 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, group or wider community. Generating creative and innovative ideas involves thinking differently; it entails proposing new approaches to existing problems 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 will evaluate, justify and synthesise what they learn and discover. They will use graphical representation techniques when they draw, sketch, model and create innovative ideas that focus on high-quality designed solutions.

Producing

Students learn and apply a variety of skills and techniques to make products, services or environments 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 physical models supports the production of successful designed solutions.

Evaluating

Students evaluate and make judgments throughout a design process and about the quality and effectiveness of their designed solutions and those of others. They identify criteria for success. In the early years the teacher may guide the development of these criteria. Progressively students develop criteria which become increasingly more comprehensive. Students consider the implications and consequences of actions and decision-making. They determine effective ways to test and judge their designed solutions. They reflect on processes and transfer their learning to other design opportunities.

Collaborating and managing

Students learn 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. Students progress from planning steps in a project through to more complex project management activities that consider various factors such as time, cost, risk and quality control.

The Australian Curriculum: Digital Technologies (F–10) comprises two related strands:

- Digital Technologies knowledge and understanding – the information system components of data, and digital systems (hardware, software and networks)

- Digital Technologies processes and production skills – using digital systems to create ideas and information, and to define, design and implement digital solutions, and evaluate these solutions and existing information systems against specified criteria.

Table 3 outlines the focus of expected knowledge, understanding and skills in Digital Technologies F–10 and Figure 4 illustrates the relationship between the Digital Technologies strands.

Digital Technologies	
Digital Technologies knowledge and understanding	**Digital Technologies processes and production skills**
Digital systems • the components of digital systems: hardware, software and networks and their use ***Representation of data*** • how data are represented and structured symbolically	***Collecting, managing and analysing data*** ***Creating digital solutions by:*** • defining • designing • implementing • evaluating • collaborating and managing

Table 3: Digital Technologies content structure

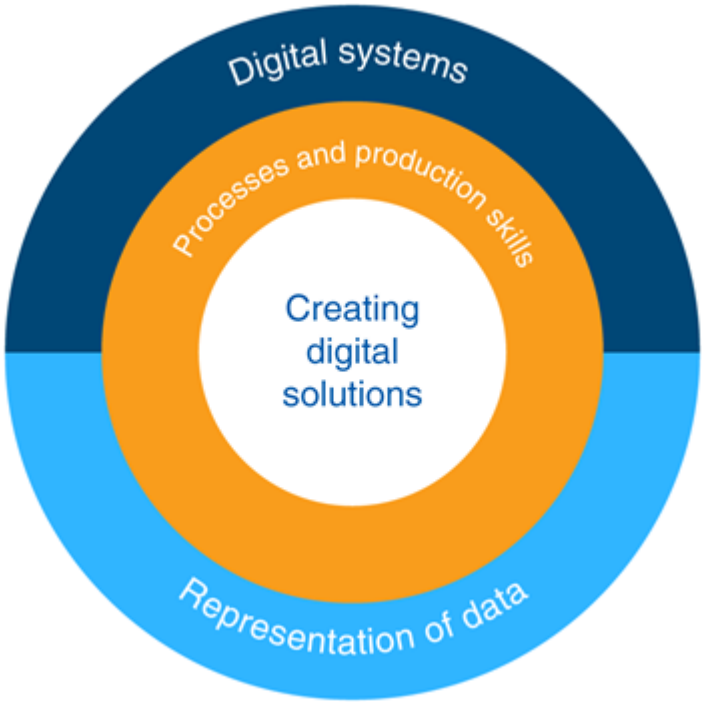

Figure 4: Relationship between the Digital Technologies strands

Relationship between the strands

Together, the two strands provide students with knowledge, understanding and skills through which they can safely and ethically exploit the capacity of information systems (people, data, processes, digital systems and their interactions) to systematically transform data into solutions that respond to the needs of individuals, society, the economy and the environment. Teaching and learning programs will typically integrate these, as content in processes and production skills frequently draws on understanding of concepts in the knowledge and understanding strand. For more information see Learning in Digital Technologies.

The strands are based on key concepts that provide a framework for knowledge and practice in Digital Technologies. For more information see Key concepts.

Digital Technologies knowledge and understanding

This strand focuses on developing the underpinning knowledge and understanding of information systems: digital systems and representation of data.

Digital systems

The digital systems content descriptions focus on the components of digital systems: hardware, software and networks. In the early years students learn about a range of hardware and software and progress to an understanding of how data are transmitted between components within a system, and how the hardware and software interact to form networks.

Representation of data

The representation of data content descriptions focus on how data are represented and structured symbolically for use by digital systems. Different types of data are studied in the bands including text, numeric, images (still and moving) and sound from Foundation – Year 8 and then categorical and relational data in Year 9 and 10.

Digital Technologies processes and production skills

This strand focuses on developing skills to create digital solutions to problems and opportunities. The Digital Technologies processes and production skills strand focuses on:

- collecting, managing and analysing data, which involves the nature and properties of data, how they are collected and interpreted using a range of digital systems and peripheral devices and interpreting data when creating information
- defining problems and designing digital solutions (Foundation – Year 2), which develops into defining problems and designing, implementing and evaluating solutions that have been developed by students, and evaluating how well existing information systems meet different needs (Year 3 – 10)
- communicating ideas and information (Foundation – Year 4), which develops into managing, creating and communicating ideas and information (Year 5 – 6) through to independently and collaboratively managing projects to create interactive solutions (Year 7 – 10). This involves creating and communicating information, especially online by creating websites, and interacting safely using appropriate technical and social protocols.

These require skills in using digital systems; critical and creative thinking including systems, design and computational thinking.

Computational thinking

The curriculum is designed so that students will develop and use increasingly sophisticated computational thinking skills, and processes, techniques and digital systems to create solutions to address specific problems, opportunities or needs. Computational thinking is a process of recognising aspects of computation in the world and being able to think logically, algorithmically, recursively and abstractly. Students will also apply procedural techniques and processing skills when creating, communicating and sharing ideas and information, and managing projects.

Key concepts

A number of key concepts underpin the Digital Technologies curriculum. These establish a way of thinking about problems, opportunities and information systems and provide a framework for knowledge and practice. The key concepts are:

- Abstraction, which underpins all content, particularly the content descriptions relating to the concepts of ***data representation*** and ***specification, algorithms and implementation***

- **Data collection** (properties, sources and collection of data), **data representation** (symbolism and separation) and **data interpretation** (patterns and contexts)
- **Specification** (descriptions and techniques), **algorithms** (following and describing) and **implementation** (translating and programming)
- **Digital systems** (hardware, software, and networks and the internet)
- **Interactions** (people and digital systems, data and processes) and **impacts** (sustainability and empowerment).

The concepts of abstraction, data collection, representation and interpretation, specification, algorithms and implementation correspond to the key elements of computational thinking. Collectively these concepts span the key ideas about the organisation, representation and automation of digital solutions and information. They can be explored in non-digital or digital contexts and are likely to underpin future digital systems. They provide a language and perspective that students and teachers can use when discussing digital technologies.

Abstraction

Abstraction involves hiding details of an idea, problem or solution that are not relevant, to focus on a manageable number of aspects. Abstraction is a natural part of communication: people rarely communicate every detail, because many details are not relevant in a given context. The idea of abstraction can be acquired from an early age. For example, when students are asked how to make toast for breakfast, they do not mention all steps explicitly, assuming that the listener is an intelligent implementer of the abstract instructions.

Central to managing the complexity of information systems is the ability to 'temporarily ignore' the internal details of the subcomponents of larger specifications, algorithms, systems or interactions. In digital systems, everything must be broken down into simple instructions.

Data collection, representation and interpretation

The concepts that are about data, focus on the properties of data, how they are collected and represented, and how they are interpreted in context to produce information. These concepts in Digital Technologies build on a corresponding Statistics and Probability strand in the Mathematics curriculum. The Digital Technologies curriculum provides a deeper understanding of the nature of data and their representation, and computational skills for interpreting data. The data concepts provide rich opportunities for authentic data exploration in other learning areas while developing data processing and visualisation skills.

Data collection describes the numerical, categorical and textual facts measured, collected or calculated as the basis for creating information and its binary representation in digital systems. Data collection is addressed in the processes and production skills strand. ***Data representation*** describes how data are represented and structured symbolically for storage and communication, by people and in digital systems, and is addressed in the knowledge and understanding strand. ***Data interpretation*** describes the processes of extracting meaning from data and is addressed in the processes and production strand.

Specification, algorithms and implementation

The concepts specification, algorithms and implementation focus on the precise definition and communication of problems and their solutions. This begins with the description of tasks and concludes in the accurate definition of computational problems and their algorithmic solutions. This concept draws from logic, algebra and the language of mathematics, and can be related to the scientific method of recording experiments in science.

Specification describes the process of defining and communicating a problem precisely and clearly. For example, explaining the need to direct a robot to move in a particular way. An ***algorithm*** is a precise description of the steps and decisions needed to solve a problem. Algorithms will need to be tested before the final solution can be implemented. Anyone who has followed or given instructions, or navigated using directions, has used an algorithm. These generic skills can be developed without programming. For example, students can follow the steps within a recipe or describe directions to locate items. ***Implementation*** describes the automation of an algorithm, typically by using appropriate software or writing a computer program. These concepts are addressed in the processes and production skills strand.

Digital systems

The digital systems concept focuses on the components of digital systems: hardware and software (computer architecture and the operating system), and networks and the internet (wireless, mobile and wired networks and protocols). This concept is addressed in both strands. The broader definition of an information system that includes data, people, processes and digital systems falls under the ***interactions and impacts*** concept below.

Interactions and impacts

The interactions and impacts concepts focus on all aspects of human interaction with and through information systems, and the enormous potential for positive and negative economic, environmental and social impacts enabled by these systems. Interactions and impacts are addressed in the processes and production skills strand.

Interactions refers to all human interactions with information systems, especially user interfaces and experiences, and human–human interactions including communication and collaboration facilitated by digital systems. This concept also addresses methods for protecting stored and communicated data and information.

Impacts describes analysing and predicting the extent to which personal, economic, environmental and social needs are met through existing and emerging digital technologies; and appreciating the transformative potential of digital technologies in people's lives. It also involves consideration of the relationship between information systems and society and in particular the ethical and legal obligations of individuals and organisations regarding ownership and privacy of data and information.

Types of digital solutions

Across each band students will create digital solutions that will use data, require interactions with users and within systems, and will have impacts on people, the economy and environments. Solutions may be developed using combinations of readily available hardware and software applications, and/or specific instructions provided through programming. Some examples of solutions are instructions for a robot, an adventure game, products featuring interactive multimedia including digital stories, animations and websites.

All young Australians are entitled to engage with the Australian Curriculum: Technologies to provide a balanced and substantial foundation in the knowledge and skills of each subject.

Complementing the band descriptions of the curriculum, the following advice describes the nature of learners and the curriculum across the following year-groupings:

- Foundation – Year 2: typically students from 5 to 8 years of age
- Year 3 – 6: typically students from 8 to 12 years of age
- Year 7 – 10: typically students from 12 to 16 years of age.

Foundation – Year 2

Students bring to school diverse backgrounds and a range of experiences with technologies. The Technologies curriculum builds on these as rich resources for further learning in each of the Technologies subjects.

In Foundation – Year 2, the Technologies curriculum builds on the ***Early Years Learning Framework*** and its key learning outcomes: children have a strong sense of identity; children are connected with, and contribute to, their world; children have a strong sense of wellbeing; children are confident and involved learners; and children are effective communicators.

In the early years students are curious about their world and are interested in exploring it. In Technologies, students have opportunities to learn through purposeful and directed play to develop attitudes of care about the places and resources they use. Through these processes they identify relationships between imagined and virtual worlds and the real world, between people and products, and between resources and environments (systems thinking). They explore materials, tools and equipment and use drawing and modelling to communicate their design ideas. Students learn about and experience connections between technologies and the designed world (design thinking). They begin to learn the importance of preparing precise instructions when solving problems using digital systems (computational thinking), creating ideas and information and sharing them online with known people.

In Design and Technologies and Digital Technologies children create imaginary situations in which they change the meaning of objects and actions as they invent new ideas and engage in futures thinking (for them). They also explore real-world concepts, rules and events as they role-play what is familiar and of interest to them.

Year 3 – 6

Through the primary years, students draw on their growing experience of family, school and the wider community to develop their understanding of the world and their relationships with others. During these years of schooling, students' thought processes become more complex and consistent, and they gradually become more independent. Students also develop their capacity to work in teams. They develop a sense of social, ethical and environmental responsibility and are interested in and concerned about the future (systems thinking). Students may share changes in their own thinking and making, giving reasons for their actions and explaining and demonstrating their organisation and sequence of ideas. They begin to recognise and appreciate the different ways in which others think and respond to problems and situations, including those with a regional perspective. They respond resourcefully to a range of design and computing problems and situations using creative and innovative ideas to realise solutions. They communicate and record their ideas in diagrams and drawings using a range of technologies. They explain the main functions of their solutions and the systems, materials, tools and equipment which could be used.

In these years, learning in Technologies occurs through integrated curriculum and Technologies subject-specific approaches. Students' activities in the early years develop into an interest in learning technologies thinking, processes and production. Students increasingly recognise the connections between Technologies and other learning areas.

Year 7 – 10

As students move into adolescence, they undergo a range of important physical, cognitive, emotional and social changes. Students often begin to question established community conventions, practices and values. Their interests extend well beyond their own communities and they develop their concerns about wider social, ethical and sustainability issues. Students in this age range increasingly look for and value learning they perceive as relevant, consistent with personal goals, and leading to important outcomes. Increasingly they analyse and work with more abstract concepts, consider the implications of individual and community actions and are keen to examine evidence prior to developing ideas.

In the Technologies learning area, students use technologies knowledge and understanding; technologies processes and production skills; and systems, design, and/or computational thinking to solve and produce creative solutions to problems, needs or opportunities. They communicate and record their ideas using a range of media and technologies. These specialised problem-solving activities will be sophisticated, acknowledge the complexities of contemporary life and may make connections to related specialised occupations and further study.

Students develop a global perspective; they have opportunities to understand the complex interdependencies involved in the development of technologies and between the developer and user in their solutions, and how these can contribute to preferred futures. Students develop an understanding of the interdependence of technologies development, values, beliefs and environment (systems thinking). Through undertaking technologies processes students develop systems, design and computational thinking; and organisational and project management skills.

In Design and Technologies students are actively engaged in the processes of creating designed solutions for personal, domestic, commercial and global settings for sustainable and preferred futures. For younger children, this usually involves personal and family settings where there is an immediate, direct and tangible outcome, and where playfulness and practical exploration are a focus. Students work independently and collaboratively on projects as they critique, explore and investigate needs and opportunities; generate, develop and evaluate ideas; and plan, produce and evaluate designed solutions. They use criteria for success that are predetermined, negotiated with the class or developed by students.

Implementing the curriculum

Technologies contexts

Teaching and learning programs will typically integrate content from each strand. By the end of each band students will have had the opportunity to create different types of designed solutions that address the technologies contexts: Engineering principles and systems, Food and fibre production, Food specialisations and Materials and technologies specialisations. For breadth of study, the curriculum has been developed to enable students to complete at least one product, one service and one environment within each band. ***See Figure 3.*** The combination of technologies contexts and types of designed solutions is a school decision. Students will work on design projects that develop processes and production skills in investigating; generating; producing; evaluating; and collaborating and managing.

Content descriptions for technologies contexts provide the stimulus for teachers to develop teaching and learning programs. Typically, a unit of learning in Design and Technologies would entail the integration of Design and Technologies knowledge and understanding content descriptions (Technologies and society and at least one Technologies context) and the Design and Technologies processes and production content descriptions. It may be possible to address multiple technologies contexts in a unit. The unit would be centred on a technologies context and may include a design brief.

Design briefs

A design brief is a concise statement clarifying the project task and defining the need or opportunity to be resolved after some analysis, investigation and research. It usually identifies the users, criteria for success, constraints, available resources, timeframe for the project and may include possible consequences and impacts. A design brief is a tool for clarifying a problem when self-generated, or a guideline for design when externally imposed. In earlier years of learning, design briefs may be fairly prescriptive and teacher directed. As design skills and design thinking develop, students should have greater input into the development of design briefs for specific identified needs or opportunities.

Factors influencing design decisions

In Design and Technologies students are encouraged to apply their knowledge and practical skills and processes when using technologies and other resources to create innovative solutions that meet current and future needs. In doing so, they consider economic, environmental and social sustainability. Students progress from considering environmental sustainability factors in the early years to then also considering social sustainability factors in primary years and extending the approach to include economic sustainability factors in later years. Students make ethical decisions about the use of design and technologies, considering health and sustainability implications. They consider aesthetic and functional requirements. They also consider the suitability of enterprise and marketing for the designed solution.

Enterprise and marketing in the early years of school focuses on local audiences and promotion through displays and presentations and sharing products and services from a personal perspective. In the later years enterprise and marketing becomes more oriented to the perspectives of others, with the use of more sophisticated mechanisms for sharing services and products. Students become more enterprising in developing and promoting designed solutions. Marketing increasingly draws on social and sustainability considerations, recognising wider societal acknowledgement of ethics and futures thinking. The Design and Technologies curriculum identifies work health and safety issues with increasing complexity in each band description to reflect students' developing knowledge, understanding and skills in the use of a range of technologies. See also Implications for teaching, assessment and reporting − Safety.

Progression of production skills

Students will spend a substantial amount of time engaged in developing processes and production skills. Through the practical application of technologies, students develop dexterity, fine motor skills and coordination through experiential activities. The quality of their solutions should improve as their production skills improve. Students produce designed solutions using production processes involving natural and fabricated materials, components and digital technologies. The types of technologies they use may become progressively more sophisticated. When students generate, develop and communicate their ideas to a range of audiences and for design tasks in a range of technologies contexts, they develop graphical representation skills. They also develop graphics skills when the focus of the design project is on producing a graphics product, service or environment. Students progress from basic drawing and modelling to using technical terms and techniques and using digital technologies to produce three-dimensional drawings and prototypes.

Managing projects and collaboration

In Design and Technologies, in the early years, students are actively involved in projects. They plan (with teacher support) simple steps and follow directions to complete their own projects or manage their own role within team projects. As students progress through primary school they take more responsibility for specific roles within a project with increasing levels of collaboration and team work. In the early years of secondary school students begin to manage projects, with support from peers and teachers. In the later years students use their increasing skills to fully manage projects and teams. They use digital tools to support their project management. They coordinate teams and collaborate with others locally and globally.

In Digital Technologies students are actively engaged in the process of defining problems and opportunities, designing, implementing and evaluating digital solutions, and creating and sharing information that meets a range of current and future needs. These solutions and information are created through the application of computational and design thinking, and technical skills. The key concepts are progressively developed through the bands as presented in the scope and sequence chart. The sophistication of the key concepts and the technical skills progressively increase and are based on the foundational knowledge, understanding and skills gained in earlier bands.

Implementing the curriculum

Teaching and learning programs will typically integrate content from each strand and focus on a digital technologies application in a unit of work. For example, interactive multimedia production, game development, robotic and automated systems, interactive website development, data management systems, application development, artificial intelligence, simulation and modelling, and networking systems. An application would not need to cover all content descriptions and therefore a range of contexts may be included over a band. When planning teaching and learning programs teachers should also consider the relationship between each of the curriculum components (band descriptions, content descriptions, elaborations and achievement standards) and how they contribute to the development of coherent programs.

Integrating content from the strands

Content from the Processes and production skills strand frequently draws on understanding of concepts in the Knowledge and understanding strand. For example, learning to acquire, interpret, manipulate, store and communicate data and information to meet a range of purposes (processes and production skills) involves an understanding of the representation of data, the basis for creating solutions (knowledge and understanding); learning to select and use the most appropriate digital systems for specific tasks with consideration of users and interface (processes and production skills) draws on knowledge of the capabilities and capacities of digital systems (knowledge and understanding).

These strands are also integrated when students undertake projects. For example, when defining, designing, implementing and evaluating a game solution, students will need an understanding of how data are represented in digital systems, how data will be input by the user and how they will be transmitted within the digital system. They draw on this knowledge when stating what is required of the solution (defining), designing the game's interface and instructions, implementing the solution using specific software functions and items of hardware, where appropriate, and then evaluating it against the stated needs.

Creating digital solutions and problem-solving

Students use their knowledge and understanding of data and digital systems to apply processes and production skills as they create digital solutions. Students apply the four-stage process of defining, designing, implementing and evaluating when individually or collaboratively managing projects to create digital solutions. As problems become more complex, and solutions more sophisticated, it becomes increasingly necessary to develop skills in abstraction. Solutions may be developed using combinations of readily available hardware and software applications, and/or specific instructions provided through programming.

Students will also engage in learning activities that do not require the full use of the process. For example, in the early years students will experiment with different ways of using digital systems to capture and present data; they will explore alternative sets of instructions through guided play when writing simple sequences of steps. This means there is greater flexibility about when different content descriptions are introduced into the learning program. It may, for example, be appropriate to sequence the content descriptions relating to data to complement student learning in Science and Mathematics.

In the later years students could start developing a website by using an existing website template and adding some interactive components or connection with data structures without engaging in the design stage (only implementation of the solution). However, as project work is introduced it makes sense to incorporate all the content descriptions related to the four-stage process, increasing the breadth or depth of coverage over the band period through different projects.

Factors influencing design decisions

When students are problem-solving and creating and communicating information, they will apply skills and protocols to meet their legal, safety, cultural and ethical obligations and responsibilities. For example, protocols such as using acceptable language, acknowledging different cultural practices, and using passwords and privacy settings on social media sites are applied to increase the security of personal data and to respect participants in online environments. In Digital Technologies students develop understanding of the characteristics of, and the relationship and interconnectedness between, the components of information systems (people, data, processes and digital systems) in authentic situations. Students apply systems thinking skills as they progress from identifying how information systems are used in familiar settings, to evaluating how well these systems meet current and future sustainability needs, to suggesting innovative ways that information systems can be used to transform lives and society.

Managing projects and collaboration

In Digital Technologies, students progress from managing the independent creation of ideas and information to managing collaborative projects in online environments. Managing the independent creation of ideas and information involves activities such as acquiring and checking data, considering and applying appropriate social and technical protocols, and selecting appropriate hardware and software. Managing projects involves identifying and sequencing tasks, determining the required resources (data and digital systems), considering economic, environmental and social factors and allocating the time to each task so that the project is completed on time.

Collaborative projects are more complex as tasks need to be allocated to different team members, priorities set (what task is dependent on the completion of another), strategies for monitoring progress determined and a file management system established so that file types and versions are clearly identified. In the later years students also apply an iterative process for managing projects by constantly reviewing and revisiting steps rather than following a lock-step project plan. Throughout collaborative projects the team will manage the security and organisation of their data and information and regulate their social behaviour.

ACARA is committed to the development of a high-quality curriculum for all Australian students that promotes excellence and equity in education.

All students are entitled to rigorous, relevant and engaging learning programs drawn from the Australian Curriculum: Technologies. Teachers take account of the range of their students' current levels of learning, strengths, goals and interests and make adjustments where necessary. The three-dimensional design of the Australian Curriculum, comprising learning areas, general capabilities and cross-curriculum priorities, provides teachers with flexibility to cater for the diverse needs of students across Australia and to personalise their learning.

More detailed advice has been developed for schools and teachers on using the Australian Curriculum to meet diverse learning needs. It is available under Student Diversity on the Australian Curriculum website.

Students with disability

The *Disability Discrimination Act 1992* and the *Disability Standards for Education 2005* require education and training service providers to support the rights of students with disability to access the curriculum on the same basis as students without disability.

Many students with disability are able to achieve educational standards commensurate with their peers, as long as the necessary adjustments are made to the way in which they are taught and to the means through which they demonstrate their learning.

In some cases, curriculum adjustments are necessary to provide equitable opportunities for students to access age-equivalent content in the Australian Curriculum: Technologies. Teachers can draw from content at different levels along the Foundation – Year 10 sequence. Teachers can also use the general capabilities learning continua in Literacy, Numeracy and Personal and social capability to adjust the focus of learning according to individual student need.

Adjustments to the delivery of some practical aspects of lessons will be necessary to ensure some students with physical disability can access, participate, and achieve on the same basis as their peers. This might involve students using modified tools, materials or equipment to create solutions. Teachers may also need to consider adjustments to assessment of students with disability to ensure student achievement and demonstration of learning is appropriately measured.

English as an additional language or dialect

Students for whom English is an additional language or dialect (EAL/D) enter Australian schools at different ages and at different stages of English language learning and have various educational backgrounds in their first languages. While many EAL/D students bring already highly developed literacy (and numeracy) skills in their own language to their learning of Standard Australian English, there are a significant number of students who are not literate in their first language, and have had little or no formal schooling.

While the aims of the Australian Curriculum: Technologies are the same for all students, EAL/D students must achieve these aims while simultaneously learning a new language and learning content and skills through that new language. These students may require additional time and support, along with teaching that explicitly addresses their language needs. Students who have had no formal schooling will need additional time and support in order to acquire skills for effective learning in formal settings.

A national *English as an Additional Language or Dialect: Teacher Resource* has been developed to support teachers in making the Australian Curriculum: Foundation – Year 10 in each learning area accessible to EAL/D students.

Gifted and talented students

Teachers can use the Australian Curriculum: Technologies flexibly to meet the individual learning needs of gifted and talented students.

Teachers can enrich student learning by providing students with opportunities to work with learning area content in more depth or breadth; emphasising specific aspects of the general capabilities learning continua (for example, the higher-order cognitive skills of the Critical and creative thinking capability); and/or focusing on cross-curriculum priorities. Teachers can also accelerate student learning by drawing on content from later band levels in the Australian Curriculum: Technologies and/or from local state and territory teaching and learning materials. Technologies education pedagogy and project-based learning allows students to take greater responsibility for their learning and allows them to make decisions based on findings from research, experimentation and testing of design ideas.

In the Australian Curriculum, the general capabilities encompass the knowledge, skills, behaviours and dispositions that, together with curriculum content in each learning area and the cross-curriculum priorities, will assist students to live and work successfully in the twenty-first century.

There are seven general capabilities:

- Literacy
- Numeracy
- Information and communication technology (ICT) capability

- Critical and creative thinking
- Personal and social capability
- Ethical understanding
- Intercultural understanding.

In the Australian Curriculum: Technologies, general capabilities are identified wherever they are developed or applied in content descriptions. They are also identified where they offer opportunities to add depth and richness to student learning through content elaborations.

Icons indicate where general capabilities have been identified in Technologies content. Teachers may find further opportunities to incorporate explicit teaching of the capabilities depending on their choice of activities. Students may also be encouraged to develop capabilities through personally relevant initiatives of their own design.

The following descriptions provide an overview of how general capabilities are addressed in the Australian Curriculum: Technologies. However, the emphasis on each general capability will vary from one Technologies subject to another. Detailed general capabilities materials, including learning continua, can be found on the Australian Curriculum website.

Literacy

Across the Australian Curriculum, students become literate as they develop the knowledge, skills and dispositions to interpret and use language confidently for learning and communicating in and out of school and for participating effectively in society. Literacy involves students in listening to, reading, viewing, speaking, writing and creating oral, print, visual and digital texts, and using and modifying language for different purposes in a range of contexts.

In Technologies, students develop literacy as they learn how to communicate ideas, concepts and detailed proposals to a variety of audiences; read and interpret detailed written instructions for specific technologies, often including diagrams and procedural writings such as software user manuals, design briefs, patterns and recipes; prepare accurate, annotated engineering drawings, software instructions and coding; write project outlines, briefs, concept and project management proposals, evaluations, engineering, life cycle and project analysis reports; and prepare detailed specifications for production.

By learning the literacy of technologies students understand that language varies according to context and they increase their ability to use language flexibly. Technologies vocabulary is often technical and includes specific terms for concepts, processes and production. Students learn to understand that much technological information is presented in the form of drawings, diagrams, flow charts, models, tables and graphs. They also learn the importance of listening, talking and discussing in technologies processes, especially in articulating, questioning and evaluating ideas.

Numeracy

Across the Australian Curriculum, students become numerate as they develop the knowledge and skills to use mathematics confidently across other learning areas at school and in their lives more broadly. Numeracy involves students in recognising and understanding the role of mathematics in the world and having the dispositions and capacities to use mathematical knowledge and skills purposefully.

The Technologies curriculum gives students opportunities to interpret and use mathematical knowledge and skills in a range of real-life situations. Students use number to calculate, measure and estimate; interpret and draw conclusions from statistics; measure and record throughout the process of generating 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 three-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.

Information and communication technology (ICT) capability

Across the Australian Curriculum, students develop ICT capability as they learn to use ICT effectively and appropriately to access, create and communicate information and ideas, solve problems and work collaboratively, and in their lives beyond school. The capability involves students in learning to make the most of the digital technologies available to them. They adapt to new ways of doing things as technologies evolve, and limit the risks to themselves and others in a digital environment.

All learning areas provide the content and contexts within which students develop and apply the knowledge, skills, behaviours and dispositions that comprise ICT capability. However it is more explicit and foregrounded in the Digital Technologies subject.

In Digital Technologies, students develop an understanding of the characteristics of data, digital systems, audiences, procedures and computational thinking. They apply this when they investigate, communicate and create digital solutions. Students learn to formulate problems, logically organise and analyse data and represent them in abstract forms. They automate solutions through algorithmic logic. Students decide the best combinations of data, procedures and human and physical resources to generate efficient and effective digital solutions. They create digital solutions that consider economic, environmental and social factors.

In Design and Technologies, key ICT concepts and skills are strengthened, complemented and extended. Students become familiar with and gain skills using a range of software applications and digital hardware that enable them to realise their design ideas. Students use ICT when they investigate and analyse information and evaluate design ideas and communicate and collaborate online. They develop design ideas; generate plans and diagrams to communicate their designs and produce solutions using digital technologies, for example creating simulations, drawings and models and manufacturing solutions (from basic drawing programs to computer-aided design/manufacture and rapid prototyping).

Critical and creative thinking

Across the Australian Curriculum, students develop capability in critical and creative thinking as they learn to generate and evaluate knowledge, clarify concepts and ideas, seek possibilities, consider alternatives and solve problems. Critical and creative thinking are integral to activities that require students to think broadly and deeply using skills, behaviours and dispositions such as reason, logic, resourcefulness, imagination and innovation in all learning areas at school and in their lives beyond school.

Students develop capability in critical and creative thinking as they imagine, generate, develop and critically evaluate ideas. They develop reasoning and the capacity for abstraction through challenging problems that do not have straightforward solutions. 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 digital tools, equipment and software helps students to build their visual and spatial thinking and to create solutions, products, services and environments.

Personal and social capability

Across the Australian Curriculum, students develop personal and social capability as they learn to understand themselves and others, and manage their relationships, lives, work and learning more effectively. The capability involves students in a range of practices including recognising and regulating emotions, developing empathy for others and understanding relationships, establishing and building positive relationships, making responsible decisions, working effectively in teams, handling challenging situations constructively and developing leadership skills.

Students develop personal and social capability as they engage in project management and development in a collaborative workspace. They direct their own learning, plan and carry out investigations, and become independent learners who can apply design thinking, technologies understanding and skills when making decisions. Students develop social and employability 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.

The Technologies learning area enhances students' personal and social capability by developing their social awareness. Students develop understanding of diversity by researching and identifying user needs. They 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.

Ethical understanding

Across the Australian Curriculum, students develop ethical understanding as they identify and investigate concepts, values, character traits and principles, and understand how reasoning can help ethical judgment. Ethical understanding involves students in building a strong personal and socially oriented, ethical outlook that helps them to manage context, conflict and uncertainty, and to develop an awareness of the influence that their values and behaviour have on others.

Students develop the capacity to understand and apply ethical and socially responsible principles when collaborating with others and creating, sharing and using technologies –materials, data, processes, tools and equipment. 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 the criteria of legality, environmental sustainability, economic viability, health, social and emotional responsibility and social awareness. They explore complex issues associated with technologies and consider possibilities. They are encouraged to develop informed values and attitudes.

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 operate.

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 in the school environment helps students to be ethical digital citizens.

Intercultural understanding

Across the Australian Curriculum, students develop intercultural understanding as they learn to value their own cultures, languages and beliefs, and those of others. They come to understand how personal, group and national identities are shaped, and the variable and changing nature of culture. The capability involves students in learning about and engaging with diverse cultures in ways that recognise commonalities and differences, create connections with others and cultivate mutual respect.

Students consider how technologies are used in diverse communities at local, national, regional and global levels, including their impact and potential to transform people's lives. They explore ways in which past and present practices enable people to use technologies to interact with one another across cultural boundaries. Students investigate how cultural identities and traditions influence the function and form of solutions, products, services and environments designed to meet the needs of daily life now and in the future.

In their interactions with others in online communities, students consider the dynamic and complex nature of cultures, including values, beliefs, practices and assumptions. They recognise and respond to the challenges of cultural diversity by applying appropriate social protocols. Students learn about the interactions between technologies and society and take responsibility for securing positive outcomes for members of all cultural groups including those faced with prejudice and misunderstanding.

There are three cross-curriculum priorities in the Australian Curriculum:

- Aboriginal and Torres Strait Islander histories and cultures
- Asia and Australia's engagement with Asia
- Sustainability.

The cross-curriculum priorities are embedded in the curriculum and will have a strong but varying presence depending on their relevance to each of the learning areas.

Aboriginal and Torres Strait Islander histories and cultures

In the Australian Curriculum: Technologies the priority of Aboriginal and Torres Strait Islander histories and cultures provides creative, engaging and diverse learning contexts for students to value and appreciate the contribution by the world's oldest continuous living cultures to past, present and emerging technologies.

Students identify and explore the rich and diverse knowledge and understandings of technologies employed by Aboriginal and Torres Strait Islander Peoples in past, present and future applications. They understand that the technologies of the world's first and most continuous culture often developed through intimate knowledge of Country/Place and Culture.

Students identify, explore, understand and analyse the interconnectedness between technologies and Identity, People, Culture and Country/Place. They explore how this intrinsic link guides Aboriginal and Torres Strait Islander People in sustaining environments, histories, cultures and identities. Students apply this knowledge and understanding within Design and Technologies and Digital Technologies to create appropriate and sustainable products, services and environments to meet personal, local, national, regional and global demands.

In the Technologies learning area, students explore how Aboriginal and Torres Strait Islander Peoples' capacity for innovation is evident through the incorporation and application of a range of traditional, contemporary and emerging technologies and practices to purposefully build and/or maintain cultural, community and economic capacity. Students apply this knowledge and understanding throughout the processes of observation, critical and creative thinking, action, experimentation and evaluation.

Asia and Australia's engagement with Asia

In the Australian Curriculum: Technologies the priority of Asia and Australia's engagement with Asia provides diverse and authentic contexts to develop knowledge and understanding of technologies processes and production and related cultural, social and ethical issues. It enables students to recognise that interaction between human activity and the diverse environments of the Asia region continues to create the need for creative solutions and collaboration with others, including Australians, and has significance for the rest of the world.

The Australian Curriculum: Technologies gives students opportunities to explore traditional, contemporary and emerging technological achievements in the countries of the Asia region. They investigate the contributions that Australia has made and is making to create products and services that meet a range of needs in the Asia region. Students apply this knowledge and understanding to create appropriate and sustainable products that reflect intercultural, creative and critical thinking. In the Technologies learning area, students learn to appreciate the diversity of the Asia region. They examine contributions that the peoples of the Asia region have made and continue to make to global technological advances. They consider the contributions that Australia has made and is making to the Asia region. Students explore Australia's rich and ongoing engagement with the peoples and countries of Asia to create appropriate products and services to meet personal, community, national, regional and global needs.

Sustainability

In the Australian Curriculum: Technologies the priority of sustainability provides authentic contexts for creating preferred futures. When students identify and critique a problem, need or opportunity; generate ideas and concepts; and create solutions, they give prime consideration to sustainability by anticipating and balancing economic, environmental and social impacts.

The Australian Curriculum: Technologies prepares students to take action to create more sustainable patterns of living. 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 curriculum reflects on human need and equity of access to limited resources. It recognises that actions are both individual and collective endeavours shared across local, regional and global communities and provides a basis for students 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.

In this learning area, students focus on the knowledge, understanding and skills necessary to choose technologies and systems with regard to costs and benefits. They evaluate the extent to which the process and designed solutions embrace sustainability. Students reflect on past and current practices, and assess new and emerging technologies from a sustainability perspective.

Learning in Technologies involves the use of knowledge, understanding and skills learned in other learning areas, particularly in English, Mathematics, Science, History, Geography, The Arts, Health and Physical Education and Economics and Business.

English

In schools across Australia there is strong support for linking learning in Technologies with learning literacy skills. Learning in Technologies places a high priority on accurate and unambiguous communication. The Australian Curriculum: Technologies is supported by and in turn reinforces the learning of literacy skills. Students need to describe objects and events; interpret descriptions; read and give instructions; generate and explore ideas with others; write design briefs and specifications, marketing texts, evaluation and variation reports; and participate in group discussions.

Mathematics

The Technologies curriculum provides contexts within which Mathematics understanding, fluency, logical reasoning, analytical thought and problem-solving skills can be applied and developed. Computational thinking particularly draws on mathematical understanding and skills. In Technologies, students process data using tables, lists, picture graphs, column graphs and line graphs. In Mathematics, students' data analysis skills will develop to include scatter plots, linear graphs and the gradient of graphs. This will enhance their ability to analyse patterns and trends in data as part of technologies investigations. In Mathematics, students learn statistical methods that may be applied to quantitative analysis of data in Technologies.

Students develop their use of metric units in both the Mathematics and Technologies curriculums. The ability to convert between common metric units of length and mass and their use of decimal notation in Mathematics will enable them to represent and compare data in meaningful ways in Technologies. Students use spatial understandings developed in Mathematics to apply knowledge of geometry, shapes and angles in Technologies. When considering systems at a vast range of scales in Technologies, students use their mathematical knowledge of timescales and intervals.

Technologies provide tools for automating mathematical processes which reinforce concepts in Mathematics. Students' mathematical ability to solve problems involving linear equations can be used in Technologies when investigating quantitative relationships and designing algorithms.

Science

The Technologies curriculum complements the Science curriculum. Both Technologies and Science emphasise creating preferred futures and the use of systems thinking. Science develops the overarching ideas of patterns, order and organisation, stability and change, scale and measurement, matter and energy, and systems as key aspects of a scientific view of the world. Students draw on these ideas when creating solutions and considering the role of technologies in society.

Design and Technologies draws on concepts from biological, chemical and physical sciences to solve problems and design solutions to meet human needs and opportunities. Links with the Science curriculum allow for applications of scientific concepts through critiquing and applying prior knowledge to designing real-world solutions that are meaningful to students. For example, students apply scientific concepts when designing in an engineering context. Students apply knowledge of forces and characteristics and properties of materials. They conduct appropriate scientific investigations of materials, processes and prototypes.

The Digital Technologies curriculum provides many techniques and technologies for automating the collection, storage and analysis of scientific data. The development of digital technologies such as data loggers, spreadsheets, databases, simulations and imaging technologies have been central to advances in science. They are used to collect and organise a wide range of data and to derive information by filtering, analysing and visualising large volumes of numerical, categorical and structured data. Digital Technologies gives students the skills to represent data in ways that enable computational analysis. Scientists use digital technologies to develop software for simulating, modelling and analysing biological, chemical and physical systems. Digital technologies give students the skills to implement simulations and gain a deeper understanding of concepts and models in Science by interacting with simulations.

History

History provides another avenue to understand how technologies develop and how their developments are a source of historical facts and artefacts. The creation and development of technologies has had an impact on and influenced society and future innovations. In the Knowledge and understanding strands students will develop increasingly sophisticated knowledge and understanding, drawn from contemporary and historical sources. It is important that students learn that technologies have developed through the gradual accumulation of knowledge over many centuries; that all sorts of people – including people like themselves – use and contribute to the development of technologies. Historical studies of technologies in a range of societies including the peoples and countries of Asia and Aboriginal and Torres Strait Islander cultures extending to modern times will help students understand the contributions of people from around the world.

Geography

Technologies knowledge, understanding and skills can be applied using a range of contexts from the Geography curriculum. From the early years students sort information, find patterns and interact with digital systems as they develop spatial understandings, particularly as they create, interpret and use maps. They use directional language, understand scale and distance, and record data related to weather. They create products and systems that measure and further develop their understanding of the influences of climate and weather conditions. They use digital tools to collect and sort information and data and there is a significant emphasis on digital and spatial technologies.

Students strengthen their Technologies understanding and skills as they study the environmental characteristics of places, processes and human significance. During their investigations they collect and convert data into useful forms using spreadsheets, graphs and distribution maps. Students consolidate their understandings of sustainability as they investigate the significance to humans of the biophysical environment and design and manage projects that enhance their understanding of the fine balance between the environment and human endeavour. See also Australian Curriculum connections − Food and fibre production in the Australian Curriculum.

Through Design and Technologies, concepts and learning that are addressed in Geography are contextualised through the design and production of products, services and environments through specific targeted projects that relate to sustainability, the environment and society. Students critique, design and produce solutions for managed and constructed environments. Learning is further enhanced through authentic activities that focus on enterprising and innovative solutions to perceived needs.

The Arts

The Technologies curriculum complements The Arts curriculum, particularly in the application of the elements and principles of design in Visual Arts and in the use of digital technologies in Media Arts. Through the Technologies curriculum, aspects of aesthetics are incorporated into the design processes in Technologies learning activities. This occurs when students design products and environments including those with a focus on graphics technologies. Knowledge of materials, tools and equipment and the ways they can be used to create designed solutions provides links between Technologies and two and three-dimensional design in Visual Arts. Skills developed in Visual Arts such as representing and exploring creative ideas through sketching and drawing complement processes used in Design and Technologies to generate ideas to create solutions. See also: Australian Curriculum connections − Design in the Australian Curriculum.

Students use multimedia in a range of learning areas in the Australian Curriculum to communicate evidence of their learning. Explicit content descriptions describing knowledge, understanding and skills in multimedia are found in Digital Technologies and Media Arts. Also in Design and Technologies students may produce designed solutions with a multimedia focus through the technologies context, ***Materials and technologies specialisations***, for example graphics technologies. See also: Australian Curriculum connections − Multimedia in the Australian Curriculum.

Health and Physical Education

The Australian Curriculum: Technologies takes account of what students learn in Health and Physical Education (HPE). In the movement and physical activity strand of HPE, students develop and practise small motor coordination skills which help them develop and apply manipulative skills in Technologies In the personal, social and community health strand in HPE, students learn about food and nutrition, which is then applied in Technologies to the selection and preparation of food when designing healthy food solutions. See also: Australian Curriculum connections − Food and nutrition in the Australian Curriculum.

Some states and territories offer Home Economics as a subject, or home economics related subjects. Elements of learning in home economics subjects will draw from content in both Health and Physical Education and Technologies in the Australian Curriculum. See also: Australian Curriculum connections − Home economics in the Australian Curriculum.

Economics and Business

In Economics and Business students develop enterprising behaviours and capabilities that can be applied in Technologies when students are creating solutions for a range of audiences. In Technologies students will apply knowledge from Economics and Business including resource allocation and making choices, consumer and financial literacy, and work and work futures. The Economics and Business skills strand focuses on the skills of questioning and research; interpretation and analysis; economic reasoning, decision-making and application; and communication and reflection. These skills can be applied in Technologies when students create solutions and consider the suitability of enterprise and marketing for these solutions. Students also reflect on how enterprise can contribute to the evolution and development of solutions.

In the Australian Curriculum: Technologies the two strands, *Knowledge and understanding* and *Processes and production skills,* are interrelated and inform and support each other. When developing teaching and learning programs, teachers combine aspects of the strands within a subject in different ways to provide students with learning experiences that meet their needs and interests. There are also opportunities for integration of learning between the Technologies subjects and with other learning areas.

While content descriptions do not repeat key skills across the bands, many aspects of Technologies curriculum are recursive, and teachers need to provide opportunity for ongoing practice and consolidation of previously introduced knowledge and skills. The content descriptions in the Australian Curriculum: Technologies enable teachers to develop a variety of learning experiences that are relevant, rigorous and meaningful and allow for different rates of development, in particular for younger students and for those who need extra support.

Teachers use the Australian Curriculum content and achievement standards first to identify current levels of learning and achievement and then to select the most appropriate content (possibly from across several year levels) to teach individual students and/or groups of students. This takes into account that in each class there may be students with a range of prior achievement (below, at or above the year level expectations) and that teachers plan to build on current learning. Organisation of the curriculum in band levels provides an extra level of flexibility that supports teachers to plan and implement learning programs that are appropriate for all students and make best possible use of available resources.

Assessment of the Australian Curriculum: Technologies takes place at different levels and for different purposes, including:

- ongoing formative assessment within classrooms for the purposes of monitoring, learning and providing feedback to teachers to inform their teaching, and for students to inform their learning
- summative assessment for the purposes of twice-yearly reporting by schools to parents and carers on the progress and achievement of students.

Safety

Identifying and managing risk in Technologies learning addresses the safe use of technologies as well as risks that can impact on 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, safety including cyber 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/or 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*, in addition to relevant state or territory health and safety guidelines.

In implementing projects with a focus on food, care 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 further information about relevant guidelines, contact your state or territory curriculum authority.

Animal ethics

Any teaching activities that involve caring, using, or interacting with animals must comply with the *Australian code of practice for the care and use of animals for scientific purposes* in addition to relevant state or territory guidelines.

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.

For further information about relevant guidelines or to access your local animal ethics committee, contact your state or territory curriculum authority.

The Technologies learning area has strong connections with a number of subjects across the Australian Curriculum. This section expands on some items discussed in the Australian Curriculum: Technologies in Links to other learning areas. Opportunities for integration are discussed below:

Design in the Australian Curriculum

In the Australian Curriculum, design thinking and design processes feature significantly in Design and Technologies, Digital Technologies and The Arts. Design thinking and design processes are examples of critical and creative thinking. Critical and creative thinking is developed in all learning areas and is described in the critical and creative thinking learning continuum, which is a statement about learning opportunities in the Australian curriculum for students to develop their critical and creative thinking capability.

The Design and Technologies processes and production skills strand develops design thinking and design processes. Designing in Design and Technologies involves design thinking and the explicit use of design processes to develop and produce designed solutions for an identified user and purpose (usually to fulfil some practical purpose in the wider world). It involves developing designed solutions that take into consideration a range of factors − such as ethics, functionality, and sustainability − related to the identified need, and that can be evaluated using identified criteria for success. It involves experimenting with technologies through drawing, modelling and the manipulation of materials.

The Digital Technologies processes and production skills strand develops design thinking and design processes. Designing in Digital Technologies involves design thinking and the explicit use of design processes to design solutions for a purpose (usually to fulfil some practical purpose in the wider world). It involves identifying the steps and decisions that are needed to execute a solution, for example using algorithms, and determining the functionality and aesthetics required by the users (user interfaces and user experiences). Design ideas are documented using techniques such as mock-ups. Design thinking also involves taking into consideration a range of economic, environmental and social factors that influence the sustainability of designs.

Food and fibre production in the Australian Curriculum

Food and fibre production provides a context and body of knowledge, understanding and skills in the Australian Curriculum: Technologies. Students will also have opportunities across other learning areas from Foundation to Year 10 to learn about the production of the food they eat, fibres they use and the environment in which they live. Learning will address key processes of production, marketing, consumption, sustainable use of resources and waste recycling.

ACARA will document how food and fibre production is addressed across the Australian Curriculum. This will provide a framework − across learning areas and specifically within the Technologies learning area as a context for core learning in F–8 − for all young Australians to understand and value food and fibre production. States and territories may offer extra learning opportunities in Years 9–12.

Food and nutrition in the Australian Curriculum

Student attitudes and behaviour regarding healthy living can be influenced by providing students with opportunities to learn about where their food comes from, how it is produced and how they can prepare it. In the Australian Curriculum students will be taught about food and nutrition in Health and Physical Education (HPE) from Foundation to Year 10 and in the Technologies learning area through Design and Technologies from Foundation to Year 8. In the HPE curriculum students develop knowledge and understanding of nutrition principles to enable them to make healthy food choices and consider the range of influences on these choices.

In Design and Technologies students learn how to apply knowledge of the characteristics and scientific and sensory principles of food, along with nutrition principles (as described in HPE) to food selection and preparation through the design and preparation of food for specific purposes and consumers. They will also develop understandings of contemporary technology-related food issues such as ‘convenience’ foods, highly processed foods, food packaging and food transport. Beyond Year 8 students may choose to study a food-related subject offered by states and territories or they may have the opportunity in Design and Technologies to design and produce solutions in a food specialisations context.

ACARA will document how food and nutrition are addressed across the Australian Curriculum. This will provide a framework across learning areas and specifically within the Technologies learning area as a context for core learning from Foundation to Year 8 − for all young Australians to understand and value food and nutrition. States and territories may offer extra learning opportunities in Years 9 to 12.

Home economics in the Australian Curriculum

Home economics subjects support students to develop the capacity to make decisions, solve problems and develop critical and creative responses to practical concerns of individuals, families and communities in the local and global context. Where Home Economics is offered as a subject, or home economics related subject elements of learning will be drawn from content in both Health and Physical Education (HPE) and Technologies in the Australian Curriculum.

Content to be drawn from the HPE curriculum is in relation to food and nutrition, growth and development, identity, and connecting to others. Students develop the knowledge, understanding and skills to make healthy choices about food and nutrition. They explore the range of influences on these choices and build the skills to access and assess nutritional information that can support healthy choices. In HPE, students become increasingly aware of the stages of human growth and development. They take increasing responsibility for their own growth and development by exploring, and learning how to manage, the many different factors that influence their identities. Students also develop a practical understanding of how connections to other people influence wellbeing. They learn positive ways to communicate, interact and relate to others in a range of social and movement-based situations.

Information and communication technology in the Australian Curriculum

In the Australian Curriculum, there are opportunities in all learning areas to develop information and communication technology (ICT) capability. These are described in the ICT general capability learning continuum, which is a statement about learning opportunities in the Australian Curriculum for students to develop their ICT capability.

In Digital Technologies the ICT capability is more explicit and foregrounded. Students develop explicit knowledge, understanding and skills relating to operating and managing ICT and applying social and ethical protocols while investigating, creating and communicating. The study of Digital Technologies will ensure that ICT capability is developed systematically. While specific elements are likely to be addressed within Digital Technologies learning programs, key concepts and skills are strengthened, complemented and extended across all subjects, including in Design and Technologies. This occurs as students engage in a range of learning activities with digital technologies requirements.

The clear difference between the Digital Technologies curriculum and the ICT general capability is that the capability helps students to become effective ***users*** of digital technologies while the Digital Technologies curriculum helps students to become confident ***developers*** of digital solutions.

Multimedia in the Australian Curriculum

Students use multimedia in a range of learning areas in the Australian Curriculum to communicate evidence of their learning. Explicit content descriptions detailing the knowledge, understanding and skills that students must acquire in relation to multimedia are found in two subjects: Digital Technologies and Media Arts. Also, in Design and Technologies students may produce designed solutions through the technologies context Materials and technologies specialisations; for example, graphics technologies specialisation with a multimedia focus. In Digital Technologies the multimedia focus relates to the technical aspects of digital multimedia solutions, and privacy and intellectual property. The technical aspects cover the digital representation of multimedia and text as forms of structured data and the digital systems required to capture and display those data. It also includes the algorithms required to create or manipulate them. An understanding of design elements and principles and how people interact with solutions (user experience) and digital media is also addressed.

In Media Arts there is a focus on using standard software to produce images, animations, videos and audios, whereas the digital representation of these media elements and the automated interaction with them are addressed in Digital Technologies. Digital Technologies takes a technical and computational approach to digital solutions featuring multimedia such as computer games and the design and development of web pages. Computer games, for example are almost always implemented by some form of computer programming (including simple visual programming environments). Learning about web design in Digital Technologies looks at the digital representation of a web page that includes digital media, the representation of a document (its structure), the formatting (its appearance), and how web pages are transmitted. Security practices and ethical protocols related to online communication when using blogs, messaging, information sharing and creation web sites and social networking are also addressed in Digital Technologies.

The Australian Curriculum
Technologies - Design and Technologies

acara AUSTRALIAN CURRICULUM, ASSESSMENT AND REPORTING AUTHORITY

Rationale and Aims

Rationale

This rationale complements and extends the rationale for the Technologies learning area.

In an increasingly technological and complex world, it is important to develop knowledge and confidence to critically 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 actively engages students in creating quality designed solutions for identified needs and opportunities across a range of technologies contexts. Students consider the economic, environmental and social impacts of technological change and how the choice and use of technologies contributes to a sustainable future. Decision-making processes are informed by ethical, legal, aesthetic and functional factors.

Through Design and Technologies students manage projects independently and collaboratively from conception to realisation. They apply design and systems thinking and design processes to investigate ideas, generate and refine ideas, 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.

Through the practical application of technologies including digital technologies, students develop dexterity and coordination through experiential activities. The subject 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

In addition to the overarching aims for the Australian Curriculum: Technologies, Design and Technologies more specifically 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 critique innovative and ethical 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.

Foundation to Year 2

Learning in Design and Technologies builds on concepts, skills and processes developed in the Early Years Learning Framework, revisiting, strengthening and extending these as needed.

By the end of Year 2 students will have had the opportunity to create designed solutions at least once in each of the following technologies contexts: Engineering principles and systems; Food and fibre production and Food specialisations; and Materials and technologies specialisations. Students should have opportunities to experience designing and producing products, services and environments. This may occur through integrated learning.

In Foundation to Year 2 students explore and investigate technologies − materials, systems, components, tools and equipment − including their purpose 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. Students 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?’ or ‘How can it be improved?’ They begin to consider the impact of their decisions and of technologies on others and the environment including in relation to preferred futures. 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 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 (with teacher support) simple steps and follow directions to complete their own or group design ideas or projects, and manage their own role within team projects. Students are aware of others around them and the need to work safely and collaboratively when making designed solutions

Foundation to Year 2 Content Descriptions

Design and Technologies knowledge and understanding	
Identify how people design and produce familiar products, services and environments and consider sustainability to meet personal and local community needs (ACTDEK001) 	• exploring how local products, services and environments are designed by people for a purpose and meet social needs, for example the range of shelters provided for the public in a local community; graphical displays to market school and community events • asking questions about natural and managed environments and impacts on them when selecting materials, tools and equipment when designing and making products, for example harvesting products from the school garden and using recycled clothing • making design decisions based on personal and family needs, for example downloading and comparing recipes to suit available cooking facilities such as cooking in the bush compared to cooking in a kitchen • exploring and critiquing products, services and environments for their impact on sustainability, for example the environmental risks and benefits of a system for organically or hydroponically growing a vegetable crop from seed or seedling to harvest

Explore how technologies use forces to create movement in products (ACTDEK002) 	• exploring how the principles of push and pull are used in the design of toys, for example in a spinning toy such as an Aboriginal mammandur • identifying, and playing and experimenting with, components such as wheels, balls, slides, springs and available local materials, tools and equipment to solve problems requiring movement • selecting materials to demonstrate how material properties are appropriate for particular designed solutions, for example materials that enable sliding or floating • 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 • combining materials and using forces in design, for example designing the door on a cage or a simple conveyor belt to move materials short distances • 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
Explore how plants and animals are grown for food, clothing and shelter and how food is selected and prepared for healthy eating (ACTDEK003) 	• exploring which plants and animals can provide food or materials for clothing and shelter and what basic needs those plants and animals have • 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 • considering the suitability of a range of tools when cultivating gardens, mulching and building garden structures and preparing and cooking food from recipes • identifying and categorising a wide range of foods, including Aboriginal bush foods, into food groups and describing tools and equipment needed to prepare these for healthy eating • exploring how people from different cultures including those of Asia design and produce different cuisines based on the plants and animals in their region and available tools and equipment • exploring the tools, equipment and techniques used to prepare food safely and hygienically for healthy eating

Explore the characteristics and properties of materials and components that are used to produce designed solutions (ACTDEK004) 	• exploring designed solutions to meet individual, family and community needs with a focus on materials, for example fabrics used for sports clothing, soft fall for play spaces • developing new meanings for objects and action during play, for example exploring how household packaging can be used to represent other objects • exploring systems used in the classroom or community for creatively dealing with problems and needs, for example storage systems for equipment, traffic system flow for drop and go zones, the use of hoists and ramps to facilitate access • exploring facilities in local environments for accessibility and environmental impact, for example location of bike tracks and sporting fields using digital maps to view local area • exploring materials, components, tools and equipment through play to discover potential uses when making products or modelling services and environments, for example when designing and making clothes, toys and shelters • experimenting with techniques to combine or alter materials to satisfy a function
Design and Technologies processes and production skills	
Explore needs or opportunities for designing, and the technologies needed to realise designed solutions (ACTDEP005) 	• identifying, gathering and playing with materials, components, tools and equipment to generate personal design ideas, for example designing a greeting card for a friend • exploring opportunities around the school for designing solutions, for example how school play areas could be improved; how the school removes classroom waste and identifying opportunities to reduce, recycle and re-use materials; reviewing the school canteen menu to identify healthy food options and suggesting changes to promote future good health • discussing possible designed solutions based on experience and some research, for example asking adults for advice • considering the importance of sustainability in designed solutions, for example comparing the durability of materials for a selected solution • exploring which tools, equipment and techniques to use with selected materials
Visualise, generate, develop and communicate design ideas through describing, drawing and modelling (ACTDEP006) 	• comparing and contrasting features of existing products to provide new ideas, for example exploring toys with several movable parts with the view to designing and making a simple puppet with one movable part • communicating design ideas by modelling, and producing and labelling two-dimensional drawings using a range of technologies to show different views (top view and side view), for example a new environment such as a cubby house or animal shelter • recording a judgment about design ideas with teacher guidance, for example expressing own likes and dislikes about a design idea • identifying one common testing method, and recording results, for example taste-testing comparisons of a food product and recording results in a digital form • describing how design ideas meet the needs of those who will use the solution

Use materials, components, tools, equipment and techniques to safely make designed solutions (ACTDEP007) 	• using and playing with everyday materials in new ways or re-using discarded materials, for example using discarded materials to design, make and model a constructed environment • learning and safely practising a range of technical skills using tools and equipment, for example joining techniques when making products, watering and mulching gardens, preparing food, using software to design an environment • assembling components of systems and checking they function as planned, for example when making a musical instrument
Use personal preferences to evaluate the success of design ideas, processes and solutions including their care for environment (ACTDEP008) 	• developing criteria for success with teacher guidance including consideration of impact on environment • recording a judgment about design ideas with teacher guidance, for example expressing own likes and dislikes about a design idea • reflecting on the processes and challenges of designing and producing a solution and sharing these reflections using digital technologies, for example when growing a food product, designing a structure to take a load or making a nutritious snack • suggesting areas for design improvement
Sequence steps for making designed solutions and working collaboratively (ACTDEP009) 	• checking that planned features have been included in design plans and drawings by referring to identified criteria for success including care for the environment • using lists or storyboarding when planning and making, for example when planning an electronic planting calendar • recording the procedure for making a product, for example a recipe or instructions for making a container • identifying roles for each member of a group when working collaboratively

Foundation to Year 2 Achievement Standard

By the end of Year 2, students describe the purpose of familiar products, services and environments and how they meet the needs of users and affect others and environments. They identify the features and uses of some technologies for each of the prescribed technologies contexts.

With guidance students create designed solutions for each of the prescribed technologies contexts. They describe given needs or opportunities. Students create and evaluate their ideas and designed solutions based on personal preferences. They communicate design ideas for their designed products, services and environments using modelling and simple drawings. Following sequenced steps students demonstrate safe use of tools and equipment when producing designed solutions.

Year 3 and 4

Learning in Design and Technologies builds on concepts, skills and processes developed in earlier years, and teachers will revisit, strengthen and extend these as needed.

By the end of Year 4 students will have had the opportunity to create designed solutions at least once in the following technologies contexts: Engineering principles and systems; Food and fibre production and Food specialisations; and Materials and technologies specialisations. Students should have opportunities to experience designing and producing products, services and environments.

In Year 3 and 4 students develop a sense of self and ownership of their ideas and thinking about their peers and communities and as consumers. 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 working 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 designs and technologies can affect people and their environments. They become aware of the role of those working in design and technologies occupations and how they think about the way a product might change in the future.

Using a range of technologies including a variety of graphical representation techniques to communicate, students clarify and present ideas, for example by drawing annotated diagrams; modelling objects as three-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.

Students become aware of the appropriate ways to manage their time and focus. With teacher guidance, they identify and list criteria for success including in relation to preferred futures and 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.

Year 3 and 4 Content Descriptions

Design and Technologies knowledge and understanding

Recognise the role of people in design and technologies occupations and explore factors, including sustainability that impact on the design of products, services and environments to meet community needs (ACTDEK010) 	• exploring, playing with and testing materials for their appropriateness, for example materials for a new sun-shade product • examining the suitability of a service or everyday system and proposing improvements, for example a water saving system for a bathroom at home • investigating materials, components, tools and equipment, including by using digital technologies, to discover their characteristics and properties, how they can be used more sustainably and their impact in the future • considering the impact of environments on users, for example a school vegetable garden, a protected outdoor play area • exploring and testing factors that impact on design decisions, for example considering the demographics of an area or the impact of natural disasters on design of constructed environments such as the structural design of buildings in Japan to withstand earthquakes • critiquing designed products, services and environments to establish the factors that influence the design and use of common technologies, for example the characteristics that contribute to energy-efficient cooking such as wok cooking; the suitability and sustainable use of particular timbers
Investigate how forces and the properties of materials affect the behaviour of a product or system (ACTDEK011) 	• examining models to identify how forces and materials are used in the design of a toy • exploring through play how movement can be initiated by combining materials and using forces, for example releasing a wound rubber band to propel a model boat • conducting investigations to understand the characteristics and properties of materials and forces that may affect the behaviour and performance of a product or system, for example woomera design deconstructing a product or system to identify how motion and forces affect behaviour, for example in a puppet such as a Japanese bunraku puppet or a model windmill with moving sails • identifying and exploring properties and construction relationships of an engineered product or system, for example a structure that floats; a bridge to carry a load • experimenting with available local materials, tools and equipment to solve problems requiring forces including identifying inputs (what goes in to the system), processes (what happens within the system) and outputs (what comes out of the system), for example designing and testing a container or parachute that will keep an egg intact when dropped from a height

Investigate food and fibre production and food technologies used in modern and traditional societies (ACTDEK012) 	• exploring tools, equipment and procedures to improve plant and animal production, for example when growing vegetables in the school garden and producing plant and animal environments such as a greenhouse, animal housing, safe bird shelters • identifying the areas in Australia and Asia where major food or fibre plants and animals are grown or bred, for example the wheat and sheep belts, areas where sugar cane or rice are grown, northern Australia's beef industry, plantation and native forest areas • describing ideal conditions for successful plant and animal production including how climate and soils affect production and availability of foods, for example Aboriginal seasons and food availability • 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 • investigating the labels on food products to determine how the information provided contributes to healthy eating, for example ingredients and nutrition panels
Investigate the suitability of materials, systems, components, tools and equipment for a range of purposes (ACTDEK013) 	• conducting experiments and tests to understand the properties of materials, for example strength, durability, warmth, elasticity • investigating the mass production of products to ensure standardisation, for example students setting up a production line to produce a product for a school fete • investigating the suitability of technologies − materials, systems, components, tools and equipment − when designing and making a product, service or environment, for example a toy for a young child, a composting system for household waste management, raised garden beds for improved access, weaving nets, bags or baskets • comparing how different components interrelate and complement each other in a finished designed solution, for example investigating and playing with joining processes for a variety of materials in the production of common products • investigating local constructed environments to compare how buildings were constructed in the past and in the present and noting innovations • analysing products, services and constructed environments from a range of technologies contexts with consideration of possible innovative solutions and impacts on the local community and the sustainability of its environment

Design and Technologies processes and production skills

Critique needs or opportunities for designing and explore and test a variety of materials, components, tools and equipment and the techniques needed to produce designed solutions (ACTDEP014) 	• exploring the different uses of materials in a range of products, including those from Aboriginal and Torres Strait Islander communities and countries of Asia • critiquing and selecting appropriate joining techniques for materials to produce working models • exploring and testing a range of materials under different conditions for suitability including sustainability considerations and identifying appropriate tools, equipment and techniques • examining the structure and production of everyday products, services and environments to enhance their own design ideas • exploring the properties of materials to determine suitability, for example the absorbency of different fabrics or the strength of different resistant materials
Generate, develop, and communicate design ideas and decisions using appropriate technical terms and graphical representation techniques (ACTDEP015) 	• exploring ways of joining, connecting and assembling components that ensure success • generating a range of design ideas for intended products, services, environments • identifying the properties of materials needed for the designed solution • visualising and exploring innovative design ideas by producing thumbnail drawings, models and labelled drawings to explain features and modifications • planning, sharing and documenting creative ideas and processes using digital tools such as a class blog or collaborative document
Select and use materials, components, tools and equipment using safe work practices to make designed solutions (ACTDEP016) 	• using appropriate technologies terms to confidently describe and share with others procedures and techniques for making, for example cutting and joining materials • exploring ways of joining, connecting and assembling components that ensure success, and the impact digital technologies have had on these processes • using tools and equipment accurately when measuring, marking and cutting; and explaining the importance of accuracy when designing and making, for example creating a template, measuring ingredients in a recipe, sowing seeds • selecting and using materials, components, tools, equipment and processes with consideration of the environmental impact at each stage of the production process • demonstrating safe, responsible and cooperative work practices when making designed solutions

Evaluate design ideas, processes and solutions based on criteria for success developed with guidance and including care for the environment (ACTDEP017) 	• negotiating criteria for success with class or group members • evaluating, revising and selecting design ideas, based on criteria for success and including consideration of ethics, social values and sustainability • evaluating the functional and aesthetic qualities of a designed solution • reflecting on the sustainability implications of selected designed solutions • comparing the amount of waste that would be produced from different design and development options and the potential for recycling waste • reflecting on designed solutions to critique and assess suitability, sustainability and enterprise opportunities and determine how well they meet success criteria
Plan a sequence of production steps when making designed solutions individually and collaboratively (ACTDEP018) 	• determining planning processes as a class, for example recording a procedure or creating time plans • managing time and resource allocation throughout production, for example materials, tools, equipment and people • identifying the steps in a mass production process • sequencing steps to collaboratively produce a designed solution

Year 3 and 4 Achievement Standard

By the end of Year 4 students explain how products, services and environments are designed to best meet needs of communities and their environments. They describe contributions of people in design and technologies occupations. Students describe how the features of technologies can be used to produce designed solutions for each of the prescribed technologies contexts.

Students create designed solutions for each of the prescribed technologies contexts. They explain needs or opportunities and evaluate ideas and designed solutions against identified criteria for success, including environmental sustainability considerations. They develop and expand design ideas and communicate these using models and drawings including annotations and symbols. Students plan and sequence major steps in design and production. They identify appropriate technologies and techniques and demonstrate safe work practices when producing designed solutions.

Year 5 and 6

Learning in Design and Technologies builds on concepts, skills and processes developed in earlier years, and teachers will revisit, strengthen and extend these as needed.

By the end of Year 6 students will have had the opportunity to create designed solutions at least once in four technologies contexts: Engineering principles and systems, Food and fibre production, Food specialisations and Materials and technologies specialisations. Students should have opportunities to experience designing and producing products, services and environments.

In Year 5 and 6 students critically examine technologies − materials, systems, components, tools and equipment − that are used regularly 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.

Students engage with ideas beyond the familiar, exploring how design and technologies and the people working in a range of technologies contexts contribute to society. They seek to explore innovation and establish their own design capabilities. 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 and develop plans to complete design tasks, and follow plans to complete design tasks safely, making adjustments to plans when necessary. Students identify, plan and maintain safety standards and practices when making designed solutions.

Year 5 and 6 Content Descriptions

Design and Technologies knowledge and understanding

Investigate how people in design and technologies occupations address competing considerations, including sustainability in the design of products, services and environments for current and future use (ACTDEK019) 	• reflecting on the features of designed solutions that ensure safety and wellbeing of users, for example smoke alarms • evaluating the sustainability implications of materials, systems, components, tools and equipment, for example materials can be recycled or re-used to reduce waste; systems may benefit some, but disadvantage others • considering the impact designed products, services or environments have in relation to sustainability and also on local, regional and global communities, including Aboriginal and Torres Strait Islander communities and countries in the Asia region • reflecting on the importance of aesthetics, function and sustainability in product design, for example a textile product that gives protection and is appealing; a motor that moves a vehicle and uses a sustainable power source • identifying the components of a service or system that contribute to its success and assessing potential risk or failure, for example, communication in the school or communication of a message to a wide audience; a system that manages an aspect of the environment; a campaign such as Clean Up Australia Day in different communities • identifying the impact of the designed features of an environment , for example a modification to a home to reduce environmental impact; restoring a natural environment and retaining access for the public
Investigate how forces or electrical energy can control movement, sound or light in a designed product or system (ACTDEK020) 	• deconstructing a product or system to discover how movement, sound or light can be controlled, for example deconstructing a torch or buzzer and exploring circuit design • investigating the properties of materials to solve problems requiring the control of movement, sound or light, for example directing light through a maze using mirrors • investigating how biomimicry can be used by engineers and designers, for example the ways plant and animal adaptations can be copied to solve human challenges, for example the Japanese building Sendai Mediatheque based on seaweed-like tubes • recognising the need to carefully plan and select components for a system to perform a specific task • producing models using materials, tools and equipment to show how to control movement, sound or light in structures, for example the design of a house with passive solar; the use of optical fibre in directing sunlight; acoustics of recording studios • investigating the technologies in a control system for an identified need or opportunity and user, for example a system that allows safe passage at pedestrian crossings

Investigate how and why food and fibre are produced in managed environments (ACTDEK021) 	• investigating and experimenting with different tools, equipment and methods of preparing soil and the effect on soil quality and sustainability, for example when designing a garden for a community group • identifying ways of applying, conserving and recycling nutrients in food and fibre production when designing a sustainable school vegetable garden or cropping area, for example composting and other forms of organic fertilisers • considering how low-input sustainable agriculture (LISA) is used in a range of environments including Australia and the countries of Asia • describing the relationship between plant types and animal breeds and their environmental suitability when selecting suitable plants or animals for an environment • sequencing the process of converting 'on-farm' food or fibre products into a product suitable for retail sale, that is, the 'paddock to plate' supply chain, or when making yarn or fabric from fibre • investigating the use of technologies including digital technologies in the production of food and fibre • exploring and comparing the efficiency of different irrigation methods in plant production systems including the use of digital technologies to improve the effectiveness, for example when designing a sustainable irrigation system to be used in a garden
Investigate the role of food preparation in maintaining good health and the importance of food safety and hygiene (ACTDEK022) 	• using current food guides and government-endorsed food policies to plan food choices • describing and using safety guidelines for food storage and preparation at home and school, for example use and care of chopping boards; methods of preparing and storing fruits and vegetables to ensure optimum quality and nutrient content • experimenting with tools, equipment, combining 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 • considering traditional and contemporary methods of food preparation used in a variety of cultures, including Aboriginal and Torres Strait Islander methods • 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

Investigate characteristics and properties of a range of materials, systems, components, tools and equipment and evaluate the impact of their use (ACTDEK023) 	• identifying the properties of materials for the design and construction of a sustainable household item, for example a product for storing harvested water • evaluating the functional properties of a specific-purpose household system, for example a security system • examining the materials and systems used in a public use system that affect the way people live, for example a community exercise environment or arts facility, water treatment, garbage collection • comparing tools, equipment and techniques to select those most appropriate for a given purpose • evaluating the use of computer-aided manufacturing in terms of cost and impacts on local and regional designers, producers and enterprises • comparing the design and production of products, services and environments in Australia and a country in the Asia region
Design and Technologies processes and production skills	
Critique needs or opportunities for designing, and investigate materials, components, tools, equipment and processes to achieve intended designed solutions (ACTDEP024) 	• exploring the steps involved in the process to satisfy a design brief, need or opportunity • investigating designed solutions from around the world to make suitable, quality decisions that meet the design brief, challenge or scenario • identifying the importance of complementary parts of working, everyday systems by deconstructing the components, structure and purpose of products, services or environments • testing a range of materials, components, tools and equipment to determine the appropriate technologies needed to make products, services or environments, for example a moving vehicle • investigating how to minimise material use and manage waste by critiquing the environmental and social impacts of materials, components, tools and equipment
Generate, develop, communicate and document design ideas and processes for audiences using appropriate technical terms and graphical representation techniques (ACTDEP025) 	• generating a range of design ideas for products, services or environments using prior knowledge, skills and research • developing alternative design ideas and considering implications for the future to broaden the appeal and acceptance of design ideas • analysing and modifying design ideas to enhance and improve the sustainability of the product, service, environment or system • representing and communicating design ideas using modelling and drawing standards including the use of digital technologies, for example scale; symbols and codes in diagrams; pictorial maps and aerial views using web mapping service applications • 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

Apply safe procedures when using a variety of materials, components, tools, equipment and techniques to make designed solutions (ACTDEP026) 	• matching material and joining techniques to the design intention, for example accurately cutting and sewing the fabric pieces to make a community banner or joining components to produce an electric circuit • working safely, responsibly and cooperatively to ensure safe work areas, for example the safe use of equipment when making a water-resistant, floating craft or a model of an environmentally sensitive outdoor shelter • using appropriate personal protective equipment required for the use of some tools and equipment, for example protective eyewear • manipulating materials with appropriate tools, equipment and techniques, for example when preparing food, cultivating garden beds, constructing products
Negotiate criteria for success that include consideration of sustainability to evaluate design ideas, processes and solutions (ACTDEP027) 	• independently and collaboratively identifying criteria for success, processes and planning, for example using visual representations such as a flowchart • evaluating the suitability of materials, tools and equipment for specific purposes • reflecting on how well their designed solutions ensure safety and wellbeing of users and consumers and meet the needs of communities and different cultures • considering the criteria for success in relation to the benefits and costs of production processes, the environmental impact, future use and application, and social values and ethics of clients • evaluating products, services and environments from a range of technologies contexts with consideration of ethics and sustainability
Develop project plans that include consideration of resources when making designed solutions individually and collaboratively (ACTDEP028) 	• examining the essential features of existing processes to inform project planning including safe work practices that minimise risk • setting milestones for production processes and allocating roles to team members • identifying when materials, tools and equipment are required for making the solution • outlining the planning and production steps needed to produce a product, service or environment using digital technologies • reflecting on planned steps to see if improvements can be made

Year 5 and 6 Achievement Standard

By the end of Year 6 students describe some competing considerations in the design of products, services and environments taking into account sustainability. They describe how design and technologies contribute to meeting present and future needs. Students explain how the features of technologies impact on designed solutions for each of the prescribed technologies contexts.

Students create designed solutions for each of the prescribed technologies contexts suitable for identified needs or opportunities. They suggest criteria for success, including sustainability considerations and use these to evaluate their ideas and designed solutions. They combine design ideas and communicate these to audiences using graphical representation techniques and technical terms. Students record project plans including production processes. They select and use appropriate technologies and techniques correctly and safely to produce designed solutions.

Year 7 and 8

Learning in Design and Technologies builds on concepts, skills and processes developed in earlier years, and teachers will revisit, strengthen and extend these as needed.

By the end of Year 8 students will have had the opportunity to create designed solutions at least once in the following four technologies contexts: Engineering principles and systems, Food and fibre production, Food specialisations and Materials and technologies specialisations. Students should have opportunities to design and produce products, services and environments.

In Year 7 and 8 students investigate and select from a range of technologies − materials, systems, components, tools and equipment. They consider the ways characteristics and properties of technologies can be combined to design and produce sustainable designed solutions to problems for individuals and the community, considering society and ethics, and economic, environmental and social sustainability factors. Students use creativity, innovation and enterprise skills with increasing independence and collaboration.

Students respond to feedback from others and evaluate design processes used and designed solutions for preferred futures. They investigate design and technology professions and the contributions that each makes to society locally, regionally and globally through creativity, innovation and enterprise. Students evaluate the advantages and disadvantages of design ideas and technologies.

Using a range of technologies including a variety of graphical representation techniques to communicate, students generate and clarify ideas through sketching, modelling, perspective and orthogonal drawings. They use a range of symbols and technical terms in a range of contexts to produce patterns, annotated concept sketches and drawings, using scale, pictorial and aerial views to draw environments.

With greater autonomy, students identify the sequences and steps involved in design tasks. They develop plans to manage design tasks, including safe and responsible use of materials and tools, and apply management plans to successfully complete design tasks. Students establish safety procedures that minimise risk and manage a project with safety and efficiency in mind when making designed solutions.

Year 7 and 8 Content Descriptions

Design and Technologies knowledge and understanding	
Examine and prioritise competing factors including social, ethical and sustainability considerations in the development of technologies and designed solutions to meet community needs for preferred futures (ACTDEK029)	• considering factors that influence the selection of appropriate materials, components, tools and equipment, for example Aboriginal and Torres Strait Islander Peoples' sustainable practices, custodianship and connection to Country • investigating how ethics, social values, profitability and sustainability considerations impact on design and technologies, for example animal welfare, intellectual property, off-shore manufacturing in Asia • analysing an environment to decide if it meets personal or community needs, for example consulting with family members when designing an enhancement to an indoor or outdoor home environment • critiquing competing factors that influence the design of services, for example a natural disaster warning system for a community • investigating the ethics of using surveillance systems while balancing privacy, security and safety concerns

Investigate the ways in which products, services and environments evolve locally, regionally and globally through the creativity, innovation and enterprise of individuals and groups (ACTDEK030) 	• exploring how products and services have changed over time and predicting future developments, for example home entertainment, communications or food packaging • considering the rights and responsibilities of those working in design and technologies occupations, for example consideration of Aboriginal and Torres Strait Islander protocols • exploring the use and development of systems for navigating unfamiliar environments, for example a service to help tourists engage with a heritage area • investigating traditional and contemporary design and technologies, including from Asia, and predicting how they might change in the future in response to factors such as social change and the need for more sustainable patterns of living • identifying needs and new opportunities for design and enterprise, for example promotion and marketing of designed solutions • investigating how developments in materials, tools and equipment influence designed solutions
Analyse how motion, force and energy are used to manipulate and control electromechanical systems when designing simple, engineered solutions (ACTDEK031) 	• investigating influences impacting on manufactured products and processes such as historical developments, society, new materials, control systems and biomimicry, for example the development of velcro • experimenting to select the most appropriate principles and systems on which to base design ideas, for example structural components to be tested for strength • calculating an engineered system's outputs, for example speed, brightness of light, volume of sound • producing prototypes and jigs to test functionality, including the use of rapid prototyping tools such as 3D printers • using code to control systems, for example code to program a microcontroller or a simple, object-based coding application to program a system such as a remote-controlled car or simple robotic arm • investigating components, tools and equipment for example testing the durability of batteries, determining the effective range of wireless devices
Analyse how food and fibre are produced when designing managed environments and how these can become more sustainable (ACTDEK032) 	• comparing land and water management methods in contemporary Australian food and fibre production with traditional Aboriginal systems and countries of Asia, for example minimum-tillage cropping, water-efficient irrigation • investigating the management of plant and animal growth through natural means and with the use of chemical products like herbicides and medicines when producing food and fibre products • recognising the need to increase food production using cost efficient, ethical and sustainable production techniques • describing physical and chemical characteristics of soil and their effects on plant growth when producing food and fibre products • investigating different animal feeding strategies such as grazing and supplementary feeding, and their effects on product quality, for example meat tenderness, wool fibre diameter (micron), milk fat and protein content when producing food and fibre products • recognising the importance of food and fibre production to Australia's food security and economy including exports and imports to and from Asia when critiquing and exploring food and fibre production

Analyse how characteristics and properties of food determine preparation techniques and presentation when designing solutions for healthy eating (ACTDEK033) 	• planning and making quality, safe and nutritious food items, using a range of food preparation tools, equipment and techniques • examining the relationship between food preparation techniques and the impact on nutrient value, for example steaming vegetables • investigating how a recipe can be modified to enhance health benefits, and justifying decisions, for example by replacing full cream milk with skim milk • analysing food preparation techniques used in different cultures including those from the Asia region and the impact of these on nutrient retention, aesthetics, taste and palatability, for example stir-frying • explaining how food preparation techniques impact on the sensory properties (flavour, appearance, texture, aroma) of food, for example the browning of cut fruit, the absorption of water when cooking rice
Analyse ways to produce designed solutions through selecting and combining characteristics and properties of materials, systems, components, tools and equipment (ACTDEK034) 	• investigating aspects of technologies specialisations, for example in architecture, critiquing the design of an existing building to identify features of passive design or in fashion, evaluating the sustainability of different fibres • investigating and selecting from a broad range of technologies − materials, systems, components, tools and equipment − when designing for a range of technologies contexts • considering the ways in which the characteristics and properties of technologies will impact on designed solutions, for example the choice of building materials and housing design in Australia and the countries of Asia; the properties of textile fibres and fabrics determine end use • considering safe work practices, for example producing a safety information video that details risk management practices for using a piece of equipment in the classroom or within a community • evaluating products and services for the individual and the community considering ethics and social factors, for example a short video encouraging individuals to increase their use of public transport in the local area • evaluating environments that have been designed in consultation with community groups, for example a bush tucker community garden developed in consultation with local Elders
Design and Technologies processes and production skills	

Critique needs or opportunities for designing and investigate, analyse and select from a range of materials, components, tools, equipment and processes to develop design ideas (ACTDEP035) 	• considering community needs when identifying opportunities for designing, for example gardens for a community centre, cost effective food service for a sport club • experimenting with traditional and contemporary technologies when developing designs, and discovering the advantages and disadvantages of each approach • investigating emerging technologies and their potential impact on design decisions, for example flame retardant fabrics or smart materials such as self-healing materials, digital technologies and agriculture • examining, testing and evaluating a variety of suitable materials, components, tools and equipment for each design project, for example the differences between natural hardwood and plantation softwood timbers, which determine their suitability for particular uses related to durability, for example interior or exterior use • evaluating the viability of using different techniques and materials in remote, isolated areas, or less developed countries • selecting appropriate materials to acknowledge sustainability requirements by using life cycle thinking
Generate, develop, test and communicate design ideas, plans and processes for various audiences using appropriate technical terms and technologies including graphical representation techniques (ACTDEP036) 	• using a variety of critical and creative thinking strategies such as brainstorming, sketching, 3-D modelling and experimenting to generate innovative design ideas • considering which ideas to further explore and investigating the benefits and drawbacks of ideas, for example using digital polling to capture the views of different groups in the community • identifying factors that may hinder or enhance project development, for example intercultural understanding • developing models, prototypes or samples using a range of materials, tools and equipment to test the functionality of ideas • producing annotated concept sketches and drawings, using: technical terms, scale, symbols, pictorial and aerial views to draw environments; production drawings, orthogonal drawings; patterns and templates to explain design ideas • documenting and communicating the generation and development of design ideas for an intended audience, for example developing a digital portfolio with images and text which clearly communicates each step of a design process
Effectively and safely use a broad range of materials, components, tools, equipment and techniques to make designed solutions (ACTDEP037) 	• developing technical production skills and safe working practices with independence to produce quality solutions designed for sustainability • practising techniques to improve expertise, for example handling animals, cutting and joining materials • identifying and managing risks in the development of various projects, for example working safely, responsibly, cooperatively and ethically on design projects, assessing uncertainty and risk in relation to long-term health and environmental impacts • developing innovative ways of manipulating technologies using traditional and contemporary materials, components, tools, equipment and techniques and considering alternatives including emerging technologies that could be substituted to reduce waste or time

Independently develop criteria for success to assess design ideas, processes and solutions and their sustainability (ACTDEP038) 	• developing criteria for success to assess the success of designed solutions in terms of aesthetics, functionality and sustainability • considering how to improve technical expertise • evaluating designed solutions and processes and transferring new knowledge and skills to future design projects
Use project management processes when working individually and collaboratively to coordinate production of designed solutions (ACTDEP039) 	• explaining and interpreting drawings, planning and production steps needed to produce products, services or environments for specific purposes • organising time, evaluating decisions and managing resources to ensure successful project completion and protection of the work space and local environment • identifying risks and how to avoid them when planning production • investigating the time needed for each step of production

Year 7 and 8 Achievement Standard

By the end of Year 8 students explain factors that influence the design of products, services and environments to meet present and future needs. They explain the contribution of design and technology innovations and enterprise to society. Students explain how the features of technologies impact on designed solutions and influence design decisions for each of the prescribed technologies contexts.

Students create designed solutions for each of the prescribed technologies contexts based on an evaluation of needs or opportunities. They develop criteria for success, including sustainability considerations, and use these to judge the suitability of their ideas and designed solutions and processes. They create and adapt design ideas, make considered decisions and communicate to different audiences using appropriate technical terms and a range of technologies and graphical representation techniques. Students apply project management skills to document and use project plans to manage production processes. They independently and safely produce effective designed solutions for the intended purpose.

Year 9 and 10

Learning in Design and Technologies builds on concepts, skills and processes developed in earlier years, and teachers will revisit, strengthen and extend these as needed.

By the end of Year 10 students will have had the opportunity to design and produce at least four designed solutions focused on one or more of the five technologies contexts content descriptions. There is one optional content description for each of the following: Engineering principles and systems, Food and fibre production, Food specialisations and Materials and technologies specialisations. There is an additional open content description to provide flexibility and choice. Students should have opportunities to experience creating designed solutions for products, services and environments.

In Year 9 and 10 students use design and technologies knowledge and understanding, processes and production skills and design thinking to produce designed solutions to identified needs or opportunities of relevance to individuals and regional and global communities. Students work independently and collaboratively. Problem-solving activities acknowledge the complexities of contemporary life and make connections to related specialised occupations and further study. Increasingly, study has a global perspective, with opportunities to understand the complex interdependencies involved in the development of technologies and enterprises. Students specifically focus on preferred futures, taking into account ethics; legal issues; social values; economic, environmental and social sustainability factors and using strategies such as life cycle thinking. Students use creativity, innovation and enterprise skills with increasing confidence, independence and collaboration.

Using a range of technologies including a variety of graphical representation techniques to communicate, students generate and represent original ideas and production plans in two and three-dimensional representations using a range of technical drawings including perspective, scale, orthogonal and production drawings with sectional and exploded views. They produce rendered, illustrated views for marketing and use graphic visualisation software to produce dynamic views of virtual products.

Students identify the steps involved in planning the production of designed solutions. They develop detailed project management plans incorporating elements such as sequenced time, cost and action plans to manage a range of design tasks safely. They apply management plans, changing direction when necessary, to successfully complete design tasks. Students identify and establish safety procedures that minimise risk and manage projects with safety and efficiency in mind, maintaining safety standards and management procedures to ensure success. They learn to transfer theoretical knowledge to practical activities across a range of projects.

Year 9 and 10 Content Descriptions

Design and Technologies knowledge and understanding

Critically analyse factors, including social, ethical and sustainability considerations, that impact on designed solutions for global preferred futures and the complex design and production processes involved (ACTDEK040) 	• evaluating design and technology professions and their contributions to society locally, nationally, regionally and globally, for example Aboriginal designers collaborating with international craftspeople for local enterprises • recognising the impact of past designed solutions and possible future decisions in relation to creating preferred futures, for example the design of public transport systems that use renewable energy and the design of rural communities to reduce fire risk • considering the factors that influence design and professional designers and technologists, including time, access to skills, knowledge, finance, expertise, for example Australian designers working with rapid prototyping manufacturers in China • explaining how product life cycle thinking can influence decision-making related to design and technologies, for example rethinking products to provide for re-use, selecting a material for a product that has a lower carbon footprint • critiquing mass production systems taking into account ethics and sustainability considerations, for example the mass production of food, clothing and shoes and why manufacturers produce different versions of the same product
Explain how products, services and environments evolve with consideration of preferred futures and the impact of emerging technologies on design decisions (ACTDEK041) 	• considering how creativity, innovation and enterprise contribute to how products, services and environments evolve • exploring the ways commercial enterprises respond to the challenges and opportunities of technological change, for example e-commerce, and carbon footprint • explaining the consequences of social, ethical and sustainability decisions for products, services and environments, for example a managed public environment such as a theme park • predicting the impact of emerging technologies for preferred futures • constructing scenarios of how the future may unfold (forecasting) and what impacts there may be for society and particular groups, and back casting from preferred futures • recognising real-world problems and understanding basic needs when considering designed solutions, for example Engineers Without Borders High School Outreach Program allows students to design solutions to problems in a country in Asia
By the end of Year 10 students will have had the opportunity to design and produce designed solutions for **one or more** of the technologies contexts below. (ACTDEK042)	
Investigate and make judgments on how the characteristics and properties of materials are combined with force, motion and energy to create engineered solutions (ACTDEK043) 	• explaining the way common machines combine properties of materials and force, motion and energy in, for example, cranes on building sites • examining and explaining the interaction between material properties and function of a common system, such as car brakes • analysing the relationship between materials of properties, forces and safety in engineered systems such as bridges • critiquing the effectiveness of the combinations of materials, forces, energy and motion in an engineered system such as a 3D printer • calculating forces, reactions and loads in structures

Investigate and make judgments on the ethical and sustainable production and marketing of food and fibre (ACTDEK044) 	• examining emerging production technologies and methods in terms of productivity, profitability and sustainability, for example vertical farming, recirculation technologies in aquaculture • investigating how digital technologies could be used to enhance food production systems, for example global positioning system (GPS) for managing animals, crop sensors or automated animal feeding or milking • comparing the environmental impacts of intensive and extensive production systems and their contribution to food and fibre production • investigating the interdependence of plants and animals in food and fibre production • examining the marketing chain of a range of agricultural products and outlining the effect of product processing and advertising on demand and price • taking account of animal welfare considerations in food and fibre production enterprises
Investigate and make judgments on how the principles of food safety, preservation, preparation, presentation and sensory perceptions influence the creation of food solutions for healthy eating (ACTDEK045) 	• experimenting with food preservation methods such as freezing and dehydrating to determine changes to food structure and how these impact on designing healthy food solutions, for example dehydrating fruit for the lunch box • conducting sensory assessment testing of a range of foods to determine how these characteristics might be used to enhance food solutions, for example taste testing a variety of milks, comparing freshly squeezed juice to commercial juices • determining how the causes of food spoilage can be addressed when preparing, cooking, presenting and storing food items, for example developing a comprehensive checklist of considerations for safe and hygienic food storage and preparation including danger zone temperatures for a food service • preparing and presenting foods using a range of techniques to ensure optimum nutrient content, flavour, texture and visual appeal, for example designing and producing a healthy snack for the canteen and using food photography and digital technologies to promote the item in a healthy eating campaign
Investigate and make judgments on how the characteristics and properties of materials, systems, components, tools and equipment can be combined to create designed solutions (ACTDEK046) 	• critiquing the design of an existing product to identify environmental consequences of material selection • justifying decisions when selecting from a broad range of technologies − materials, systems, components, tools and equipment, for example selecting low-emission paints and locally sourced materials • analysing and explaining the ways in which the properties and characteristics of materials have been considered in the design of a product with specific requirements such as reduced weight to reduce transport costs in rural Australia • investigating emerging materials and their impact on design decisions

Investigate and make judgments, within a range of technologies specialisations, on how technologies can be combined to create designed solutions (ACTDEK047) 	• examining factors influencing the design of a product that has an explicit environmental emphasis, for example the low-flush toilet • critiquing product manufacturing processes in relation to society, ethics, and sustainability factors, for example a mechanised entertainment system; an interactive multimedia product to teach a concept to a student in a country in Asia • critiquing the social nature of services, for example a signage system to manage students and community members during a school function (signs may include words, pictures and/or braille); organisational system for an aged-care facility • critiquing environments in relation to preferred futures in relation to society, ethics and sustainability practices, for example the refurbishment of a local playground; the re-design of a local wetland
Design and Technologies processes and production skills	
Critique needs or opportunities to develop design briefs and investigate and select an increasingly sophisticated range of materials, systems, components, tools and equipment to develop design ideas (ACTDEP048) 	• critiquing the design of new products to identify how well design ideas respond to sustainability issues • critiquing a range of design and technologies ideas, for example assessing those that draw on the intellectual property of others, exploring how well the ideas respond to international and Australian standards • considering the needs of community groups to identify rich design tasks • examining relationships of properties for complementary materials for products, for example examining compressive and tensile strengths of materials • identifying appropriate tools, equipment, techniques and safety procedures for each process and evaluating production processes for accuracy, quality, safety and efficiency
Apply design thinking, creativity, innovation and enterprise skills to develop, modify and communicate design ideas of increasing sophistication (ACTDEP049) 	• using techniques including combining and modifying ideas and exploring functionality to generate solution concepts • undertaking functional, structural and aesthetic analyses of benefits and constraints of design ideas, for example to different communities and environments including those from the countries of Asia • re-imagining designs to feature emerging technologies • considering competing variables that may hinder or enhance project development, for example weight, strength and price; laws; social protocols and community consultation processes • producing drawings, models and prototypes to explore design ideas, for example using technical drawing techniques, digital imaging programs, 3D printers or augmented reality modelling software; producing multiple prototypes that show an understanding of key aesthetic considerations in competing designs • communicating using appropriate technical terms and recording the generation and development of design ideas for an intended audience including justification of decisions, for example developing a digital portfolio with images and text which clearly communicates each step of a design process

Work flexibly to safely test, select, justify and use appropriate technologies and processes to make designed solutions (ACTDEP050) 	• refining technical skills and using production skills with independence to produce quality designed solutions and to reduce risks in production • using materials, components, tools, equipment and techniques safely and considering alternatives to maximise sustainability, for example using timber because it stores carbon and offsets the demand for alternative products • experimenting with innovative combinations and ways of manipulating traditional and contemporary materials, components, tools, equipment and techniques, and recording findings in a collaborative space to debate the merits of each with peers • explaining safe working practices required for a specific classroom design project for individual or community use • modifying production processes to respond to unforeseen challenges or opportunities, for example when producing bulk quantities of recipes, lower than average rainfall and impacts on growth, materials with unexpected faults
Evaluate design ideas, processes and solutions against comprehensive criteria for success recognising the need for sustainability (ACTDEP051) 	• establishing specific criteria for success for evaluating designed solutions • evaluating and justifying the use and best combination of traditional, contemporary and emerging technologies during project development, including consideration of sustainability, for example farming methods in South-East Asia • evaluating choices made at various stages of a design process and modifying plans when needed with consideration of criteria for success • evaluating projects for their long-term application, functionality and impact • reflecting on learning, evaluating processes and transferring new knowledge and skills to future design projects
Develop project plans using digital technologies to plan and manage projects individually and collaboratively taking into consideration time, cost, risk and production processes (ACTDEP052) 	• producing, explaining and interpreting drawings; and planning production timelines using digital technologies • creating production flow charts using digital technologies to ensure efficient, safe and sustainable sequences • establishing materials and equipment needs using digital technologies such as spreadsheets • collaborating to develop production plans for equitable distribution of work • investigating manufacturing processes to identify strategies to enhance production

Year 9 and 10 Achievement Standard

By the end of Year 10 students explain how people working in design and technologies occupations consider factors that impact on design decisions and the technologies used to produce products, services and environments. They identify the changes necessary to designed solutions to realise preferred futures they have described. When producing designed solutions for identified needs or opportunities students evaluate the features of technologies and their appropriateness for purpose for one or more of the technologies contexts.

Students create designed solutions for one or more of the technologies contexts based on a critical evaluation of needs or opportunities. They establish detailed criteria for success, including sustainability considerations, and use these to evaluate their ideas and designed solutions and processes. They create and connect design ideas and processes of increasing complexity and justify decisions. Students communicate and document projects, including marketing for a range of audiences. They independently and collaboratively apply sequenced production and management plans when producing designed solutions, making adjustments to plans when necessary. They select and use appropriate technologies skilfully and safely to produce high quality designed solutions suitable for the intended purpose.

Design and Technologies Foundation to Year 10 scope and sequence

Strand		Foundation to Year 2	Years 3 and 4	Years 5 and 6	Years 7 and 8	Years 9 and 10 (Elective subject)
Design and Technologies knowledge and understanding	***Technologies and society***	2.1 Identify how people design and produce familiar products, services and environments and consider sustainability to meet personal and local community needs	4.1 Recognise the role of people in design and technologies occupations and explore factors, including sustainability that impact on the design of products, services and environments to meet community needs	6.1 Investigate how people in design and technologies occupations address competing considerations including sustainability in the design of products, services, and environments and for current and future use	8.1 Examine and prioritise competing factors, including social, ethical and sustainability considerations, in the development of technologies and designed solutions to meet community needs for preferred futures	10.1 Critically analyse factors, including social, ethical and sustainability considerations that impact on designed solutions for global preferred futures and the complex design and production processes involved
					8.2 Investigate the ways in which products, services and environments evolve locally, regionally and globally through the creativity, innovation and enterprise of individuals and groups	10.2 Explain how products, services and environments evolve with consideration of preferred futures and the impact of emerging technologies on design decisions
	Technologies contexts	*By the end of Year 2 students will have had the opportunity to create designed solutions addressing the three technologies contexts below.*	*By the end of Year 4 students will have had the opportunity to create designed solutions addressing the three technologies contexts below.*	*By the end of Year 6 students will have had the opportunity to create designed solutions addressing the four technologies contexts below.*	*By the end of Year 8 students will have had the opportunity to create designed solutions addressing the four technologies contexts below.*	*By the end of Year 10 students will have had the opportunity to design and create for **one or more** of the technologies contexts below.*
	Engineering principles and systems	2.2 Explore how technologies use forces to create movement in products	4.2 Investigate how forces and the properties of materials affect the behaviour of a product or system	6.2 Investigate how forces or electrical energy can control movement, sound or light in a designed product or system	8.3 Analyse how motion, force and energy, are used to manipulate and control electromechanical systems when designing simple, engineered solutions	10.3 Investigate and make judgments on how the characteristics and properties of materials are combined with force, motion and energy to create engineered solutions
	Food and fibre production	2.3 Explore how plants and animals are grown for food, clothing and shelter and how food is selected and prepared for healthy eating	4.3 Investigate food and fibre production and food technologies used in modern and traditional societies	6.3 Investigate how and why food and fibre are produced in managed environments	8.4 Analyse how food and fibre are produced when designing managed environments and how these can become more sustainable	10.4 Investigate and make judgments on the ethical and sustainable production and marketing of food and fibre
	Food specialisations			6.4 Investigate the role of food preparation in maintaining good health and the importance of food safety and hygiene	8.5 Analyse how characteristics and properties of food determine preparation techniques and presentation when designing solutions for healthy eating	10.5 Investigate and make judgments on how the principles of food safety, preservation, preparation, presentation and sensory perceptions influence the creation of food solutions for healthy eating

	Materials and technologies specialisations	2.4 Explore the characteristics and properties of materials and components that are used to produce designed solutions	4.4 Investigate the suitability of materials, components, systems, tools and equipment for a range of purposes	6.5 Investigate characteristics and properties of a range of materials, systems, components, tools and equipment and evaluate the impact of their use	8.6 Analyse ways to produce designed solutions through selecting and combining materials, systems, components, tools and equipment	10.6 Investigate and make judgments on how the characteristics and properties of materials, systems, components, tools and equipment can be combined to create designed solutions 10.7 Investigate and make judgments, within a range of technologies specialisations, on how technologies can be combined to create designed solutions
Design and Technologies processes and production skills	***Creating designed solutions by:***					
	Investigating	2.5 Explore needs or opportunities for designing and the technologies needed to realise designed solutions	4.5 Critique needs or opportunities for designing and explore and test a variety of materials, components, tools and equipment and the techniques needed to produce designed solutions	6.6 Critique needs or opportunities for designing and investigate materials, components, tools, equipment and processes to achieve intended designed solutions	8.7 Critique needs or opportunities for designing and investigate, analyse and select from a range of materials, components, tools, equipment and processes to develop design ideas	10.8 Critique needs or opportunities to develop design briefs and investigate and select an increasingly sophisticated range of materials, systems, components, tools and equipment to develop design ideas
	Generating	2.6 Visualise, generate, develop and communicate design ideas through describing, drawing and modelling	4.6 Generate, develop, and communicate design ideas and decisions using technical terms and graphical representation techniques	6.7 Generate, develop and communicate design ideas and processes for audiences using appropriate technical terms and graphical representation techniques	8.8 Generate, develop, test, and communicate design ideas, plans and processes for various audiences using appropriate technical terms and technologies including graphical representation techniques	10.9 Apply design thinking, creativity, innovation and enterprise skills to develop, modify and communicate design ideas of increasing sophistication
	Producing	2.7 Use materials, components, tools, equipment and techniques to safely make designed solutions	4.7 Select and use materials, components, tools and equipment using safe work practices to make designed solutions	6.8 Apply safe procedures when using a variety of materials, components, tools, equipment and techniques to make designed solutions	8.9 Effectively and safely use a broad range of materials, components, tools, equipment and techniques to make designed solutions	10.10 Work flexibly to safely test, select, justify and use appropriate technologies and processes to make designed solutions
	Evaluating	2.8 Use personal preferences to evaluate the success of design ideas, processes and solutions including their care for environment	4.8 Evaluate design ideas, processes and solutions based on criteria for success developed with guidance and including care for the environment	6.9 Negotiate criteria for success that include consideration of sustainability to evaluate design ideas, processes and solutions	8.10 Independently develop criteria for success to assess design ideas, processes and solutions and their sustainability	10.11 Evaluate design ideas, processes and solutions against comprehensive criteria for success recognising the need for sustainability
	Collaborating and managing	2.9 Sequence steps for making designed solutions and working collaboratively	4.9 Plan a sequence of production steps when making designed solutions individually and collaboratively	6.10 Develop project plans that include consideration of resources when making designed solutions individually and collaboratively	8.11 Use project management processes individually and collaboratively to coordinate production of designed solutions	10.12 Develop project plans using digital technologies to plan and manage projects individually and collaboratively, taking into consideration time, cost, risk and production processes

Glossary

Abstraction

The process of reducing complexity to formulate generalised ideas or concepts, for example reducing a computing problem to its fundamental concepts.

Algorithm

A description of the steps and decisions required to solve a problem

Algorithmic logic

The logic of breaking down computing problems and information systems to a step-by-step process to solve a problem or achieve some end. It involves sequencing and abstraction and leads to algorithmic statements.

Augmented reality (AR)

Augmented reality replicates, enhances or overlays extra information about the real-world environment using computer-generated data such as global positioning systems (GPS), sound and images.

Automate

In Digital Technologies, any process of transforming and manipulating data that does not require user intervention. For example, through the use of formulas in a spreadsheet, new sets of data can be processed and the results recalculated automatically.

Biomimicry

Inspiration of functions found in nature for use and adaptation in the design of a product or to solve human problems.

Branching

Branching occurs when an algorithm makes a choice to do one of two or more actions depending on sets of conditions and the data provided.

CAPTCHA™

A graphic image recognition test to confirm a human rather than a computer response to a request. An acronym for Completely Automated Public Turing test to tell Computers and Humans Apart.

Characteristics

Distinguishing aspects (including attributes and behaviours) of an object, material, living thing, system or event.

Compression

Encoding information using fewer bits than the original representation to reduce file size.

Computational thinking

A problem-solving method that involves various techniques and strategies in order to solve problems that can be implemented by digital technologies, such as organising data logically, breaking down problems into components, and the design and use of algorithms, patterns and models.

Constructed environments

Environments developed, built and/or made by people for human and animal activity, including buildings, streets, gardens, bridges and parks. It includes the natural environment after it has been changed by people for a purpose.

Data

In Digital Technologies, numbers, characters, images, symbols and sounds that can be manipulated, stored and communicated by digital systems.

Data repositories

Central places where ***data*** are stored and maintained.

Database

A collection of data organised so the contents can be easily accessed, managed and updated.

Decompose

Separate a complex problem into parts to allow a problem to be more easily understood.

Deconstructing

Dismantling a process systematically to identify and analyse the components that make up a product or service and their relationships.

Design brief

A concise statement clarifying the project task and defining the need or opportunity to be resolved after some analysis, investigation and research. It usually identifies the users, criteria for success, constraints, available ***resources***, timeframe for the project and may include possible consequences and impacts.

Design processes

Processes that typically involve investigating; generating; producing; evaluating and collaborating and managing to create a designed solution that considers social, cultural and environmental factors. In Design and Technologies ***technologies processes*** includes design processes and ***production processes***.

Design thinking

Use of strategies for understanding design problems and opportunities, visualising and generating creative and innovative ideas, and analysing and evaluating those ideas that best meet the criteria for success and planning.

Designed solutions

In Design and Technologies, the products, services or environments that have been created for a specific purpose or intention as a result of design thinking, design processes and production processes.

Desk checking

A method used by a human to check the logic of a computer program's algorithm to ensure there are no errors.

Digital citizenship

The norms of appropriate, responsible behaviour with regard to the use of digital technologies. This involves using digital technologies effectively and not misusing them to disadvantage others. Digital citizenship includes appropriate online etiquette, literacy in how digital technologies work and how to use them, an understanding of ethics and related law, knowing how to stay safe online, and advice on related health and safety issues.

Digital information

The nature and forms of information stored digitally, and the processes that transform digital data into information for various purposes and meanings; the structures, properties, features and conventions of particular forms of digital information and the appropriate methods of storage, transmission and presentation of each form.

Digital solutions

The result (or output) of transforming data into information using digital systems, skills, techniques and processes to meet a need or opportunity.

Digital systems

Digital hardware and software components (internal and external) used to transform data into digital solutions. When digital systems are connected they form a network.

Digital technologies

Any technologies controlled using digital logic, including computer hardware and software, digital media and media devices, digital toys and accessories and contemporary and emerging communication technologies.

Drawing standards

Australian standards for engineering and technical drawing.

Economic sustainability

Practices that sustain economies while recognising the finite nature of resources and use resources optimally over the longer term without resulting in economic loss.

Engineering

The practical application of scientific and mathematical understanding and principles as part of the process of developing and maintaining solutions for an identified need or opportunity.

Engineering principles and systems

A technologies context focused on how forces can be used to create, light, sound, heat, movement, control or support in systems.

Enterprise

A project or activity that may be challenging, requires effort and initiative and may have risks.

Enterprising

Showing initiative and willingness to take action and commitment to follow through on initiatives.

Environment

One of the outputs of technologies processes and/or a place or space in which technologies processes operate. Environments may be natural, managed, constructed or digital.

Environmental sustainability

Practices that have minimal impact on ecosystem health, allow renewal of natural systems and value environment qualities that support life.

Exploded views

A technical drawing of an object, with parts shown separately, that shows the relationship or order of assembly of various parts.

Features

In Design and Technologies, features are distinctive attributes, characteristics, properties and qualities of an object, material, living thing, system or event.

File transfer protocol (FTP)

A set of rules or standards for transmitting files between digital systems on the internet.

Food and fibre production

A technologies context focused on the process of producing food or fibre as natural materials for the design and development of a range of products. Fibre includes materials from forestry.

Food specialisations

A technologies context focused on the application of nutrition principles and knowledge about the characteristics and properties of food to food selection and preparation; and contemporary technology-related food issues.

Functionality

Design of products, services or environments to ensure they are fit for purpose and meet the intended need or market opportunity and identified criteria for success.

Futures thinking

Strategic thinking that envisages what can be, given existing knowledge and strategies, to propose scenarios for probable, possible and preferred futures.

General-purpose programming language

A programming language designed to solve a wide range of programming problems (rather than a language designed for solving domain-specific problems or designed for pedagogical reasons). It includes procedural, functional and object-oriented programming languages, but does not include declarative programming languages such as Prolog or SQL. It includes scripting and/or dynamically typed languages such as Python and Ruby. Examples include C#, C++, Java, JavaScript, Python, Ruby and Visual Basic.

Graphic organisers

Digital frameworks that help structure thinking. They make thinking processes visible by showing connections between data. Examples include concept maps, flowcharts and cause-and-effect patterns.

Graphical representation techniques

Techniques used to communicate ideas and plans, for example sketching, drawing, modelling, making patterns, technical drawing, computer-aided drawing. The graphical representation techniques for each band are included in the band description.

Health

A state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity (World Health Organization 1948).

healthy eating

dietary patterns that aim to promote health and wellbeing including the types and amounts of foods and food groups which reduce the risk of diet-related conditions and chronic disease (National Health and Medical Research Council 2013)

Hypertext transfer protocol (HTTP)

A set of rules or standards for transferring files and messages on the World Wide Web. It provides a standard for web browsers and servers to communicate.

IF statement

A conditional decision statement used to control the flow of a program, for example in a spreadsheet.

Information systems

The combination of digital hardware and software components (digital systems), data, processes and people that interact to create, control and communicate information

Intitle

A prefix indicating a strategy to limit searches to the title field of a web page. It indicates that a word or phrase is included in the title.

Inurl

A prefix indicating a strategy to limit searches to particular words in a URL.

Iteration

Repetition of a process or set of instructions in computer programming.

Life cycle thinking

A strategy to identify possible improvements to products, services and environments to reduce environmental impact and resource consumption. The cycle goes from the acquisition of materials through to disposal or recycling.

Low-input sustainable agriculture (LISA)

A way of thinking about farming that focuses on reducing purchased inputs and uses on-farm resources effectively. Concepts include rotations and soil and water conservation.

Managed environments

In Design and Technologies, those environments coordinated by humans, for example, farms, forests, marine parks, water, wetlands.

Materials

Natural (such as animals, food, fibre, timber) and fabricated materials (such as metals alloys plastics, textiles). Materials are used to create products or environments and their structure can be manipulated by applying knowledge of the origins, structure, characteristics, properties and uses.

Materials and technologies specialisations

A technologies context focused on a broad range of traditional, contemporary and emerging materials and specialist areas that typically involve extensive use of technologies.

Model

A representation that describes, simplifies, clarifies or provides an explanation of the workings, structure or relationships within an object, system or idea.

Multimedia

The use of digital technologies to present text, graphics, video, animation and sound in an integrated way.

Object-oriented programming language

A programming language that supports the object-oriented programming paradigm. In object-oriented programming, objects represent a combination of data (the attributes of an object) and the actions that can be performed on or with that data (the methods of the object). The valid attributes and methods of an object are defined by its class, and these attributes and methods can be inherited from the definition of another class. Examples include C++, Eiffel, Java, Python and Scala. It is possible to use Python to teach general-purpose and object-oriented programming languages.

Orthogonal drawings

Drawings in which each edge is represented by a connected line, each segment of which is parallel to a coordinate axis. A scaled drawing view, showing either top or bottom, and two sides.

Peripheral devices

Digital components that can be connected to a digital system but are not essential to the system, for example printer, scanner, digital camera.

Perspective drawing

a drawing that represents the way objects appear to be smaller and closer together, the further away they are. Perspective drawings may be one point, or two or three-point vanishing points. A one-point perspective drawing has a single vanishing point.

Play

Includes both an imaginary situation and the exploration of objects and actions for a specific purpose, where meaning and sense of objects, actions and social situation can change for individual and collective needs to create something new.

Preferred futures

Preferences for the future identified by a student to inform the creation and evaluation of solutions.

Producing

Actively realising (making) designed solutions using appropriate resources and means of production.

Product

One of the outputs of technologies processes, the end result of processes and production. Products are the tangible end results of natural, human, mechanical, manufacturing, electronic or digital processes to meet a need or want.

Production drawing

A working drawing that details the manufacture and assembly of products.

Production processes

In Design and Technologies the technologies context-specific processes used to transform technologies into products, services or environments, for example the steps used for producing a product.

Project

The set of activities undertaken by students to address specified content, involving understanding the nature of a problem, situation or need; creating, designing and producing a solution to the project task and documenting the process. Project work has a benefit, purpose and use; a user or audience who can provide feedback on the success of the solution; limitations to work within; and a real-world technologies context influenced by social, ethical and environmental issues. Project management criteria are used to judge a project's success.

Project management

The responsibility for planning, organising, controlling ***resources***, monitoring timelines and activities and completing a project to achieve a goal that meets identified criteria for judging success.

Protocols

Generally accepted standards or 'rules' that govern relationships between and within information systems.

Prototype

A trial or model built to test an idea or process to inform further design development.

Radiofrequency identification (RFID)

A small electronic device, consisting of a small chip and antenna, used for identifying and tracking products, animals and people.

Rendered

A perspective drawing that shows the relative weight of elements using light and shade

Resources

In Design and Technologies, this includes technologies, energy, time and human input

Service

One of the outputs of technologies processes, the end result of processes and production. Services are the less tangible outcome (compared to products) of technologies processes to meet a need or want. They may involve development or maintenance of a system and include, for example catering, cloud computing (software as a service), communication, transportation and water management. Services can be communicated by charts, diagrams, models, posters and procedures.

Service design

The design of the service and the service concept. The service concept aims to meet the needs of the end user, client or customer. The service design includes the physical, organisational, aesthetic and psychological benefits of the service and required systems thinking

Social protocols

Generally accepted 'rules' or behaviours when people interact in online environments, for example, using language that is not rude or offensive to particular cultures, and not divulging personal details about people without their permission

Social sustainability

Practices that maintain quality of life for people, societies and cultures in a changing world for a long period of time, ensuring health and wellbeing without disproportionate costs or side-effects.

Structured query language (SQL)

Specialist programming language used to manage data in relational database management systems.

economic, environmental and social sustainability issues that impact on design decisions

Sustainable

Supports the needs of the present without compromising the ability of future generations to support their needs.

Systems

The structure, properties, behaviour and interactivity of people and components (inputs, processes and outputs) within and between natural, managed, constructed and digital environments.

Systems thinking

A holistic approach to the identification and solving of problems where parts and components of a system, their interactions and interrelationships are analysed individually to see how they influence the functioning of the whole system. This approach enables students to understand systems and work with complexity, uncertainty and risk.

Technologies

The materials, data, systems, components, tools and equipment used to create solutions for identified needs and opportunities, and the knowledge, understanding and skills used by people involved in the selection and use of these.

Technologies contexts

The focus and opportunities for students in Design and Technologies to use processes and production skills to design and produce products, services and environments. The prescribed technologies contexts for Foundation to Year 8 are: engineering principles and systems; food and fibre production; food specialisations and materials and technologies specialisations.

Technologies processes

The processes that allow the creation of a solution for an audience (end user, client or consumer). The proceses involve the purposeful use of ***technologies*** and other ***resources*** and appropriate consideration of impact when creating and using solutions. The processes typically require one or more of the following types of thinking: computational, critical, creative, design or systems. For Design and Technologies, the processes involve: investigating; generating; producing; evaluating; and collaborating and managing (***design processes***) and technologies-specific ***production processes***. For Digital Technologies, the processes involve: defining; designing; implementing; evaluating and collaborating and managing.

Technologies specialisations

Areas of specialisation that typically involve extensive use of technologies (for example, architecture, electronics, graphics technologies, fashion).

Transmission control protocol/internet protocol (TCP/IP)

A set of rules or standards for organising how messages are transmitted over the internet.

Visual programming

A programming language or environment where the program is represented and created visually rather than as text. A common visual metaphor represents statements and control structures as blocks that can be composed to form programs, allowing programming without having to deal with syntax errors. Examples of visual programming languages include: Alice, GameMaker, Kodu, Lego Mindstorms, MIT App Inventor, Scratch (Build Your Own Blocks and Snap).

Note: A visual programming language should not be confused with programming languages for creating visualisations or programs with user interfaces, for example, Processing or Visual Basic.

Visualisation tools

Software to help in the recording of ideas as visual representations.

While loop

A set of instructions in a loop with a test at the top. The beginning and ending of the loop are indicated by two key words ‘while’ and ‘endwhile’.