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 enables students to develop the confidence and enquiring and responsive designers. When they consider how the economic, environmental and social impacts of technological change, and how the choice and use of technologies contribute to a sustainable future, they are developing the knowledge, understanding and skills to become discerning design- makers.

Design and Technologies actively engages students in creating quality designed solutions for identified needs and opportunities across a range of technologies contexts. Students manage projects independently and collaboratively from conception to realisation. They apply design and systems thinking and design processes to investigate 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. Design and Technologies motivates young people and engage them in a range of learning experiences that are transferrable to family and home, constructive leisure activities, community and the world of work.

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, safely and professionally
- 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.

Thinking in Technologies

**Systems thinking**

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

In Design and Technologies, the success of designed solutions depends on 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 communication technologies (ICT) in a connected world through 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 the user, the problem and all needs and wants. It involves visualising and generating creative and innovative ideas, planning, and analysing and evaluating those ideas. Design thinking processes can be implemented using digital technologies.

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 solutions 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 processes.

For example, designing a maze; writing precise performance or modelling trends.

Computational thinking

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

Computational thinking is used when specifying and implementing algorithms; 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 can produce an outcome. This may include identifying 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.

Projects include when calculating costs, testing materials and components, comparing performance or modelling trends.

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 of 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 practices 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 in the 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.

Safety

Identifying and managing risk in Technologies learning addresses the safe use of technologies as well as risks that can impact on project timelines. Students learn to consider aspects of health, safety and injury prevention and, in any technologies context, the use of potentially dangerous materials, tools and equipment. It includes economics, safety including cyber safety, data security, 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 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 and childcare centres. 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 safety guidelines.

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

Rationale

Years 7 and 8

By the end of Year 8 students will have had the opportunity to design solutions at least once in the following 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 orthographic drawings. They use a range of symbols and technical terms in a range of contexts to produce patterns, annotated concept drawings and sketches, 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.
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 and defining, designing, producing and implementing, evaluating, and collaborating and managing.

Relationship between the strands
Together, the two strands provide students with knowledge, understanding and skills and the ability to 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 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 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 contexts for technologies. 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 to Year 8 and, optionally, to Year 9–10 or lead to more specialised Technologies subjects in Year 9 and 10.

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.

- Band 1: Students learn about and appreciate the role of the designer and the importance of design and how it influences everyday life. Students will explore the role of design and technology and develop an understanding of the design process.
- Band 2: Students learn about and understand the characteristics and properties of materials, systems, components, tools, equipment, and technologies and the role they play in the design and production of designed solutions. Students will develop an understanding of the relationship between design and technology.
- Band 3: Students learn about and understand the role of technology in society and the impact of technology on society. Students will develop an understanding of the relationship between technology and society.
- Band 4: Students learn about and understand the role of technology in society and the impact of technology on society. Students will develop an understanding of the relationship between technology and society.
- Band 5: Students learn about and understand the role of technology in society and the impact of technology on society. Students will develop an understanding of the relationship between technology and society.
- Band 6: Students learn about and understand the role of technology in society and the impact of technology on society. Students will develop an understanding of the relationship between technology and society.

- Band 7: Students learn about and understand the role of technology in society and the impact of technology on society. Students will develop an understanding of the relationship between technology and society.

- Band 8: Students learn about and understand the role of technology in society and the impact of technology on society. Students will develop an understanding of the relationship between technology and society.

Design and Technologies processes and production skills
This strand focuses on developing the understanding and application of design processes and production skills. These processes and skills are typically addressed through a designed solution.

The Design and Technologies processes and production skills strand focuses on creating designed solutions by investigating and defining, designing, producing and implementing, evaluating and collaborating and managing.

Types of designed solutions
Across each band from Foundation to Year 8, students will have the opportunity to produce at least three types of designed solutions (produced, 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/food specialisation service, and a materials and technologies specialisation service.

Students in other years may select different contexts to suit their interests and strengths.

Design and Technologies processes and production skills
- Investigating and defining: Investigating and defining involves students exploring, analysing and interpreting information. Students generate ideas, question why things work and consider alternatives.
- Designing: Designing involves students generating ideas, developing and planning by making and testing models or prototypes. It involves problem solving and evaluating ideas.
- Producing: Producing involves students making and testing designed solutions in a variety of ways. It involves using a range of tools and equipment and working within health and safety regulations.
- Implementing: Implementing involves students evaluating designed solutions and reflecting on the design processes.
- Collaborating and managing: Collaborating and managing involves working with others to create designed solutions. It involves understanding and valuing the contributions of others and working with them to achieve common goals.

Design and Technologies contexts
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- Implementing: Implementing involves students evaluating designed solutions and reflecting on the design processes.
- Collaborating and managing: Collaborating and managing involves working with others to create designed solutions. It involves understanding and valuing the contributions of others and working with them to achieve common goals.

Years 7 and 8 Content Descriptions

- Design and Technologies Knowledge and Understanding: Design and Technologies knowledge and understanding – the use, development and impact of technologies and design ideas across a range of technologies contexts and the skills needed to design and produce designed solutions.

- 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.

- Design and Technologies Processes and Production Skills: Generate, develop, test and communicate design ideas, plans and processes for various audiences using appropriate technical terms and technologies including graphical representation techniques.

- Design and Technologies Processes and Production Skills: Select and justify choices of materials, components, tools, equipment and techniques to effectively and safely make designed solutions.

- Design and Technologies Processes and Production Skills: Independently develop criteria for success to evaluate design ideas, processes and solutions and their sustainability.

- Design and Technologies Processes and Production Skills: Use project management processes when working individually and collaboratively to coordinate production of designed solutions.

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