Years 9 and 10

Rationale

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

Design and Technologies actively engages students in creating quality designed solutions for identified needs and opportunities across a range of technologies contexts. Students manage projects independently and collaboratively from conception to realisation. They apply design and systems thinking and design processes to investigate ideas, generate and refine ideas, plan, produce and evaluate designed solutions. They develop a range of technologies capability, are able to develop designed solutions and evolve and refine them through the practical application of technologies including digital technologies, student design dexterity and coordination through experiential activities. Design and Technologies motivates young people and engages them in a range of learning experiences that are transferable to family, home, leisure and constructive 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 innovations and solutions
- use design and systems thinking to design and communicate 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
- participate in and shape the future of information and communication technologies
- understand the roles and responsibilities of people in design and technologies occupations and how they contribute to society.

Key Ideas

Overarching ideas: 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 livability, 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 a feasible solution. Students will develop an understanding of quality, evaluating processes and collaborating and communicating with others at different stages of the process.

To plan and manage projects which may be challenging, students and their teachers will need to identify and manage risks and opportunities.

Thinking in Technologies

Systems thinking

A system is an organised group of related objects or components that form a whole. Systems thinking is a method that is used to analyse and solve problems where the focal points are treated as components of a system, and their interactions and interrelationships are considered 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 interconnectedness of and interactions between people, places and events in local and wider 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

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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 capabilities, 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.

Years 9 and 10 Band Description

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. They will be able to do four of the five Technologies content descriptions. There is one optional content description for each of the following: Engineering principles and systems, Food and fibre production, Food specialisation and Materials and technologies specialisation. 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 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 is supported by the complexities of contemporary life and makes 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 the 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, orthographic and production drawings with detailed technical specifications. Students produce rendered images for viewing and use in local and wider contexts. 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 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.
Years 9 and 10 Content Descriptions

Design and Technologies Knowledge and Understanding

Types of designed solutions

Across each band from Foundation to Year 8, students will have the opportunity to produce at least five 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, food and fibre production/food specialisations environment and a materials or technologies specialisations service. Whereas in another school students may design and produce an engineered environment, a food and fibre production/food specialisations service, and a materials and technologies specialisations product. The combination of contexts and types of designed solutions is a school decision.

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.

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

- investigating and defining
- generating and designing
- producing and implementing
- evaluating
- collaborating and managing

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

Investigating and defining

Investigating and defining 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, analysis, 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 judgements about them. Students may respond to design briefs or develop design briefs in response to needs and opportunities.

Generating and designing

Generating and designing 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 representations techniques when they draw, sketch, model and create innovative ideas that focus on high-quality designed solutions.

Producing and implementing

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 manufacturing 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 judgements 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 evaluate 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 timetables, 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.

Subject structure

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 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 through which they can safely and ethically design, plan and 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).