In a world that is increasingly digitised and automated, it is critical to the wellbeing and sustainability of the economy, the environment and society, that the benefits of information systems are exploited ethically. This requires deep knowledge and understanding of digital systems (a component of an information system) and how to manage them. Ubiquitous digital systems such as mobile and desktop devices and networks are transforming learning, recreation, work and social interactions. The teaching and learning of Digital Technologies needs to support new ways of coping with these systems and solving new types of problem-solving tasks in our information-based society.

The Australian Curriculum: Digital Technologies empowers students to shape change by influencing how contemporary and emerging information systems and practices are applied to meet current and future needs. A deep knowledge and understanding of information systems enables students to be creative and discerning decision-makers when they select, use and manage data, information, processes and digital systems to meet needs and shape preferred futures.

Digital Technologies provides students with practical opportunities to use design thinking and to be innovative developers of digital solutions and knowledge. The subject helps students to become innovative creators of digital solutions, effective users of digital systems and critical consumers of information conveyed by digital systems.

Digital Technologies provides students with authentic learning challenges that foster curiosity, confidence, persistence, innovation, creativity, respect and cooperation. These are all necessary when using and developing information systems to make sense of complex ideas and relationships in all areas of learning. Digital Technologies helps students to become regional and global citizens capable of actively and ethically communicating and collaborating.

Aims

In addition to the overarching aims for the Australian Curriculum: Technologies, Digital Technologies more specifically aims to develop the knowledge, understanding and skills that enable, to individually and collaboratively, students:

- design, create, manage and evaluate sustainable and innovative digital solutions to meet and redefine current and future needs
- use computational thinking and the key concepts of abstraction; data collection, representation, algorithms; and models to develop digital solutions
- confidently use digital systems to efficiently and effectively automate the transformation of data into information and to creatively communicate ideas in a range of settings
- apply protocols and legal practices that support safe, ethical and respectful communications and collaboration with known and unknown audiences
- apply systems thinking to monitor, analyse, predict and shape the interactions within and between information systems and the impact of these systems on individuals, societies, economies and environments.

Key Ideas

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 become involved in the processes of identifying problems, defining problems, exploring possible solutions, creating prototypes or digital models, evaluating the effectiveness of proposed solutions, and justifying their conclusions to others.

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 way of thinking about systems, identifying the relationships and interdependencies amongst the parts of a whole, and making predictions about the whole system. Problem-solving where the focal points are treated as components of a whole systems approach, and interrelationships are analysed individually to see how they influence the functioning of the entire system.

In Digital Technologies, the success of designed solutions includes the generation of ideas and decisions made throughout design processes. It requires students to understand the larger and more complex real-world context, the complexity and uncertainty and risk. Students recognise the interconnectedness of design and social processes and are prepared to consider the impact of their designs and actions in a connected world.

Participating in and shaping the future of information and digital systems is an integral part of learning in Digital Technologies. The ability to identify and respond to the demands of industry and the interdependence of客戶s is necessary to create timely solutions to technical, economic and social problems. Students need to be prepared to respond to shifting digital landscapes and engage in the consequences for the people who use the system, and may introduce unintended costs or benefits that impact the present or future society.

Computational thinking

Computational thinking involves the use of strategies for understanding design needs and opportunities, visualising and generating prototypes and algorithms, implementing and testing digital solutions, and evaluating 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 the data, the degree of interaction with that data and the various types of computational processing and transaction the system will undertake. Developing 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.
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 open 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 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 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 explicitly 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 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 strand.

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 strands. Interactions refer to all human interactions with information systems, expressions of use 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 impacts result from emerging and changing 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 the environment. Solutions may be developed using combinaisons of readily available hardware and software applications, and/or specific instructions provided by designers or programmers. Some examples of solutions are instructions for a robot, an adventure game, products featuring interactive multimedia including digital stories, animations and websites.