acara AUSTRALIAN CURRICULUM, ASSESSMENT AND REPORTING AUTHORITY

The Shape of the Australian Curriculum: Technologies

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Purpose

1. The *Shape of the Australian Curriculum: Technologies* provides broad direction on the purpose, structure and organisation of the Technologies curriculum. It is intended to guide the writing of the Australian Curriculum: Technologies from Foundation to Year 12.
2. This paper has been prepared in consultation with the Technologies Advisory Group following decisions taken by the ACARA Board, analysis of feedback from the Technologies National Forum and the Technologies National Panel to the *Initial Advice Paper: Technologies* (November 2011) and feedback from the national consultation on the draft *Shape of the Australian Curriculum: Technologies*.
3. The paper should be read in conjunction with *The Shape of the Australian Curriculum* v3.0. It is informed by ACARA's *Curriculum Design* paper v3.0 and the *Curriculum Development Process* v6.0.

Introduction

4. The Australian Curriculum: Technologies will shape the future of Technologies learning in schools, ensuring that all students benefit from learning about and working with the traditional, contemporary and emerging technologies that shape the world in which we live. The Technologies learning area draws together the distinct but related subjects of Design and Technologies and Digital Technologies and includes the range of technologies currently addressed by state and territory curricula.

5. Technologies enrich and impact on the lives of people, cultures and societies globally. It is important that as a nation we make connections between creativity, technologies and enterprise as a catalyst for twenty-first century innovation. We depend upon technologies for food and fibre production, communication, construction, energy and water management, health and wellbeing, knowledge creation, information management, manufacturing and transportation. Australia needs enterprising individuals who can make discerning and ethical decisions about the use of technologies, independently and collaboratively develop innovative solutions to complex problems and contribute to sustainable patterns of living. The Australian Curriculum: Technologies has the potential to develop Australia's capacity to creatively respond to our national research priorities, many of which focus on sustainability; and participate in and contribute to a knowledge-based economy.

6. Information and communication technologies, and social media in particular, have increased the pace of change and transformed learning, recreational activities, home life and work. They have provided new ways of thinking, collaborating and communicating for all ages and abilities. The now ubiquitous nature of digital technologies resulting from digitisation, the miniaturisation and embedding of microelectronics into a range of products, and wireless networking means that students of all ages and abilities expect to be able to play, learn and study anytime and anywhere.

7. New developments in technologies challenge us to adapt to and critically examine how they influence our ideas, opportunities and actions. Technologies, in both their development and use, are influenced by and can play a role in transforming societies and our natural, managed, constructed and digital environments. All young Australians should develop a critical appreciation of the processes through which technologies are developed and how they can contribute to societies and cultures. They need opportunities to shape and challenge attitudes to the use and impact of technologies by evaluating how their own solutions and those of others affect users, equity, sustainability, ethics, and cultural and personal values. We create, as well as respond to, the designed world in which we live.

8. Technologies education uniquely engages students in technologies processes and production, and design and computational thinking. It helps students to understand the world in which they live as they identify, explore and analyse real-world needs, aspirations and opportunities and play an active role in matters that are relevant to them. Students develop knowledge, understanding and skills in the discriminating, ethical, innovative, creative and enterprising use of a range of technologies. They learn to create, design, develop and produce innovative technological solutions. They play,

learn, create and produce (make) using a range of materials, data, systems, tools and equipment throughout their years of schooling.

9. A core dimension of Technologies education is the way students learn to use higher order thinking skills to design and conduct investigations including considering ethics, researching and collecting data; predicting outcomes; trialling and experimenting; and reflecting on, evaluating and validating data. Students develop knowledge and confidence in critically analysing and creatively responding to the challenges of a highly technological future. They manage projects from the identification of needs or opportunities to conception and realisation.

10. Reflecting on learning in Technologies builds students' technologies knowledge and deepens their understanding. Technologies knowledge may be demonstrated by how well a project or task has achieved the brief given to, or developed by, the student. Student choices about effective use of materials, data, systems, tools and equipment can be evaluated using criteria for success and design specifications.

11. The Technologies learning area provides opportunities for students to identify and consider the contribution of designers and technology specialists to the improvement of the quality of life, including personal health and wellbeing, home and family life, the nature of their work, the processes used in specialisations and the importance of teamwork and collaboration.

12. Students develop a sense of pride, satisfaction and enjoyment in producing quality solutions that may be both functionally appropriate and aesthetically pleasing. Technologies education satisfies the intrinsic motivation of young people to make learning fun and provides students with skills for constructive leisure activities.

Technologies education for diverse learners

13. The Australian Curriculum: Technologies is shaped by the propositions that each student can learn and that the needs of every student are important. A comprehensive education in Technologies provides opportunities for students to progress from creative play, through to consolidated skills and the challenges of developing innovations in knowledge. In the first years of schooling, students engage in relatively simple technologies, project briefs and problems, then demonstrate knowledge, understanding and skills in established processes, and eventually work on technologically complex projects using materials, data, systems, tools and equipment.

14. Students in Australian classrooms have multiple, diverse and changing needs that are shaped by individual learning histories and abilities, as well as gender, cultural and language backgrounds and socio-economic factors. The Technologies curriculum will be accessible to all students, enabling equality of opportunity. It will provide the flexibility required to personalise learning and build on each student's needs, strengths and abilities. It will allow teachers to take into account the different rates at which students develop, and ensure that all students have equivalent opportunities and choices in their education.

15. The curriculum will allow for difference in student interests, capabilities and future pathways. It will provide the means to engage every student, enabling them to make active and informed decisions, and equipping them with skills to participate actively in the broader community. The principles of the Universal Design for Learning framework will inform the development of the Technologies curriculum, ensuring that the curriculum is inclusive.

Relationships with other areas of the Australian Curriculum

16. The Technologies learning area has strong links to a number of learning areas and to further education, training and career pathways. The Australian Curriculum: Technologies will draw on these relationships and provide opportunities to develop complementary or integrated teaching and learning programs, promote deep understanding and foster interest in career pathways.

Integrating the Technologies curriculum with other learning areas

17. Thinking and working in the Technologies learning area provides rich opportunities for applying, synthesising and extending learning from other learning areas. It uses, for example, scientific knowledge, language, mathematical concepts, aesthetics and an understanding of sociology and human behaviour. Mapping the potential links between the Technologies learning area and other learning areas will allow for meaningful opportunities for integrated learning, transfer of knowledge and understanding between learning areas, playfulness and innovation across the curriculum, particularly from Foundation (F) to Year 6.

Food and fibre production in the Australian Curriculum

18. 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 the 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. This learning will address key processes of production, marketing, consumption, sustainable use of resources and waste recycling.

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

Food and nutrition in the Australian Curriculum

20. The best way to influence student attitudes and behaviour regarding healthy living is to provide them 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 both Health and Physical Education (HPE) and in the Technologies learning area through Design and Technologies from Foundation to Year 8. In Technologies students will learn how to apply nutrition knowledge through the preparation of food. Beyond Year 8 students may choose to study a food-related subject offered by states and territories.

Multimedia in the Australian Curriculum

21. Students learn about multimedia (the use of digital technologies to present text, graphics, video, animation and sound in an integrated way) across the Australian Curriculum. In Technologies the focus is on the functional, technological aspects of production and meeting the needs of the end user. In the English curriculum media are studied as forms of communication and students consider how the media are used to inform and influence an audience. In Media Arts students use communication technologies to tell stories, represent and communicate ideas and explore concepts. Making in Media Arts involves designing, planning, producing, capturing and

recording, choosing, combining and editing, representing and distributing. Students make media arts works in a range of traditional, contemporary and hybrid forms and use media arts to investigate concepts and ideas from other Arts subjects and learning areas.

Technologies and further education, training and career pathways

22. Technologies education makes direct links to the world of work and the skills needed for collaboration, communication, education, training and employment within a technologically attuned and innovative workforce. To foster interest in careers with a technologies focus, students should have opportunities to engage in rich technologies experiences from an early age. In this way students build technologies competence and awareness over time. In secondary education, students have the opportunity to specialise in technologies that may provide the stimulus for career choices.

23. The curriculum from Foundation to Year 8 provides a basis for a range of education pathways including subjects for Years 9–12 developed as part of the Australian Curriculum and the National Training Cadetship (NTC); those offered by states and territories; and the Vocational Education and Training (VET) frameworks already offered in many schools Australia-wide.

Aims

24. The Australian Curriculum: Technologies will contribute to the educational goals set out in the *Melbourne Declaration on Educational Goals for Young Australians* (2008 pp. 7–9) and build on the vision for children's learning and early childhood pedagogy outlined in *The Early Years Learning Framework.*

25. The Technologies curriculum aims to develop active and informed citizens and consumers. It enables students to become confident, creative, ethical, enterprising, environmentally and socially responsible innovators. Students will develop the technologies knowledge, understanding and skills to engage purposefully in the process of creating preferred futures. They will use a range of thinking skills, including futures and systems thinking, to generate and communicate creative ideas. These ideas will be enacted through the practical application of design and computational thinking along with traditional, contemporary and emerging technologies. The end products students produce (make) will be effective, meaningful and culturally authentic solutions to identified problems or opportunities in personal, family, community and global settings.

26. More specifically, Technologies aims to develop the knowledge, understanding and skills to ensure that individually and collaboratively students:

    - are creative, innovative and enterprising when using traditional, contemporary and emerging technologies
    - effectively and responsibly select and use appropriate technologies, materials, data, systems, tools and equipment when designing and creating healthy, socially, economically and environmentally sustainable products, services or environments
    - critique, evaluate and use thinking skills and technologies processes for a range of problems or situations
    - plan, manage, create and produce (make) technologies solutions for situations or problems for a range of settings
    - engage confidently with and make informed, ethical decisions about technologies for personal wellbeing and health, recreation, everyday life, the world of work and preferred futures.

Structure

27. Students need continuing opportunities and sustained engagement to learn to think critically, creatively and innovatively when using and creating with technologies and technologies processes. They need conceptual frameworks, knowledge and skills to explore and understand aspects of the natural, constructed and virtual worlds that surround them. They need to learn to critique and use knowledge to develop innovative, enterprising solutions to a range of challenges. These needs can be met from Foundation through a continuum of learning involving a range of technologies.

Subjects in the Technologies learning area

28. The Australian Curriculum: Technologies comprises two mandatory subjects from Foundation to Year 8: Design and Technologies and Digital Technologies, with the assumption that all young Australians are entitled to study both in these year levels.

29. In Years 9 to 12, students will be able to choose from a range of subjects developed as part of the Australian Curriculum as well as those developed by states and territories. At Years 9 to 10, the Australian Curriculum: Technologies will include two optional subjects, also to be named Design and Technologies and Digital Technologies. States and territories may offer additional technologies specialisations that do not duplicate the subjects in the Australian Curriculum. Decisions about the study of these additional Technologies opportunities in Years 9 to 12 will be taken by school authorities.

30. Ministers of Education will decide in December 2012 whether senior secondary courses will be developed for Technologies as part of the Australian Curriculum. Pending this decision, it is proposed that two subjects would be developed: one focusing on Design and Technologies and one on Digital Technologies. Consideration will be given to developing instead of Digital Technologies, one or both of the following subjects: Information Systems and Software Development. States and territories may also provide additional technologies subjects for students in the senior secondary years that do not duplicate the Australian Curriculum.

31. Curriculum for Design and Technologies and Digital Technologies will describe the distinct knowledge, understanding and skills of each subject and, where appropriate, will also highlight their similarities and complementary learning. This will allow for connections to be made and provide the flexibility for developing integrated teaching programs, especially in the primary years of schooling. This is central to pedagogy in the early years, and a key strength for meaningful learning in the Technologies curriculum. Schools are best placed to determine if and how this will occur.

32. The key difference between Design and Technologies and Digital Technologies is the relative emphasis on design thinking and computational thinking. While both are utilised in each subject, Design and Technologies has a strong focus on design thinking, the application of the design process and producing (making) solutions to design products, services and environments. In Digital Technologies the focus is on the use of digital systems, information and computational thinking to create solutions for identified needs and opportunities.

33. Design thinking is predominantly heuristic in nature. It includes using strategies in order to understand design problems, generating creative and innovative ideas, and analysing and evaluating those ideas to find the best solution.

34. Computational thinking is predominantly algorithmic in nature. This includes problem solving techniques and strategies, such as organising data logically, breaking down problems into components, and the design and use of algorithms, patterns and models.

Content structure in the Technologies subjects

35. As the curriculum is developed, knowledge, understanding and skills in each subject will be presented through two related strands:

    - Knowledge and understanding
    - Processes and production skills.

36. The common strand structure provides an opportunity to highlight similarities across the two subjects that will facilitate integrated approaches to teaching from Foundation to Year 8. However, during the writing process consideration will be given to whether organisation by strands is necessary and/or whether different strands are more appropriate.

37. There are clear relationships between the two strands in each subject. It is intended that when implementing the curriculum, teachers will select technologies-specific content from the *Knowledge and understanding* strand and ask students to apply the skills in the *Processes and production skills* strand to that content.

Overarching idea: Creating preferred futures

38. The Technologies curriculum focuses on students developing the technologies knowledge, understanding and skills to engage purposefully in helping to create preferred futures. A focus on preferred futures involves systems thinking and provides a methodology for identifying and moving towards socially responsible and sustainable patterns of living.

39. While the future cannot be predicted, future outcomes can be influenced by the problems we choose to solve, the designs we create and the choices and decisions we make. Preferred futures are those that students will envisage as desirable and sustainable as they work through technologies processes and production, considering ethical, economic, environmental and social sustainability factors.

40. In both Design and Technologies and Digital Technologies, a focus on creating preferred futures provides opportunities for students to engage in predicting outcomes and impacts of technological decisions for current and future generations. They creatively and actively design sustainable and appropriate solutions to meet the needs of the present without compromising the ability of future generations to meet their needs. Both subjects acknowledge the strong connection with the Sustainability cross-curriculum priority and in particular the sustainability organising ideas related to futures.

41. Design and Technologies provides students with an opportunity to consider the environmental impact of decisions and re-design and re-engineer products, services and environments to support more sustainable patterns of living, for example, sustainable food supply. Students will reflect on the future impact of decisions from

ethical, economic and social perspectives. They will apply futures thinking across a range of contexts, including food and fibre production, and evaluate designed solutions and traditional, contemporary and emerging technologies from the point of view of sustainability.

42. In Digital Technologies, students will assess the role of contemporary and emerging digital technologies in creating more sustainable patterns of living including technologies used to: manage and monitor natural, managed, constructed and digital environments; model data and identify trends; control conditions and machinery to enable systematic increases in productivity and significant reductions and efficiencies; and facilitate social interaction and the development of ethical forms of entertainment that develop world views.

43. The overarching idea of creating preferred futures bridges the subjects and strands and allows students to engage purposefully in this endeavour. It is reflected in each of the subjects to ensure a futures-oriented approach to Technologies learning. It frames the development of concepts in the *Knowledge and understanding* strand, supports key aspects of the *Processes and production skills* strand, and contributes to developing students' capacity to be active, innovative and informed citizens.

Managing projects

44. Technologies projects involve ethical, health and safety considerations, commercial realities, sustainability, project management, and consumer and client needs, including consideration of personal and cultural beliefs and values. Students learn that when they and others work technologically, they are responsible and accountable for their designs and solutions.

45. Project management is an essential element in building students' capacity to more successfully innovate in Design and Technologies and Digital Technologies. Project work and project management occur as a part of everyday life and are critical to many fields of technologies employment. Technologies education allows students to develop skills to manage projects from identification of need or opportunity through conception to realisation. Project management will be addressed in all years of schooling as individuals and groups of students plan how they will work to bring a design idea to fruition.

46. Students are explicitly taught how to manage projects including planning; evaluating technologies; considering constraints; risk assessment and management; decision-making strategies; quality control; developing resource, finance, work and time plans; and collaborating and communicating with others at different stages of the process.

47. Assessing and managing risk in Technologies learning addresses the safe use of technologies and the risks that can impact on project timelines. It covers all necessary aspects of health, safety and injury prevention at any year level and in any technologies context when using potentially dangerous materials, tools and equipment. It includes ergonomics, safety including cyber safety, and ethical and legal considerations when communicating and collaborating online.

Design and Technologies

48. The Design and Technologies subject comprises two related strands:
    - Design and Technologies knowledge and understanding
    - Design and Technologies processes and production skills.
49. Together, the two strands provide students with technologies knowledge, understanding and skills through which they can design and work technologically to produce solutions for real-world needs, opportunities and target audiences.
50. In Design and Technologies students engage in a design process. They generate, develop and evaluate ideas and design, produce (make) and evaluate products, services and environments in a range of technologies contexts in home, community and global settings. Students take action and make ethical decisions about technologies, considering legal, economic, environmental and social implications. They learn about the process of design as well as different technologies contexts. They realise (make) solutions by working technologically using technologies processes and production involving their hands, tools, equipment and digital technologies, using natural and fabricated materials. The hands-on, practical application of technologies skills in Design and Technologies develops manual dexterity, fine motor skills and coordination. Students represent and communicate their ideas, plans and solutions to a range of audiences. For younger children, this usually involves personal and family settings where there is an immediate, direct and tangible outcome, and where playfulness and hands-on exploration are a focus.
51. Technologies contexts provide the focus and opportunity for students in Design and Technologies to use technologies processes and production skills to design, produce and evaluate products, services and environments. For example:
    - integrating learning from other learning areas (for example, 'Living things' from Science; 'Changes in technology' from History)
    - focusing on specific materials, such as electronics, food, metal, textiles or timber
    - focusing on a product, service or environment (for example, a natural, managed, constructed or digital environment)
    - focusing on an area of specialisation (for example, architecture, engineering, food and fibre production).
52. In the Foundation to Year 8 scope and sequence, content descriptions and elaborations will be written for a range of technologies contexts. They will complement content descriptions already developed for other learning areas to enable teachers to create integrated teaching and learning programs.
53. In Years 9 to 12, schools will be able to select a range of technologies contexts suited to their location, resources and student interests.

Design and Technologies knowledge and understanding

54. This strand focuses on materials, systems, tools and equipment and technologies and society. Knowledge and understanding will be dependent on the technologies required to realise or model a solution to meet a need or opportunity. Students will develop increasingly sophisticated knowledge and understanding, drawn from both contemporary and historical sources, of:

- the range of materials, systems, tools and equipment that are central to traditional, contemporary and emerging technologies, including their properties, characteristics and components and consideration of constraints on their use
- the ways in which materials, systems, tools and equipment interrelate and can be combined to create solutions to problems and to identify new opportunities for innovation
- how people use and develop technologies to meet their needs
- the relationship between technologies and individuals and their communities (local, national and global), and the economic, ethical, environmental and social factors that shape the development of technologies
- the consequence of use and the impact of technologies on individuals, families, communities and the environment.

Design and Technologies processes and production skills

55. This strand focuses on identifying, exploring and critiquing a need or opportunity; generating, researching and developing ideas; and planning, producing and evaluating solutions that utilise processes and production skills, creativity, innovation and enterprise to promote the development of sustainable patterns of living. Students will develop increasingly sophisticated skills in design and procedural thinking, and technologies processes and production, through designing and producing products, services and environments in response to needs or opportunities. They will:

- identify, explore and critique needs or opportunities, and use critical, creative, design and systems thinking for a range of technologies contexts
- create and produce innovative and enterprising products, services and environments that have positive and sustainable outcomes for preferred futures, for the economy, the environment and societies
- identify needs and wants, consider user values and beliefs, generate and develop ideas, research and investigate possible solutions, establish criteria for success, and evaluate and justify their designs against these criteria and design specifications
- assess risk and observe safety standards and practices, including cooperation and respect for others
- use appropriate techniques, tools and equipment to produce a technology output of appropriate quality, and in so doing develop a range of production skills
- give appropriate thought to impact when creating a product, service or environment for real use by a target audience, with the opportunity to respond to and gain feedback from an end user, client or consumer
- assess all aspects of the development of their solutions from ethical, health and wellbeing, safety, economic, environmental and social sustainability perspectives; evaluate the success of their solutions based on the results of testing and user satisfaction; and suggest improvements that could be made to the solution and to their own performance.

Digital Technologies

56. The Digital Technologies subject comprises two related strands:

    - Digital Technologies knowledge and understanding
    - Digital Technologies processes and production skills.

57. Together, the two strands provide students with knowledge, understanding and skills through which they can safely and ethically exploit the capacity of digital technologies, controlled through a variety of means, to create and interact with digital information and systems for specific purposes and/or audiences.

58. In Digital Technologies students use digital systems, digital information and computational thinking to create solutions that enable the articulation of human knowledge. They develop understanding of the relationship and interconnectedness between the components of digital systems in authentic situations. They consider social, cultural, legal, environmental and ethical issues. They use computational thinking methods and strategies to understand and solve information problems. They develop conceptual, collaborative and technical skills to systematically create information processing solutions (such as means of communication, databases, digital media, robotics, transactions and websites) for specified audiences, end users, clients or consumers. They learn to operate and manage digital systems to locate, manage, organise, analyse, represent and present information; create digital products; troubleshoot, control and monitor processes and devices; communicate with others; and support computational and design thinking and production.

Digital Technologies knowledge and understanding

59. This strand focuses on digital systems and digital information, and digital technologies and society. Students will develop increasingly sophisticated knowledge and understanding, drawn from both contemporary and historical sources, of:

    - the range, properties and characteristics of data, procedures, communication, digital systems and electronic equipment
    - the ways in which digital information and systems can be combined and controlled to create structured information and solutions to problems and to identify new problems and innovations
    - the relationship and interconnectedness between the components of digital systems and digital information in real-world situations, including the nature of the human–computer interface and multimodal communication, considering social, cultural, legal, environmental and ethical issues
    - the relationship between digital technologies, themselves, their communities (local and global), the factors that shape the development of these technologies and the consequence of use and the impact of these technologies on individuals, families, communities and the environment.

Digital Technologies processes and production skills

60. This strand focuses on formulating and investigating problems; analysing and creating digital solutions; representing and evaluating solutions; and utilising skills of creativity, innovation and enterprise for sustainable patterns of living. Students will develop and use increasingly sophisticated computational thinking skills and digital technologies processes and techniques to create digital information products, systems or software instructions to address specific problems or needs. Through investigation they will:

- discuss and formulate the dimensions of problems
- take action to promote the use of digital technologies in ways that support the evolution of preferred futures, including consideration of security, values, beliefs, ethics and safety including cyber safety
- conduct research, generate ideas for digital solutions, analyse data, organise and develop digital information, and use an increasing variety of methods, techniques and forms to communicate ideas and digital information
- develop solutions to problems using computational thinking, representing the solution with a model, simulation, prototype or final solution, both independently and collaboratively
- evaluate solutions and processes against criteria or specifications
- increasingly select and manage digital information and systems within constraints, and make decisions concerning appropriate techniques, software, processes, quality standards and testing
- explore the capabilities of digital technologies for supporting creative, innovative and enterprising pursuits, including for personal expression, cultural and artistic activity, mathematical abstraction and logic, scientific and social invention and complex algorithmic thought processes.

Organisation

61. The curriculum for each Technologies subject is organised in the following bands:

    - Foundation to Year 2
    - Years 3 and 4
    - Years 5 and 6
    - Years 7 and 8
    - Years 9 and 10
    - Senior secondary (Years 11 to 12).

62. The organisation of the curriculum in these bands provides the flexibility to address knowledge, understanding and skills in a way that meets the diverse cognitive and developmental needs and interests of students. The Australian Curriculum has been developed so that it can be taught within 80 per cent of the available teaching time. With this in mind, a notional time allocation will be used to guide the development of the Technologies curriculum. For Design and Technologies and Digital Technologies combined these are:

    - 60 hours across Foundation to Year 2
    - 80 hours across Years 3 and 4
    - 120 hours across Years 5 and 6
    - 160 hours across Years 7 and 8
    - 160 hours (80 hours for each subject) across Years 9 and 10

    and a further 200 to 240 hours of learning across Years 11 and 12 for each subject.

63. Allocation of time for teaching the Technologies learning area will be decided by school authorities or schools. These decisions will take account of the different approaches that can be taken for each Technologies subject.

Scope and sequence

64. The knowledge, understanding and skills proposed in the scope and sequence of Technologies learning are sequential and cumulative in nature. The proposed overview of the curriculum is presented (on pages 19–24) in bands of schooling for the Design and Technologies and Digital Technologies subjects. The detailed curriculum will reflect the general capabilities and cross-curriculum priorities.

Foundation to Year 8

65. The Early Years Learning Framework (EYLF) recognises the importance of children connecting with people, places, technologies and natural and fabricated materials; being effective communicators; and using information and communication technologies to access information, investigate ideas and represent their thinking. In Foundation to Year 2, the curriculum builds on the EYLF in which the outcomes for children include developing a strong sense of identity and wellbeing, being connected with, and contributing to, their world, becoming confident and involved learners and becoming effective collaborators and communicators. The EYLF has a specific focus on play-based learning and intentional teaching, and recognises children's rights to be active participants in all matters affecting their lives. Play is defined as children co-creating imaginary situations where they give new meaning to objects and events.

66. The F–2 curriculum will focus on personal forms and use of technologies in children's immediate environments (for example, home, the backyard/farmyard and the classroom). It will recognise children's diverse experiences with technologies, especially digital technologies. The curriculum will also support the change in perspectives needed so that young children can engage in design thinking (for example, understanding plan views, planning and evaluating, and the use of everyday digital technologies for personal needs and communications).

67. Like other learning areas, the Technologies curriculum, particularly in the primary years, allows for integration with and support of other learning area knowledge for shared development of concepts and skills across learning areas. The Technologies curriculum will provide both rich and practical opportunities for young students to bring learning from other learning areas to their projects as they read, measure, write, draw, research, construct and think critically. Technologies learning is active and involves play and collaborative group activities as students design and create solutions to challenges and needs relevant to their lives. Technologies learning applied to real-world situations supports student-centred inquiry and purposeful play and learning. It provides meaning and motivation for learning in all areas of the curriculum.

68. In Years 3 and 4 (typically 8 to 10 years of age), students become more concerned with the social and environmental use of technologies in their local, national and global communities for a range of purposes and users, including for community-based work. Students continue to use knowledge from other areas of learning. This helps them to build an appreciation of design as a learned concept, and the role of technologies in supporting and sustaining human activity in relation to other living things. Students need opportunities to be enterprising and to investigate and test design ideas in relation to environmental and social needs.

69. In Years 5 and 6 (typically 10 to 12 years of age), students broaden the scope of their investigations to consider the safe and ethical use of technologies, including the reach of these technologies across local and global settings for a range of purposes and audiences, end users, clients or consumers. This helps them to understand the relationship between responsible and appropriate design, function and aesthetics, end-user needs and resourcing constraints, and local and global systems. Students evaluate technology ideas and solutions in relation to their ethical impact in local and global settings. Students continue to use knowledge from other learning areas and work more formally in a collaborative way.

70. In Years 7 and 8 (typically 12 to 14 years of age), the Australian Curriculum: Technologies will provide learning opportunities for students to engage in a range of specialised technologies contexts. The focus of the curriculum will be on the personal and local community, with opportunities for national and global perspectives. The curriculum will develop students' capacities to think and act technologically and solve problems that move progressively from individual interests to problems of wider community concern. Greater opportunity for collaborative design and engagement with others will be available.

Years 9 to 12

71. The design of the Australian Curriculum for Years 9 and 10 recognises that many students commence senior secondary pathways and programs, including vocational pathways, during these years. In Years 9 and 10, there is flexibility for students to undertake more specialised learning pathways in a range of learning areas as preparation for learning in the senior secondary years.

72. In Years 9 and 10 (typically 14 to 16 years of age), Technologies curriculum will be developed for two subjects: Design and Technologies and Digital Technologies. Students may also choose to study additional technologies subjects offered by states and territories that do not duplicate the Australian Curriculum. In the Technologies learning area, students will use technologies knowledge and understanding, technologies processes and production skills and design and/or computational thinking to solve and produce solutions to identified problems or opportunities. These specialised problem-solving activities will be sophisticated, acknowledge the complexities of contemporary life and make connections to related specialised occupations and further study. Increasingly, study will have a global perspective, with opportunities to understand the complex interdependencies involved in the development of technologies. Students will incorporate understanding of the interdependence of technology development, culture, values, beliefs, environment and the developer and user in their technologies solutions.

73. The senior secondary curriculum will provide students with increased opportunities to make choices about pathways through school and beyond. The Technologies curriculum for senior secondary will provide for a range of specialised courses that have explicit pathways that allow for more depth of study, multidisciplinary collaborative approaches and sophistication of engagement and can lead to tertiary study, vocational training or employment. Years 9–10 technologies subjects are not a prerequisite. Students will use technologies knowledge and understanding, technologies processes and production skills, and design and/or computational thinking to solve and produce solutions to identified complex problems or opportunities. Increasingly, study will acknowledge the complexities of contemporary life and the

future. Students will make connections to other learning areas, related specialised occupations and further study, and have a more global perspective, with a more sophisticated understanding of the complex interdependencies involved in technologies development. Students will incorporate a more sophisticated understanding of culture, environment, developer and user in their design solutions.

74. Ministers of Education will decide in December 2012 whether senior secondary courses will be developed for Technologies as part of the Australian Curriculum (see paragraph 30).

Technologies scope and sequence

Note: Students may start school with quite different levels of Design and Technologies and Digital Technologies knowledge, understanding and skills. Prior knowledge needs to be taken into consideration and differentiation of the curriculum particularly in F–2 may be required.

	Design and Technologies	Digital Technologies
	Foundation to Year 2	
	In F–2, Design and Technologies content will provide opportunities for students to:	In F–2, Digital Technologies content will provide opportunities for students to:
Knowledge and understanding	• investigate technologies, materials, systems, tools and equipment, with a focus on purpose, personal and social needs within local settings • develop new meanings for objects and action	• identify data, digital information and digital systems that support personal, family and classroom needs, how some forms of digital information are transmitted and their main purposes • develop working knowledge of major components of the digital systems they use, their functions, simple terminology to describe them and methods of control • explore some common ways in which digital systems and digital information are used in school and at home to help meet the needs of self and familiar others
Processes and production skills	• begin to develop an understanding of the concept of technologies processes, through purposefully and safely using and producing with technologies to meet personal and social needs. This includes visualising, identifying and communicating design ideas, drawing (top-view, cross-section, side-view), talking, modelling, trial and error, planning and safely utilising tools and equipment including digital tools and equipment to produce solutions. • evaluate a project using criteria such as 'Does it work?', 'Does it meet a purpose?', 'Do I like it?' or 'Can it be improved?' • begin to consider the impact of decisions on others.	• explore the key design features of common digital solutions, and use this understanding to develop ideas using systematic exploration of alternatives • communicate ideas using drawings, discussion, or appropriate digital tools • use computational thinking to plan, construct and evaluate digital solutions for personal need, safely using a range of appropriate software devices, functions and commands.

	Design and Technologies	Digital Technologies
	Years 3 and 4	
	In Years 3 and 4, Design and Technologies content will provide opportunities for students to:	In Years 3 and 4, Digital Technologies content will provide opportunities for students to:
Knowledge and understanding	• investigate and evaluate the range of technologies, materials, systems, tools and equipment that support local community needs with consideration of sustainability • identify the factors that influence the design and use of common technologies	• identify some common forms of digital information that local communities create and use; identify how some forms of digital information are transmitted and their intended purposes • investigate the use of common digital systems and typical cause-and-effect relationships between major components, and control using linear sequences of instructions • examine the use of digital systems and digital information to meet the needs of some people and not others and consider how they impact on people
Processes and production skills	• investigate and critique design problems and solutions based on research that goes beyond personal opinion and experience to include understanding about the place and impact of technologies in relation to other living things • visualise, identify, research, test, communicate and document design ideas before, during or after producing a designed solution using traditional and digital tools and equipment • produce designed, sustainable solutions for design projects by purposefully planning, selecting, safely using and evaluating technologies, materials including natural, recycled and everyday household items, and tools and equipment • consider the impact of decisions on others, and begin to evaluate the impact of decisions on the environment and whether a design is appropriate.	• use digital technologies to manipulate data and information • investigate, identify and communicate design features of a digital solution to a problem • generate and evaluate ideas for digital solutions using systematic exploration of alternatives, communicating these using drawings, discussion and appropriate digital tools • plan, select and safely use a range of devices, software, functions and commands in digital environments • use computational thinking to understand the nature of a problem; describe processes; and plan, construct, modify and test creative digital solutions for personal and community purposes.

	Design and Technologies	Digital Technologies
	Years 5 and 6	
	In Years 5 and 6, Design and Technologies content will provide opportunities for students to:	In Years 5 and 6, Digital Technologies content will provide opportunities for students to:
Knowledge and understanding	• critically examine technologies, materials, systems, tools and equipment that are used regularly in the home and in local, national or global communities, with consideration of ethics and sustainability • develop an understanding of the factors that influence the design, innovation and use of common technologies in order to consider why and for whom the technologies were developed • recognise the interdependence between local and global settings	• make critical judgments about the use of everyday digital information and digital systems, considering cyber safety and ethical issues • identify the components of local digital systems and explain their functions and methods of connection and control using linear and looping sequences of instructions • examine data organisation, uses and control through digital systems from personal, social and community perspectives • identify some factors that influence the design and use of common digital technologies, considering why and for whom the technologies were developed
Processes and production skills	• critique ethical and socially responsible solutions to design problems, focusing on design ideas and local and global systems, materials, tools and equipment • create, modify and test ideas • safely design, plan and produce purposeful, enterprising and high quality solutions for personal, home and some community-based situations, taking account of social and cultural values • identify and use criteria to evaluate their own and others' processes and solutions taking account of users, resources, sustainability, ethics, and cultural and personal values.	• collect and analyse relevant data • plan, select and safely use a range of devices, software, functions, commands and techniques in online and local digital environments to design, create, test, edit, troubleshoot and evaluate digital solutions • capture, access, store and present a range of information • use computational thinking to analyse problems to identify key dimensions, compare common digital solutions and make decisions about fundamental design and development features.

	Design and Technologies	Digital Technologies
	Years 7 and 8	
	In Years 7 and 8, Design and Technologies content will provide opportunities for students to:	In Years 7 and 8, Digital Technologies content will provide opportunities for students to:
Knowledge and understanding	• investigate and select from a range of materials, systems, tools and equipment • consider the ways characteristics and properties or resources can be combined to create and produce solutions to problems for individual students and the community considering ethics, culture and social factors • develop an understanding of the ways in which products, services and environments evolve, and identify the factors that influence design, including ethical, environmental and social sustainability considerations • investigate design and technology professions and the contributions that each makes to society both locally and globally	• understand a wider range of digital information and digital systems designed to meet criteria for specific purposes and/or audiences • use principles of systems thinking to investigate commonly used digital systems and control them by linear, repeating and branching instructions • consider the influence of scientific developments and social needs, beliefs and values on the evolving design and use of digital technologies
Processes and production skills	• use creativity, innovation and enterprise skills with increasing independence and collaboration • test and evaluate design ideas and technologies in relation to who does and does not benefit from them, considering equity of access and sustainable, responsible and ethical use of materials, systems, tools and equipment • use production skills with increasing independence to design, plan, manage and safely produce quality solutions for increasingly complex problems • evaluate design solutions using identified criteria taking account of users, resources, sustainability, ethics, and cultural and personal values.	• collect and analyse relevant data with increasing independence and in collaboration with others • safely use a range of processes, hardware and software to design, plan and construct, to specified quality criteria, digital solutions that exhibit creative, innovative, and enterprising use of digital technologies • use computational thinking with increasing independence and in collaboration with others to define, analyse, research, model, test and evaluate digital solutions to problems.

	Design and Technologies	Digital Technologies
	Years 9 and 10	
	In Years 9 and 10, Design and Technologies content will provide opportunities for students to:	In Years 9 and 10, Digital Technologies content will provide opportunities for students to:
Knowledge and understanding	• investigate and make judgments in selecting from a broad range of materials, systems, tools and equipment when working technologically • make judgments about appropriateness for purpose and investigate ways that characteristics and properties of resources can be combined and utilised to create solutions to problems of relevance to individual students and the wider global community considering ethics, culture and social factors • explain factors influencing design and the ways that products, services and environments evolve and the ethical, economic, environmental and social sustainability implications of design projects • evaluate design and technology professions and the contributions that each makes to society both locally and globally	• consider a range of digital information and digital systems that are designed, transformed or produced/constructed to meet technical, functional, social, economic and aesthetic criteria • investigate the nature, structure, operation, control and evaluation of a range of common digital systems that include subsystems • consider input, processes and output, and the effect on the performance of digital solutions from changes to functions, procedures, devices and sequences of instructions • evaluate the ethical, social and sustainability risks of particular digital systems and digital information and environments, considering security strategies and protocols to protect information, rights, identity and personal safety
Processes and production skills	• confidently use design thinking, creativity, innovation, enterprise and project management skills to develop design projects of increasing sophistication • identify, explore, critique, design, produce, manufacture and construct quality products, services and environments with increasing independence and collaboration • recognise risks and adopt safe work practices, working both independently and collaboratively, to select and use a range of technologies, skills and processes appropriate for specific tasks, purposes and technologies contexts • evaluate design processes employed and solutions achieved, using identified design criteria, taking account of impact.	• understand the value of, and be able to use skills in, creativity, innovation, collaboration, project management and enterprise in the design and development of digital solutions • work both independently and collaboratively using a range of skills and processes to generate and communicate ideas and select and safely use appropriate digital information and systems optimised to suit specific tasks, purposes and audiences • use computational thinking with increasing independence and in collaboration with others to deconstruct, analyse and understand information problems; define, research, create, construct, test and evaluate digital solutions to problems involving the collection and analysis of relevant data.

	Design and Technologies	Digital Technologies
	Senior secondary	
	In Senior secondary, Design and Technologies content will provide opportunities for students to:	In Senior secondary, Digital Technologies content will provide opportunities for students to:
Knowledge and understanding	• develop deep knowledge and understanding of materials, systems, tools and equipment that are used in the design and production of products, services and environments within specialised technologies contexts • understand properties and applications of materials, including the biological, chemical and physical properties that make them suitable for a range of applications involving complex combinations of materials • make critical, ethical decisions about resolving complex design problems • investigate products, services and environments that enhance aspects of the social, cultural, economic and environmental world • critically evaluate design and technology professions and the contributions that each makes to society both locally and globally	• investigate how the nature and design of particular digital systems can influence and constrain the techniques used, and the conventions applied to structure digital information • investigate specialised digital systems and how the components interact within the system and with an environment to provide effective and efficient digital solutions • analyse the social, economic and environmental costs and benefits of the emergence and application of specialised digital systems and digital information and the influence of the beliefs and values of stakeholders on their design • consider the connections between current studies in digital technologies, further studies and employment
Processes and production skills	• independently and collaboratively use design processes and design thinking, communication, creativity, innovation, production, project management and enterprise skills when developing design projects of increasing sophistication • use effective project management to produce, manufacture and construct complex quality products, services and environments using a range of skills and processes, while recognising risks, observing safe practices and applying social and ethical protocols • critically evaluate processes, techniques and finished products against standards for quality, sustainability and identified success criteria.	• create, test and justify detailed designs and use common methods of communicating thinking, including the use of symbols, graphics and technical languages in preparing a range of reports • optimise the operation and outputs of a range of digital systems, using effective project management techniques and skills in creativity, innovation and enterprise • use computational thinking to develop increasingly sophisticated digital solutions for self-generated, multi-layered digital problems, demonstrating algorithmic thinking and generating data to resolve information problems associated with specialised applied digital technologies or systems and/or software engineering, using safety and security strategies and protocols.

General capabilities

75. In the Australian Curriculum, the knowledge, skills, behaviours and dispositions that students need to succeed in life and work in the twenty-first century have been identified as general capabilities. Over the course of their schooling, students develop and use these capabilities within and across learning areas and in their lives outside school. General capabilities and learning areas have a reciprocal relationship. Learning areas provide opportunities for students to develop and use general capabilities. Similarly, wherever general capabilities are made explicit in learning areas, they can enrich and deepen learning. Aspects of each of the seven general capabilities will be embedded in the content descriptions and/or elaborations where appropriate.

Literacy

76. The Technologies curriculum will present students with literacy demands and opportunities as they comprehend, respond to and compose a range of visual and digital texts. They will learn how to communicate ideas, concepts and detailed proposals to a variety of audiences; recognise how language can be used to manipulate meaning; 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 and project analysis reports; and prepare detailed specifications for production. Drawing, modelling and working with digital tools, equipment and software assists the development of visual literacy. Listening, talking and discussing are critical in design thinking and throughout the design process, especially in articulating, questioning and evaluating ideas.

Numeracy

77. The Technologies curriculum will provide opportunities for students to interpret and use mathematical knowledge and skills in a range of real-life situations. Numeracy skills enable students to analyse technologies and design questions. This includes: using number to calculate, measure and estimate; interpreting and drawing conclusions from statistics; measuring and recording throughout the process of idea generation; developing, refining and testing concepts; and costing and sequencing when making products and managing projects. In using software, materials, tools and equipment, students work with the numerical concepts of geometry, scale, proportion, measurements and volume. Use of three-dimensional models, accurate technical drawings and working with digital models are essential in technologies learning. Algorithmic thinking is used in decision-making processes when selecting best-fit solutions.

Information and communication technology (ICT) capability

78. In the Australian Curriculum, information and communication technology (ICT) will feature significantly in the Digital Technologies subject. Some aspects of ICT are general and apply across all learning areas. These are described in the ICT general capability.

79. While there is a clear relationship between the subject and the capability, the ICT general capability assists students to become effective users of ICT, the Digital Technologies curriculum assists students to become confident developers of information solutions by applying computational thinking and explicitly learning how digital technologies work.

80. In the Digital Technologies subject students will acquire the knowledge and skills they need to operate and manage digital systems, create digital artefacts and prototypes, control and monitor processes and devices, support technologies thinking, production and processes and communicate with others.

81. While much of the explicit teaching of ICT occurs in the Digital Technologies subject, key ICT concepts and skills are strengthened, made specific and extended in Design and Technologies and across the learning areas as students engage in a range of learning activities with ICT demands. Across all learning areas, including Technologies, students apply appropriate social and ethical protocols and practices in using ICT to investigate, create and communicate, and develop their ability to manage and operate ICT to meet their learning needs and to become effective users of ICT.

82. In contrast with these general knowledge and skills, in the Digital Technologies subject, students create solutions that consider social, cultural and environmental factors when using digital systems, digital information and computational thinking. They develop and apply an understanding of the characteristics of data, audiences, procedures and digital technologies and computational thinking to create, develop and evaluate purpose-designed information solutions. Students will learn to formulate problems, logically organise and analyse data and represent it in abstract forms. They will automate solutions through algorithmic logic and determine the best combinations of data, procedures and human and physical resources to generate efficient and effective information solutions.

83. In Design and Technologies students will learn how to use specific software tools and digital hardware to assist them to realise their design ideas by gathering and evaluating design ideas, developing innovative and creative design solutions and generating plans and diagrams of their designs. This will occur, for example, when researching and analysing information, collaborating online, creating simulations and drawing and modelling (from basic drawing programs to computer-aided design/manufacture and rapid prototyping).

Critical and creative thinking

84. Critical and creative thinking underpin learning in Technologies. Students develop critical and creative thinking as they imagine, generate, develop, produce and critically evaluate ideas against a backdrop of changing economic, environmental and social needs and concerns. Abstract thinking capabilities will be developed through challenging problems that do not have straightforward solutions. Students will analyse problems, refine concepts and reflect upon the decision-making process by engaging in design, spatial and systems thinking and sustainable action. They will identify, explore and clarify technologies information and use that knowledge in a range of situations and challenges. Students will be stimulated to think critically and creatively about possible, probable and preferred futures, how products, services and environments impact upon our lives and how they might be better designed and managed. Experimenting, drawing, modelling, designing and working with digital tools,

equipment and software will assist students to build their visual and spatial thinking and to create solutions, products, services and environments.

Personal and social capability

85. The Technologies curriculum will develop key aspects of students' personal and social learning. Involvement in project management will provide rich opportunities to develop students' capacity for self-management. It will help them direct their own learning, plan and carry out investigations, and become independent learners who can apply technologies understanding and skills to decisions they will have to make in the future. Designing and innovation involve a degree of risk-taking and resilience as students work with the uncertainty of sharing new ideas. Through collaborating with others, students develop their social and employability skills, and learn to work cooperatively in teams, make group decisions, resolve conflict and show leadership. Students develop social awareness when they research the needs of users and consider the impact of decisions on people, communities and environments.

Ethical behaviour

86. The Technologies curriculum will provide students with opportunities to understand and apply ethical principles and social responsibility when collaborating, creating, sharing and using technologies, materials, data, processes, tools and equipment. Using a critical framework, they will investigate current and future local, national and global priorities, evaluating their findings against the criteria of legality, environmental sustainability, economic viability, health, social and emotional responsibility and cultural awareness. When they explore complex issues associated with technologies, students will consider possibilities and be encouraged to develop informed values and attitudes. They will learn about their own roles and responsibilities as discerning citizens, including detecting bias and inaccuracies. Understanding the protection of data, intellectual property and individual privacy in the school environment assists students to become ethical digital citizens. Students will learn about safe and ethical procedures for investigating and working with data, materials, people and animals, and will consider their responsibilities in using sustainable practices that protect the planet and its life forms.

Intercultural understanding

87. The Technologies curriculum will provide students with opportunities to 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. It will enable students to explore ways that people use technologies to interact with one another across cultural boundaries and investigate how cultural identities and traditions influence the function and form of products, services and environments designed to meet the needs of daily life. In their interactions with others, students will consider the dynamic and complex nature of cultures, including values, beliefs, practices and assumptions. They will recognise and respond to the challenges of cultural diversity and take responsibility for securing positive outcomes for members of cultural groups faced with prejudice and misunderstanding (for example, demonstrating cultural sensitivity in their choice and use of language and images when communicating and collaborating online with culturally diverse audiences).

Cross-curriculum priorities

88. The Australian Curriculum must be relevant to the lives of students and address the contemporary issues they face. With these considerations in mind, the Australian Curriculum gives special attention to three cross-curriculum priorities:

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

89. In the Australian Curriculum: Technologies, these priorities will have a strong but varying presence, depending on whether the focus is on Design and Technologies or Digital Technologies.

Aboriginal and Torres Strait Islander histories and cultures

90. The Australian Curriculum: Technologies will provide opportunities for students to value Aboriginal and Torres Strait Islander histories, cultures and technological knowledge. It will provide opportunities for students to appreciate that Aboriginal and Torres Strait Islander peoples represent the world's oldest, continuous living cultures. Through rich and diverse knowledge and understanding of technologies, Aboriginal and Torres Strait Islander peoples have created and continue to create products, services and environments to meet a variety of personal, local, national and global purposes.

91. Students will have opportunities to understand that Aboriginal and Torres Strait Islander peoples develop technologies that support sustainable practices for local conditions. Students will also recognise that the world's first and most continuous technologies often developed through intimate knowledge of and intrinsic links with Country/Place and Culture, to meet the need of sustaining environments, histories, cultures and identities.

92. Students will explore how Aboriginal and Torres Strait Islander peoples' capacity for innovation is evident through the critical processes of observation, action, experimentation and evaluation. These processes reflect traditional, contemporary and emerging technologies which produce a range of products, services and environments. The incorporation of a range of introduced technologies within existing practices purposefully builds or maintains cultural, community and economic capacity, such as solutions for food or medicinal preparation, building and architecture, and the use of digital technologies to enhance communication.

Asia and Australia's engagement with Asia

93. The Australian Curriculum: Technologies will enable students to explore and appreciate the significant contribution that the people and countries of Asia have made to design and global technological advancement, and the impact that Australia's technological advances have had upon the countries of Asia.

94. Students will explore the role that the people and countries of the Asia region play in contemporary research linked to development of innovative technologies. They will examine the extent to which technologies from the Asia region such as advanced

manufacturing processes linked to automotive, electronic and robotic technologies, multimedia and medical advances have influenced Australian culture.

95. Students will also explore the significant technological contribution that Australia has made to the countries of the Asia region through collaboration and engagement with the peoples of Asia (for example, in response to natural disasters and improving food and fibre production). They will consider the influence of migration from Asia to Australia and the peoples of Asia on the development of products, services and environments for both local and export markets. Students will recognise that Asia is one of Australia's major trading regions.

96. They will also gain an understanding of the important contributions that human-powered technologies and the use of local materials and sophisticated craft-based fabrication techniques have made in assisting communities in diverse environmental conditions to create sustainable modes of existence.

Sustainability

97. The Sustainability cross-curriculum priority is strongly articulated in the Technologies curriculum through the overarching idea, creating preferred futures, which includes consideration of economic, environmental and social sustainability and applies to both Design and Technologies and Digital Technologies.

98. The Technologies curriculum will help prepare students to take action to create more sustainable patterns of living. The curriculum will focus on the knowledge, understanding and skills necessary to implement systematically a process to design and engage with sustainability action(s) to create solutions to meet the needs of the present without compromising the ability of future generations to meet their needs. The curriculum recognises that actions are both individual and collective endeavours shared across local and global communities. Students will explore their own and competing viewpoints, values and interests; work with complexity, uncertainty and risk; make connections between disparate ideas and concepts; self-critique and propose creative and sustainable solutions.

99. The process of designing for effective sustainability action requires students to reflect on human need and equity of access to limited resources. When identifying and critiquing a need or opportunity, generating ideas and concepts, and producing solutions, students will give prime consideration to sustainability by anticipating and balancing economic, environmental and social impacts. For each project, they choose processes, materials, technologies and systems with regard to life-cycle costs and benefits and evaluate the extent to which the process and designed solutions embrace sustainability. Students reflect on past practices and assess new and developing technologies from a sustainability perspective.

100. Technologies education enables students to understand why it is important to develop and use environmentally suitable technologies and it prepares them to be more discriminating and sustainable consumers. It can equip young people for work within new industries emerging from the development of sustainable technologies and to bring a sustainability ethos to traditional fields of employment. Furthermore, it enables and challenges them to reflect on personal lifestyle choices, their own environmental footprint and their role as global citizens.

Conclusion

101. Technologies is an active, creative and engaging learning area that fosters students' capacity to be discriminating and informed producers, innovators and users of technologies. The Technologies learning area focuses on the purposeful use of technologies knowledge, understanding and skills, including the creative processes that assist people to select and utilise natural and fabricated materials, data, systems, tools and equipment to design and realise solutions. These technologies solutions address personal, community, national and global needs and opportunities, and aim to improve quality of life while taking into account ethics, personal and social values and economic, environmental and social sustainability.

Key terms

The following terms are used throughout this paper. For each item the operational definitions will be used by the curriculum writers when developing the Australian Curriculum: Technologies.

abstraction

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

algorithm

a series of ordered steps taken to solve a problem or achieve some end

algorithmic logic

the logic of breaking down computing problems and 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.

computational thinking

a problem-solving method that involves various techniques and strategies, such as organising data logically, breaking down problems into components, and the design and use of algorithms, patterns and models

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 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

design processes

a subset of technologies processes that typically involve identifying, exploring and critiquing needs or opportunities, generating, researching and developing ideas and planning, producing and evaluating to produce a solution that considers social, cultural and environmental factors

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 systems

the nature, types and components of systems, devices and software that facilitate the creation, storage, interaction, processing and consumption of digital information

digital technologies

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

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

enterprising

showing initiative and willingness to take action and commitment to follow through on initiatives

environmental sustainability

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

environments

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.

food and fibre production

the process of producing food or fibre (including forestry) as natural materials for the design and development of a range of products

futures thinking

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

graphics and modelling

techniques to generate and test ideas, communicate and represent alternatives and solutions and document processes. This includes freehand and technical drawings, diagrams, algorithms, systems architecture diagrams, flowcharts and workflow plans, Gantt charts, simulations, physical and virtual prototypes, 3-D models, recipes, report writing and the development of folios.

health

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

materials

the origins, structure, characteristics, properties and uses of natural (for example, animals, food, fibre, plants, timber) and fabricated resources such as metals, plastics, textiles. Materials are used to create products, services or environments and their structure can be manipulated.

preferred futures

envisaged futures that are economically, environmentally and socially desirable and sustainable

produce solutions

actively realise (make) designs and solutions using appropriate resources and means of production

products

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.

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

renewable resource

a substance of economic or social value that can be replaced or replenished in no more time than it takes to draw the supply down

services

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 service), communication, ecosystem provisioning and regulation, the internet and transportation. Services can be communicated by charts, diagrams, 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 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

sustainability

the ongoing capacity of Earth to maintain life

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

repertoires of practice for understanding and working with complexity, uncertainty and risk (including scientific method, systems modelling, game scenarios and role-playing, probability and risk assessment). A holistic approach to problem solving and analysis where parts of a system are analysed individually to see the whole, the interactions and interrelationships between the parts and how these parts or components influence the whole.

technologies

the resources including materials, data, systems, 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 resources

technologies contexts

the focus and opportunities for students in Design and Technologies to use Technologies processes and production skills to design, produce and evaluate products, services and environments, for example:

- integrating learning from other learning areas (for example, 'Living things' from Science; 'Changes in technology' from History)
- focusing on specific materials such as electronics, food, metal, textiles or timber
- focusing on a product, service or environment (for example, natural, managed, constructed or digital environment)
- focusing on an area of specialisation (for example, architecture, engineering, food and fibre production).

technologies processes

the processes that allow the realisation of a solution for a target audience (end user, client or consumer). They involve the purposeful use of resources including materials, data, systems, tools and equipment when creating, designing, producing and using products, services and environments. They may involve identifying, exploring, critiquing, formulating and investigating a problem or opportunity; generating, researching and developing ideas; analysing, creating, designing, planning, producing, representing, constructing and evaluating solutions in a sustainable way, giving appropriate thought to impact. These processes typically require one or more of the following types of thinking: computational, critical, creative, design, futures or systems.

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