



# curriculum for excellence: technologies

experiences and outcomes

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# Technologies

## Experiences and outcomes

The technologies framework provides a range of different contexts for learning that draw on important aspects of everyday life and work.

It includes creative, practical and work-related experiences and outcomes in business, computing science, food, textiles, craft, design, engineering, graphics and applied technologies.

Learning in the technologies enables me to:

- develop an understanding of the role and impact of technologies in changing and influencing societies
- contribute to building a better world by taking responsible, ethical actions to improve my life, the lives of others and the environment
- gain the confidence and skills to embrace and use technologies now and in the future, at home, at work and in the wider community
- become an informed consumer and producer who has an appreciation of the merits and impacts of products and services
- be capable of making reasoned choices relating to the environment, sustainable development and ethical, economic and cultural issues
- broaden my understanding of the role that information and communications technology (ICT) has in Scotland and in the global community
- broaden my awareness of how ideas in mathematics and science are used in engineering and the technologies
- experience work-related learning, and establish firm foundations for lifelong learning, and specialised study and careers.

It is important to remember that as children and young people play and learn they will develop an interest, confidence and enjoyment in ICT skills that can be transferred and applied in different learning contexts.

## Technological developments in society

Early	First	Second	Third	Fourth
<p>I enjoy playing with and exploring technologies to discover what they can do and how they can help us. TCH 0-01a</p>	<p>By exploring and using technologies in the wider world, I can consider the ways in which they help. TCH 1-01a</p>			<p>I can compare traditional with contemporary production methods to assess their contribution in the world around me and explain the impact of related technological changes. TCH 4-01a</p>
	<p>I can work with others to generate, discuss and develop imaginative ideas to create a product of the future. TCH 1-01b</p>	<p>When exploring technologies in the world around me, I can use what I learn to help to design or improve my ideas or products. TCH 2-01a</p>	<p>From my studies of technologies in the world around me, I can begin to understand the relationship between key scientific principles and technological developments. TCH 3-01a</p>	<p>Having investigated a current trend of technological advance in Scotland or beyond, I can debate the short- and long-term possibilities of the technological development becoming a reality. TCH 4-01b</p>
	<p>By exploring current news items of technological interest, I have raised questions on the issues and can share my thoughts. TCH 1-01c</p>	<p>I can investigate how an everyday product has changed over time to gain an awareness of the link between scientific and technological developments. TCH 2-01b</p>		<p>I can debate the possible future impact of new and emerging technologies on economic prosperity and the environment. TCH 4-01c</p>

## Technological developments in society (continued)

Early	First	Second	Third	Fourth
<p>Within and beyond my place of learning, I can reduce, re-use and recycle resources I use, to help care for the environment.</p> <p style="text-align: right;"><b>TCH 0-02a</b></p>	<p>Throughout all my learning, I take appropriate action to ensure conservation of materials and resources, considering the impact of my actions on the environment.</p> <p style="text-align: right;"><b>TCH 1-02a</b></p>	<p>Having analysed how lifestyle can impact on the environment and Earth's resources, I can make suggestions about how to live in a more sustainable way.</p> <p style="text-align: right;"><b>TCH 2-02a</b></p> <p>I can investigate the use and development of renewable and sustainable energy to gain an awareness of their growing importance in Scotland or beyond.</p> <p style="text-align: right;"><b>TCH 2-02b</b></p>	<p>From my studies of sustainable development, I can reflect on the implications and ethical issues arising from technological developments for individuals and societies.</p> <p style="text-align: right;"><b>TCH 3-02a</b></p>	<p>I can examine a range of materials, processes or designs in my local community to consider and discuss their environmental, social and economic impact, discussing the possible lifetime cost to the environment in Scotland or beyond.</p> <p style="text-align: right;"><b>TCH 4-02a</b></p>

## ICT to enhance learning

Italicised 'ICT' experiences and outcomes are likely to be met in all curriculum areas and so all practitioners can contribute to and reinforce them.

Early	First	Second	Third	Fourth	
<p><i>I explore software and use what I learn to solve problems and present my ideas, thoughts, or information.</i></p> <p><b>TCH 0-03a</b></p>	<p><i>As I extend and enhance my knowledge of features of various types of software, including those which help find, organise, manage and access information, I can apply what I learn in different situations.</i></p> <p><b>TCH 1-03a / TCH 2-03a</b></p>	<p><i>I can access, retrieve and use information from electronic sources to support, enrich or extend learning in different contexts.</i></p> <p><b>TCH 1-03b</b></p>	<p><i>Throughout all my learning, I can use search facilities of electronic sources to access and retrieve information, recognising the importance this has in my place of learning, at home and in the workplace.</i></p> <p><b>TCH 2-03b</b></p>	<p><i>I can explore and use the features of a variety of familiar and unfamiliar software to determine the most appropriate to solve problems or issues.</i></p> <p><b>TCH 3-03a</b></p>	<p><i>I can approach familiar and new situations with confidence when selecting and using appropriate software to solve increasingly complex problems or issues.</i></p> <p><b>TCH 4-03a</b></p>
<p><i>I can use ICT effectively in different learning contexts across the curriculum to access, select and present relevant information in a range of tasks.</i></p> <p><b>TCH 4-03b</b></p>	<p><i>I enjoy exploring and using technologies to communicate with others within and beyond my place of learning.</i></p> <p><b>TCH 0-04a</b></p>	<p><i>I explore and experiment with the features and functions of computer technology and I can use what I learn to support and enhance my learning in different contexts.</i></p> <p><b>TCH 1-04a / TCH 2-04a</b></p>	<p><i>I enhance my learning by applying my ICT skills in different learning contexts across the curriculum.</i></p> <p><b>TCH 3-04a</b></p>	<p><i>Throughout my learning, I can make effective use of a computer system to process and organise information.</i></p> <p><b>TCH 4-04a</b></p>	
<p><i>I enjoy taking photographs or recording sound and images to represent my experiences and the world around me.</i></p> <p><b>TCH 0-04b</b></p>	<p><i>I can create, capture and manipulate sounds, text and images to communicate experiences, ideas and information in creative and engaging ways.</i></p> <p><b>TCH 1-04b / TCH 2-04b</b></p>				

## Business contexts for developing technological skills and knowledge

Early	First	Second	Third	Fourth
	<p>I have experienced the different jobs involved in running a business enterprise and understand the role each one plays in its success.</p> <p style="text-align: right;"><b>SOC 1-22a</b></p>	<p>By experiencing the setting up and running of a business, I can collaborate in making choices relating to the different roles and responsibilities and have evaluated its success.</p> <p style="text-align: right;"><b>SOC 2-22a</b></p>	<p>When participating in an enterprise activity, I can explore ethical issues relating to business practice and gain an understanding of how businesses help to satisfy needs.</p> <p style="text-align: right;"><b>SOC 3-20a</b></p>	<p>By discussing the business, environmental, ethical and social implications of computer technology, I can begin to gain an understanding of the need for sustainability and accessibility.</p> <p style="text-align: right;"><b>TCH 4-05a</b></p>
			<p>In a business environment, I explore and use data handling software which allows me to search, sort, calculate, interpret, retrieve or display information.</p> <p style="text-align: right;"><b>TCH 3-06a</b></p>	<p>To facilitate the transfer of skills between classroom and the world of work, I can select and use specialist equipment and appropriate software to develop administrative and management skills.</p> <p style="text-align: right;"><b>TCH 4-06a</b></p>
			<p>When participating in a collaborative enterprise activity, I can develop administrative and entrepreneurial skills which contribute to the success of the activity.</p> <p style="text-align: right;"><b>TCH 3-07a</b></p> <p>I can select and use a range of media to present and communicate business information.</p> <p style="text-align: right;"><b>TCH 3-07b</b></p>	<p>Whilst working in a simulated or real workplace, I can select and use appropriate software to carry out a range of tasks which support business and entrepreneurial activities.</p> <p style="text-align: right;"><b>TCH 4-07a</b></p> <p>Whilst working in a simulated or real workplace, I can examine my work environment, considering office layout, ergonomic factors, and health and safety legislation.</p> <p style="text-align: right;"><b>TCH 4-07b</b></p>

Computing science contexts for developing technological skills and knowledge				
Early	First	Second	Third	Fourth
	<p>I am developing my knowledge and use of safe and acceptable conduct as I use different technologies to interact and share experiences, ideas and information with others.</p> <p><b>TCH 1-08a / TCH 2-08a</b></p>	<p>By considering ways to protect technological devices, I can act safely and responsibly when selecting and using different technologies to communicate and collaborate.</p> <p><b>TCH 3-08a</b></p> <p>I can build a digital solution which includes some aspects of multimedia to communicate information to others.</p> <p><b>TCH 3-08b</b></p> <p>Having gained knowledge and understanding of the components of a computer, I can make an informed choice when deciding on the system required for a specific purpose.</p> <p><b>TCH 3-08c</b></p>	<p>I can work with others to plan and use a learning group for sharing experiences, ideas and information within a secure online environment.</p> <p><b>TCH 4-08a</b></p> <p>I can compare different forms of security software to gain knowledge and understanding of their functions in protecting contemporary technologies.</p> <p><b>TCH 4-08b</b></p> <p>I can integrate different media to create a digital solution which allows interaction and collaboration with others.</p> <p><b>TCH 4-08c</b></p> <p>Through research, I can gain knowledge of computer systems or emerging technologies to understand their differing features and consider their suitability for the world of work.</p> <p><b>TCH 4-08d</b></p>	

## Computing science contexts for developing technological skills and knowledge (continued)

Early	First	Second	Third	Fourth
<p>I am developing problem-solving strategies, navigation and co-ordination skills, as I play and learn with electronic games, remote control or programmable toys.</p> <p style="text-align: right;"><b>TCH 0-09a / TCH 1-09a</b></p>		<p>Using appropriate software, I can work collaboratively to design an interesting and entertaining game which incorporates a form of control technology or interactive multimedia.</p> <p style="text-align: right;"><b>TCH 2-09a</b></p>	<p>Using appropriate software, I can work individually or collaboratively to design and implement a game, animation or other application.</p> <p style="text-align: right;"><b>TCH 3-09a</b></p>	<p>By learning the basic principles of a programming language or control technology, I can design a solution to a scenario, implement it and evaluate its success.</p> <p style="text-align: right;"><b>TCH 4-09a</b></p> <p>I can create graphics and animations using appropriate software which utilise my skills and knowledge of the application.</p> <p style="text-align: right;"><b>TCH 4-09b</b></p> <p>I can use features of software to create my own animation which can then be used to create an animated sequence.</p> <p style="text-align: right;"><b>TCH 4-09c</b></p>

## Food and textiles contexts for developing technological skills and knowledge

Early	First	Second	Third	Fourth
<p>Together we enjoy handling, tasting, talking and learning about different foods, discovering ways in which eating and drinking may help us to grow and keep healthy. <b>HWB 0-30a</b></p> <p>I explore and discover where foods come from as I choose, prepare and taste different foods. <b>HWB 0-35a</b></p>	<p>I experience a sense of enjoyment and achievement when preparing simple healthy foods and drinks. <b>HWB 1-30b</b></p> <p>When preparing and cooking a variety of foods, I am becoming aware of the journeys which foods make from source to consumer, their seasonality, their local availability and their sustainability. <b>HWB 1-35a / HWB 2-35a</b></p>		<p>I can practise and apply a range of preparation techniques and processes to make a variety of items showing imagination and creativity, and recognising the need to conserve resources. <b>TCH 3-10a</b></p> <p>I have gained confidence and dexterity in the use of ingredients and equipment and can apply specialist skills in preparing food. <b>TCH 3-10b</b></p> <p>I can use textile skills in practical and creative situations in my place of learning, at home or in the world of work. <b>TCH 3-10c</b></p>	<p>I can confidently apply preparation techniques and processes to make items using specialist skills, materials, equipment or software in my place of learning, at home or in the world of work. <b>TCH 4-10a</b></p> <p>I can explore the properties and functionality of ingredients, materials, equipment or software to establish their suitability for a task at home or in the world of work. <b>TCH 4-10b</b></p>

## Food and textiles contexts for developing technological skills and knowledge (continued)

Early	First	Second	Third	Fourth
<p>Throughout my learning, I share my thoughts with others to help further develop ideas and solve problems. TCH 0-11a</p>	<p>Through discovery and imagination, I can develop and use problem-solving strategies to meet design challenges with a food or textile focus. TCH 1-11a / TCH 2-11a</p> <p>Having evaluated my work, I can adapt and improve, where appropriate, through trial and error or by using feedback. TCH 1-11b / TCH 2-11b</p>		<p>By using problem-solving strategies and showing creativity in a design challenge, I can plan, develop, make and evaluate food or textile items which meet needs at home or in the world of work. TCH 3-11a</p>	<p>Showing creativity and innovation, I can design, plan and produce increasingly complex food or textile items which satisfy the needs of the user, at home or in the world of work. TCH 4-11a</p> <p>I can apply skills of critical thinking when evaluating the quality and effectiveness of my own or others' products. TCH 4-11b</p> <p>By examining and discussing the features of everyday products used within the home, I am gaining an awareness of the factors influencing design and can evaluate how these products meet the needs of the user. TCH 4-11c</p> <p>Having gained knowledge of colour theory, I can apply it to a food or textile item or when using computer aided design/computer aided manufacture. TCH 4-11d</p>

## Craft, design, engineering and graphics contexts for developing technological skills and knowledge

Early	First	Second	Third	Fourth
<p>Within real and imaginary settings, I am developing my practical skills as I select and work with a range of materials, tools and software.</p> <p><b>TCH 0-12a</b></p>	<p>I explore materials, tools and software to discover what they can do and how I can use them to help solve problems and construct 3D objects which may have moving parts.</p> <p><b>TCH 1-12a</b></p>	<p>By applying my knowledge and skills of science and mathematics, I can engineer 3D objects which demonstrate strengthening, energy transfer and movement.</p> <p><b>TCH 2-12a / TCH 3-12a</b></p>		<p>Having gained knowledge of how formulae may be used in the context of energy transfer and mechanical systems, I can apply them to solve problems, for example in engineering.</p> <p><b>TCH 4-12a</b></p> <p>I can use my knowledge and skills of science and mathematics and can apply the basic principles of control technology in solving practical problems.</p> <p><b>TCH 4-12b</b></p>
<p>During practical activities and design challenges, I can estimate and measure using appropriate instruments and units.</p> <p><b>TCH 1-13a / TCH 2-13a</b></p>		<p>I have gained confidence and dexterity in the use of materials, tools, equipment, software or control technology and can apply specialist skills to make quality products.</p> <p><b>TCH 3-13a</b></p> <p>I can practise and apply a range of preparation techniques and processes to manufacture a variety of items in wood, metal, plastic or other material, showing imagination and creativity, and recognising the need to conserve resources.</p> <p><b>TCH 3-13b</b></p>	<p>I can confidently apply preparation techniques and processes to manufacture items using specialist skills, materials, tools and software in my place of learning, at home or in the world of work.</p> <p><b>TCH 4-13a</b></p>	

**Craft, design, engineering and graphics contexts for developing technological skills and knowledge**  
(continued)

Early	First	Second	Third	Fourth
<p>Through discovery, natural curiosity and imagination, I explore ways to construct models or solve problems. <b>TCH 0-14a</b></p>	<p>Through discovery and imagination, I can develop and use problem-solving strategies to construct models. <b>TCH 1-14a / TCH 2-14a</b></p> <p>Having evaluated my work, I can adapt and improve, where appropriate, through trial and error or by using feedback. <b>TCH 1-14b / TCH 2-14b</b></p>		<p>By using problem-solving strategies and showing creativity in a design challenge, I can plan, develop, organise and evaluate the production of items which meet needs at home or in the world of work. <b>TCH 3-14a</b></p>	<p>Showing creativity and innovation, I can design, plan and produce increasingly complex items which satisfy the needs of the user, at home or in the world of work. <b>TCH 4-14a</b></p> <p>I can apply skills of critical thinking when evaluating the quality and effectiveness of my own or others' products or systems. <b>TCH 4-14b</b></p> <p>I can explore the properties and functionality of materials, tools, software or control technology to establish their suitability for a task at home or in the world of work. <b>TCH 4-14c</b></p> <p>By examining and discussing the features of everyday products, I am gaining an awareness of the factors influencing design and can evaluate how these products meet the needs of the user. <b>TCH 4-14d</b></p>

**Craft, design, engineering and graphics contexts for developing technological skills and knowledge**  
(continued)

Early	First	Second	Third	Fourth
<p>Throughout my learning, I explore and discover different ways of representing my ideas in imaginative ways.</p> <p style="text-align: right;"><b>TCH 0-15a</b></p>	<p>I am developing an interest, confidence and enjoyment in using drawing and colour techniques, manually or electronically, to represent ideas in different learning situations.</p> <p style="text-align: right;"><b>TCH 1-15a</b></p>	<p>I can use drawing techniques, manually or electronically, to represent objects or ideas, enhancing them using effects such as light, shadow and textures.</p> <p style="text-align: right;"><b>TCH 2-15a</b></p> <p>Throughout my learning, I experiment with the use of colour to develop an awareness of the effects and impacts it can have.</p> <p style="text-align: right;"><b>TCH 2-15b</b></p>	<p>Having explored graphical techniques and their application, I can select, organise and represent information and ideas graphically.</p> <p style="text-align: right;"><b>TCH 3-15a</b></p> <p>I gain inspiration from natural forms, the built environment or imagination to develop a creative idea which could be realised using computer aided manufacture.</p> <p style="text-align: right;"><b>TCH 3-15b</b></p>	<p>Having sketched or drawn a series of everyday objects pictorially and orthographically, I have become proficient in third angle projection and can apply this knowledge when producing 2D or 3D images when using software.</p> <p style="text-align: right;"><b>TCH 4-15a</b></p> <p>When developing or enhancing representations of ideas or items, manually or electronically, I can apply my knowledge of colour theory, justifying the choices I make.</p> <p style="text-align: right;"><b>TCH 4-15b</b></p> <p>I can confidently use appropriate software to represent my ideas and items in the world around me, showing creativity, imagination or innovation.</p> <p style="text-align: right;"><b>TCH 4-15c</b></p> <p>I can understand and use computer aided design/computer aided manufacture, exploring its applications.</p> <p style="text-align: right;"><b>TCH 4-15d</b></p>

## Appendix –Explanations

### TCH line of development 01

By exploring technologies in everyday life, learners will begin to understand the extent and significance of technological developments in society. As learners progress, they will become more aware of the close links between scientific and technological developments: for example how engineering can be used to link technologies with science, the role of technologies in medical advances or the practical application of nanotechnology.

### TCH 2-12a, TCH 3-12a, TCH 4-12a

Energy is transferred when it is changed from one form to another, for example when chemical energy is converted to kinetic energy when using batteries to power a motor or when using gravitational force to create the movement in models.

### TCH 1-11a, TCH 2-11a, TCH 3-11a, TCH 1-14a, TCH 2-14a, TCH 3-14a

Within a design challenge ‘problem-solving’ can be used to describe a number of approaches learners may adopt. These could include investigative approaches, trial and error, visualisation, breaking the problem into smaller components, collaboration with others or other appropriate strategies.

### TCH lines of development 9, 12, 13, 14

Control technology plays an increasingly important role in society, in a diverse range of industrial and commercial applications, for example, in security systems, entertainment systems, manufacturing and production. Control technology includes technological systems such as electronic, mechanic, pneumatic or mechatronic. It involves computer control and may also involve computer automation and programmable control devices, including those that sense and control an environment. Systems thinking is an integral part of control technology, with the relationship of inputs, processes and outputs being a fundamental component.

### TCH line of development 15

Through different and increasingly challenging contexts, learners will develop the ability to communicate and realise ideas and information using a variety of manual and electronic means. Learners will also explore methods of enhancing representations such as the use of tone, shadow, texture and colour.