BOSTES | BOARD OF STUDIES TEACHING & EDUCATIONAL STANDARDS NSW

Technology (Mandatory)

Years 7–8

Draft Directions for Syllabus Development

Draft for consultation
18 July–31 August 2016

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Contents

BOSTES K–10 syllabus development project

The BOSTES process for the development of K–10 syllabuses with consideration of Australian curriculum content involves expert writers and opportunities for broad consultation with teachers and other stakeholder groups in order to receive the highest quality advice from across the education community.

This project will follow the BOSTES syllabus development process, recognising the substantial review and development work that the Australian Curriculum, Assessment and Reporting Authority (ACARA), together with all states and territories, has undertaken.

The *Draft Directions for Syllabus Development* is the detailed blueprint for the development of a draft syllabus and is structured according to the elements of a K–10 syllabus. Each subsection of the *Draft Directions for Syllabus Development* addresses a syllabus component and includes an explanation of the component's purpose. Content subsections include proposed instructions to the writers in the writing of the draft syllabus.

In developing the draft Directions for Syllabus Development in Technology (Mandatory) 7–8, the Australian curriculum rationales, aims, content and achievement standards have been considered for a NSW context.

Consultation

The following icons are used throughout the document to assist respondents:

for your information	This icon indicates general information that assists in reading or understanding the information contained in the document. Text introduced by this icon will not appear in the final syllabus.
consult	This icon indicates material on which responses and views are sought through consultation.

The *Technology (Mandatory) Years 7–8 Draft Directions for Syllabus Development* is accompanied by an online consultation survey on the Board of Studies, Teaching and Educational Standards NSW (BOSTES) website. The purpose of the survey is to obtain detailed comments from individuals and systems/organisations on the directions for syllabus development. Feedback will be considered in the development of the draft syllabus.

The consultation period is from 18 July to 31 August 2016.

Written responses may be forwarded to:
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BOSTES NSW
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Sydney NSW 2001

Or emailed to: alesha.bleakley@bostes.nsw.edu.au

Or faxed to: (02) 9367 8476

Technology (Mandatory) Years 7–8 Draft Directions for Syllabus Development

1 Introduction

The K–10 Curriculum

ⓘ for your information

The Board of Studies, Teaching and Educational Standards NSW (BOSTES) syllabuses are developed with respect to some overarching views about education. These include the Board's *K–10 Curriculum Framework* and *Statement of Equity Principles,* and the *Melbourne Declaration on Educational Goals for Young Australians (December 2008)*.

BOSTES syllabuses include the agreed Australian curriculum content and content that clarifies the breadth and depth of learning and scope for Technology (Mandatory). The Australian curriculum achievement standards underpin the syllabus outcomes and the Stage statements for Early Stage 1 to Stage 5.

In accordance with the *K–10 Curriculum Framework* and the *Statement of Equity Principles*, the *Technology (Mandatory) Years 7–8 Syllabus* takes into account the diverse needs of all students, it identifies essential knowledge, understanding, skills, values and attitudes. The syllabus outlines clear standards of what students are expected to know and be able to do in K–10. It provides structures and processes by which teachers can provide continuity of study for all students.

The framework also provides a set of broad learning outcomes that summarise the knowledge, understanding, skills, values and attitudes essential for all students in all learning areas to succeed in and beyond their schooling.

The continued relevance of the *K–10 Curriculum Framework* is consistent with the intent of the *Melbourne Declaration on Educational Goals for Young Australians* (December 2008), which sets the direction for Australian schooling for the next ten years. There are two broad goals:

> Goal 1: Australian schooling promotes equity and excellence
>
> Goal 2: All young Australians become successful learners, confident and creative individuals, and active and informed citizens.

The way in which learning in the *Technology (Mandatory) Years 7–8 Syllabus* will contribute to the curriculum and to students' achievement of the broad learning outcomes is outlined in the syllabus rationale.

Diversity of learners

ⓘ for your information

The *Technology (Mandatory) Years 7–8 Syllabus* is inclusive of the learning needs of all students. The rationale, aim, objectives, outcomes and content have been designed to accommodate teaching approaches that support student diversity as detailed under the sections: Students with special education needs; Gifted and talented students; Students learning English as an additional language or dialect (EAL/D).

Students with special education needs

All students are entitled to participate in and progress through the curriculum. Schools are required to provide additional support or adjustments to teaching, learning and assessment activities for some students. Adjustments are measures or actions taken in relation to teaching, learning and assessment that enable a student to access syllabus outcomes and content and demonstrate achievement of outcomes.

Students with special education needs can access the K–10 outcomes and content in a range of ways. Students may engage with:

- syllabus outcomes and content with adjustments to teaching, learning and/or assessment activities
- selected outcomes and content appropriate to their learning needs
- outcomes from an earlier Stage, using age-appropriate content
- selected Years 7–10 Life Skills outcomes and content appropriate to their learning needs.

Decisions regarding adjustments should be made in the context of collaborative curriculum planning with the student, parent/carer and other significant individuals to ensure that syllabus outcomes and content reflect the learning needs and priorities of individual students.

Further information can be found in support materials for:

- Special education needs
- Life Skills Years 7–10.

Gifted and talented students

Gifted students have specific learning needs that may require adjustments to the pace, level and content of the curriculum. Differentiated educational opportunities assist in meeting the needs of gifted students.

Generally, gifted students demonstrate the following characteristics:

- the capacity to learn at faster rates
- the capacity to find and solve problems
- the capacity to make connections and manipulate abstract ideas.

There are different kinds and levels of giftedness. Gifted and talented students may also possess learning difficulties and/or disabilities that should be addressed when planning appropriate teaching, learning and assessment activities.

Curriculum strategies for gifted and talented students may include:

- differentiation: modifying the pace, level and content of teaching, learning and assessment activities
- acceleration: promoting a student to a level of study beyond their age group
- curriculum compacting: assessing a student's current level of learning and addressing aspects of the curriculum that have not yet been mastered.

School decisions about appropriate strategies are generally collaborative and involve teachers, parents and students with reference to documents and advice available from BOSTES and the education sectors.

Gifted and talented students may also benefit from individual planning to determine the curriculum options, as well as teaching, learning and assessment strategies, most suited to their needs and abilities.

Students learning English as an additional language or dialect (EAL/D)

Many students in Australian schools are learning English as an additional language or dialect (EAL/D). EAL/D students are those whose first language is a language or dialect other than Standard Australian English and who require additional support to assist them to develop English language proficiency.

EAL/D students come from diverse backgrounds and may include:

- overseas and Australian-born students whose first language is a language other than English, including creoles and related varieties.
- Aboriginal and Torres Strait Islander students whose first language is Aboriginal English, including Kriol and related varieties.

EAL/D students enter Australian schools at different ages and stages of schooling and at different stages of English language learning. They have diverse talents and capabilities and a range of prior learning experiences and levels of literacy in their first language and in English. EAL/D students represent a significant and growing percentage of learners in NSW schools. For some, school is the only place they use English.

EAL/D students are simultaneously learning a new language and the knowledge, understanding and skills of the Technology (Mandatory) syllabus through that new language. They require additional time and support, along with informed teaching that explicitly addresses their language needs, and assessments that take into account their developing language proficiency.

2 Technology (Mandatory) key

ⓘ for your information

The following codes will be used in the *Technology (Mandatory) Years 7–8 Syllabus.*

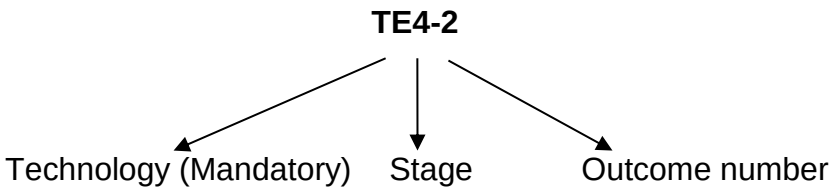
Outcome coding

Syllabus outcomes will be coded in a consistent way. The code identifies the subject, Stage, outcome number and the way content is organised.

The stages will be represented by the following codes:

Stage	**Code**
Stage 4	4
Life Skills	LS

In the Technology (Mandatory) syllabus, outcome codes indicate the subject, Stage and outcome number. For example:



Coding of Australian curriculum content

The syllabus will contain Australian curriculum content descriptions for Technology (Mandatory) with Australian curriculum codes in brackets at the end of each content description, for example:

> Investigate the ways in which products, services and environments evolve locally, regionally and globally and how competing factors including social, ethical and sustainability considerations are prioritised in the development of technologies and designed solutions for preferred futures (ACTDEK029)

Learning across the curriculum icons

ⓘ for your information

Learning across the curriculum content, including cross-curriculum priorities, general capabilities and other areas identified as important learning for all students, is incorporated and identified by icons in the *Technology (Mandatory)* Years *7–8 Syllabus.*

Aboriginal and Torres Strait Islander histories and cultures
Asia and Australia's engagement with Asia
Sustainability
Critical and creative thinking
Ethical understanding
Information and communication technology capability
Intercultural understanding
Literacy
Numeracy
Personal and social capability
Civics and citizenship
Difference and diversity
Work and enterprise

3 Rationale

ⓘ for your information

The rationale describes the distinctive nature of the subject and outlines its relationship to the contemporary world and current practice. It explains the place and purpose of the subject in the curriculum, including:

- why the subject exists
- the theoretical underpinnings
- what makes the subject distinctive
- why students study the subject
- how it contributes to the purpose of the *K–10 Curriculum Framework*
- how it prepares students for further schooling.

 consult

Proposed rationale for Technology (Mandatory) Years 7–8

Technology enriches and impacts on the lives of people and societies globally. Australia needs enterprising individuals who can make discerning decisions about the development and use of technologies and who can independently and collaboratively develop solutions to complex challenges and contribute to sustainable patterns of living. Technologies can play an important role in transforming, restoring and sustaining societies and natural, managed and constructed environments.

The study of Technology (Mandatory) ensures that all students learn about and work with contemporary and advancing technologies that shape the world in which we live. Students apply knowledge, understanding and skills when using technologies and other resources to make innovative and enterprising solutions. Independently and collaboratively students develop communication skills and learn how to respond creatively to current and future needs. Technology aims to foster students' sense of wonder and encourages them to embrace new ideas, the unexpected, value risk taking, and learning through trial and error.

The practical nature of Technology education engages students in critical and creative thinking, including understanding interactions between systems when solving complex problems. 'Design and make' processes instil in students the value of planning, managing and developing ideas. The study of Technologies, including digital systems provides students with practical opportunities to use design thinking. The subject helps students to become creative and innovative producers of digital solutions, effective users of digital systems and critical consumers of information conveyed by digital systems.

Through the practical application of a range of technologies including digital technologies, students develop dexterity and coordination through experiential activities. Design activities motivate students and engage them in a range of learning experiences that are transferable to family and home situations, constructive leisure activities, community contribution, the world of work and more specialised technology and engineering study.

The diversity of learning experiences within Technology (Mandatory) develops independent learning and project management skills that can be transferred to specialised Technology elective courses 7–10. Practical experiences lead students to develop, select and apply

technological skills involved in designing and making. Thinking skills are developed experientially through the Technology (Mandatory) course as students design and make quality design solutions. The use of reflective, flexible and creative thinking skills are encouraged to build understanding to form a foundation for future studies.

Actions for writers

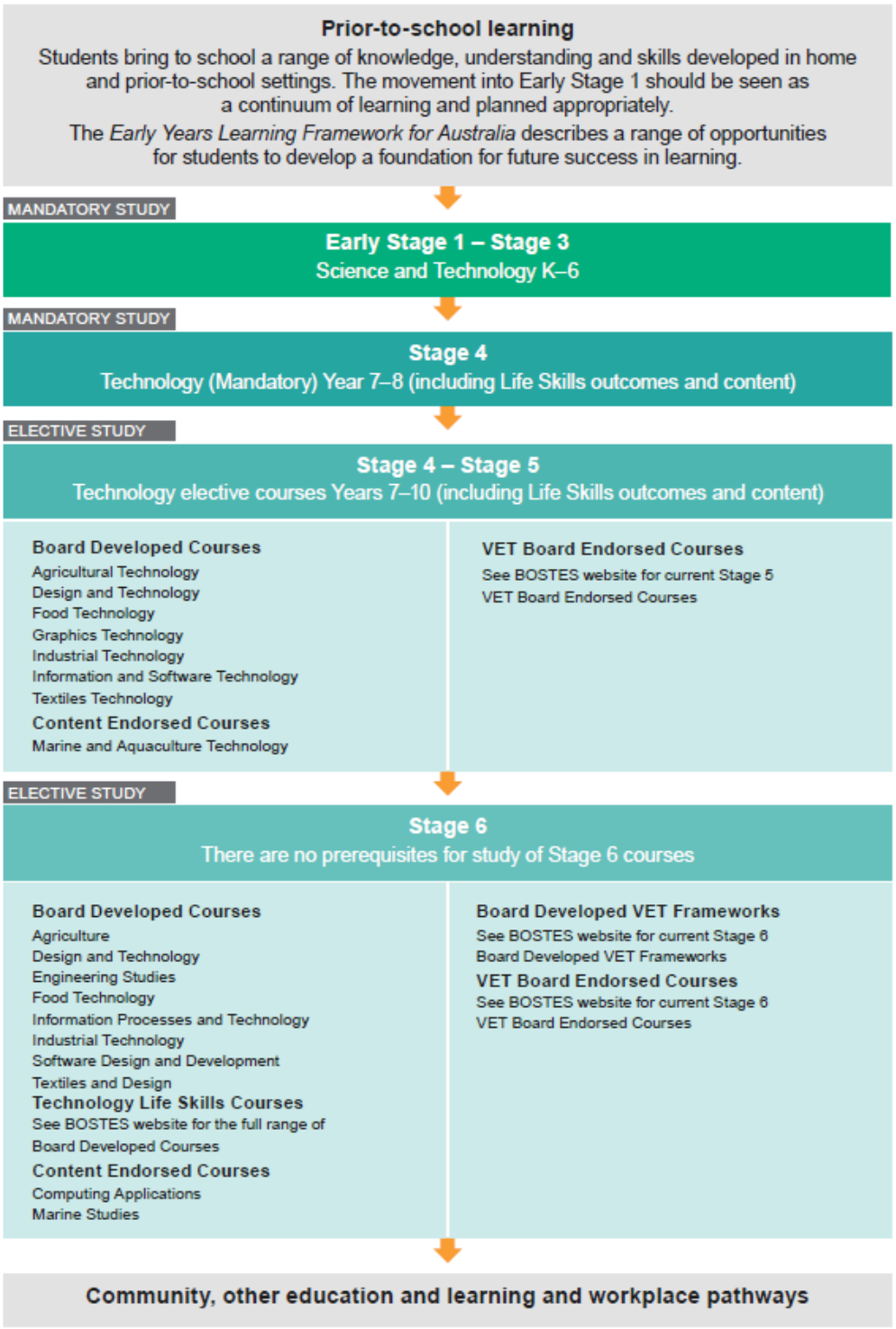
- Review the alignment of the rationale to other areas of the directions paper, including the aim, objectives and outcomes
- Review and consider why the subject exists, its place in the Technology learning area, the theoretical underpinnings and what makes Technology (Mandatory) distinctive
- Review and consider why students study the subject, how it contributes to the purpose of the K–10 Curriculum Framework and how it prepares students for further schooling
- Position the syllabus in preparing students for future study.

4 The Place of the *Technology (Mandatory) Years 7–8 Syllabus* in the K–12 Curriculum

ⓘ for your information

NSW syllabuses include a diagram that illustrates how the syllabus relates to the learning pathways K–12. This section places the 7–8 syllabus in the K–12 curriculum as a whole.

consult



5 Aim

ⓘ for your information

In NSW syllabuses the aim provides a succinct statement of the overall purpose of the syllabus. It indicates the general educational benefits for students from programs based on the syllabus.

The aim, objectives, outcomes and content of a syllabus are clearly linked and sequentially amplify details of the intention of the syllabus.

 consult

Proposed aim for Technology (Mandatory) Years 7–8

The aim of the *Technology (Mandatory) Year 7–8 syllabus* is to develop in students the ability to be creative in designing and producing solutions to identified needs or opportunities. Through engaging with practical activities students develop knowledge and understanding about and skills in the use of contemporary and advancing technologies, materials and systems.

Actions for writers

- Review the alignment of the aim to other areas of the directions paper, including the rationale, objectives and outcomes.
- Ensure the aim highlights the core skills and broad educational benefits of studying Technology (Mandatory).
- Ensure the proposed aim does not reflect only part of the course.
- Refine the draft aim to better reflect the purpose and place of Technology (Mandatory) in the curriculum.
- The syllabus should ensure a continuum of learning from Stage 3 to Stage 4.

6 Objectives

ⓘ for your information

In NSW syllabuses objectives provide specific statements of the intention of a syllabus. They amplify the aim and provide direction to teachers on the teaching and learning process emerging from the syllabus. They define, in broad terms, the knowledge, understanding, skills, values and attitudes to be developed through study in the subject. They act as organisers for the intended outcomes.

 consult

Proposed objectives for Technology (Mandatory) Years 7–8

Knowledge and understanding
Students:

- develop knowledge and understanding about the features and characteristics of contemporary and advancing technologies
- develop knowledge and understanding about how the collection and processing of data enhances the development, testing and production of systems and design solutions
- develop knowledge and understanding about the role of people and technologies in developing innovative solutions for preferred futures.

Skills
Students:

- develop and apply skills of inquiry, critical thinking, creative problem solving and communicating while working independently and collaboratively to develop innovative and enterprising design solutions
- develop and apply skills in the use of tools, materials and techniques through the application of contemporary, advancing and digital technologies.

Values and attitudes
Students:

- recognise the importance and impact of innovation and technologies in their lives now and for the future
- recognise the dynamic nature of the design process and how it is used as a tool to develop solutions to personal, social and global issues
- recognise the importance of evaluating and reflecting when problem solving.

Actions for writers

- Ensure objectives highlight the knowledge and understanding, and skills that students will gain through the study of Technology (Mandatory)
- Ensure the objectives demonstrate a closer alignment with the rationale to define what is distinctive about the course.

7 Outcomes

ⓘ for your information

In NSW syllabuses outcomes provide detail about what students are expected to achieve at the end of each Stage in relation to the objectives. They indicate the knowledge, understanding and skills expected to be gained by most students as a result of effective teaching and learning. They are derived from the objectives of the syllabus.

 consult

Proposed objectives and outcomes for Technology (Mandatory) Years 7–8

The following draft outcomes are a guide only and may be amended as the syllabus is developed.

Objectives: Students: • develop knowledge and understanding about the features and characteristics of contemporary and advancing technologies • develop knowledge and understanding about how the collection and processing of data enhances the development, testing and production of systems and design solutions • develop knowledge and understanding about the role of people and technologies in developing innovative solutions for preferred futures.
Stage 4 outcomes A student:
TE4-1 investigates the characteristics and properties of materials, systems, components, tools and equipment
TE4-2 investigates the scientific principles of the technologies used to explore and develop design solutions
TE4-3 describes how digital systems represent data, communicate information and automate processes
TE4-4 analyses interactions between information systems and predicts the effects of the transmission of data
TE4-5 examines how people in technology related professions contribute to the development of innovative solutions for preferred futures
TE4-6 describes the impact and ethical use of technology in the economy, environment and society for a sustainable future

Objectives: Students: • develop and apply skills in inquiry, critical thinking, creative problem solving and communicating while working independently and collaboratively to develop innovative and enterprising design solutions • develop and apply skills in the use of tools, materials and techniques through the application of contemporary, advancing and digital technologies.
Stage 4 outcomes A student:
TE4-7 generates, communicates, evaluates and collaborates on the development of creative design ideas and solutions
TE4-8 collects, interprets and evaluates research data and draws conclusions to inform the development of quality designed solutions
TE4-9 considers and safely applies a broad range of contemporary and emerging tools, materials and processes in the development of design projects and digital systems
TE4-10 develops, makes and evaluates quality products and refined systems to address real world problems

Actions for writers

- Up to 10 outcomes are to be developed.
- Outcomes are to demonstrate a clear progression from Science and Technology K–6 to Stage 4.
- Ensure the outcomes align with, and amplify the objectives.
- Ensure that objectives and outcomes reflect and complement the rationale and aim.

8 Stage statement

ⓘ for your information

In NSW syllabuses Stage statements summarise the knowledge, understanding, skills, values and attitudes developed by students as a result of achieving the outcomes for each stage of learning.

 consult

Proposed stage statement for Technology (Mandatory) Years 7–8

By the end of Stage 4, students describe contributions of technological innovations and enterprise in society. Students make designed solutions for each prescribed technology context based on an evaluation of needs or opportunities. Students safely, confidently and accurately apply a range of contemporary and appropriate tools, materials and techniques. They understand the implication and applications of these in the wider community. Students develop understanding of different types of digital networks for defined purposes.

Students explain how features of technologies influence their decisions and impact on designed solutions. Students explain how social, ethical, technical and sustainability considerations influence the design of innovative and enterprising solutions to meet a range of present and future needs.

Students collect, authenticate and interpret data from a range of sources to assist in making informed judgments. Students generate and document in digital and non-digital form, design ideas for different audiences using appropriate technical terms, and graphical representation techniques including algorithms. They independently and safely plan, design, test, modify and create a range of solutions that meet intended purposes.

Students apply project management skills in the production of projects. They plan, document and effectively manage processes and resources to produce designed solutions. They develop criteria for success and use these to judge the suitability of their ideas, solutions and processes. Students use appropriate protocols when collaborating, creating and communicating ideas, information and solutions.

Actions for writers

- Review the stage statement and the Australian Curriculum achievement standards and describe the knowledge, understanding, skills values and attitudes demonstrated by the typical student by the end of the Stage.

9 Content

ⓘ for your information

In NSW syllabuses for Kindergarten to Year 10, courses of study and educational programs are based on the outcomes of syllabuses. The content describes in more detail how the outcomes are to be interpreted and used, and the intended learning appropriate for the stage. In considering the intended learning, teachers will make decisions about the sequence, the emphasis to be given to particular areas of content, and any adjustments required based on the needs, interests and abilities of their students.

The knowledge, understanding and skills described in the outcomes and content will provide a sound basis for students to successfully move to the next stage of learning.

Organisation of the content for Technology (Mandatory) Years 7–8

 consult

Content

The Technology (Mandatory) Years 7–8 syllabus outcomes will be categorised in two related strands:

- Knowledge and Understanding
- Skills

Technology (Mandatory) Years 7–8 is a 200 hour course. The knowledge and understanding content is to be divided into 5 technology contexts and delivered through design and make processes. The proposed technology contexts are:

- Agriculture Technology
- Digital Systems
- Engineering Principles and Systems
- Food Technology
- Materials Technology.

Key considerations

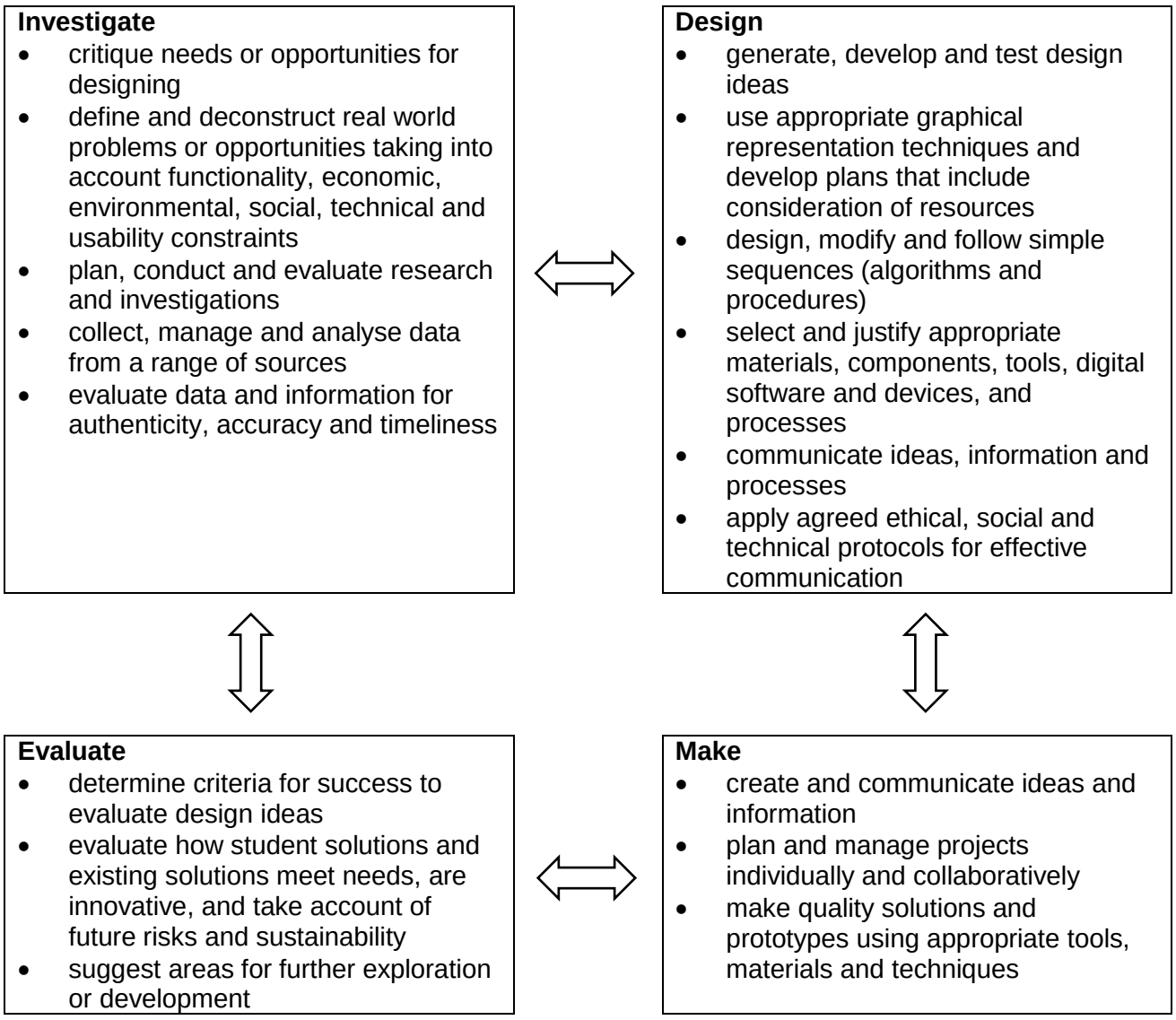
- All 5 technology contexts must be delivered by the end of the stage.
- Technology contexts may be taught individually or concurrently.
- Technology contexts may be repeated.
- Digital technologies content will also be integrated throughout each of the technology contexts as appropriate.
- For each technology context students are to develop a design project and document the designing and making processes to provide ongoing evidence of the application of skills, knowledge and understanding.

'Design and make' processes

'Design and make' processes are the skills students use to extend their knowledge and understanding of technology concepts. Students will develop and apply appropriate skills in tools, materials and techniques when inquiring and designing for a purpose. Students collect, and communicate information, solve problems and formulate innovative ideas when making their solution.

It is not intended that students will always undertake a complete 'design and make' process. Designing and making processes are dynamic and non-linear. They are interactive and aspects of the processes may vary according to the demands of the task. The processes may be repeated to generate a final conclusion, result, solution or product. Unexpected results are to be welcomed and used to inspire further designing and making.

The components of design and make processes are:



Agricultural technology

Agricultural technology focuses on the resources produced and harvested by humans to sustain human life. They investigate managed environments such as farms and plantations or resources harvested from wild stock. Students gain understanding of the processes of food and fibre production by investigating innovative and sustainable ways of supplying agriculturally produced raw materials. Students will progressively develop knowledge and understanding about the managed systems that produce food and fibre through designing and making solutions.

Concepts to be addressed:

- land and water management methods in contemporary Australian food and fibre production
- management of plant and animal growth
- characteristics of different breeds of animals and types of plants
- sustainable and ethical food production
- importance of food and fibre production to Australia's economy
- application of digital technologies in the management of food and fibre production.

Example topics

The following sample topics may be considered by teachers in the development of teaching and learning programs:

- Agricultural products
- Agricultural systems
- Animal and plant management systems
- Animal products
- Aquaculture
- Efficient farming
- Hydroponic systems
- Permaculture
- Plant products
- Water management systems

Digital systems

Digital systems focuses on how data is transmitted between components within a system, and how the hardware and software interact to form networks. Students learn about a range of hardware and software and gain an understanding of how data is represented and structured symbolically for use by digital systems.

Concepts to be addressed:

- hardware and software components and how they interrelate
- how networks transmit data between and within digital systems
- how digital systems represent text, numbers, images, video, and audio data in binary
- how data is organised in databases and how people access data for specific purposes
- problem solving using sequences and instructions (algorithms) implemented using coding in an appropriate programming language
- how users interact with digital systems.

Example topics

The following sample topics may be considered by teachers in the development of teaching and learning programs:

- App development
- Automated systems
- Games
- Information systems
- Internet of things
- Multimedia
- Robotics
- User experience
- Web page development

Engineering principles and systems

Engineering principles and systems focuses on how motion, force and energy can be used to create light, sound, heat, movement, control or support in systems. Knowledge of these principles and systems enables the design and production of sustainable, engineered solutions. Students will progressively develop knowledge and understanding of how forces and the properties of materials affect the behaviour and performance of designed engineering solutions.

Concepts to be addressed:

- how motion, force and energy are used to manipulate and control engineered systems
- how forces are used in electromechanical systems
- calculating output from engineered products and systems
- the effect of characteristics and properties of materials on engineered solutions.

Example topics

The following sample topics may be considered by teachers in the development of teaching and learning programs:

- Control systems
- Electro-mechanical technologies
- Electronics technology
- Hydraulic-pneumatic technologies
- Mechatronics
- Structural engineering
- Simple machines

Food technology

Food technology involves the application of nutrition principles and knowledge about the characteristics and properties of food, to food selection and preparation. Students will progressively develop knowledge and understanding about the nature of food and food safety, and how to make informed and appropriate food preparation choices when experimenting with and preparing food in a sustainable manner.

Concepts to be addressed:

- characteristics and properties of food
- safe and hygienic food preparation techniques including the use of a range of tools and techniques
- planning and making quality, safe and nutritious food items
- how recipes can be modified to enhance health benefits
- how food preparation can impact on the sensory properties of food

Example topics

The following sample topics may be considered by teachers in the development of teaching and learning programs:

- Alfresco creations
- Bush tucker
- Chemical reactions of food products
- Cultural fusion
- Food invention
- Food products
- Food systems
- Nutrition
- Paddock to plate

Materials technology

Materials technology is focused on the application of specialist skills and techniques to a broad range of contemporary and advancing materials. Students will progressively develop knowledge and understanding of the characteristics and properties of a range of materials either discretely or when making products.

Concepts to be addressed:

- selection of appropriate systems, components, tools and equipment when working with materials in the development of design solutions
- characteristics and properties of materials
- measuring, cutting, joining and constructing with materials
- appropriate use of materials in the development of design solutions
- safe working practices.
- the use of advancing technologies to automate processes

Example topics

The following sample topics may be considered by teachers in the development of teaching and learning programs:

- Architectural design
- CAD-CAM
- Environmental design
- Graphics
- Industrial design
- Jewellery
- Landscape design
- Metal products
- Mixed material products
- Polymers
- Textile products
- Timber products

The NSW *Technology (Mandatory) Years 7–8 Syllabus* represents Stage 4 in the following way:

This diagram is a draft and will be amended when a model is established and as the syllabus is developed.

consult

Learning across the curriculum

ⓘ for your information

BOSTES has described learning across the curriculum areas that are to be included in syllabuses. In K–10 syllabuses, the identified areas will be embedded in the descriptions of content and identified by icons. Learning across the curriculum content assists students to achieve the broad learning outcomes defined in the BOSTES *K–10 Curriculum Framework* and *Statement of Equity Principles,* and in the *Melbourne Declaration on Educational Goals for Young Australians* (December 2008).

Knowledge, understanding, skills, values and attitudes derived from the learning across the curriculum areas will be included in BOSTES syllabuses, while ensuring that subject integrity is maintained.

The learning across the curriculum areas include the cross-curriculum priorities and general capabilities from the Australian curriculum as well as other areas identified by BOSTES as important learning for all students.

Cross-curriculum priorities enable students to develop understanding about and address the contemporary issues they face.

The cross-curriculum priorities are:

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

General capabilities encompass the knowledge, skills, attitudes and behaviours to assist students to live and work successfully in the 21st century.

The general capabilities are:

- Critical and creative thinking
- Ethical understanding
- Information and communication technology capability
- Intercultural understanding
- Literacy
- Numeracy
- Personal and social capability

BOSTES syllabuses include other areas identified as important learning for all students:

- Civics and citizenship
- Difference and diversity
- Work and enterprise

 consult

Proposed learning across the curriculum statements for Technology (Mandatory) Years 7–8

These statements are a draft and may be amended as the syllabus is developed.

Aboriginal and Torres Strait Islander histories and cultures
Aboriginal and Torres Strait Islander communities have diverse cultures, social structures and a history of unique, complex knowledge systems. The Syllabus provides students with opportunities to learn about how Aboriginal and Torres Strait Islander peoples have developed and refined knowledge about the world through observation, making predictions, testing (trial and error) and responding to environmental factors within specific contexts. Students will investigate examples of Aboriginal and Torres Strait Islander peoples' understanding of the environment and the ways that traditional knowledge and western scientific knowledge can be complementary.

When planning and programming content relating to Aboriginal and Torres Strait Islander histories and cultures teachers are encouraged to consider involving local Aboriginal communities and/or appropriate knowledge holders in determining suitable resources, or to use Aboriginal or Torres Strait Islander authored or endorsed publications.

Information and communication technology capability
Information and communication technology (ICT) can be used effectively and appropriately to access, create and communicate information and ideas, solve problems and work collaboratively. Students are provided with opportunities to develop ICT capability when they develop design ideas and solutions, research concepts and applications, investigate phenomena, and communicate their technological understandings. In particular they learn to access information, collect, analyse and represent data, model and interpret concepts and relationships, and communicate ideas, processes and information. Digital technology and aids, such as animations and simulations, provide opportunities to view phenomena and test predictions that cannot be investigated through practical experiences in the classroom, and may enhance students' understanding and engagement with technology.

Actions for writers

- Review the cross-curriculum priorities and generate capabilities in the Australian Curriculum Technologies to develop succinct learning across the curriculum statements.

Draft content sample page for Technology (Mandatory) Years 7–8

The following draft content page presents a sample of Stage 4 content.

Digital systems — Stage 4

OUTCOMES

A Student:

- describes how digital systems represent data, communicate information and automate processes TE4-3
- analyses interactions between information systems and predicts the effects of the transmission of data TE4-4
- generates, communicates, evaluates and collaborates on the development of creative design ideas and solutions TE4-7

Related Stage 4 Life Skills outcomes: TELS-1, TELS-2, TELS-6, TELS-7

CONTENT FOCUS

Digital systems focuses on how data is transmitted between components within a system, and how the hardware and software interact to form networks. Students learn about a range of hardware and software and gain an understanding of how data is represented and structured symbolically for use by digital systems.

Students:

- investigate how data is transmitted and secured in wired, wireless and mobile networks, and how the specifications affect performance (ACTDIK023). For example
  - investigate how networks have components that control the movement of data
  - compare the reliability and speed of transmitting data through wireless, wired and mobile networks
  - investigate different protocols from transmitting data in networks
- investigate how digital systems represent text, image and audio data in binary (ACTDIK024). For example:
  - investigate how colours are represented in images and videos for example: manipulating RGB colours in an image
  - explain the different ways media elements are presented for example the difference between embedded and linked media
- design algorithms represented diagrammatically and in English, and use trace tables to predict output and to identify errors (ACTDIP029). For example
  - investigate and design some common algorithms, such as to sequence and control data structures
  - check the accuracy of an algorithm before it is implemented using trace tables
  - use diagrams to describe key decisions, for example creating flow charts to describe a set of instructions and how these skills can be transferred to other experiences
- design the user experience of a digital system, generating evaluating and communicating alternative designs (ACTDIP028)
  - develop design ideas using a storyboard to explain the stages of a game, and wire-frames and mock-ups to describe the appearance of a solution
  - presenting and comparing alternative designs to a solution for a problem, for example presenting alternative design mock-ups to the class

Draft content sample page for Technology (Mandatory) Years 7–8

The following draft content page presents a sample of Stage 4 content.

Materials technology — Stage 4

OUTCOMES

A Student:

- investigates the characteristics and properties of materials, systems, components, tools and equipment TE4-1
- generates, communicates, evaluates and collaborates on the development of creative design ideas and solutions TE4-7
- considers and safely applies a broad range of contemporary and emerging tools, materials and processes in the development of design projects and digital systems TE4-9

Related Stage 4 Life Skills outcomes: TELS-1, TELS-8, TELS-9, TELS-10

CONTENT FOCUS

Materials technology is focused on the application of specialist skills and techniques to a broad range of contemporary and advancing materials. Students will progressively develop knowledge and understanding of the characteristics and properties of a range of materials either discretely or when making products.

Students:

- investigate aspects of technology specialisations. For example:
  - critique the design of an existing product or environment to identify how materials have been selected and used for a purpose
  - evaluate the sustainability of different materials
  - developing technical production skills and safe working practices with independence to produce quality solutions designed for sustainability
- analyse ways to make design solutions through selecting and combining characteristics and properties of materials, systems, components, tools and equipment (ACTDEK034). For example:
  - investigate the characteristics and properties of a range of materials and products such as metals, polymers, textiles and/or timber
  - identify, select and use appropriate materials when making design projects considering sustainability
  - identify and select specific tools appropriate to selected materials when making a project
  - correctly use appropriate tools for measuring, marking, cutting and constructing projects
- select and use appropriate techniques when making a design project. For example:
  - cutting, shaping and finishing metals, polymers, timber or textiles
  - use appropriate surface preparation, finishes, embellishments and/or decorations
- consider and demonstrate safe working practices appropriate to the technology specialisation

10 Years 7–10 Life Skills outcomes and content

ⓘ for your information

The Years 7–10 Life Skills outcomes and content are developed from the objectives of the *Technology (Mandatory) Years 7–8 Syllabus*.

Before deciding that a student should undertake a course based on Life Skills outcomes and content, consideration should be given to other ways of assisting the student to engage with the regular course outcomes. This assistance may include a range of adjustments to the teaching, learning and assessment activities of the Technology (Mandatory) Years 7–10 curriculum.

If the adjustments do not provide a student with sufficient access to some or all of the Stage 4 and Stage 5 outcomes, a decision can be explored for the student to undertake Life Skills outcomes and content. This decision should be made through the collaborative curriculum planning process involving the student and parent/carer and other significant individuals. School principals are responsible for the management of the collaborative curriculum planning process.

The following points need to be taken into consideration:

- students are not required to complete all Life Skills outcomes
- specific Life Skills outcomes should be selected on the basis that they meet the learning needs, strengths, goals and interests of each student
- outcomes may be demonstrated independently or with support.

Further information in relation to planning, implementing and assessing Life Skills outcomes and content can be found in support materials for:

- Special education needs
- Life Skills Years 7–10.

Table of objectives and outcomes

ⓘ for your information

For students undertaking a course based on Life Skills outcomes and content:

- students are not required to complete all Life Skills outcomes
- specific Life Skills outcomes should be selected on the basis that they meet the learning needs, strengths, goals and interests of each student
- outcomes may be demonstrated independently or with support.

 consult

Proposed Life Skills outcomes

The following table presents the draft Life Skills outcomes developed from the regular syllabus objectives. These outcomes may be amended as necessary during syllabus development.

Objectives Students: • develop knowledge and understanding about the features and characteristics of contemporary and emerging technologies • develop knowledge and understanding about how the collection and processing of data enhances the development, testing and production of systems and design solutions • develop knowledge and understanding about the role of people and technologies in developing innovative solutions for preferred futures.
Life Skills outcomes A student:
TELS-1 explores the features of technologies used in the production of design solutions
TELS-2 explores how information is communicated in digital systems
TELS-3 explores how people in technology related professions have contributed to improvements in our way of life
TELS-4 explores the impact of innovation and emerging technologies

Objectives Students: • develop and apply skills in inquiry, critical thinking, creative problem solving and communicating while working independently and collaboratively to develop innovative and enterprising design solutions • develop and apply skills in the use of tools, materials and techniques through the application of contemporary, advancing and digital technologies.
Life Skills outcomes A student:
TELS-5 gathers and uses information in the context of producing design solutions
TELS-6 communicates ideas in the context of producing design solutions
TELS-7 develops design solutions to address real world problems
TELS-8 selects and uses appropriate tools, equipment, materials and systems for specific design solutions
TELS-9 demonstrates safe practices in the use of tools, equipment, materials and systems for specific design solutions
TELS-10 evaluates everyday products and systems in terms of their intended use

Actions for writers

- Ensure the Life Skills outcomes align with the course objectives.
- Ensure that Life Skills outcomes reflect and complement the rational and aim.
- Life Skills outcomes should demonstrate an alignment with Stage 4 outcomes.
- Consider the continuum of learning from Science and Technology K–6.

Content

ⓘ for your information

The Years 7–10 Life Skills outcomes and content provide the basis for developing a rigorous, relevant, accessible and meaningful age-appropriate program. Outcomes and content should be selected based on the learning needs, strengths, goals and interests of each student. Students are not required to complete all of the content to demonstrate achievement of an outcome.

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Actions for writers:

- Life Skills content should demonstrate alignment with Stage 4 and Stage 5 content.
- Ensure Life Skills content aligns with Life Skills outcomes and course objectives.
- Ensure that the content is succinct and manageable and considers the range of students for whom Life Skills outcomes and content are appropriate.

The following sample Life Skills content page demonstrates how Years 7–10 Life Skills content will be represented. It is intended to guide writers and does not describe all the learning that will occur. The draft Life Skills content may be amended as the syllabus is developed.

SAMPLE LIFE SKILLS SYLLABUS CONTENT PAGE –STAGE 4

Materials technology LIFE SKILLS

OUTCOMES

A student:

- gathers and uses information in the context of producing design solutions TELS-5
- communicates ideas in the context of producing design solutions using a variety of techniques TELS-6
- develops design solutions to address real world problems TELS-7
- selects and uses appropriate tools, equipment, materials and systems for specific design solutions TELS-8
- demonstrates safe practices in the use of tools, equipment, materials and systems for specific design solutions TELS-9

Related Stage 4 outcomes: TE4-7, TE4-8, TE4-9, TE4-10

CONTENT FOCUS

Materials Technology is focused on a broad range of traditional, contemporary and emerging materials and specialist areas that typically involve extensive use of technologies.
Students will progressively develop knowledge and understanding of the characteristics and properties of a range of materials either discretely in the development of products or through producing designed solutions for a technologies specialisation.

Students:

- Propose a design solution to address a specific need
  - Recognise the intended use of the design solution
  - Gather information in relation to the purpose and audience of the proposed design solution
  - Consider appropriate materials for use in the proposed design solution
  - Research and evaluate tools, materials, equipment and solutions that may be used in a proposed design solution.

- Plan the completion of a design solution
  - Recognise time required to develop a design solution
  - Plan steps for completing a design solution
  - Develop a project plan to undertake a design solution in the required timeframe, for example: use online or print planning tools, such as a gantt chart or calendar
  - Develop a budget for required materials, tools and equipment required to complete a design solution
  - Gather materials, tools and equipment needed to complete a design solution.

10 Assessment

ⓘ for your information

Specific assessment advice relating to Technology (Mandatory) will be provided in support materials.

Standards

The Board of Studies, Teaching and Educational Standards NSW (BOSTES) *K–10 Curriculum Framework* is a standards-referenced framework that describes, through syllabuses and other documents, the expected learning outcomes for students.

Standards in the framework consist of three interrelated elements:

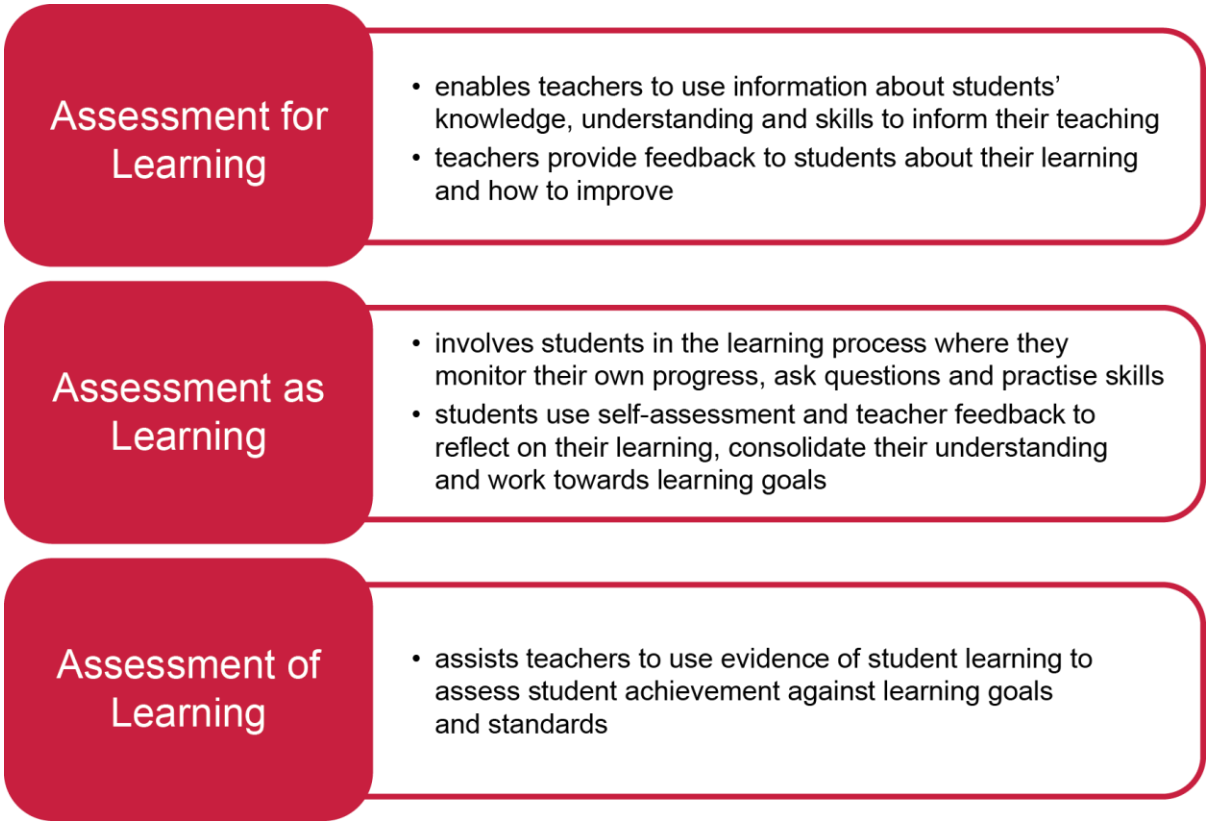
- outcomes and content in syllabuses showing what is to be learned
- Stage statements that summarise student achievement
- samples of work on the BOSTES Assessment Resource Centre (ARC) website which provide examples of levels of achievement within a Stage.

Syllabus outcomes in Technology (Mandatory) contribute to a developmental sequence in which students are challenged to acquire new knowledge, understanding and skills.

Assessment

Assessment is an integral part of teaching and learning. Well-designed assessment is central to engaging students and should be closely aligned to the outcomes within a Stage. Effective assessment increases student engagement in their learning and leads to enhanced student outcomes.

Assessment for Learning, Assessment as Learning and *Assessment of Learning* are three approaches to assessment that play an important role in teaching and learning. The BOSTES Years K–10 syllabuses particularly promote *Assessment for Learning* as an essential component of good teaching.



Further advice on programming and appropriate assessment practice in relation to the Technology (Mandatory) syllabus is contained on the BOSTES website. This support material provides general advice on assessment as well as strategies to assist teachers in planning education programs.

Assessment for students with special education needs

Some students with special education needs will require adjustments to assessment practices in order to demonstrate what they know and can do in relation to syllabus outcomes and content. The type of adjustments and support will vary according to the particular needs of the student and the requirements of the activity. These may be:

- alternative formats for responses, for example written point form instead of essays, scaffolded structured responses, short objective questions or multimedia presentations
- adjustments to assessment activities, for example rephrasing questions, using simplified language, fewer questions or alternative formats for questions
- adjustments to the assessment process, for example additional time, rest breaks, quieter conditions, or the use of a reader and/or scribe or specific technology.

It is a requirement under the *Disability Standards for Education 2005* for schools to ensure that assessment tasks are accessible to students with a disability. Schools are responsible for any decisions made at school level to offer adjustments to course work, assessment tasks and in-schools tests.

Further examples of adjustments to assessment for students with special education needs and information on assessment of students undertaking Life Skills outcomes and content can be found in support materials for:

- Technology (Mandatory)
- Special education needs
- Life Skills Years 7–10.

Reporting

Reporting is the process of providing feedback to students, parents and other teachers about student progress.

Teachers use assessment evidence to extend the process of *Assessment for Learning* into their *Assessment of Learning*. In a standards-referenced framework, teachers make professional judgements about student achievement at key points in the learning cycle. These points may be at the end of a Year or Stage, when schools may wish to report differentially on the levels of knowledge, understanding and skills demonstrated by students.

Descriptions of student achievement in Technology (Mandatory) provide schools with a useful tool to report consistent information about student achievement to students and parents, and to the next teacher to help plan the next steps in the learning process.

The A–E grade scale or equivalent provides a common language for reporting by describing observable and measurable features of student achievement at the end of a Stage, within the indicative hours of study. Teachers use the descriptions of the standards to make a professional, on-balance judgement, based on available assessment information, to match each student's achievement to a description. The Common Grade Scale (A–E) or equivalent is used by teachers to report student levels of achievement from Stages 1 to 5.

For students with special education needs, teachers may need to consider, in consultation with their school and sector, the most appropriate method of reporting student achievement. It may be deemed more appropriate for students with special education needs to be reported against outcomes or goals identified through the collaborative curriculum planning process. There is no requirement for schools to use the Common Grade Scale (A–E) or equivalent to report achievement of students undertaking Life Skills outcomes and content.

11 Glossary

ⓘ for your information

This section will draw on the *Technologies* glossary developed by ACARA. Writers will review and refine the glossary to identify additional terminology and definitions to be included.

Actions for Writers

- Review the Australian Curriculum Technologies glossary and identify terminology for inclusion in the NSW syllabus.
- Include subject specific terminology.