

Technology (2003)

Years 1 to 10 Sourcebook Guidelines (Part 3 of 7)

Note: The PDF version of this document has been split into sections for easier download. This file is Part 3 of 7.

Scope and sequence of learning outcomes

Outcomes approach

An outcomes approach to education defines the end product of education in terms of what it is that students know and are able to do with what they know. It is based on a belief that there are certain things that all students should learn and that these things, expressed as learning outcomes, should be made explicit to all concerned. This approach accepts that learning is progressive and that stages along a continuum leading to the desired learning outcomes can be identified. It emphasises the provision of activities that give students opportunities to learn and to demonstrate this learning. This approach places a high importance on relevant, real-life student-centred contexts, as well as on how and what students learn. These contexts are used to develop the knowledge, practices and dispositions they need now, and in the future, as lifelong learners.

In an outcomes approach to education, the emphasis is on what students learn, rather than on what they have been taught. Progressive monitoring of students' demonstrations of learning outcomes is vital to ensure that curriculum programs can be individualised to meet the particular needs of students.

An outcomes approach places high importance on learning in context as well as how learners make meaning and what they should learn. These contexts should be student-centred and reflect real-life and lifelike situations. They are used to link the knowledge, practices and dispositions that learners need in order to prepare for future learning and life beyond school.

Principles of an outcomes approach

The principles of an outcomes approach include:

- a clear focus on learning outcomes
- high expectations for all students
- a focus on development
- planning curriculum with students and outcomes in mind
- expanded opportunities to learn.

Clear focus on learning outcomes

This involves:

- focusing on demonstrations of learning outcomes rather than on the content being used in an activity
- students, teachers, parents/carers and members of the community knowing the outcomes that students are working towards
- students understanding the reasons for learning what they are learning.

High expectations for all students

This involves:

- recognising that all students can succeed
- challenging students to achieve high standards by providing experiences that promote learning
- giving students time to produce work of a high standard
- establishing clear expectations of student performance, including criteria, and referring to these when monitoring the progress of student learning.

Focus on development

This involves:

- a knowledge of students' progression along the outcomes continuum
- providing opportunities for self-assessment so that students can monitor their own progress
- a knowledge of the preferred learning styles of students
- the use of a wide range of strategies to cater for developmental differences and the prior knowledge and skills of students
- building comprehensive and cumulative developmental assessment using the techniques of observation, consultation, focused analysis and peer- or self-assessment to monitor student progress and to facilitate further learning.

Planning curriculum with students and outcomes in mind

This involves:

- planning assessment at the same time as planning experiences that promote learning
- using assessment to inform future planning and to provide opportunities to learn
- planning activities for students that provide them with opportunities to progress and be assessed in their demonstrations of learning outcomes
- valuing students' backgrounds, interests, prior understandings, experiences and learning styles and considering these when planning programs, units and activities
- recognising the different ways and settings in which learning and assessment take place
- identifying and overcoming barriers that might limit students or groups of students in their demonstrations of outcomes
- maintaining a learner-centred approach to learning and teaching.

Expanded opportunities to learn

This involves:

- giving students opportunities to progress and demonstrate core learning outcomes in more than one context
- developing programs, units and activities that are sufficiently flexible to cater for the different characteristics and learning needs of students
- involving students in planning, assessment and evaluation processes.

Learning outcomes

The *Years 1 to 10 Technology Syllabus* describes four different types of outcomes:

- key learning area outcomes
- core learning outcomes
- discretionary learning outcomes at Beyond Level 6
- example learning outcomes for Foundation Level.

The learning outcomes use terms such as 'communicate', 'consult', 'describe', 'discuss', 'explain' and 'express'. These should be understood to mean all forms of verbal or nonverbal communication including the use of signed communication or devices such as communication boards. Teachers should plan to allow for all students to demonstrate their understandings when contextualising outcomes. For example, a student who is not able to read or write may be able to 'communicate' or 'compare' by using pictures or diagrams, pointing to various objects, or using gestures or body movements.

Strands

The core learning outcomes are organised into four strands, which define the scope of the key learning area. Key concepts underpin each strand. Each of the strands makes an equivalent contribution to the Technology key learning area.

The four strands are:

- Technology Practice — this strand is about the investigation, ideation, production and evaluation in the design and development of products.
- Information — this strand is about the nature of information and the techniques with which to manipulate it.
- Materials — this strand is about the nature of materials and the techniques with which to manipulate them.
- Systems — this strand is about the nature of systems and the techniques with which to manipulate them.

Levels

The sequence of the key learning area is defined in levels, which sequence the learning outcomes from Foundation Level to Beyond Level 6. Example learning outcomes are identified for the Foundation Level, core learning outcomes are described in Levels 1 to 6 inclusive and discretionary learning outcomes are described for Beyond Level 6.

The different levels are described in *level statements*. These level statements provide the conceptual framework for, and summary of, the learning outcomes at each level in each strand. For example, each level in the Systems strand has a statement that describes both the major concepts and summarises the core learning outcomes.

Within the scope of the core learning outcomes there is a sense of progression from:

- novice to expert
- familiar cultural contexts to less familiar cultural contexts
- self to community
- concrete to abstract consideration of a single aspect to consideration of multiple aspects
- simple to complex concepts
- immediate time to past or future time
- supported to independent.

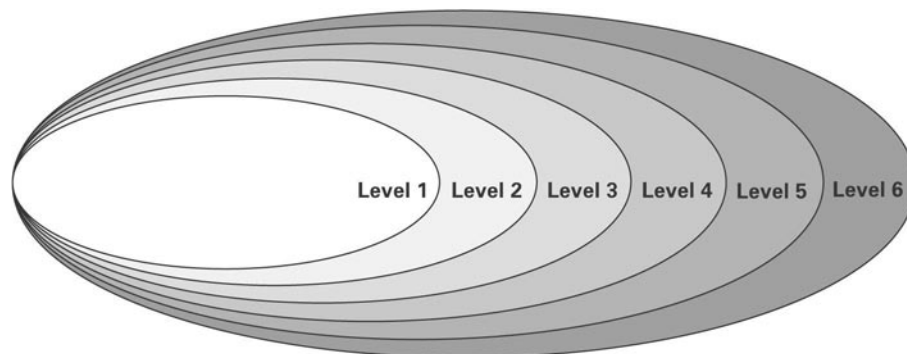
Key learning area outcomes

Key learning area outcomes highlight the uniqueness of the Technology key learning area and its particular contribution to lifelong learning. They describe the knowledge, practices and dispositions students develop about Technology during the compulsory years of schooling. (See p. 13 of the *Years 1 to 10 Technology Syllabus*.)

Core learning outcomes

Core learning outcomes describe what students know and can do with what they know on a continuum of increasing complexity from Level 1 to Level 6. In an outcomes approach, core learning outcomes provide a framework for developing rich and diverse activities that meet the learning needs of students. They are also a means by which teachers can develop shared understandings about what students know and can do with what they know at the different levels. It is expected that most students will have demonstrated all of the core learning outcomes in all four strands over the compulsory years of schooling. (See pp. 20–35 of the *Years 1 to 10 Technology Syllabus*.)

The conceptual progression of the core learning outcomes is described by using the term 'nestedness'. This refers to the ways in which a core learning outcome at one level relates to the corresponding core learning outcome in the same strand at the next level. Learning outcomes in successive levels are conceptually linked to each other, forming a continuum, rather than a number of discrete entities. This continuum is represented in the following illustration.



Progression of conceptual development of outcomes

Key concepts

Each of the four strands has its own set of key concepts and these are the basis for the progression of the learning outcomes. Each core learning outcome relates to a key concept. The key concepts are informed by knowledge about learners and learning and the knowledge base of technology education.

There are four key concepts in the Technology Practice strand and two key concepts in each of the Information, Materials, and Systems strands. The strands, their key concepts and some of the knowledge, practices and dispositions that may be developed are summarised in the following table.

Strand	Key concept	Students develop Technology-related knowledge, practices and dispositions when they:
Technology Practice	<ul style="list-style-type: none"> • Investigation is carried out to gather and use knowledge, ideas and data to meet design challenges. • Ideation is undertaken to generate and communicate ideas that meet design challenges and to justify the selection of these ideas. Production procedures can be identified, described and managed to make products that meet design challenges. • Evaluation is undertaken to make judgments about the appropriateness of processes and products when meeting design challenges. 	<ul style="list-style-type: none"> • investigate and explore how products meet human needs and wants, capitalise on opportunities and extend human capabilities • express thoughts and opinions about their own and others' products • communicate and modify design ideas and develop and follow production plans to realise products • evaluate design features and functions of products and reflect on how design ideas may become products • consult with others to explore needs and wants beyond their own experience and communicate ideas for meeting these using detailed plans • develop procedures using processes and equipment with growing understandings of industrial and commercial standards.
Information	<ul style="list-style-type: none"> • Information originates from different sources, exists in various forms and can be used for different purposes. • Information can be manipulated, presented and managed in different ways for different purposes. 	<ul style="list-style-type: none"> • find and use different forms of information to communicate with a wide range of audiences across many contexts • analyse ways in which information processing and transmitting is continually changing and how this may affect people's lives • access, store, record or generate information • process and transmit information using specialised equipment and techniques • evaluate reliability, accessibility, standards and conventions related to the use of information and how these may impact on the ways information is presented and interpreted.
Materials	<ul style="list-style-type: none"> • Materials have characteristics that determine their selection and use in products. • Equipment and techniques can be used to manipulate and process materials. 	<ul style="list-style-type: none"> • identify and investigate how materials can be used and the ways in which they can be manipulated to meet design challenges • test materials to analyse what characteristics they have in order to use them for particular design purposes • develop a range of techniques to manipulate materials and evaluate some of the impacts of using these techniques and materials over time • combine, modify and work materials to specified standards of safety, accuracy and presentation.
Systems	<ul style="list-style-type: none"> • Systems consist of interactive components and have inputs, processes and outputs that can be controlled in logical ways based on certain principles. • Systems can be developed, refined and optimised by organising their components. 	<ul style="list-style-type: none"> • make links between routines and systems using steps to carry out familiar tasks • identify how components of systems operate together, assemble and trial systems, and describe impacts these systems may have in meeting design challenges • explain relationships between inputs, components and outputs in systems they make and modify • analyse the logic of systems and their subsystems and refine these to optimise beneficial impacts • control systems and their outputs by identifying and correcting faults.

Discretionary learning outcomes

The *Years 1 to 10 Technology Syllabus* does not have discretionary learning outcomes at each level, only those outcomes described at Beyond Level 6 are considered discretionary. It is suggested that to broaden a student's experience at any particular level, teachers should plan using the outcomes in different contexts. Discretionary learning outcomes are of a different order to core learning outcomes. It is not expected that all students will demonstrate them.

Foundation Level example learning outcomes

The syllabus provides level statements at Foundation Level, which have been developed for students who are yet to demonstrate learning outcomes at Level 1 because of a disability. These statements provide a framework for teachers to develop outcomes that meet the individual needs of these students.

Example learning outcomes for Foundation Level are provided at the beginning of each strand. These are examples only and provide a model that teachers may use as they develop learning outcomes for students working in the Foundation Level. Learning outcomes selected or developed at Foundation Level should relate to the students' individualised curriculum programs.

Sequence of core learning outcomes with elaborations for Foundation Level and Levels 1 to 6

The tables on pages 30 to 64 contain elaborations to help teachers understand the intent of core learning outcomes for Levels 1 to 6 and the level statements for Foundation Level. The elaborations indicate possible contexts through which students might demonstrate learning outcomes, and can be used to inform the development of activities.

Elaborations for Foundation Level

To assist teachers in understanding the intent of the level statements for Foundation Level, and to develop learning outcomes for students' individual education programs, example learning outcomes and elaborations have been included.

These elaborations for Foundation Level were developed from the level statements and key concepts for each of the Technology strands. Teachers can use these elaborations to assist in the development of individualised learning outcomes. At class program level, teachers are encouraged to develop purposeful and authentic learning activities that incorporate a number of learning outcomes from various key learning areas.

The tables of elaborations that follow are not exhaustive and are not checklists. They provide examples only and teachers may select specific contexts and contents according to the needs, abilities and interests of their students. It is not intended that all elaborations will be addressed. The elaborations are not meant to be goals for students' Individual Education Plans (IEPs). However, there should be links between the school and class curriculum programs and students' IEP goals.

The following communication statement is included to draw attention to the breadth and variety of modes and ways in which students may demonstrate the learning outcomes.

Communication statement

Students with disabilities may communicate their understandings in a variety of ways and modes (both aided and unaided), for example:

- *Gestural* — pointing, touching, manipulating, hand squeezing, giving eye contact, eye blinking, moving towards/away from, miming, signing, using body language or facial expressions
- *Vocal* — vocalising, communicative vocalisations, speaking
- *Visual/written* — cutting and pasting, using books, drawing pictures or diagrams, matching, sorting, Braille, software programs, multilevel communication book, using spell and phrase board
- *Aided* — using a manufactured aid which is either low-tech — for example, object symbol, daily schedule, multilevel communication book, topic pages, spell and phrase board; or high-tech — for example, voice output communication devices (VOCAs), computers.

Context statement

Learning opportunities should be provided through a variety of contexts, routines and activities to assist students develop their knowledge, practices and dispositions. Opportunities for demonstrations of the learning outcomes should be in these same contexts, routines and activities.

Some of these contexts replicate real-life situations and so provide practical opportunities for students to engage with learning outcomes from a number of key learning areas. Cooking activities, for example, might include learning outcomes from Health and Physical Education, English, Mathematics, Science, and Technology.

When monitoring and reporting on students' demonstrations of learning outcomes, the contexts, routines, activities and personnel involved in the learning opportunities and demonstrations should be indicated. Students may demonstrate their learning in one context, routine or activity but not another; with one person but not another. Therefore, it is important to engage students in purposeful activities in a range of contexts and with a variety of personnel.

The following diagram illustrates the layout of the elaborations for Foundation Level for the Information, Materials and Systems strands. The layout of the Technology Practice strand is similar.

Strand from Technology syllabus

Level statement describes what students know and are able to do

Sample learning outcomes that teachers can use as examples when developing learning outcomes for individual students

Example learning activities identify possible contexts and content for learning from the learning outcome

Systems	
<p>Level statement — Foundation Level: Students are developing an understanding of simple routines and familiar tasks and are participating in activities that involve familiar, simple systems. They identify cause–effect relationships within these systems.</p>	
<p>At each level, activities should occur in a range of contexts. Students should consider aspects of appropriateness and management within these activities.</p>	
<p>Students, with scaffolding, are developing an understanding of simple routines and familiar tasks as they:</p> <ul style="list-style-type: none"> • undertake simple routines and familiar tasks <ul style="list-style-type: none"> – recall steps in a daily routine <ul style="list-style-type: none"> • make a poster that describes a routine • choose from visual cues and match them to the steps of a routine – sequence images to describe events <ul style="list-style-type: none"> • carry out a safe practice • prepare a meal — make toast • follow or give one- or two-step instructions <ul style="list-style-type: none"> • on, off, start, stop, in, out • instruct someone to carry out the steps of a task for them • develop their own routines and familiar tasks <ul style="list-style-type: none"> – prepare a meal — make sandwiches – organise belongings – tidy the workplace – play activities — make a train line or road system, serve customers. • adapt to or accept changes to a routine <p>Students are participating in activities that involve familiar, simple systems as they:</p> <ul style="list-style-type: none"> • operate traffic lights to cross the road • use equipment to carry out a task <ul style="list-style-type: none"> – turn on a computer – use a mixer to process food. <p>Students identify cause–effect relationships in familiar, simple systems as they:</p> <ul style="list-style-type: none"> • identify components of systems that they use <ul style="list-style-type: none"> – identify a switch to operate a light – identify switches or handles for opening or closing doors • observe the effect of operating components of systems <ul style="list-style-type: none"> – turn a CD-player, television, tape player or computer on or off – make an electric wheelchair go backwards or forwards. 	
<p>The following are examples of learning outcomes developed from the level statement for Foundation Level. Use these outcomes, or create others, to meet the individual needs and group needs of the class.</p> <p>Students' demonstrations of outcomes are apparent when they have provided evidence across a range of contexts as exemplified below.</p>	
<p>Example learning outcome: Students use simple routines for familiar purposes.</p> <p>Students:</p> <ul style="list-style-type: none"> • sequence representations (pictures or concrete objects) of the steps involved in a routine <ul style="list-style-type: none"> – getting dressed – mowing the lawn – washing dishes – eating a meal • respond appropriately to routines <ul style="list-style-type: none"> – put on hat and gloves before gardening – wash hands before eating – put on an apron before cooking – place dirty clothes in a bag – use a spoon to add sugar to a drink. 	<p>Example learning outcome: Students indicate their understandings of cause–effect relationships through the use of simple routines.</p> <p>Students:</p> <ul style="list-style-type: none"> • plug in an appliance before turning it on • turn off the power before removing the power plug • carry out a task as part of a group process or sequence <ul style="list-style-type: none"> – add topping to a pizza – make a cake – participate in the care of a pet • press a switch to produce a sound or picture.

Advice about contexts, appropriateness and management

Elaboration of the level statement identifying possible contexts and content for learning from the level statement

Sample learning outcomes that teachers can use as examples when developing learning outcomes for individual students