

Technology (2003)

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

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

Appendix 1: Students with disabilities and learning difficulties

Ten documents relating to students with disabilities and learning difficulties are included in the equity section of the Queensland Studies Authority website (www.qsa.qld.edu.au). These documents provide general introductory information on students with:

- acquired brain injury
- autistic spectrum disorder
- hearing impairment
- intellectual impairment
- learning difficulties
- multiple impairment
- physical impairment
- social emotional disorder
- speech–language impairment
- vision impairment.

The information in these documents is organised under headings such as:

- description
- terminology
- population
- disability-specific needs
- teaching strategies
- classroom modifications and strategies
- safety and independence.

There is also a section that provides information on further references, resources and relevant contacts.

Specific information on individual students may be accessible through support services and structures available at a local level.

Appendix 2: An introduction to the use of tools, equipment and associated items in Technology

Introduction

Students undertaking activities in Technology are often required to use tools and equipment. To ensure safety, it is essential that teachers and students have knowledge and understandings about the correct use of the tools and equipment that could be used in this key learning area.

The purpose of this appendix is to:

- identify safety issues associated with the use of tools and equipment
- provide basic information to teachers about tools and equipment, such as:
 - their selection
 - their classroom use
 - their appropriateness for certain tasks.

The appropriateness of tools and equipment for a task must be considered. Tools and equipment need to be manageable and safe to use. This may mean that they are smaller and lighter than adult tools. They need to be sturdy and robust. The tools and equipment covered in this appendix have been grouped under the actions of joining, cutting, heating, and computing.

This appendix provides only general guidance. More detailed advice is available in other publications — for example:

- *Department of Education Manual* (1999, Brisbane) — this document provides policy, procedures and advice and is for use by Queensland state schools. Teachers in other school authorities may wish to consult this document for advice. It is available on the Education Queensland website (<http://education.qld.gov.au/corporate/doem/>).
- *Workplace Health and Safety Act 1995* — this is designed to promote the health and safety of people performing work and to protect members of the public from dangers. Links to this document are available at the Department of Employment, Training and Industrial Relations website (<http://dtir.qld.gov.au/hs/hs/htm>).
- *Aspects of Science Management: A Reference Manual for Schools* (1996, Department of Education, Brisbane) — this handbook contains information pertinent to the safe use of science-related materials that may be used in science- and technology-related subjects.
- *Food Safety Matters* (2002, Queensland Health, Brisbane, kit) — this resource kit was developed for use in secondary schools and TAFE colleges to promote the safe handling of food. It comprises seven posters, student booklets and black-line masters. More information is available from the Queensland Health website (<http://www.health.qld.gov.au>) and from the website of the Home Economics Institute of Australia (<http://www.heia.com.au>).
Enquiries should be directed to: Environmental Health Unit, Queensland Health, GPO Box 48 Brisbane Qld 4001. Phone: (07) 3234 0938 email: ehu@health.qld.gov.au
- Manufacturer's instructions — these documents provide advice on the use of specific tools and/or equipment. For specific tools and/or equipment, the manufacturer's instructions take precedence over the general guidance given in this appendix.



An introductory general statement about some broad aspects of safety has been provided in the notes below. Safety issues with certain tools are highlighted with the symbol shown in the left margin.

Safety

Safety is directly affected by:

- human behaviour — actions which are associated with, or contrary to, manufacturer's instructions, lack of training, insufficient instruction, failing to follow procedures
- environmental issues — fumes, noise, heat, hygiene, light
- design — poorly designed equipment, inferior workplace layout
- procedures — lack of appropriate procedures, clarity of instructions.

Risk assessment and management is the responsibility of each teacher and should be considered in the planning of activities. Special consideration may be required for students with disabilities.

Before students use tools and equipment, teachers should:

- make themselves conversant with guidelines provided by the school or school authority for the use of specific tools and equipment, or the management of students in specified locations such as workshops
- carry out and document risk assessment and risk management if necessary
- ensure the maintenance of tools and equipment in a safe, operational condition
- provide suitable demonstrations of the tools and equipment
- provide clear instructions on the use and care of specific items
- explain safety procedures, including procedures to follow should a mishap occur.

Electrical safety

Electrical tools and equipment require regular safety checks. Teachers should inspect the cords of tools and equipment to ensure they are free of visible damage that may have been caused by wear and tear or accidental damage. Students should draw teachers' attention to any defect they observe with any tools and equipment.

It is recommended that mains-operated and hand-held electric tools and equipment are used with a residual current device. Residual current devices (RCDs) may be known by other names — for example, trip switches or safety switches. Such equipment works on the principle that if a fault or accident occurs that may lead to electric shock then the device cuts off the power in a few milliseconds. These devices are available in several forms:

- built into building's electrical switchboard
- general power point outlets with RCD capability
- individual or multiple outlet units that plug into wall power sockets
- earth leakage units.

Professional advice should be sought on the installation and use of these devices and particularly on the distinction between RCDs and resettable power boards with overload cut-out.

Below are some general safety rules relating to electricity:

- dry hands thoroughly before operating any switch
- do not use damaged power points or switches
- ensure the switch is in the 'off' position before inserting or removing plugs
- pull on the plug and not the lead when removing plugs from sockets
- operate portable tools and equipment through an RCD
- disconnect tools and equipment not in use
- disconnect portable or fixed equipment from the power supply before cleaning
- use a qualified electrician to carry out all electrical repairs
- use a power board when several appliances need to be plugged in

- do not use damaged tools or equipment
- do not use tools or equipment with damaged power leads
- do not use damaged extension leads
- inspect and test tools and equipment on a regular basis.

The work environment

In most primary school situations, Technology activities will be undertaken in a general learning area. In secondary school situations, specialised learning areas such as workshops, kitchens or laboratories may be utilised for Technology activities. Each situation presents its own unique set of safety issues. Teachers will need to make judgments and undertake a risk assessment about safety issues depending on the age, maturity, competence, skill, attitude, confidence and physical capability of their students.

Primary teachers need to be particularly conscious of safety issues because of the temporary and makeshift nature of facilities that may be set up for Technology in general classrooms. Examples of issues that may require consideration include:

- location and set up of the workspace
- provision of bench area for tasks such as hammering or sawing
- stability and suitability of tables/desks for the equipment being used — for example, student desks may not be suitable for equipment such as an electric fry pan
- location of electrical cords to power tools and equipment
- provision of earth leakage units or residual current devices (RCDs) that cut power in milliseconds should a fault occur
- use of power boards to provide additional power outlets
- the load placed on individual power outlets
- movement of students and adults around the learning space especially when anything hot, sharp or heavy is in use
- potential hazards such as power cords
- height of work areas in relation to students' physical sizes
- type of floor covering
- wearing of suitable clothing and shoes, particularly if required under workplace, health and safety regulations
- correct use and manipulation of tools
- adequate ventilation, especially if adhesives, cleaning agents and paints are being used
- protective clothing or equipment such as gloves, eye protection, hearing protection and the use of dust masks
- storage and location of tools and equipment so that there is no access to them when there is no authorisation or supervision for use
- tools that have been temporarily set aside for later use should be placed in a safe location
- display space
- access to water
- removal of jewellery and neckties
- tying back of long hair
- adequate supervision of all students.

Protective equipment

The use of protective equipment will depend on the activity being undertaken. As part of risk assessment, teachers should assess the potential for harm that may arise and the need to provide equipment that protects students. For example:

- eyes could be protected by:
 - safety goggles
 - face shield
 - safety spectacles
- ears could be protected by:
 - ear muffs
 - ear plugs
- lungs could be protected by:
 - dust masks
 - respirators
- hands and feet could be protected by:
 - gloves and footwear
- clothing could be protected by:
 - aprons
 - overalls.

Adhesives

As some adhesives and fixatives emit fumes, they should only be used in well-ventilated rooms. The product to be used will depend largely on the application in question. Typically, products include:

- P.V.A. glue and other water-based non-toxic products
- aerosol fixative sprays
- aerosol spray adhesives
- adhesive powders to mix with water such as wallpaper glues
- paste
- gum
- acrylic cement
- pressure sensitive adhesive cement
- two-part chemical glues.

Cleaning agents

Cleaning agents may be required in certain instances. As these may emit fumes or be flammable, adequate ventilation is essential.

Paint

The painting of artefacts made during Technology activities is best carried out in well-ventilated space, particularly when non-water-based paints are used. If spray cans are used, ensure that the spray location is not too draughty as fumes may affect others.

Material safety data sheets (MSDs) provide data on all chemicals, including adhesives, cleaning agents and paints. It may be necessary to display these sheets and include first aid requirements to deal with any mishaps that may occur when using such materials.

Management strategies

Teachers should adapt and practise management strategies that ensure safety in the classrooms. Such strategies could include:

- using teacher aides or parent/carers to assist with task supervision
- colour coding of tools and equipment to signify which items can be used with and without supervision
- ensuring that tool boxes and tool racks are stored in accessible but secure locations
- producing safety posters to remind students of safety issues and procedures
- keeping student movement to a minimum in areas where mishaps may occur
- designating specific areas or locations for particular tasks — for example, a particular desk or bench space located near a power point for a melt adhesive glue gun
- storing tools and equipment in such a way that they can be readily moved from classroom to classroom
- working cooperatively with another teacher to provide adequate supervision of groups
- considering supervision ratios of adults to students depending on the activity
- being aware that there may be hidden dangers in some situations — for example, corrosive batteries in items being dismantled at a tinkering table
- keeping track of tools through the use of racks with tool shadows
- keeping tools and equipment in good condition
- storing sharp tools in slotted blocks of timber or cork.

Students with special needs

Students with specific needs in Special Schools or Special Education Units can undertake Technology activities through the use of adaptive technologies. These students can be inhibited through a range of disabilities and each requires an individual education program. Teachers in special schools or special education units will be aware of available tools and equipment such as switch boxes or adaptive devices for computers. In situations where special students' lessons are integrated into mainstream classes, these teachers may need to consult with specialist teachers as to the availability and suitability of adaptive technologies. In all cases, close supervision is recommended both for safety reasons and to achieve the most desirable outcome for the student.

Joining

Topics covered in this section include:

- melt adhesive glue guns
- clamps
- hammers
- screwdrivers
- staplers
- sewing.

Melt adhesive glue guns (hot melt glue guns)

Melt adhesive glue guns are designed to supply a melted adhesive that can provide a quick, reliable and strong method of joining materials. The adhesive dries or sets rapidly allowing the materials to be joined in a short space of time without using nails or clamps. Glue guns are powered by electricity and consist of an insulated plastic body, a trigger mechanism and a nozzle to direct the melted glue. Glue is purchased in stick form, and is inserted into the rear of the gun.

Two types of glue guns are available:

- hot melt glue guns
- low melt glue guns.

Hot melt glue guns work at a higher temperature than low melt glue guns. Low melt glue guns are more appropriate for students in early years of schooling because of the smaller size of the gun, lighter weight and the lower operating temperature. Hot melt glue guns are more appropriate for intricate work likely to be encountered in later years of schooling.

Teachers should demonstrate the use of the glue gun prior to students working with the tool. Manufacturer's instructions should be followed when using the equipment.

Directions for use

Generally, all melt glue guns are operated in a similar way, although some variations may occur depending on the brand or model.

- Load the gun with the correct glue stick through the back of the glue gun.
- Squeeze the trigger several times to position the glue stick.
- Plug the glue gun into the power source. Most guns do not have their own switch and some brands may have an indicator light to show that the power is on.
- Wait approximately five minutes for the gun to heat sufficiently. Trying to force glue through by pressing on the glue stick or applying excessive pressure to the trigger can damage the feed mechanism.
- Squeeze the gun to allow the glue to flow from the nozzle.
- Have materials prepared and ready to join.
- Apply adhesive to one surface only and bring the surfaces together within a few seconds.
- Hold or clamp the surfaces together until the adhesive has cooled and set.
- Reload with another glue stick once there is sufficient space in the rear of the gun to support another stick.
- Do not extract glue sticks from the rear of the gun as this can damage the feed mechanism.



Safety issues

- The glue gun is an electric tool and should be used with an earth leakage unit or residual current device.
 - The glue gun should not be used near water.
 - The melted glue must not be touched as the hot glue is sticky and will burn the skin.
 - Lightweight cotton gloves could be worn to avoid accidental burns from the melted glue. Gloves, however, reduce dexterity and loose material may get caught in moving parts of tools and equipment. Teachers will need to make their own risk assessment after considering the circumstances of the activity and with reference to policy documents.
 - Avoid touching metal parts of the gun as these parts are hot and will cause burns.
 - Do not force glue sticks into the rear of the gun.
 - Do not push any object except a glue stick into the back of the gun.
 - When the glue gun is not in use, place it on its stand. Place the stand on a piece of cardboard or timber to catch any drips of hot glue.
 - Switch off when not in use.
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Clamps

A clamp is a useful device for holding work while adhesive is setting or when the object must be held securely. Small spring clamps with low spring pressure are useful for student activities. The same effect can be achieved using clothes pegs or bulldog clips although these may present restrictions due to the width of opening.

G-clamps come in a variety of sizes and can be used to secure material or bench hooks to a bench for tasks such as sawing or drilling. Quick release clamps are a suitable alternative.

Hammers

The most common hammer used by students is the claw hammer although other hammers will be used for metal work. The claw hammer is used to drive and extract nails and to tap other tools such as hole punches. A mini claw hammer is smaller than an adult size hammer and is a suitable alternative as it is lighter and more manageable for younger students.

Nailing may not always be the most appropriate method of joining materials. Inappropriate selection of nail size in relation to the size of the material may lead to the splitting of the material. Consideration should be given to alternative methods of joining.



Safety issues

- A hammer should be held in one hand near the end of the handle.
- The material should be held in a clamp or similar device to keep the other hand free from the area of impact.

Screwdrivers

Screwdrivers are available in a range of sizes with ends for either slotted-head or cross-head ('phillips') screws. Screwdrivers are designed to be used for inserting or removing screws and not as a general purpose lever. The size of screwdriver used will depend on the size of the screw head and should fit neatly into the screw head. Smaller screwdrivers are referred to as instrument screwdrivers. Students may often use screwdrivers when dismantling or assembling objects.



Safety issues

- Care should be taken that screwdrivers are pointed away from the user in case they slip when being used.
- The free hand should be kept away from the blade when possible.

Staplers

Staplers available for student use may include hand-pressed paper staplers and staple guns. Hand-pressed paper staplers pose little danger and are frequently used by students from a young age. A staple gun is a larger and more difficult tool for students to use and poses some degree of risk. A staple gun provides a rapid method of joining materials. These tools are spring-loaded and require the user to squeeze the handle to operate the firing mechanism. This spring can be quite strong and beyond the physical capability of young students. Care must be taken to ensure that staples are fired with the materials positioned on a hard supportive surface. If the materials are thin then the staple may fix the material to the backing surface causing difficulty in removing the object being constructed.



Safety issues

- Staple guns must not be fired in the air as staples can travel some distance and could injure eyes or other parts of the body.
 - Fingers must be kept well clear of the firing mechanism as staples can easily penetrate the skin.
 - When passing a staple gun to another person ensure that it is not held by the firing mechanism.
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Sewing

Some Technology activities may require that materials be sewn together. This may include hand sewing and machine sewing. Activities requiring the use of a machine are more likely to be undertaken by students demonstrating higher-level learning outcomes. Hand sewing can be undertaken at all levels but with varying degrees of accuracy and neatness depending on manipulative skills. Larger craft needles with a large eye and blunt point are more suitable for younger students. Materials being sewn may sometimes require pinning and this can present a danger to the student. Thimbles may be used to protect the fingers.

Sewing machines are generally electric and controlled with a foot pedal. It may take some time for a student to become proficient in regulating the speed of these machines. Students should keep hands well free of the sewing mechanism. Close supervision is required at all times when students are using a sewing machine.



Safety issues

- Care with electrical equipment.
 - Care with sharp objects — pins, needles and scissors.
 - Care with the sewing foot.
 - Care should be taken carrying and using scissors.
 - Long hair should be tied back.
 - Loose jewellery and neckties should be removed.
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Cutting

Tools covered in this section include:

- | | |
|-------------------------|-------------------|
| • scissors | • bench hook |
| • trimming knife | • mitre box |
| • cutting mat and board | • pliers |
| • safety rule | • wrench |
| • rotary cutter | • wire stripper |
| • circle cutter | • files and rasps |
| • saws | • gardening tools |
| • carving tools | • kitchen tools. |
| • hand drill | |

Scissors

Scissors are the most common cutting tool used by students. Scissors with rounded ends provide the greatest safety. Older students may use other types of scissors for special purposes such as dressmaking. Whenever scissors are used, the free hand should be kept away from the cutting area. Scissors should be used for the task of cutting material, paper or thin cardboard. Scissors are not generally designed to cut thick card or wire.

Most scissors are designed for right-handers but left-handed scissors are available from many outlets. 'Safety scissors' especially designed for young students do not have as sharp a cutting edge and present less danger to the students.



Safety issues

- If scissors are carried, hold the hand around the closed blades.
 - Pass scissors to another person by holding the blades and offering the handles.
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Trimming knife

A trimming knife is a useful tool for many Technology activities, but is also one that has the potential to be dangerous to both the user and others. The danger arises from the sharpness and point of the blade. There are many types available, some of which have retractable blades that allow for safer handling. There are wide-blade and narrow-blade knives. Narrow blades usually have a score mark approximately every centimetre so that the blunt section of the blade can be snapped off. For this reason, students should not lever the blade sideways as it has the potential to snap, with the loose section possibly travelling some distance. Teachers should snap off old sections of the blade by having only a short section of the blade protruding from its case. The section to be removed should be held firmly with pliers and the snapping action should be away from the body. Large blades are reversible and require the blade to be removed from the case, turned and reinserted.

Directions for use

The safest technique for using the trimming knife is to:

- place the material to be cut on a cutting mat or cutting board
 - place a safety rule along the line to be cut
 - pull the knife along the edge of the rule using several gentle strokes rather than attempting to cut the material in one stroke
 - only expose a short section of blade beyond the casing of the knife
 - keep fingers well clear of the blade.
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Safety issues

- Use a safety rule to hold the material and to guide the blade.
 - Cut on a cutting mat or cutting board.
 - Keep fingers away from the cutting space.
 - Teachers may wish to designate a particular work area in the room where students can be adequately supervised as they use the trimming knives.
 - Depending on the age of the students, the teacher may want a teacher aide or parent/carer to supervise students using trimming knives.
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Cutting mat and board

Cutting mats or cutting boards are particularly useful when using trimming knives, rotary cutters and circle cutters and in the preparation of food. They protect the surface from accidental cuts, provide a non-slip cutting surface and provide a cutting surface that maintains the sharpness of the blade or knife. Different types of cutting mats or boards are available for food preparation or craft-type activities. Craft mats often have a grid system printed on the surface to guide the accuracy of cutting.

Safety rule

A safety rule should be used when thicker material has to be cut or scored. A variety of designs of safety rules are available, but they all:

- help to hold the material being cut firmly in place
- allow fingers holding the rule to be kept away from the cutting edge
- provide a clean straight edge for cutting.

Rotary cutter

Rotary cutters provide an alternative to trimming knives. Rotary cutters vary in design. Some have a protective cover around the circular blade that retracts when downward pressure is applied. Others do not have a protective cover. Some rotary cutters come with perforation blades or wave cutter blades. Rotary cutters for cutting paper, card or plastic materials should be used with a cutting mat or board and guided along a safety rule.

Rotary cutters are also used in food preparation. Pizza rotary cutters tend to be larger and the blade is thicker and not as sharp as the trimmer rotary cutter.

Circle cutter

A circle cutter is used to cut large circles or circular holes in a variety of materials. It is used like a pair of compasses. A small blade on the outer arm cuts the material as the instrument is turned. As with the trimming knife, several turns should be made to cut through the material. A cutting mat or cutting board should be used.

Saws

A variety of saws may be used by students during Technology activities. They include:

- coping saws
- dovetail saws
- tenon saws
- hand saws
- hacksaws.

Saws may be injurious if not used with care.



Safety issues

- Use a bench hook or a vice.
 - Clamp the bench hook into place.
 - Keep fingers of the free hand away from the blade.
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Coping saw

A coping saw is best used to cut curved lines in thin materials such as plywood, small timber or plastic sheeting. The depth of the cut is limited by the frame of the saw. The blade is inserted with the teeth towards the handle and downwards from the frame and tensioned, usually by tightening the handle. The

blade is held at right angles to the work being cut. The material being cut should be clamped to the bench or cutting surface using a G-clamp or quick release clamp.

Dovetail saw

A dovetail saw is used for straight cuts of soft timber and plastics. It has a straight blade strengthened along the top edge and a straight wooden handle. The saw is held with one hand with the index finger along the top of the saw. The material being cut is held securely in place on a bench hook or in a vice. The free hand holds the material but at a safe distance to avoid the blade. The bench hook should be clamped to the work surface of the bench with a G-clamp or quick release clamp.

Tenon saw

The tenon saw consists of a straight blade, approximately 300 mm long, reinforced along the top edge and having a grip handle. The blade is thicker than the dovetail blade and is more cumbersome for a young student to use than a dovetail saw.

Hand saw

The hand saw is approximately 550 mm long with a grip handle. Three types of hand saws are panel, crosscut and rip saws. Panel saws have finer teeth than the other two hand saws. The teeth of a rip saw are coarse. A hand saw is not a practical saw for young students because of its size and robust cut. Its application for primary school use would be limited to tasks such as cutting pine logs for garden edges.

Hacksaw

A hacksaw is used for cutting metal. Mini hacksaws are also available for small metal objects such as thick wire or metal bar about the size of thick nails. Thicker metals should be cut with a full-size hacksaw. Hacksaws have a metal frame and a blade with fine teeth. The teeth of the blade should point forward away from the handle. To replace the blade, the handle is usually loosened by unscrewing it. The blade is usually held in place through the holes at each end of the blade.

The hacksaw is used by firstly creating a groove in the material by drawing the saw towards the user several times. Cutting occurs as the blade is pushed away from the user. The material being cut should be held in a vice and the cut made close to the vice. The student's free hand can hold the material on the opposite side of the vice to the cut.

Carving tools

Carving tools are tools that have handles attached to small, shaped blades. The tools usually are available in a set with a variety of shaped cutting blades. These tools are used to cut designs into surfaces of materials. Such tools could be used, for example, in cutting patterns for lino printings.

Carving tools have the potential for injury if not used with care. The direction of use should always be away from the user — never towards the user — as a slip of the tool could result in a stabbing action.



Safety issues

- Use a bench hook or vice.
 - Clamp the bench hook into place.
 - Always push the carving tool away from the operator.
 - Keep fingers of the free hand behind the direction of the blade.
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Hand drill

A hand drill is used to bore holes in various materials such as wood, plastic or metal. It can be used in a vertical or horizontal position. A hand drill is light for students to use and is a two-handed operation with one hand holding the tool and the other winding the handle. Young students may need practice in coordinating this movement. Some hand drills have fully enclosed gears to make the unit safer for students to use.

Drill stands are available to hold a drill in a vertical position for accurate drilling. The drill stand is clamped to the bench and the material being drilled is also clamped. This keeps hands free of the moving parts while downwards pressure is applied to the handle.



Safety issues

- Ensure that the drill has fully enclosed gears if possible.
 - Work should be held securely using clamps.
 - The teacher or aide should fit the twist drill bit into the chuck.
 - Use a backing board of scrap material sufficiently thick to ensure that students do not drill through the work and into the bench.
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Battery-powered electric drills are suitable for students to use. These could be relatively inexpensive versions that are low in torque with variable speed, forward and reverse and a keyless chuck. A charged spare battery is essential to ensure continuity of use during a lesson should the installed battery run flat.

Bench hook

A bench hook is a wooden device made from a flat piece of timber with a block of wood attached above and below at opposite ends. Some bench hooks have a groove next to the block that provides a niche in which material can easily be hand held. The bench hook is clamped to the benchtop before use.

Mitre box

A mitre box is a timber or metal u-shaped channel with guide cuts in each vertical surface. It is used for the accurate cutting or sawing of timber or other materials at angles of 45°, 60° and 90°. Various saws could be used with the mitre box.



Safety issues

- The mitre box should be clamped to the bench.
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Pliers

Pliers commonly used for Technology activities could be one of three types:

- pointed-nose pliers
- bent-nose pliers
- engineers pliers.

Pliers are essentially used to hold items such as small nuts, screws, wires or items too difficult to hold in the fingers. They may be used to hold hot objects or objects being hammered. Pliers are not the ideal tool for loosening nuts as any slipping of the tool may damage the nut.

Wrench

An adjustable wrench is a spanner that can be opened or closed to fit a variety of nut sizes. The wrench must be adjusted so that the jaws of the tool fit tightly on the nut and will not slip when turned. The wrench must face the right way so that the turning movement tends to tighten, not loosen, its grip. It is particularly useful for students taking an object apart at a tinkering table.

Wire strippers

Wire strippers remove the plastic insulation from around the wire. Wire strippers grip the wire and remove the insulation by lever action. Young students may have to use two hands to operate the tool. Knives and scissors should not be used for stripping insulation from wire.

Files and rasps

Files and rasps are metal tools designed to smooth and shape materials. Rasps are used to shape wood and are much coarser than the surface of a file. Both files and rasps require a handle to be fitted to the pointed end so the tool can be held comfortably in the hand. The material to be worked should be held in a vice or by clamp. This allows one hand to guide the front of the tool and the other to hold the handle as the tool is worked in a forwards motion across the material.



Safety issues

- Abrasions may occur if the surface of the tool is rubbed across the skin.
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Gardening tools

Tools in this section include:

- saws — bow, pruning
- secateurs
- axes, tomahawks, block splitters
- digging tools — hand tools, spade, shovel, fork, rake, chipping hoe, mattock, pick.

The tools described in this section may be used in activities in an environmental context, which may include gardening activities. Agricultural Education in lower secondary may make use of these tools and other specialised equipment. This appendix does not cover the use of specialised equipment.

As Technology activities involving the use of garden tools will most likely be undertaken outdoors, sun safety considerations must be observed.

Saws

Bow saws and pruning saws are used to cut woody growth on shrubs and trees. Pruning saws usually comprise a curved blade about 300 mm long attached to a handle. They are normally used for light woody growth. Bow saws are available in various sizes up to approximately 800 mm long, have a bow-shaped handle, coarser teeth than a pruning saw and are used to cut thicker timber such as tree branches.



Safety issues

- Hold material being sawn, keeping fingers at a sufficient distance for safety.
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Secateurs

Secateurs are used to cut relatively thin plant growth. The jaws of the tool are often spring-loaded to hold the jaws open. Young students may have difficulty manipulating this tool because of the width of the opening of the handles and the toughness of the material to be cut. For safety issues, please refer to those associated with the use of scissors.

Axes, tomahawks, block splitters

Tools such as these would rarely be used, particularly in a primary school setting. These tools can be extremely dangerous. It is recommended that alternative methods of cutting be considered.



Safety issues

- The tool should be appropriate to the age and capability of the student.
 - Close adult supervision is essential.
 - Other persons should not be in close proximity to the user.
 - A chopping block could be used.
 - Clear instructions should be provided to the student.
 - Tools with loose heads should not be used.
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Digging tools

Digging tools range from small hand tools such as hand trowels and small forks to full size digging and levelling implements. The physical size of the students will limit the effectiveness of some of these tools and may even impact on the safe use of the tool. In undertaking a risk analysis, teachers will need to judge the value of the task in terms of whether the students can effectively undertake it. All these tools have the potential to cause injury and supervision is recommended.



Safety issues

- Tools should not be left lying on the ground.
 - Rake prongs should be pointed downwards or inwards when not in use.
 - Tools with loose heads, particularly mattocks and picks, should not be used.
 - Enclosed footwear must be worn when using full-size garden tools.
 - Persons using these tools should be well clear of others.
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Kitchen tools

Technology activities related to food preparation may require the use of kitchen implements such as knives, cleavers, and graters. The type of tools may depend on the application in question. The appropriate knife should be used if available. Synthetic cutting boards should be used to protect the cutting surface, protect the cutting edge of the tool and provide a hygienic cutting surface. Students should be instructed in the correct use of the tool and this should include safety issues. Use of specialised equipment, such as a blender, will require specific consideration of its use, risk assessment and specific instructions to students. Manufacturer's instructions should be observed.

Heating

Topics covered in this section include:

- plastic vacuum forming
- heat setting/hot iron pressing
- food preparation
- cooking facilities.

Plastic vacuum forming

Plastic vacuum forming or moulding is a process of creating moulded shapes using heat-softened plastic sheeting. Sheets of plastic material are heated in an oven such as a toasting oven. The object, or mould, on which the workpiece will be moulded, is placed in a box with a vacuum cleaner connection. Once softened by heat, the plastic sheet, which is held in a frame, is placed over the mould. Air is withdrawn from the box by the vacuum cleaner. The depression draws the softened plastic on to the mould. The plastic takes the shape of the mould, quickly cools, and can be trimmed using a pair of scissors.

Moulded shapes are particularly useful for construction work and moulded components can be glued together to create the desired model.



Safety issues

- The benchtop oven must be isolated from any combustible material.
 - Caution students about touching surfaces of the oven as these may be hot enough to cause burns.
 - The wooden frame holding the plastic sheeting will not be excessively hot, but cotton gloves should be worn when handling the heated sheeting in the frame.
 - Do not touch the heated plastic sheeting as it may stick to the skin causing burns.
 - Should anyone burn themselves, immerse the burn immediately in cold water. As a precaution, have ready a large container of cold water for this purpose.
 - Plastic vacuum forming is an operation best carried out by more than one operator.
 - Ensure that the electrical equipment has had an electrical safety check.
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Heat setting/hot iron pressing

Some Technology activities may require the use of an iron. This may involve the pressing of fabric to remove creases or the application of heat to set fabric dyes such as those applied in screen printing.

Ironing boards should be used and care taken with the electric cord.

Do not iron on the top of desks that have plastic tops such as laminex, as the heat can melt the adhesive resulting in the removal or loosening of the top.



Safety issues

- Ensure the iron is safe from accidental damage by positioning on an ironing board.
 - Ensure the safety of the cord.
 - Caution students about the possibility of burns from steam.
-

Food preparation

Some Technology activities may require food preparation and this may involve the heating or cooking of food. Danger exists when hot liquids such as boiling water or heated oil are present. Risk assessment is essential for any activity where these items or other heated materials are present. Refer to the general section on safety for information on electrical safety, the work environment and the movement of students.

Students should consider the nutritional value of the ingredients they intend using in food preparation. For example, the sugar content of lollies or the fat content of dairy products may affect people with health concerns.

Hygiene is extremely important in the preparation and handling of food. To avoid cross-contamination, cutting boards and utensils should be washed regularly after the preparation of various ingredients, for example, meats, before the equipment is used for another purpose. When cleaning up spills, teachers and students should ensure that dishcloths are not used for other purposes, such as wiping the floor.



Safety issues

- Food needs to be handled and prepared in a hygienic manner.
- Teachers must warn students that hot appliances can cause burns and protective clothing, for example, oven gloves, need to be worn when handling such appliances.
- Sharp tools such as knives need to be used in a safe fashion.
- Electrical safety must be ensured.
- The stability and suitability of work areas must be checked.
- The capability and maturity of students relative to the task must be considered.
- Activities that require deep frying should be excluded due to the risks posed by boiling oil.
- Activities that have the potential to cause burns, for example, toffee making, should be excluded.

Cooking facilities

Cooking facilities are not often available in primary schools. However, they may be located in staffrooms or school tuckshops. Equipment may include stoves, microwave ovens, toasters, benchtop ovens and sandwich makers. As there is always some level of risk involved with such equipment, supervision is always necessary whether it be by a teacher or a responsible adult such as a teacher aide or parent/carer.



Safety issues

- Ensure electrical safety.
 - Use protective clothing such as aprons and oven mittens.
 - Ensure regular checks on microwave ovens for microwave leakage.
 - Ensure metal objects are not put in microwave ovens.
 - Be fire aware and provide fire-fighting equipment such as fire blankets and extinguishers.
 - Consider the ratio of adults to students for supervision.
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Computing

The use of computers enhances learning in various curriculum areas, including the Technology key learning area, and can be prominent in the Information and Systems strands. Computer use will depend largely on the activities being undertaken.

Typically, schools provide computing facilities as either computer laboratories or classroom computers. Classroom computers may be networked or stand alone. Whatever facility is provided, it is important that computer workstations are ergonomically designed to suit the physical sizes of the students.



Safety issues

- Position computers so that electrical cords and other connecting cords, such as printer cords, are not causing obstructions.
 - Workbench or table height should be adjusted for the physical size of the student.
 - Monitors should be level with the eye height of the student while seated.
 - Keyboards should be positioned so that the forearm can remain horizontal while operating the keyboard.
 - Seating should allow the feet to be positioned flat on the floor.
 - The back, particularly the lower back, should be adequately supported.
 - Avoid positioning the computer where glare or sunlight reflects off the monitor.
 - Adequate ventilation should be provided, particularly in hot climatic conditions.
 - Security of equipment should be considered.
 - Protect computers from the potential damage of power spikes by installing suitable surge control devices.
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In addition to teaching basic computer skills, including the use of the Internet, teachers should make students aware of the privacy, ethical, copyright and security issues related to this technology.

Appendix 3: Contributors, and trial and pilot schools

The valuable contributions of the following individuals, organisations and schools to the Years 1 to 10 Technology Curriculum Development Project are gratefully acknowledged.

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Beenleigh State High School

Bremer State High School (Ipswich)

Bribie Island State School

Cairns School of Distance Education

Cannon Hill Anglican College

Chinchilla State High School

Coorparoo State School

Crestmead State School

Darling Point Special School (Redland Bay)

Darra-Jindalee Catholic School

Dunwich State School

Good News Lutheran Primary School (Brisbane)

Grand Avenue State School (Ipswich)

Gympie Central State School

Gympie State High School

Holy Cross School (Cairns)

Holy Spirit School (Townsville)

Ipswich Girls Grammar School
Ipswich State High School
Ironside State School
Kalamia State School (Ayr)
Kallangur State School
Kirwan State School
Labrador State School
Mountain Creek State High School
Mount Alvernia College
Mundingburra Special School (now Townsville Community Centre)
Mutdapilly State School
Park Ridge State High School
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Peace Lutheran Primary School (Gatton)
Runcorn State High School
Ryan Catholic College (Townsville)
St Aidan's Anglican Girls' School (Brisbane)
St Augustine's College (Cairns)
St Francis Primary School (Ayr)
St Hilda's School (Gold Coast)
St John's Catholic Primary School (Roma)
St Joseph's College (Nudgee College, Brisbane)
St Mary's Primary School (Ipswich)
St Paul's School (Bald Hills, Brisbane)
St Thomas More Catholic Primary School (Noosa)
The Scots PGC College (Warwick)
Townsville Grammar School
Trinity Lutheran Primary School (now Trinity Lutheran College Primary School, Gold Coast)
Tully State High School
Windaroo Valley State High School (Beenleigh)
Yarrabah State School

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