

# The Science Toolbox

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The Science and Mathematics Task Force recommended that a science toolbox be developed to support primary school teachers in their delivery of *Science in the New Zealand Curriculum*. This curriculum can be delivered effectively only if students are provided with practical experiences. Practical work enables students to develop the essential skills of the curriculum, especially their problem-solving and investigative skills, and it is an essential component of a classroom science programme.

This publication will enable teachers to identify materials for use in their science programmes. Schools will not need to buy every item listed – nor do the lists include everything needed for science programmes. However, the lists will help teachers identify gaps in a school’s current provision for a science programme. They also suggest other ways to use existing materials and promote the cross-curricular use of materials.

The equipment list does not include the safety equipment that every board of trustees must provide to ensure that science teaching takes place in a safe and healthy learning environment. (A list of suggested minimum safety equipment is provided in Appendix One on page 35).

# Planning for Science Programmes

## Using *The Science Toolbox*

*The Science Toolbox* lists materials for a variety of science activities in the classroom, identifies some sources of equipment and consumables, and gives some approximate prices at the time of publication.

Teachers with responsibility for science can use the lists provided to help make decisions about buying science materials. The checklist column on the far right is left blank for use in recording existing equipment and materials. Such a record provides information needed for regular stocktaking and for planning new purchases. Teachers can adapt these lists to suit their school's particular needs.

Because both prices and supply can fluctuate, this publication will be updated regularly on the Internet in the Ministry of Education's science website:  
[www.minedu.govt.nz/curriculum/science/scicont.htm](http://www.minedu.govt.nz/curriculum/science/scicont.htm)

## Budgeting

It is essential that the science curriculum area is allocated an adequate budget each year to cover the cost of new purchases, maintenance, and consumables. Some primary and intermediate schools budget up to \$35 per student per year for science. The teacher in charge of science is responsible for making a strong, realistic case for budget allocation to the principal and board of trustees. Teachers should not have to provide incidental classroom resources themselves. Some schools allocate each teacher a discretionary budget of \$50–\$100 for this purpose.

Planning for purchasing should be carried out when long-term teaching plans are formulated. At this stage, lists of required resources can be made. The teacher responsible for science can then work from these lists to prepare, for the year's programme, a budget and a purchase plan that meet the needs of all staff. It may be necessary to prioritise some purchasing or spread payment over a period of time.

Various organisations, such as the school's parent-teacher association, businesses, or other local community organisations may be able to help provide resources. Preparing a long-term plan (3–5 years) may be helpful for buying more expensive capital items. These may include microscopes, Lego Technic®, meters, and sophisticated measuring instruments such as barometers, anemometers, and balances. Small schools may find it useful to pool resources for buying more expensive capital items and establishing a local science resource library.

The school budget also needs to allow for the purchase of learning materials for students and curriculum materials for teachers, including subscriptions to magazines and science teacher associations.

## Sources of Equipment and Consumables

An active science programme will involve using materials that cannot be recovered for future use; these are listed as consumables. Consumables such as chemicals can be obtained in a variety of qualities or grades, which are reflected in the price. A school science programme does not usually require high-grade (Analar grade) chemicals. Many substances of a suitable quality can be bought from a supermarket or garden centre.

Consumable items and equipment need to be bought from appropriate suppliers (see Appendix Two on pages 36–37). The lists provide approximate costs (as at 1 June 1998) for many items, and teachers are encouraged to “shop around” to find the best value. Many materials are common household items and can be provided by parents at the start of the year or unit of work. A sample request letter is given in Appendix Three on page 38. Other useful items can be collected over the years as opportunities arise. Suggested items for collection are included in Appendix Four on page 39.

Low-cost alternatives can be used for some items, such as spring pegs for alligator clips. Sources of materials can also be obtained through liaison with local intermediate and secondary schools and tertiary institutions, who may also be prepared to lend equipment and materials. The Science Teachers’ Association committee is another source of information.

## Storage

Many items listed here can be used in more than one curriculum area. It is important to have a central storage area (a clean, dry, cool place) so that equipment can be easily found and replaced.

Each school needs to decide how to store science equipment and materials. Some schools organise alphabetically, some use a thematic approach, others use the contextual strands of *Science in the New Zealand Curriculum*, and others use a combination of these. You could consider the following points when you are organising storage for your school.

- Plastic tote trays, storage cubes, or large cardboard boxes are useful containers for sets of equipment for topics such as electricity or weather. Accompany each of these with a subject-based colour-coded card. This could include a list of contents, a list of required items that are not stored in the resource room, and a list of extra items that might be required and their location. It is easier to check the contents of such containers if they do not have lids.
- Tote trolleys make it easier to store tote trays and to transport equipment and materials.
- It is useful to have small boxes, such as ice cream containers, that are sized to contain only a set quantity of equipment and that are labelled with the number (for example, 10 scissors, 10 thermometers) because it is immediately obvious when equipment is missing.
- Arranging items alphabetically in the central storage area makes them easier to locate.

- It is essential to label shelves and boxes. Use removable labels on trays.
- Keep tools in a separate, labelled toolbox (see Appendix Five on page 39 for a selection of suggested tools).
- Keep heavy items on low shelves.
- When selecting containers, consider who will need to carry the equipment.
- Always clean and dry equipment before storing it. Wash glassware in soapy water and leave it to drip dry. A bucket of warm water can be used as a portable sink.

### **Special storage notes**

- Store magnets with “keepers” on to protect the magnetism.
- Store lenses and magnifying glasses in a covered container.
- Store chemicals in clearly labelled jars or bottles on a shelf with a retaining rail and in a cool place that is not easily accessible to students. Store hydrochloric acid and other corrosive chemicals separately from any metals, tools, instruments, or electrical equipment. Poisons must be stored in a locked cupboard. Do not use food or drink containers for storing chemicals. See Storage on pages 16–17 and Chemicals on pages 61–63 of *Safety and Science: A Guidance Manual for New Zealand Schools*.

## **Issue and Retrieval of Materials**

A system should be established for issuing and retrieving materials. Many schools use a reservations book and/or library cards to keep track of materials. Teacher aides or parent helpers could be delegated responsibility for monitoring the issue and retrieval of materials as well as for monitoring the level of stock. A whiteboard or sheet of poster paper on the door of the storage area can be used for teachers to note items that need replenishing or repair. Resources should be checked regularly to ensure that enough stocks are held and that equipment is in good repair. Chemicals may need to be checked for expiry dates. (See page 40 of *Safety and Science: A Guidance Manual for New Zealand Schools*.) This task can often be delegated.

Students can be trained as monitors to be responsible for the daily management of materials in classrooms.

Each classroom should have a secure cabinet or cupboard where materials or ongoing activities can be kept. Teachers must have ready access to replacement items (in case of breakage or loss) without their having to leave the classroom.