Minding 'minibeasts'

Strand	Organiser	Level						
		1	2	3	4	5	6	B6
Technology Practice	*Investigation*		■	■				
	Ideation		■	■				
	Production		■	■				
	Evaluation		■	■				
Information	*Nature*		■	■				
	Techniques		■	■				
Materials	*Nature*		■	■				
	Techniques		■	■				
Systems	*Nature*		■	■				
	Techniques		■	■				

Purpose

The activities in this module are planned to provide students with opportunities to design, create and use a device to collect and observe 'minibeasts'. They investigate the needs of 'minibeasts' and create a device for collecting and keeping them without harming them.

Overview

The following table shows the activities in this module and the way in which these are organised into orientating, enhancing and synthesising phases.

Orientating	Enhancing	Synthesising
Letter from a scientist. Gather information —'minibeasts' project log. Manage workspaces, resources and equipment. Investigate the needs and life cycles of 'minibeasts'. What's out there?	Specify a design brief. Work with tools and equipment. Test and select materials. Create products from designs.	Report on production processes. Fieldwork. Evaluate and express opinions about their products. Report on effectiveness of their products.

Core learning outcomes

This module focuses on the following core learning outcomes from the *Years 1 to 10 Technology Syllabus*:

Technology Practice

TP 2.1 Students organise knowledge, ideas and data about how needs and wants might be met and use this information when meeting design challenges.

TP 3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.

TP 2.2 Students generate design ideas, acknowledge the design ideas of others and communicate their design ideas using annotated drawings that identify basic design features.

TP 3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.

TP 2.3 Students identify, sequence and follow production procedures to make products of their own design.

TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.

TP 2.4 Students consider initial design ideas with final products and give reasons for similarities and differences.

TP 3.4 Students test and judge how effectively their own and others' processes and products meet the design challenge.

Information

INF 2.1 Students explain the purposes of different forms of information and describe how these are used in everyday life.

INF 3.1 Students describe advantages and disadvantages of different sources and forms of information.

INF 2.2 Students use simple techniques for accessing and presenting information for themselves and others.

INF 3.2 Students select and use techniques for generating, modifying and presenting information for different purposes.

Materials

MAT 2.1 Students match the characteristics of materials to design requirements.

MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.

MAT 2.2 Students select and use suitable equipment and techniques for manipulating and processing materials.

MAT 3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.

Systems

SYS 2.1 Students identify and describe the order of components in familiar systems.

SYS 3.1 Students identify and describe relationships between inputs, processes and outputs in systems.

SYS 2.2 Students combine components to assemble systems in order to meet their needs and the needs of others.

SYS 3.2 Students assemble and trial systems they design by considering inputs, processes and outputs.

Core content

The core learning outcomes are the focus for planning learning activities and assessment tasks. Students will engage with core content (see pp. 37–40 of the syllabus) when they are provided with opportunities to demonstrate core learning outcomes. While the content is listed in strands for organisational convenience, no one part of that content is to be viewed as discretely associated with a single strand.

The organisation of content within a strand should not be considered hierarchical. Any of the content can be addressed at any appropriate level; not all of the content need be addressed at every level. Core content should be selected to suit students' needs, interests and abilities and to take account of their prior knowledge and experiences.

The core content should be studied in a range of contexts. These could include personal and global contexts, as well as contexts of agriculture, business, communities, home and family, industry, leisure and recreation, and school.

Using this module

The activities in this module are designed to provide opportunities for students to demonstrate Level 2 and 3 core learning outcomes from all strands. These activities can also provide opportunities for students to develop and demonstrate the related learning outcomes at other levels. In order to do this, teachers will need to prepare additional sets of anticipated evidence derived from the related learning outcomes at different levels. They may need to modify aspects of the activities.

This module includes a variety of sequenced activities requiring varying amounts of time. Teachers can modify the design challenge and related activities depending on the local contexts, particular needs and prior knowledge of students, and availability of materials and resources.

Advice to teachers

In this unit, the term 'minibeasts' is used to refer to small invertebrates such as ants, butterflies, beetles, cockroaches, snails, mosquitoes, flies and spiders. The unit involves students in designing devices for collecting and observing these animals. When planning and implementing activities that involve students handling animals, teachers should be aware of and observe the relevant school authority policies.

Teachers will need to consider that students' knowledge of, and prior experiences with, the concept of 'life cycles' and the needs of living things will differ. Some students may have toys or devices for collecting and observing creatures at home and will be able to describe how these work. It is important the parents/carers are informed about the nature of the activities in this module. Parents/carers might prefer to supervise students collecting and observing 'minibeasts'.

Some of the activities in this module require the participation of a scientist or a person to act in role as a scientist. If possible, organise for a colleague, parent/carer or community member to assume this role.

Resources

Students' creativity in demonstrating core learning outcomes in this module should not be limited by the range and scope of resources and equipment provided by the teacher. A variety of recyclable materials should be collected over time and should be safely stored and made available to students as required.

Teachers should identify and collect pictures or examples of commercially available devices for collecting and/or observing 'minibeasts'. Students should be encouraged to contribute to the collection.

Students might find computer software and equipment for recording, manipulating and presenting text, images and sound useful when they are preparing their scientific reports — for example, computers, scanners, cameras, microphones.

Evaluation of a unit of work

After completion of a unit or units of work developed from this module, teachers collect information and make judgments about:

- teaching strategies and activities planned or selected to allow students to demonstrate the core learning outcomes
- future learning opportunities for students who have not yet demonstrated the core learning outcomes and to challenge and extend those students who have already demonstrated the core learning outcomes
- the extent to which activities matched needs of particular groups of students and reflected equity considerations
- the appropriateness of time allocations for particular activities
- the appropriateness of resources used.

Information from this evaluation process can be used to plan subsequent units of work to support future student learning. The evaluated units of work may also be adapted prior to their reuse. For further information, refer to the 'Curriculum evaluation' section of the sourcebook guidelines.

Links

Links to other key learning areas

Activities from this module can be used as part of an integrated unit that makes links to other key learning areas. When incorporating this module into an integrated unit of work, teachers can select activities that provide opportunities for students to demonstrate learning outcomes from other key learning areas. However, it is important that the integrity of the processes and concepts within key learning areas is maintained.

This module has links to learning outcomes in:

- The Arts
- English
- Mathematics
- Science.

Activities in the Science sourcebook modules, *The Nature and Uses of Materials, Scientists at Work* and *Observable Features and Survival* (pp. 6–10), can be used or adapted for use in conjunction with this unit. Information on animal welfare is provided on p. 14 of *Needs of Living Things*.

The Arts sourcebook module, *Pigs Can Fly*, provides advice for teachers about the drama convention 'mantle of the expert' and establishing a drama contract.

Contributions to the cross-curricular priorities

This module contributes to students' development of the cross-curricular priorities:

- **literacy**, as students develop and use terminology for describing animal life cycles, devices for housing and observing living things, and equipment and materials used to make such devices
- **numeracy**, as students count, compare size and shape, and estimate and measure time, length, area and volume
- **lifeskills**, as students cooperate, negotiate, establish and maintain relationships and enhance their self-management skills
- **a futures perspective**, as students envisage and evaluate options and design devices for gathering scientific information about 'minibeasts'.

The valued attributes of a lifelong learner

The overall learning outcomes of the curriculum contain elements common to all key learning areas and collectively describe the valued attributes of the lifelong learner. The following points indicate how various activities in this module might contribute towards the development of these attributes.

Knowledgeable person with deep understanding

- draws together knowledge from a range of areas (including drama, visual arts, mathematics and science) to design and develop creative solutions
- uses simple routines and systems to share resources and equipment.

Complex thinker

- evaluates the suitability of materials for particular purposes
- recognises cause and effect relationships in simple systems.

Active investigator

- investigates and evaluates a range of ways of housing 'minibeasts' for observation
- develops understandings about diversity in the characteristics of materials.

Responsive creator

- uses imagination and originality in meeting design challenges
- envisions and generates a range of potential solutions
- identifies and conceptualises new ways to solve problems.

Effective communicator

- presents design ideas using oral or written descriptions or drawings
- communicates research findings to a specific audience.

Participant in an independent world

- works collaboratively to devise and construct ways of housing 'minibeasts' so that they can be observed
- demonstrates confidence in using tools and equipment.

Reflective and self-directed learner

- looks for and recognises ways of 'working technologically' in everyday life
- displays self-motivation and perseverance in competing tasks.

Assessment strategies

The assessment opportunities outlined in the module are examples of how to assess students' demonstrations of the identified learning outcomes. As often as possible, negotiate assessment with students and support a variety of ways of demonstrating the learning outcomes. Reflect with students on evidence gathered when making judgments about their demonstrations of learning outcomes. Some students may require more time and/or other contexts in which to demonstrate these learning outcomes. Other modules may provide such time and/or contexts.

Suggestions for gathering information about student learning are provided in the activities section of this module. The anticipated evidence column in the table below provides descriptions of what students may do in order to demonstrate the learning outcomes. The table is neither exhaustive nor mandatory. Once sufficient evidence has been collected, judgments can be made about students' demonstrations of learning outcomes. *[This table spreads over three pages.]*

Core learning outcomes	Anticipated evidence	Sources of evidence
TP 2.1 Students organise knowledge, ideas and data about how needs and wants might be met and use this information when meeting design challenges.	Record their observations of 'minibeasts' in tables. Record information about the needs of 'minibeasts' in their project logs. Collect pictures of, or contribute to a handling collection of, existing devices for collecting and/or observing 'minibeasts'.	Anecdotal records: • observations of students' participation in discussions and activities. 'Minibeast' project logs (Technology project folios): • Student resource 1 • Student resource 2 • research notes • 'minibeast' reports • annotated designs.
TP 3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.	Compare devices for collecting and observing 'minibeasts' and identify features that they could use in their own designs. Analyse information about the needs of 'minibeasts' and the stages of their life cyles and identify implications for their designs.	
TP 2.2 Students generate design ideas, acknowledge the design ideas of others and communicate their design ideas using annotated drawings that identify basic design features.	Discuss their own and others' design ideas and comment on design features. Communicate designs using drawings labelled with basic design features.	Anecdotal records: • observations of students' participation in discussions and activities. 'Minibeast' project logs: • design proposals.
TP 3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.	Collaborate with peers to generate design ideas. Communicate design ideas using plans that depict top, front and side views. Use correct technical terms to label their designs with dimensions and information about design features and materials.	
TP 2.3 Students identify, sequence and follow production procedures to make products of their own design.	Outline simple production processes in their design proposals. Follow production procedures to make products that approximate their designs.	Anecdotal records: • interviews with students • observations of students constructing their collection and observation chambers. 'Minibeast' project logs: • design proposals • progress report to the scientist recounting how they produced their devices.
TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.	Collaboratively develop production plans that include safety considerations. Work cooperatively to follow their production plans safely to create products that closely resemble their designs.	

TP 2.4 Students consider initial design ideas with final products and give reasons for similarities and differences.	Identify similarities and differences between design proposals and their final products. Explain reasons for similarities and difference.	'Minibeast' project logs: • progress report to the scientist about the effectiveness of their devicesobservation reports • evaluations of personal and team performance • Student resource 2.
TP 3.4 Students test and judge how effectively their own and others' processes and products meet the design challenge.	Analyse the effectiveness of devices from the handling collection. Field test devices of their own design and report on how effectively they met the design challenge.	
INF 2.1 Students explain the purposes of different forms of information and describe how these are used in everyday life.	Identify different sources of information for different purposes. Describe how to access information for different purposes.	Anecdotal records: • interviews with students • observations of students' researching the needs of 'minibeasts' and preparing their scientific reports. 'Minibeast' project logs: • design proposals • progress reports to the scientist • scientific reports.
INF 3.1 Students describe advantages and disadvantages of different sources and forms of information.	Discuss the advantages and disadvantages of different sources of information about 'minibeasts' such as library books, observations and the Internet. Compare information about 'minibeasts' presented in various forms and describe advantages and disadvantages of each form. Choose particular sources and forms of information to use when developing their scientific reports to the scientist.	
INF 2.2 Students use simple techniques for accessing and presenting information for themselves and others.	Use simple techniques to: access information about 'minibeasts' and record the results of their observations and research present information for themselves in their project logs present information for others in progress reports to the scientist, scientific reports.	Anecdotal records: • interviews with students • observations of students' researching 'minibeasts' and preparing their progress reports and scientific reports. 'Minibeast' project logs: • research reports • design proposals • progress reports to the scientist (letters, emails, multimedia presentations, sound or video recordings) • scientific reports.
INF 3.2 Students select and use techniques for generating, modifying and presenting information for different purposes.	Select and use techniques to access and select information about 'minibeasts' from the Internet, CD-ROM reference materials. Use specialised equipment such as digital cameras, scanners, video and audio devices and publishing programs to enhance their design proposals, progress reports and/or scientific reports.	
MAT 2.1 Students match the characteristics of materials to design requirements.	Locate and use suitable materials to construct their devices for collecting and observing 'minibeasts'.	Anecdotal records: • interviews with students about their design proposals • observations of students testing materials and constructing their collection and observation chambers. 'Minibeast' project logs: • design proposals.
MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.	Identify features of materials that make them suitable for particular purposes. Record the results of tests of the suitability of the materials in their project logs. Annotate designs with information about why particular materials were chosen for the design.	

MAT 2.2 Students select and use suitable equipment and techniques for manipulating and processing materials.	Select materials that are suitable for their design purposes. Use suitable equipment and techniques to construct their devices.	Anecdotal records: • observations of students constructing their collection and observation chambers. Devices for collecting and observing a 'minibeast'.
MAT 3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.	Use equipment and techniques with precision when measuring, cutting and joining materials to construct their devices.	
SYS 2.1 Students identify and describe the order of components in familiar systems.	Examine existing devices for collecting and/or observing 'minibeasts' and identify system components. Describe how components fit together.	Anecdotal records: • interviews with students. 'Minibeast' project logs: • design proposals.
SYS 3.1 Students identify and describe relationships between inputs, processes and outputs in systems.	Describe the purpose of components of devices from the handling collection. Describe how the devices work by identifying inputs, processes and outputs.	
SYS 2.2 Students combine components to assemble systems in order to meet their needs and the needs of others.	Assemble the components of a device for collecting and/or observing a minibeast.	Devices for collecting and observing 'minibeasts'. Evaluations of devices.
SYS 3.2 Students assemble and trial systems they design by considering inputs, processes and outputs.	Assemble devices that they have designed for collecting and observing 'minibeasts'. Consider inputs, processes and outputs as they field test their devices.	

Background information

Terminology

In this module, students have opportunities to become familiar with and use the following terminology:

amphibians
cardboard
chamber
device
durable
insects
fabric
flexible
metal
plastic
reptiles
scientist
transparent
water resistant
wood

School authority policies

Teachers need to be aware of and observe school authority policies that may be relevant to this module.

Safety policies might be of particular relevance to some of the activities that follow. It is essential that teacher demonstrations and student activities are conducted according to procedures developed through appropriate risk assessments at the school.

In this module, teachers may need to consider safety issues relating to students working with simple tools and equipment to test materials and create products.

The Department of Education has developed policy related to risk assessment and risk management. The *Department of Education Manual* (1999–2001), published by Education Queensland, includes a number of general requirements for teachers. The module, *Handling Live Animals* (HS-10-12), provides specific information about handling live animals.

Equity considerations

This module provides opportunities for students to increase their understanding and appreciation of equity and diversity within a supportive environment. It includes activities that encourage students to:

- be involved in collaborative research
- work individually or in groups
- value diversity of ability, opinion and experience
- support one another in their efforts
- become empowered to communicate freely during class discussions and group work
- negotiate and accept changes to design and production processes.

It is important that these equity considerations inform decision making about teaching strategies, classroom organisation and assessment.

Some students with disabilities may need assistance with some activities. Advice should be sought from their support teachers.

Activities

Orientating activities

Focus

These orientating activities focus on introducing the project, setting up the classroom for project activities and encouraging students to begin investigating 'minibeasts'.

Teaching considerations

Generate a letter inviting the class to assist in a study of local 'minibeasts' (insects, small reptiles or amphibians) or adapt Teacher resource 1. Before beginning this module, refer to The Arts sourcebook module, *Pigs Can Fly* (p. 15). The advice on roleplay may be useful if the class is unfamiliar with this dramatic technique.

Resources

Teacher resource 1 (Letter or email from a scientist).

Sourcebook modules, *Scientists at Work* and *Pigs Can Fly*.

'Know, need to know and how to find out' chart.

Australian Backyard Wildlife by J. Grant and B. Winters, or similar text.

Student resource 1 (Backyard 'minibeasts').

Activity 1

Letter from a scientist

Technology Practice (Investigation)

Links to The Arts and Science:

The Arts DR 3.1 Students negotiate, in and out of role, a range of situations and narratives.

Science SS 2.2 Students identify some ways scientists think and work.

1. Explain to the class that you have received a letter or email from an internationally recognised scientist who needs the help of the class to study 'minibeasts' in the local area. Read the letter/email to the students.
2. Discuss what scientists do and the fields of science that they might work in.
3. Explain to students that the term 'minibeasts' is not a scientific term, but is used for this unit of work to refer to small animals such as ants, butterflies, cockroaches, grasshoppers, ladybirds, moths and snails. Ask students to name 'minibeasts' that they have seen around their homes, in local parks or at school.
4. Begin a 'know, need to know and how to find out' chart. Ask the students what they already know about these animals — for example, where they live, what they eat, what their life spans are and what changes occur during their life spans.
5. Record the information on the chart.

Animal	Know	Need to know	How to find out

6. Ask students to collect illustrations or examples of devices for collecting and/or observing 'minibeasts'. Students might have examples of devices at home. Illustrations might be found in toy catalogues, on the Internet or in magazines.

Activity 2

Gather information: 'minibeasts' project log

Technology Practice (Investigation)

Links to English:

Why Wait? A Way into Teaching Critical Literacies in the Early Years (pp. 51–62).

1. Read Australian Backyard Wildlife with the class.
2. Explain that scientists keep records of their work.
3. Provide each student with a scrapbook and Student resource 1. Explain that the purpose of their 'minibeasts' project log is to record observations, ideas and project progress for future reference. Ask students to:
   - create a title page for their 'minibeasts' project
   - illustrate the title page with pictures and drawings of insects, spiders, small reptiles and amphibians
   - glue in their copy of the letter from a scientist and Student resource 1.
4. Ask students to look for 'minibeasts' and record their observations in Student resource 1. Discuss safety aspects of the task. Encourage students to observe the 'minibeasts' without handling or disturbing them.

[Orienting activities continued next page]

Focus on activities 3–5

The following orientating activities provide opportunities for students to investigate the needs and life cycles of 'minibeasts'.

Teaching considerations

Set up a class library of fiction and non-fiction books and other resources about 'minibeasts'.

Resources

Class library and Big Books about 'minibeasts'.

'Minibeast' project logs (Technology project folios).

Illustrations or examples of devices for collecting and/or observing 'minibeasts' — bug catchers, ant houses, butterfly nets, microscopes.

Student resource 2 (Can it do the job?).

Activity 3

Manage workspaces, resources and equipment

Materials, Systems

1. Suggest that if the students are going to help the scientist, they might need a science laboratory. If there is not enough room in the classroom, negotiate a space elsewhere in the school. With the students' help, plan and set up a science laboratory. The laboratory may include:
   - a workshop equipped with tools and materials for making their devices
   - display areas for the results of students' research and their collection and observation chambers.
2. Discuss and negotiate systems for storing material and equipment.
3. Discuss safety, ethical and cultural issues related to collecting and observing 'minibeasts' and using materials and equipment.

Activity 4

Investigate the needs and life cycles of 'minibeasts'

Technology Practice (Investigation)

Links to Science:

LL2.2 Students illustrate changes which take place in the course of the life span of living things (including the growth of a plant and an animal).

LL3.2 Students present information which illustrates stages in different types of life cycles (including metamorphosis) of familiar living things.

1. Read books about animals.
2. Compare similar information from a variety of sources. Discuss how information can be verified through further research or personal observations.
3. Ask the students to choose a 'minibeast' and think about what they need to know in order to design a collection and observation chamber. Students should list questions in their 'minibeast' project logs.
4. Provide time for students to do an Internet search and further reading about the animal they have chosen. Notes should be recorded in their project logs.
5. Ask students which 'minibeasts' they intend to collect, observe and prepare a report about the animal in their project logs. The report should describe or illustrate:
   - the physical characteristics of the animal
   - how it moves
   - where it lives
   - what it eats
   - changes during its life span.

Activity 5

What's out there?

Technology Practice (Investigation, Evaluation)

1. Discuss what the students will need to do in order to help the scientist. Their discussion should include ideas about collecting 'minibeasts' without harming them, providing them with an environment that is similar to their natural environment, feeding them, observing their behaviour and releasing them back into their natural environment.
2. Examine illustrations or examples of devices for collecting and/or observing 'minibeasts'. Provide students with Student resource 2. Allow them to work in pairs to evaluate each device.
3. Ask students to work in groups to consider the benefits, limitations and interesting features of each device, and report back to the class.
4. Make a chart of the features that could be used or adapted for the collection and observation chambers — for example, transparent panels, doors or flaps to cover openings.

Assessment

Sources of evidence could include:

- notes and research reports in 'minibeasts' project log
- observations of students' participation in activities and discussions.

Enhancing activities

Focus

The enhancing activities in this section focus on the design challenge. Students investigate ways of creating safe and comfortable living environments for 'minibeasts', and generate ideas for devices for collecting and observing 'minibeasts'. They present their design ideas, investigate the suitability of materials for their designs and create devices for collecting and observing 'minibeasts'.

Design challenge
Design and make a device for collecting and observing 'minibeasts'. The devices should allow you to collect and observe the animals without handling them. They must also provide a safe and comfortable living environment for the animal.

Teaching considerations

Encourage students who are working towards Level 3 learning outcomes to work in pairs or small groups. These activities have links to Science learning outcomes.

Resources

'Minibeast' project logs (Technology project folios).

Computers and software for communicating design ideas and investigating design considerations.

A range of materials, tools and equipment for making their devices.

Activity 6

Specify a design brief

Technology Practices (Ideation)

Links to Science:

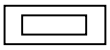
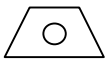
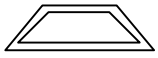
LL2.1 Students look for patterns and relationships between the features of different living things and how those living things meet their needs.

LL2.3 Students make links between different features of the environment and the specific needs of living things.

LL3.1 Students draw conclusions about the relationship between features of living things and the environments in which they live.

LL3.3 Students describe some interactions (including feeding relationships) between living things and between living and non-living parts of the environment.

1. Explain to the students that the purpose of the activity is to design collection and observation chambers. Ask the students to refer to their 'minibeast' reports and decide which aspects of their research might influence their designs.
2. Ask the students to consider the animal's physical features, its needs and life style. They could consider the following:
   - its size and shape when collected
   - its size and shape when fully grown
   - how it moves
   - what it eats
   - how much warmth and light it needs
   - its life cycle and whether it is likely to reproduce.
3. Ask students to prepare design proposals that specify the requirements and constraints of their designs. The students should consider how their devices will function as a living environment. For example, explain that if students are building a device for collecting and observing a butterfly, they should cater for the needs of all stages of its life cycle. One opening must be big enough to let a butterfly in and out. They will need to let in light so that they can observe the butterfly. They will need to supply food for a caterpillar and butterfly.

Design challenge:		
'Minibeast': ant	Sketches or plans	Considerations:
Design requirements:	top view 	
Materials:	front view 	Production process:
	side view 	

4. Ask students to list the desirable characteristics of materials for making the device. Ask them to suggest materials that have these characteristics. Students might also indicate where these materials might be found. Encourage students to label their plans with dimensions and correct technical terms.

Activity 7

Work with tools and equipment

Technology Practices (Production)

1. Provide a range of tools for working with wood, metal, cardboard and plastic. Ask students to name the tools and describe how they can be used. Ask students to identify tools that they might need assistance with and discuss safety issues related to the use of particular tools.
2. Negotiate class guidelines for working with and caring for tools.
3. Ask students to select the tools they might use to make their devices, and draw or list their selection in their 'minibeast' project logs.

[Enhancing activities continued next page]

Activity 8

Test and select materials

Technology Practice (Investigation, Ideation), Materials

1. Provide samples of wood, metal, cardboard, fabric and plastic in a range of thicknesses. Discuss and compare the samples to help students develop the appropriate language. Record vocabulary in a class list.
2. Talk about the meaning of the terms 'transparent', 'water resistant', 'flexible' and 'durable'. Discuss whether these qualities are desirable in their design and why. Discuss what other qualities would be desirable in their design.
3. Discuss how materials could be tested for flexibility and durability.
4. Devise a test with the class and demonstrate it with a number of materials.
5. Ask students to select a range of materials that they think would be useful in making their design and to draw or list them in their 'minibeast' project logs.
6. In groups, the students test and record their impressions of the levels of flexibility and durability of the samples. For example, students could test each sample, place the samples in order of least flexible to most flexible then draw the samples in that order and label their list.
7. Ask students to record in their project logs the materials that appear to be most appropriate for their design. They should be encouraged to explain why these materials are suitable.

Activity 9

Create products from designs

Technology Practice (Production, Evaluation), Materials, Systems

1. Allow students to spend time further exploring materials for their design.
2. Confer with students about their chosen design.
3. Encourage students to refer to their designs and follow the production procedures described in their proposals as they develop their products.
4. Provide time at the end of each session for students to record their thoughts and actions in their 'minibeast' project logs.
5. Encourage students to use this time to plan what they might need for the next session. Set up a stock list in the Technology area and ask students to add what they need for the following session on the stock list. The teacher or a classroom helper can act as scribe for the stock list.
6. Interview students and help them annotate their 'minibeast' project logs with information from the interview. The following questions could be used as a basis for discussion:
   - What was easy to do? What was difficult?
   - What was learnt about the materials and equipment used?
   - What else would they like to try?
   - How is the product different from your original ideas?
   - How could your design be tested?
7. Encourage students to think about how the functionality of their design could be tested.

Assessment

Sources of evidence could include:

- Student resources 1 and 2
- observations of students testing the suitability of materials and working on their designs
- results of tests of materials
- design proposals and related entries in 'minibeast' project logs
- conferences and interviews with students about their design ideas and their progress in making products.

Synthesising activities

Focus

The synthesising activities provide opportunities for students to report on the development of their devices, collect and observe 'minibeasts', record and present their observations and reflect on the effectiveness of their designs.

Teaching considerations

A useful way to introduce learners to the development of production plans is to ask them to describe the production processes used to develop their product.

Resources

Word-processing programs, spreadsheets, graphics packages, scanners and digital cameras.

'Minibeast' project logs (Technology project folios).

Equipment and software for recording images and sounds related to their scientific reports.

Students' devices for collecting and observing 'minibeasts'.

Activity 10

Report on production processes

Technology Practice (Evaluation), Information

1. Ask students to discuss in pairs how they produced their devices for collecting and observing 'minibeasts'.
2. Encourage students to report on their progress by drafting emails or letters to the scientist in their 'minibeast' project logs.
3. Their emails or letters to the scientist should describe:
   - how they constructed their devices
   - materials and processes used to make them
   - how the collection and observations chambers work as an environment
   - their plans for catching and observing 'minibeasts'.

Activity 11

Fieldwork

Technology Practice (Evaluation), Information

Links to Science:

LL2.1 Students look for patterns and relationships between the features of different living things and how those living things meet their needs.

LL2.3 Students make links between different features of the environment and the specific needs of living things.

LL3.1 Students draw conclusions about the relationship between features of living things and the environments in which they live.

LL3.3 Students describe some interactions (including feeding relationships) between living things and between living and non-living parts of the environment.

1. Encourage students to use their devices to collect and observe 'minibeasts'.
2. If possible, the students should observe their 'minibeasts' for a period of two weeks and make daily observation notes in their 'minibeast' project logs.
3. Provide opportunities each day for students to record their observations in their 'minibeasts' project log and report what they have observed to the class.
4. During this period, interview students about the effectiveness of their design, and encourage them to record their opinions in their 'minibeast' project logs.
5. Provide time for students to discuss ideas for improvements to their designs.
6. Encourage students to provide progress reports to the scientist in a range of forms, for example, email, letter, multimedia presentations or video or sound recordings.

[Synthesising activities continued next page]

Activity 12	1. Ask students to display their devices when they are complete. 2. Provide opportunities for the students to present their devices for collecting and observing small creatures to the class. 3. Ask them to explain how the devices work, why particular materials were chosen, what they like about their devices and what they might like to change and why. 4. Invite other members of the class to make supportive comments about each device. 5. Students might like to refine their devices in response to feedback. 6. Ask students to describe and discuss the challenges they met in making their collection and observation chambers and what they had learnt about particular materials and equipment.
Evaluate and express opinions about their products Technology Practice (Evaluation)	
Activity 13	1. At the end of the observation period, ask students to: • write a second letter to the scientist detailing the advantages and limitations of their collection and observation chambers. • prepare a word-processed scientific report on their observations to accompany the letter. 2. Ask students to consider appropriate ways of presenting their findings. Assist students to use spreadsheets and graphics packages to generate plans, tables, graphs, photographs, flowcharts and diagrams.
Report on effectiveness of their products Technology Practice (Evaluation), Information	
Assessment	Sources of evidence could include: • observations of students' participation in discussions • devices for collecting and observing small creatures • oral presentations about their devices • 'minibeast' project logs • progress reports to the scientist • word-processed scientific reports.

Sample text for a letter or email from a scientist **Teacher resource 1**

<insert date>

<insert address>

Dear Year ___

I have recently returned from a visit to *<insert name of your town, suburb or local area>*. I spent a great deal of my time there bushwalking and visiting national parks and wildlife reserves. I was surprised by the variety of *<insert the type of 'minibeast' to be studied>* in your area.

As I am a leading *<insert type of scientist, for example, entomologist>* here in *<insert location>*, I am very interested in learning more about the *<insert type of animal>* in your locality.

I would like to enlist your help to study these animals. I am keen to know more about their life cycles. I thought your class might be interested in designing and making devices for collecting and observing the animals.

I am very concerned, however, about the wellbeing of your specimens. The collection and observation chambers will need to be designed so that you do not have to handle the animal and the chambers must provide for their every need.

I will be returning to *<insert name of local town, suburb or local area>* towards the end of term. I would be honoured if, at that time, your class could share what they have learnt with me.

Yours sincerely

Professor B. Cairfel

Backyard 'minibeasts'

Student resource 1

Spend time in a playground or garden at home, at school or at a park. What 'minibeasts' can you find?

1. Write the name of the 'minibeast' in the first column if you know it. Draw what it looks like.

2. Draw or describe where it was found, when it was found, and what it was doing.

Name of minibeast	What did it look like?	Where was it found?	When was it found?	What was it doing?

Table adapted from p. 61 of Ludwig 2000, *Why Wait? A Way into Teaching Critical Literacies in the Early Years*.

Can it do the job?

Student resource 2

List devices for collecting or observing 'minibeasts' beside the numbers at the top of each column.

Use a four-point scale to evaluate how well each device does the jobs listed in the left-hand column. (3 – does the job well; 2 – does the job adequately; 1 – almost does the job; 0 – does not do the job)

	Devices for collecting and/or observing 'minibeasts'					
Name of device >	1.	2.	3.	4.	5.	6.
How well does the device allow you to:						
• collect the 'minibeast' without harming it?						
• provide a living environment similar to the 'minibeast's' natural environment?						
• cater for all stages of the 'minibeast's' life cycle?						
• provide the 'minibeast' with nourishment?						
• observe the 'minibeast's' behaviour?						
• release the 'minibeast' into its natural environment?						
•						
•						
Total						

Support materials

Education Queensland 1996, *Handling Live Animals* (HS-10-12), Brisbane.

Grant, J. & Winters, B. 1997, *Australian Backyard Wildlife*, Gould League of Victoria, Moorabbin.

Ludwig, C. 2000, *Why Wait? A Way into Teaching Critical Literacies in the Early Years*, Education Queensland, Brisbane.

Queensland School Curriculum Council 2000, *The Nature and Uses of Materials*, Science sourcebook module, Brisbane.

Queensland School Curriculum Council 2000, *Needs of Living Things*, Science sourcebook module, Brisbane.

Queensland School Curriculum Council 2000, *Observable Features and Survival,* Science sourcebook module, Brisbane.

Queensland School Curriculum Council, 2002, *Pigs Can Fly*, The Arts sourcebook module, Brisbane.

Queensland School Curriculum Council 2000, *Scientists at Work*, Science sourcebook module, Brisbane.

This sourcebook module should be read in conjunction with the following Queensland Studies Authority materials:

Years 1 to 10 Technology Syllabus

Years 1 to 10 Technology Sourcebook Guidelines

Technology Initial In-service Materials

Technology CD-ROM

Copyright notice

Guidance in connection with the Copyright Amendment (Digital Agenda) Act

Libraries, educational institutions, and institutions helping people with a disability may have the right to:

- supply another library with digital copies of a work, or parts of a work that they hold, if the other library cannot get the work in a reasonable time at an ordinary price
- display digital works within their premises (e.g. on an intranet)
- make a digital copy for research or study
- for administrative purposes, make a digital copy of a work held in printed format
- make a copy of an artistic work to display on their premises if the original is lost or in danger.

To comply with subsection 49(5A) of the *Copyright Amendment (Digital Agenda) Act 2000*, anything that a library makes available on their computer system must be so arranged that it can be accessed only through a computer that cannot itself make a copy, or print out the copy displayed. This is made clear in subsection 49(5).

Direct quotation of subsection 49(5A), Copyright Amendment (Digital Agenda) Act

> If an article contained in a periodical publication, or a published work (other than an article contained in a periodical publication) is acquired, in electronic form, as part of a library or archives collection, the officer in charge of the library or archives may make it available online within the premises of the library or archives in such a manner that users cannot, by using any equipment supplied by the library or archives:
> (a) make an electronic reproduction of the article or work; or
> (b) communicate the article or work.

Any inquiries should be addressed to:

Queensland Studies Authority, PO Box 307, Spring Hill Q 4004 Australia
Phone: (07) 3864 0299. **Fax**: (07) 3221 2553
Website: www.qsa.qld.edu.au **Email**: office@qsa.qld.edu.au