Level

F	1	2	3	4	5	6	B6

There's science in my community

Strand
Science and Society

Key concept
Decisions about the way that science is applied have short- and long-term implications for the environment, communities and individuals.

Purpose

Activities in this module are designed to help students understand that everyone is affected by science and its applications. Students have opportunities to:

- access resources (human, electronic and material) to collect information about the ways applications of science affect their community;
- reflect on and consider the ways that science is applied in their local community;
- collect information and construct a report to explain how science has benefited aspects of community life;
- envision alternative futures in which applications of science are used in their community.

Overview of activities

The following table shows the activities in this module and the way in which these are organised in **introductory**, **developmental** and **culminating** phases.

Introductory ►	Developmental ►	Culminating
Science in my community	Community health	Science affects my community
	Local health services	Science and my community in the future
	Science and food	
	Transport	
	Understanding the environment	
	Using microprocessors	

QUEENSLAND SCHOOL CURRICULUM COUNCIL

Core learning outcomes

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

Science and Society

1.3 Students illustrate different ways that applications of science affect their daily lives.

2.3 Students explain some of the ways that applications of science affect their community.

3.3 Students make predictions about the immediate impact of some applications of science on their community and environment, and consider possible pollution and public health effects.

Core content

This module incorporates the following core content from the syllabus:

Science and Society

Applications of science

- community, industry, environment, agriculture

Short-term effects (costs and benefits) for:

- individuals and communities — health
- the environment — pollution of water, soil

Long-term effects (costs and benefits) for:

- environment — degradation, habitat loss, agricultural practices, biodiversity

Futures

- planning
- envisioning alternatives

Assessment strategy

Suggestions for gathering information about student learning are provided in each of the activities in this module. Once sufficient information has been collected, judgments can be made about students' demonstrations of outcomes. Typical demonstrations of this module's intended outcomes are provided here to indicate the pattern of behaviour to look for when making judgments.

Science and Society

1.3 Students illustrate different ways that applications of science affect their daily lives.

Students may:

- explain, using words or drawings, the ways science is applied in their daily lives;
- explain how applications of science are helpful in the way they live.

Science and Society

2.3 Students explain some of the ways that applications of science affect their community.

Students may:

- explain, using words or drawings, where science is applied in their local community — for example, in local council services, agriculture, industry, medicine;
- explain how applications of science have affected their community, both positively and negatively;
- prepare a report (negotiated format) on one aspect of an application of science — for example, on food production or packaging, transport, environment, communication, computers;
- draw or describe what life in the community may have been like without some of the current applications of science;
- envision alternative futures in which applications of science are used in their community.

Science and Society

3.3 Students make predictions about the immediate impact of some applications of science on their community and environment, and consider possible pollution and public health effects.

Students may:

- explain, using words or drawings, the possible impact of the applications of science in their local community — for example, on local council services, agriculture, industry, the environment, medicine;
- suggest how science applications may benefit their community in the future, in relation to pollution and public health;
- create scenarios of their community and environment in the future and describe how applications of science may be used.

Background information

Current scientific conceptions

Science is but one way of looking at and exploring our world. It is part of the human quest for understanding and wisdom and reflects human wonder about the world. Scientific knowledge is not static. Scientific explanations are tentative and continue to evolve. As new evidence emerges, ideas are modified or new knowledge is constructed.

There have been both positive and negative effects from science applications. Frequently it has not been a scientific discovery itself, but its application that has had a major effect on our planet and its inhabitants. Also, the long-term effects of the applications of science may be different from those perceived in the short term.

A science 'way of knowing' can be applied to many aspects of personal and community life, not just as they are frequently depicted in the media. A knowledge of how scientists work and an understanding of the aspects and components of working scientifically will help individuals to assess innovations critically and make thoughtful choices about the applications of science in their community.

Students' prior understandings

Students' prior understandings may differ from current scientific conceptions in a range of ways.

Some students may think that:

- science is a body of facts, and this body of facts is static and always 'true';
- relying on a science 'way of knowing' will eventually 'cure all';
- science is the answer to all human problems or, alternatively, that science is responsible for disastrous happenings in the world;
- science is a 'way of knowing' only for professional scientists.

Teachers can help students build on and expand their concepts of science and its applications in their community by providing activities where students can:

- develop awareness of the applications of science in their community that they may not have considered — for example, by pointing out such applications on local area walks;
- consider other 'ways of knowing' about the world — for example, through Studies of Society and Environment and The Arts, and make explicit comparisons about the usefulness and purposes of each;
- investigate how scientific ideas change over time, namely, changes in modes of transport from the past to the present, changes in the way we care for the environment or changes in the ways that food is produced;
- envision alternative pasts and futures with regard to the applications of science in their community, such as in the areas of community health and the environment.

Terminology

Terms associated with students' understanding that everyone is affected by science and its applications are essential to the activities in this module — for example:

agriculture	community	investigate	sample
application	computers	negative	technology
benefits	data	positive	transport
collecting	disadvantages	report	
communication	industry	research	

Students may already be familiar with some of these terms and understand their meaning and use in scientific contexts. If so, the activities in this module will provide opportunities for them to evaluate current usage. If not, these activities will provide opportunities for students to begin to develop their understandings.

School authority policies

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

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

In this module, teachers need to consider safety issues relating to planning and conducting excursions.

Support materials and references

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- *Telstra Information Kit Number 2: The Busy Ray*
- *Telstra Information Kit Number 3: The Switching Place*
- *Telstra Information Kit Number 4: Linking a Nation*
- *Telstra Information Kit Number 5: The Information Super Highway*
- *Telstra Information Kit Number 6: Mobile Phones*
- *Telstra Information Kit Number 7: Telecommunications*

ACTIVITY

Science in my community

Introductory

Focus

This activity provides opportunities for students to identify where in their local community applications of scientific knowledge are evident. They will consider the ways that science affects the development of their community and the way that people understand their surroundings.

Materials

For each group of students:

- map of local area (e.g. from street directory, local council)
- highlighter pens (several colours)

Teaching considerations

Conduct the local area excursion in groups. Involve extra staff or adult helpers so that there is one helper per group.

During the excursion each group records observations of a particular application of science in their community, using one colour to indicate the position of each of those applications on their map.

Working scientifically

Time: 90 minutes

Collecting information
Interpreting data
Making links
Explaining ideas and decisions

▶ Students discuss their views of science and some ways that a science 'way of knowing' can be 'applied' — for example, using a lever to remove a tyre from a bicycle wheel rim; adding chemicals to swimming pool water to kill bacteria; determining which products perform better than others.

▶ Students brainstorm examples of the applications of science apparent in their local community — for example, gardening, cooking, first aid, building materials, agricultural practices, communication, transport, computerisation, food production, industry.

▶ Students undertake a local area walk to identify situations where applications of science have had an impact and record each type of application on a map. Each group of students investigates a different application.

▶ Students view and interpret data collected by each group on return to the classroom (applications may overlap).

▶ Students respond to the question: 'How does science affect our community?'. The teacher records students' suggestions by constructing a web diagram of general areas of application, and further itemising specific areas of local business, industry, recreation and activities where applications of science were evident on their excursion.

▶ Students discuss how these applications have affected their community's development.

► Students decide which application of science in their community they consider to be the most significant and record this in their notebooks. They also record their thoughts on how science has affected the development of their community.

Gathering information about student learning

Sources of information could include:

- students' contributions to group discussions;
- students' maps identifying applications of science in the community;
- self-evaluation and peer evaluation of maps and discussions;
- students' explanations about where science is applied;
- students' written comments in their notebooks about significant applications of science in their community.

ACTIVITY

Community health

Developmental

Focus

This activity provides opportunities for students to collect information about local health services and consider how applications of science have affected these services.

Students imagine what their health services would be like without the benefit of scientific research and envision health services in a preferred future.

Materials

- Resource Sheet 1, 'Health services'
- highlighter pens

Teaching consideration

Students work in small groups. Ensure that each group is of mixed ability.

Working scientifically

Time: 30 minutes

Resource Sheet 1

Collecting information
Reflecting and considering
Envisioning alternative futures

▶ Students brainstorm health services they know are available in the local community.

▶ Working individually, students use a highlighter pen to mark the services listed on Resource Sheet 1 that are available in their local community.

▶ Explain to students that the 000 number is for emergencies only (police, fire and ambulance).

▶ Students discuss how applications of science have improved each service and add any comments in the relevant section on Resource Sheet 1.

▶ In a whole-class discussion, students share ideas and discuss how the application of science has contributed to each health service area.

▶ In groups of three or four, students imagine what their health services would be like if there had been no scientific research in the area of health and discuss possible consequences to the community.

▶ Students envision what health services might be like in a preferred future and present their thoughts to the class in words and/or pictures.

Gathering information about student learning

Sources of information could include:

- individuals' group-working skills;
- students' comments on Resource Sheet 1 about how science has improved various health services;
- students' descriptions of present and future health services.

ACTIVITY

Local health services

Developmental

Focus

This activity provides opportunities for students to collect information about local government health services available in their community and to consider how the applications of science have affected these services.

Materials

- rates notice
- resources from local government websites

Teaching consideration

Invite a guest speaker (a health surveyor or an environmental officer). When guest speakers are invited, ensure that they are aware before the visit of the topics to be discussed and the learning outcomes that are the focus of the activity.

Working scientifically

Time: 30 minutes

Accessing resources
Formulating questions
Reflecting and considering
Illustrating

▶ Students collect information about the types and costs of services provided by their local council — for example, immunisation, refuse collection and disposal, water treatment, sewage treatment, parks and gardens. Costs for many of these services are itemised on rates notices.

▶ Students formulate questions to direct to a guest speaker about how science has affected the type of health services available to the community and how local government health policies have been shaped by science knowledge and research.

▶ Students listen to a guest speaker and ask questions previously prepared.

▶ Students create annotated drawings showing one of the ways science has helped to shape local government health services and policies.

Gathering information about student learning

Sources of information could include:

- students' questions;
- students' annotated drawings of science applications in local government health services.

ACTIVITY

Science and food

Developmental

Focus

This activity provides opportunities for students to develop an understanding about the application of science in food production.

Materials

- pictures, texts and electronic resources featuring food production
- planning and reporting worksheets (see the sourcebook guidelines, appendix 3)

Teaching considerations

The planning and reporting worksheets in the sourcebook guidelines will help to scaffold students' learning as they conduct their research into, and prepare their report on, food production.

Note that this activity uses a KWL strategy (What do I know? What do I want to know and how will I find out? What have I learned?).

Groups could select one food production area to report on or they could spend further time investigating and reporting on several.

Appropriate audiences for presentations include classmates, another class or the community (a library or community centre display).

Consider aspects of this activity as excursion opportunities.

Working scientifically

Time: 2 x 40 minutes

Accessing resources
Collecting information
Creating presentations
Using scientific report genres

▶ Students brainstorm places where food is produced. As a basis for a class discussion about what they already know about the topic, they consider which of these places are to be found in their local area — for example, market gardens, dairy farms, commercial fishing, cannery, cheese factory.

▶ Working in groups, students discuss what they want to find out, how they will conduct their research, and how they will present their findings.

▶ Using available resources, students investigate an area of food production to find answers to their questions. They construct their reports using the planning and reporting worksheets provided. They consider the ways that applications of science have benefited their chosen industry — for example, knowledge about hygiene, animal husbandry, insect control, fertilisers, plant needs, quality controls, production technology.

▶ Students present their reports to an appropriate audience.

Gathering information about student learning

Sources of information could include:

- consultation with students at various stages of the activity;
- students' skills in accessing resources;
- students' written work, including notes and preparation for reporting;
- students' presentations of their completed reports.

ACTIVITY

Transport

Developmental

Focus

This activity provides opportunities for students to develop an understanding of the application of science in transport technology.

Students create a presentation comparing past and present technology to explain how science has benefited one or more modes of transport.

Materials

- pictures, texts and electronic resources featuring past and present modes of transport

Teaching considerations

The planning and reporting worksheets in appendix 3 of the sourcebook guidelines could be used to scaffold students' learning as they conduct their research into, and prepare their report on, transport.

Groups could select one mode of transport to report on or spend further time investigating and reporting on transport generally.

Appropriate audiences include classmates, another class or the community (a library or community centre display).

Consider aspects of this activity as excursion opportunities.

Working scientifically

Time: 2 x 40 minutes

Collecting information
Making comparisons
Creating presentations
Using scientific report genres

▶ Students identify forms of transport in their community (for example, bus, train, car, plane, bicycle) and use them as a basis for a class discussion on what they already know about the applications of science in transport.

▶ In groups, students discuss what they want to find out, how they will conduct their research, and how they will present their findings.

▶ Students use available resources to investigate one mode of transport to find answers to their questions and prepare their reports.

▶ Students construct their reports, considering the ways that science has benefited the mode of transport they are investigating, and comparing that form of transport in the past with the present.

▶ Students present their reports to an appropriate audience.

Gathering information about student learning

Sources of information could include:

- consultation with students throughout the activity;
- students' skills in accessing resources;
- students' written work, including notes and preparation for reporting;
- students' presentations of their completed reports.

ACTIVITY

Understanding the environment

Developmental

Focus

This activity provides opportunities for students to reflect on their knowledge of their local environment by listening to, and asking questions of, an environmental expert and exploring environmental phenomena.

Students consider how scientific research helps planning and management of the environment in a variety of situations.

Teaching considerations

Invite a guest speaker (an environmental officer from the Department of Primary Industries, the Department of Natural Resources or the local council). Ask the guest speaker to talk about environmental phenomena and how science has contributed to planning and management of the environment. Before the visit, brief the guest about topics to be discussed and learning outcomes on which the activity is focused.

Students may require assistance to formulate questions for the guest speaker to ensure they are suitable and relevant to the purpose of the activity.

Kits produced by the Queensland Department of Primary Industries, such as *Saltwatch* and *Waterwatch* (see p. 5), could be used. Consider inviting the guest speaker to take students through the materials in one of these kits.

Working scientifically

Time: 40 minutes

Exploring phenomena
Generalising
Listening and questioning

▶ Prior to the guest speaker's visit, students devise a set of questions to be asked about the applications of science in the speaker's particular field of expertise.

▶ Students listen to the guest speaker and ask their prepared questions.

▶ Students explore an environmental phenomenon suggested by the speaker. Guests may assist students in designing an investigation of an aspect of the environment that involves an application of science. Students collect and record information relevant to the topic.

▶ Students discuss ways that such studies help environmental understanding and list other situations where similar research would help — for example, planning and managing agricultural land, industrial sites, road and bridge work, national parks and recreational areas.

Gathering information about student learning

Sources of information could include:

- students' questioning and participation;
- students' exploration of an environmental phenomenon;
- students' discussion of the usefulness of scientific research for environmental planning.

ACTIVITY

Using microprocessors

Developmental

Focus

This activity provides opportunities for students to hypothesise what their lives would be like without computer chips.

Students discuss their thinking about computerisation and the use of microprocessors as an application of science, draw devices that use microprocessors and construct a graph with information from personal experiences.

Materials

- calculators
- several pieces of 10 cm x 10 cm paper per student
- coloured pencils or crayons

Teaching considerations

To display the class graph to be constructed, prepare a large area in the classroom beforehand.

The processing units in a computer are contained in microchips. Many devices that do not look like computers also use microprocessors to control their functioning. In this activity such devices will be called 'devices that use microprocessors'.

Working scientifically

Time: 30 minutes

Hypothesising
Creating tables and graphs
Discussing thinking
Illustrating

▶ Students race to recall basic number facts — one team with calculators, the other without.

▶ Students use calculators to solve algorithms at a level above their mental calculation ability.

▶ Students discuss the usefulness of calculators as a tool.

▶ Students create a list of other everyday devices that use microprocessors — for example, CD players, microwave ovens, television remote controls, breadmakers, lifts, mobile telephones, personal computers.

▶ Students hypothesise what would happen if devices that use microprocessors were suddenly unavailable. Questions for discussion could include:

- How would life be different without your favourite microprocessor-controlled appliances and games?
- What would shopping be like for adults if there were no automated teller machines, EFTPOS facilities or credit cards?

▶ Using one piece of 10 cm x 10 cm paper per item, students draw and label the devices in their community that use microprocessors.

▶ Students discuss ways of sorting the devices that use microprocessors into groups, the names of which will be the column headings on a graph.

► Students construct a class graph by pasting the illustrated squares in labelled columns on the class display.

► Students discuss the graph and consider the effect that science — in the form of microprocessors — has on their lives.

► Students suggest summary sentences to describe their findings and add them to the bottom of the class graph.

Gathering information about student learning

Sources of information could include:

- students' contributions to discussions and hypothesising;
- roles individual students played in the graph-making exercise;
- students' comments during discussion of the class graph.

ACTIVITY

Science affects my community

Culminating

Focus

This activity provides opportunities for students to demonstrate their understandings of how science applications have affected their community.

Materials

- drawing paper
- coloured pencils or paints

Teaching considerations

Display a wordbank of terminology used in activities leading up to this one. The terminology list at the beginning of this module could be used as a guide.

Prepare a structure in which students can record ideas about effects, such as a Positive–Negative continuum or a PMI (Plus, Minus, Interesting) chart.

Prepare a display area for students' work entitled 'How has science affected my community?'.

Working scientifically

Time: 60 minutes

Creating diagrams
Expressing points of view
Summarising and reporting
Using scientific terminology

▶ In a class discussion, students express their points of view on the applications of science in their community, deciding whether they have been positive, negative or have made no difference.

▶ Through annotated drawings, and using scientific terminology from a class wordbank, students summarise their findings about the effects that science applications have had on their community.

▶ Students display and share their ideas.

Gathering information about student learning

Sources of information could include:

- students' contributions to discussions;
- students' illustrations of the effects of science on the local community;
- students' use of scientific terminology in oral and written work.

ACTIVITY

Science and my community in the future

Culminating

Focus

This activity provides opportunities for students to reflect on their current understandings and explore and elaborate on their ideas through envisioning the future of science applications and creating possible scenarios.

Materials

- drawing paper
- coloured pencils or paints
- materials to create models

Teaching considerations

Display a wordbank of terminology used in activities leading up to this one. The terminology list at the beginning of this module could be used as a guide.

Prepare a display area for students' work.

Working scientifically

Time: 30 minutes

Envisioning alternative futures
Explaining ideas and decisions
Exploring and elaborating ideas
Using scientific terminology

▶ Students reflect on previous activities and brainstorm their ideas of the effects science may have on their community in the future.

▶ Students discuss the ideas raised in the brainstorming exercise and suggest reasons for the possible effects these may have.

▶ Students present their ideas through annotated illustrations or models, using scientific terminology from the class wordbank.

▶ In a class discussion, students describe the types of futures they envision. Ideas to be discussed could include what they think needs to happen to create that future and the role they or their family might play in contributing to such futures — for example, future occupations or careers, undertaking environmentally friendly household activities such as recycling and energy conservation.

Gathering information about student learning

Sources of information could include:

- students' contributions to discussions;
- students' annotated illustrations or models;
- students' use of scientific terminology in oral and written work.

Health services

Resource Sheet 1

Name _____ Date _____

Highlight the health services below that are in your community. Say how science has helped in each health area.

Remember that you can reach the ambulance service in an emergency by dialling 000.

Health service	**Comment** (How has science helped this health service?)
Acupuncture	
Ambulance	
Child welfare clinic	
Dentist	
Doctor's surgery	
Immunisation clinic	
Natural health clinic	
Pathology	
Pharmacy	
Physiotherapy	
Radiology	

Acknowledgments

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This sourcebook module should be read in conjunction with the following Queensland School Curriculum Council materials:

Years 1 to 10 Science Syllabus

Years 1 to 10 Science Sourcebook: Guidelines

Science Initial In-service Materials

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