TECHNOLOGY

Upper Primary

Regenerate the environment: Case study



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

Purpose

This case study documents aspects of an environmental project undertaken by upper primary students at a small country school. The project culminated in a tree-planting day that also became a social event for the school. The case study outlines a range of sequenced activities that enabled the students to:

- demonstrate core learning outcomes in the strands of Technology and other key learning areas
- investigate and devise possible solutions to a variety of problems
- consider and devise systems to suit various situations in different contexts.

The activities provided students with opportunities to:

- collect, select and present information for a range of purposes
- generate lists, surveys, information paragraphs and letters and participate in telephone conversations
- generate conclusions, make decisions, explain and discuss the progress of aspects of their projects, and evaluate how effectively they met their design challenges
- develop ideas in consultation with community members and use plans, scale and measurement to communicate ideas.

Overview

The following diagram provides an overview of the activities associated with this case study and the way in which these were organised into introductory, developmental and culminating phases.

Introductory	Developmental	Culminating
Investigate and discuss the design challenge and create a flow chart of ideas. Make a submission to the Australian Habitat Projects competition. Measure the site.	Generate and develop ideas. Design aspects of the project. Record information and data. Correspond with community participants. Produce aspects of the project.	Participate in a tree-planting day and associated activities.

Core learning outcomes

The activities in this case study focus on the following core learning outcomes from the Years 1 to 10 Technology Syllabus:

Technology **TP 4.1** Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.

TP 4.2 Students generate design ideas through consultation and communicate these in detailed design proposals.

TP 4.3 Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.

TP 4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.

Information **INF 4.1** Students analyse sources and forms of information and match these to the requirements of design challenges.

INF 4.2 Students apply techniques for transforming and transmitting information for different audiences.

Materials MAT 4.1 Students explain how characteristics of materials affect ways they can be manipulated.

MAT 4.2 Students employ their own and others' practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.

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 case study

This case study details a sequence of activities that were designed to provide opportunities for students to demonstrate Level 4 core learning outcomes. The activities require varying amounts of time for completion and can be modified depending on the local contexts, particular needs and prior knowledge of students and availability of materials and resources. They could also be used to develop an integrated unit that makes links to learning outcomes in other key learning areas.

Advice to teachers

For some aspects of this project, the students required support from community members and experts. In particular, the help of parents/carers was needed to clear an overgrown area, a task the students may have been physically unable to complete alone.

Resources

To ensure that students' creativity in demonstrating core learning outcomes is not limited when participating in units of work based on this case study, a variety of resources and equipment should be collected over time and made available to the students as required.

Evaluation of a unit of work

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

- the 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 so that they build on and 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	 The activities included in this case study engaged students in the following key learning areas: English Mathematics

The activities contributed to students' development of the cross-curricular priorities:

literacy, as students used a variety of consultative methods to gather information; used

 lifeskills, as students developed and demonstrated understandings of the designed world; gained skills required for communicating technological information and ideas; and

inception to realisation, within a range of contexts. They were encouraged to experiment, to take reasonable risks and to view options and opportunities in imaginative and enterprising

Science

ways.

• Studies of Society and Environment.

numeracy, as students measured space

Contributions to the crosscurricular priorities

The valued attributes of a lifelong learner

The overall learning outcomes of the Queensland Years 1 to 10 curriculum contain elements common to all key learning areas and collectively describe the valued attributes of a lifelong learner. The following points indicate how various activities in this module might contribute towards the development of these attributes.

• a futures perspective, as students accepted responsibility for their own ideas from

Knowledgeable person with deep understanding

terminology associated with design and technology

developed interpersonal skills in cooperative learning situations

- gains knowledge and conceptual understanding about technology practices, materials, information and systems as they designed an environmental area
- · draws together knowledge from a range of sources
- develops understandings about investigation, ideation, production and evaluation.

Complex thinker

- · recognises cause-effect and part-to-whole relationships
- makes decisions and justifies choices when realising designs.

Active investigator

• explores aesthetic, economic, environmental, functional and social implications generates and accesses information from a variety of sources.

Responsive creator

- uses imagination, originality, intuition, enterprise and aesthetic judgment
- envisions and generates a range of potential solutions.

Effective communicator

- uses a variety of methods to communicate design ideas effectively to a range of audiences
- uses accepted standards and forms for measurement, calculation and written and visual representations.

Participant in an interdependent world

- works individually and collaboratively on a variety of design challenges with confidence and initiative
- negotiates with others and resolves conflict in appropriate ways as they work towards common goals and shared equipment and resources.

Reflective and self-directed learner

- · critically evaluates processes and products of technology
- displays self-motivation and perseverance in seeing projects through to completion.

Assessment strategies

The methods used to gather information about student learning are listed at the end of each of the activities sections of this case study. The table below provides descriptions of anticipated evidence that could be used to support teachers' judgments about students' demonstrations of learning outcomes when participating in activities developed from this case study. Once sufficient evidence is collected, judgments should be made about students' demonstrations of learning outcomes.

Core learning outcomes	Anticipated evidence	Sources of evidence
TP 4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.	Consult with parents/carers and external organisations.	 Anecdotal records: observation of students as they participate in activities. interviews with students. Consultation summaries.
TP 4.2 Students generate design ideas through consultation and communicate these in detailed design proposals.	Consult with others to inform design ideas. Prepare and present detailed design proposals.	 Anecdotal records: observation of students as they participate in activities. Detailed design proposals. Feedback sheets.
TP 4.3 Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.	Draw on the practical expertise of others during consultation. Outline production processes for achieving the desired outcomes.	 Anecdotal records: observation of students as they participate in activities. Consultation with students to verify evidence. Student work samples.
TP 4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.	Gather feedback about how well their products match users' needs. Assess the overall success of aspects of the project.	Feedback sheets. Peer- and self-assessment sheets. Technology project folios. Student presentations.
INF 4.1 Students analyse sources and forms of information and match these to the requirements of design challenges.	Select suitable sources of information. Select information related to the tasks.	 Anecdotal records: observation of students as they participate in activities. Technology project folios.
INF 4.2 Students apply techniques for transforming and transmitting information for different audiences.	Prepare and produce information materials. Use equipment such as digital cameras.	Technology project folios. Student work samples.
MAT 4.1 Students explain how characteristics of materials affect ways they can be manipulated.	Demonstrate understandings about materials to be used.	 Anecdotal records: observation of students as they participate in activities. Technology project folios. Student work samples.
MAT 4.2 Students employ their own and others' practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.	Consult with others to determine appropriate equipment and techniques for manipulating materials. Use this knowledge to enhance products.	 Anecdotal records: observation of students as they participate in activities. Student work samples. Consultation summaries.

Background information

This case study documents aspects of an environmental project undertaken at a small country school. The project culminated in a tree-planting day that also became a social event for the school. The design challenge provided students with the opportunity to undertake a variety of activities that involved working technologically.

The teacher:

- realised that this project had the potential to provide opportunities for students to demonstrate outcomes in Technology and a number of other key learning areas while undertaking a coordinated series of activities
- was aware of local organisations such as the shire council, the local Landcare group and industry groups that could provide assistance and was able to direct students to these organisations
- made a successful application to the Australian Habitat Projects competition for funding for the project.

The students:

- had varying degrees of background knowledge, understanding and skills
- were able to use investigation to acquire the knowledge they required for various aspects of the project.

Terminology

The activities in this case study provided students with opportunities to become familiar with and use the following terminology:

- environment
- conservation
- consultation
- vegetation.

School authority policies

Teachers need to be aware of and observe any relevant school authority policies when conducting activities from this case study. It is essential that teacher demonstrations and student activities are conducted according to procedures developed through appropriate risk assessments at the school. Particular safety issues that should be considered relate to:

- the use of tools, equipment and machinery
- dangers associated with animals such as snakes and spiders
- possible allergic reactions to poisonous plants and noxious weeds
- sun safety
- participation by students with disabilities.

Equity considerations

The activities in this case study provided 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
- work individually or in groups
- value diversity of ability, opinion and experience
- value diversity of language and cultural beliefs
- support one another in their efforts
- become empowered to communicate freely
- negotiate and to accept change.

Activities

Introductory activities

Focus

Teaching

considerations

Investigation

Design challenge

Design and create a native forest environment that will provide a safe habitat for animals, birds and butterflies.

TP 4.2 Students generate design ideas through consultation and communicate these in detailed design proposals.

INF 4.1 Students analyse sources and forms of information and match these to the requirements of design challenges.

INF 4.2 Students apply techniques for transforming and transmitting information for different audiences.

MAT 4.1 Students explain how characteristics of materials affect ways they can be manipulated.

MAT 4.2 Students employ their own and others' practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.

Investigation and ideation were introduced during these introductory activities and revisited throughout the project.

The project involved a range of activities that drew upon other key learning areas. Because every opportunity was taken to integrate the project into everyday class lessons, it became the context for a wide range of learning.

Students were introduced to the design challenge and the Australian Habitats Project competition. Following class discussion, an area of the school grounds was identified as a suitable site for the project.



The selected site was overgrown with noxious weeds.

Brainstorming was used to generate a flow of ideas relating to the project.

Students created a timeline and flow chart to give some chronological order to the events or tasks that would be involved in the project. A class wall chart was designed showing the steps in the project and actions that were required at each step. This chart was displayed on the classroom wall as an ongoing focus for the project.

Students discussed ways of improving their chances of obtaining funding for the project. Suggestions included:

- thinking of a name for the project (for example, BARKS Beautification and Revegetation of Kalamia School; Native Habitat Area; and Habitat Haven)
- drawing a map of the site
- writing a detailed description of the project
- · identifying the intended outcomes of the project
- · writing letters to local organisations requesting support
- · taking photographs of the site
- listing what would be needed at various steps.

'As a class, we discussed the importance of a native tree habitat that would be a haven for animals, birds and butterflies and would enhance the school environment. We listed local experts and organisations who could assist us with advice and material. The children took photographs of the proposed area for future reference.3

Ideation

Ideation

Investigation	Students investigated the site and observed its overgrown nature, noxious weeds and discarded rubbish.
Cross- curricular links — Mathematics	Students used measuring tapes and trundle wheels to measure the dimensions of the area to be developed. The slope of the area was discussed and students used protractors to investigate the slope of the land. These measurements were used to create a class plan and were also incorporated into lessons on plan conventions and drawing to scale.
Cross- curricular links — English	Students helped to prepare the draft submission for the Australian Habitat Projects competition. They worked in pairs to write paragraphs on allocated topics such as project location, description of the project and site description. Although the teacher worded the final application, this student input was important in establishing ownership of the project.
	The project application was prepared under the following headings:• Project title• Objectives of the project• School details• Details of the site, including site map and photographs• Contact details• Resources required• Project location• Resources available within the school community• Site description• Risk assessment• Background to the project• Maintenance.
Resources	Students used the school's digital camera to take photographs of the site to accompany the submission. They learned how to download, save and print photographs.
Cross- curricular links — English	 Students wrote letters to the following local organisations outlining the project and asking for a letter of support: the local shire council Greening Australia

- the local branch of Landcare
- local industry groups.

When replies were received, students composed letters of acknowledgement thanking representatives of the organisation.

KALAMIA STATE PRIMARY SCHOOL Katarris fatore AR. 9, 480 PHONE 607,4185 2191 HX 507,4185 1952 If San 1800	The Year 4–7 students of Kalamia State School would like to thank the Lower Burdekin Landcare Association for your letter of support for funding from the Australian Habitat Project to create a native habitat at our school.
Savantary et das Lorens Bursteich Landcans Mesociation 190 Bas 50 Nar Quitant Duar Mic Barros	We especially thank you for your interest and offer of support for this project.
The part 4-2 reactions of Kylonia Gauss Schwei workt like in these the Assew Bactelin Lastnew Romannian he poor laster of support the Family loss the Romanian Schwei Freijker in cause a perfer holder even at our robod. We supporting thesis pur for poor interest and office of support for the profers. These if nor metalestics in unsuccessful we will still be proceeding with the profers and will contact the Lawre Querkshin Lamburg Romannians for pure tited offer of continuous and much assist the Lawre Querkshin Lamburg Romannians for pure tited offer of continuous and much assist an apport.	Even if our submission is unsuccessful, we will still be proceeding with the project and will contact the Lower Burdekin Landcare Association for your kind offer of assistance and much needed support.
Tau I minimit Sugiania Mander & Menila Friend Tylanda Tara Liberd	

The submission for funding of \$1000 was successful.

Assessment Sources of information included:

- student-produced plans
- letters generated by students
- paragraphs written for the submission.

	Developmental activities
Focus	To further develop the students' ideas, carry out production tasks and complete associated key learning area activities.
	TP 4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
	TP 4.2 Students generate design ideas through consultation and communicate these in detailed design proposals.
	TP 4.3 Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.
	TP 4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.
	INF 4.1 Students analyse sources and forms of information and match these to the requirements of design challenges.
	INF 4.2 Students apply techniques for transforming and transmitting information for different audiences.
Ideation	After further class discussion, students added to and amended the wall chart that was started during the introductory activities. Additional ideas were added to the chart throughout the project.
	Students began to consider proposals for the area. They started by adding details such as the location of fences and large trees to the plan they created during the introductory activities. Groups of students then discussed and proposed ideas for improvements, such as a pathway, irrigation points and further plantings of trees and shrubs.
	 Students began to realise that in order to complete a plan of their proposed ideas they needed more information about: plants that would attract birds, butterflies and animals irrigation schemes suitable materials for pathways.
	Consultation with people who had relevant specialised knowledge was encouraged.
Investigation Ideation Production	The students helped to devise an animal spotting survey sheet that was used to gather data about the animals that might be living in the area (see Student resource 1). Similar sheets were produced for bird watching and butterfly observing.
Cross-curricular links — English	Once the survey data had been collated, students wrote a report on an animal, bird and butterfly that inhabited the area. To assist with this activity, students helped to organise an excursion to the local Nature Display Park where an expert on local native flora and fauna helped them to identify local species. One student was selected to phone the Nature Display Park to make excursion arrangements. Students also used resources from the local library and school library and conducted Internet searches to help them compile their reports.
Investigation Ideation Cross-curricular links —	Students gained the knowledge they needed to design an irrigation scheme during a visit by the owner of a local irrigation company. Students were involved in measuring irrigation pipes and did some simple calculations about water flow and the circular area coverage of sprinklers.
Mathematics	 Students indicated significant existing vegetation on their site map. A number of issues relating to vegetation arose during discussion. Students realised they needed to: identify existing vegetation
	 identify vegetation that would be compatible with the native fauna of the area identified during the survey conduct research into vegetation characteristics such as growth rates, shade and water tolerance and seed dispersal.
	 source new plants for the area.
	For help in addressing these issues, students telephoned the local branch of Greening Australia and arranged for members to visit the class. The members assisted students to identify the existing vegetation and suggested suitable plants that could be used to develop the area. With assistance, students decided on locations for these plants and plotted them on the site map. Donations of plants were sought from Greening Australia and the local council, both of which had previously been approached to support the project.

Cross-curricular links — English Ideation Production Workplace, health and safety issues Students realised that it was beyond their physical capability to clear the land and proposed that parents be invited to participate in a working-bee. To encourage participation, students developed a newsletter that contained a report on the project. This newsletter was a design project in itself, with students proposing layout and content. It concluded with an invitation to parents to participate in the working-bee.

Some weeks prior to the working-bee, the weeds on the site were sprayed with a herbicide. For safety reasons, this was done over a weekend when students were not present.

Students discussed relevant safety issues prior to the working-bee, including the need for protective footwear, awareness of possibly harmful creatures such as snakes, and sun safety. Equipment that would be needed was also discussed and listed and students sought parents' help in providing this.

During the working-bee, all unwanted vegetation and rubbish that had accumulated on the site over several years was removed.



Students help clear the site of unwanted vegetation and rubbish

Ideation Investigation Production Investigation

Once the site had been cleared, attention turned to the culminating event, the planting day. It was decided that this should be a school social event and that it should include a barbeque lunch. This required financial support from the Parents and Citizens Association. Two students prepared and delivered an oral report to the Parents and Citizens Association meeting.

Students identified a number of tasks that needed to be completed prior to the planting day, *viz* :

- ensure the plants have arrived
- ensure the mulch has been delivered
- organise and prepare a barbeque lunch
- issue invitations to parents/carers, Landcare and Greening Australia representatives who had given support, a representative from the local newspaper, and other people or associations that were considered important in the local context.

The organisation and preparation for the barbeque lunch was used as a design challenge.

	Design challenge Organise and prepare a barbeque lunch for those participating in the planting day.
	 Through teacher-led discussion, students considered factors that would need to be addressed, including: the menu numbers attending available facilities.
	Students worked in groups to address these factors. Consideration was given to the type of food to be provided, quantity required, the location of the lunch and the sourcing of facilities such as tables and barbeques. Students realised that assistance was required to cook the lunch and asked parents to help. They devised a system for the production of the lunch and established a roster. Arrangements were made for the collection of tables and other equipment.
Teaching considerations	Specific lessons were required to develop students' skills in the genres of report writing and oral and written invitations and to introduce them to a range of telephone techniques.
Assessment	Sources of information included: survey sheets students' reports (see Teacher resource 1)

• cross-curricular activities — for example, mathematical calculations

• the success of the newsletter in communicating ideas.

Culminating activities

Focus **TP 4.4** Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.

INF 4.2 Students apply techniques for transforming and transmitting information for different audiences.

Ideation During a brainstorming session, students came up with a range of events that could be incorporated into the planting day. These ideas were added to the planning wall chart.

Crosscurricular links —English Students were helped to develop the skills needed to write and deliver a welcome speech. These were delivered to the class and one student was selected to deliver their speech at the welcoming ceremony.

Following the welcoming ceremony, students, parents and other volunteers were given instructions on how to plant, mulch and stake trees.

Students used the school's digital camera and a video camera to record the events. This required some investigation, instruction and practice prior to the day.

Students gathered feedback about the effectiveness of the project by interviewing participants during the planting day and recorded this information in their Technology Project Folios. They used the information to discuss how they could improve the effectiveness of similar projects.

Crosscurricular links — English After the planting day, students prepared an article for the local newspaper. The final article was accompanied by a selection of photographs.

Students wrote letters to thank all those who had participated in the planting day and helped throughout the project.



At the end of the project, a representative of the Australian Conservation Trust visited the school to present the students with a framed certificate.

Teaching considerations

The culminating activities created a sense of celebration within the school community and provided students with a range of opportunities to work collaboratively with adults.

Assessment	 Sources of information included: discussions on aspects of the wall planning chart oral and written presentations level of involvement on the planting day. 	

Animal spotting survey sheet

Student resource 1

estatestatestatestates



KKKKKKKKKKK

KKKKKKKKKKKKKKKKKKKKKKK

Keep a tallv of all the birds	Bar-Shouldered Dove
vou see at Lilliesmere	Black Ducks
I agoon and the surrounding	Black Swan
Lagoon and the surrounding	Blue Winged Kookaburra
rea. Use the book The	Crested Pigeon
field Guide to the Birds of	Crimson Rosella
lustralia" and the Internet	Crow
) help you identify them.	This (White)
	Kite
ou will see most of the	Laughing Kookaburra
irds on the list. You may	Little Kinofisher
ee others that are not on	Magnie
he list.	Magpie Geese
	Peaceful Dove
	Peewee
	Pelican
	Pheasant Coucal
	Plover
	Rainbow Lorikeets
	Red Tailed Black
	Cockatoo
	Restless Flycatcher
	Shining Flycatcher
	Sparrow
	Sulphur-crested
	Cockatoo
	Top Knot Pigeon
	White-faced Heron
	Willie Wagtail
	Wood Ducks
	Wood Swallow
	Yellow Breasted Sunbird

XXXXXXXXXXXXXXXX

Butterfly	Observing
Keep a tally of all the butterflies you see. Use pictures from "Butterflies of Australia" and the Internet to help you identify them. You may not see all the butterflies on the list as some are only seen in summer. You may see others that are not on the list.	Blue TriangleChequeredSwallowtailBlue Banded EggflyBig GreasyRed BodiedSwallowtailTailed EmperorGreen TriangleBirdwing ButterflyCommon MigrantOrange MigrantOrange MigrantNorthern JezebelCommon CrowBlue TigerWandererEvening BrownCommon EggflyCruiserCommon OakblueUlysses ButterflyLesser WandererGrass Yellow

Acknowledgment and support materials

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Support materials

(The following website was last accessed in December 2002)

Greening Australia. www.greeningaustralia.org.au

Homepage for Greening Australia, an organisation that works in partnership with landholders, the community, government and business to tackle environmental degradation in a practical, apolitical and scientific way.

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

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