Projects

ASSESSMENT RESOURCE KIT

Purpose
Sources of Evidence
Judging and Recording
Estimating Achievement
Reporting

A Focus On Process

A Focus On End Product

When Comparability Matters

Designing Project Assessments

ISBN 0-86431-208-3

ARK

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Contents

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what is project assessment?

Projects are extended pieces of work completed over a period of time – investigations which involve the collection, organisation, evaluation, and presentation of material or data.

Because project work often involves searching primary and secondary data sources, critically evaluating the results of an investigation, and working with others, projects are particularly useful vehicles for assessing general investigative skills important in all learning areas.

Projects also can provide useful information about students' understandings and knowledge of particular learning areas, about abilities to apply that knowledge in practical investigations, and about abilities to communicate subject-specific information clearly.

the process of project work

Curriculum documents specify many learning outcomes which can be assessed while students are engaged in the *process* of project work. Examples of these outcomes include:

- planning and organising an investigation;
- working in a team; and
- self-direction.

Many of these outcomes are not subject-specific.

end products of project work

Curriculum documents also include many outcomes which can be assessed by looking at the *end products* of project work – completed students' reports. Examples of these outcomes include:

- identifying and collecting relevant information;
- analysing and interpreting data; and
- communicating results.

Some of these outcomes are subject-specific.

Because skills in collecting, organising, evaluating, and presenting information are of such general importance, the assessment of project work occurs at all levels of education.

Projects provide contexts for assessing general skills and for assessing students' abilities to apply subject-specific knowledge and understandings.

Outcomes observable in the process of project work

New Zealand and Australian curriculum documents

Curriculum documents specify many learning outcomes which can be assessed during the *process* of project work. Examples can be found in all learning areas.

Essential Skills: New Zealand[1]

'Information skills'

Students will:

- identify, locate, gather, store, retrieve, and process information;
- use a range of information retrieval and information processing technologies confidently and competently.

Mathematics: Working mathematically strand Australia[2]

'Investigating'

Shows persistence, autonomy, flexibility and self reliance when working mathematically.

Evident when students, for example:

- Try alternative lines of investigation when initial attempts are unproductive.

Mathematics: Chance and Data strand Australia[3]

'Collecting data'

Collaborates in deciding how data collection could help investigate situations and problems, frames helpful questions and decides what data to collect.

Evident when students, for example:

- Collaborate in identifying problems or areas of concern to their class and school.

Studies of Society and Environment: Investigation, Communication and Participation strand Australia[4]

'Investigation'

Uses the methodologies of the learning area to investigate different perspectives on an issue.

Evident when students, for example:

- Prepare a plan outlining the most suitable method for the task (case study, survey, content analysis).

Science: Working scientifically Australia[5]

'Planning investigations'

At level 5 a student 'Selects an appropriate pathway for an investigation, given its purposes and the resources available.'

Outcomes observable in the end products of project work

US, UK, Canada and New Zealand documents

Curriculum documents include many learning outcomes which can be assessed in the *end products* of project work – students' project reports. Examples can be found in all learning areas.

Curriculum and Evaluation Standards for School Mathematics – US[6]

'Mathematics as reasoning'

The mathematics curriculum should include numerous and varied experiences that reinforce and extend logical reasoning skills so that all students can:

- make and test conjectures;
- formulate counter examples;
- judge the validity of arguments; and
- construct simple and valid arguments.

Science standards – US National Academy of Sciences[7]

'Science as inquiry'

All students should develop:

- abilities necessary to do scientific inquiry.

Mathematics attainment target – UK[8]

'Using and applying mathematics'

Level 4: Pupils are developing their own strategies for solving problems and are using these strategies both in working within mathematics and in applying mathematics to practical contexts. They present information and results in a clear and organised way, explaining the reasons for their presentation. They search for a pattern by trying out ideas of their own.

Mathematics, Science and Technology – Ontario[9]

Inquiring, reasoning and reporting

By the end of Grade 9, students will:

- gather information from various sources, make decisions based on the information, and communicate the decisions, using appropriate methods.

Essential Skills – New Zealand[10]

Information skills

Students will present material clearly, logically, concisely and accurately.

Projects usually are completed by individuals or small groups of students with the teacher acting as supervisor.

In some tertiary courses, projects can account for a significant proportion of the overall course grade. For many higher degrees, projects (research theses/dissertations), are the main form of assessment.

Some examples of projects:

- a mathematics investigative project at secondary level;
- a sport research project on 'posture' at primary level;
- a physics practical investigation in the final year of school;
- a multi-disciplinary project (e.g. 'water in our homes') for Year 6 students;
- an engineering design project at university level.

contexts and purposes for project assessment

There are many contexts and purposes for project assessment. For classroom purposes, teachers may place particular emphasis on the *process* of project work, using projects as a vehicle for developing and monitoring students' planning, research, and analysis skills.

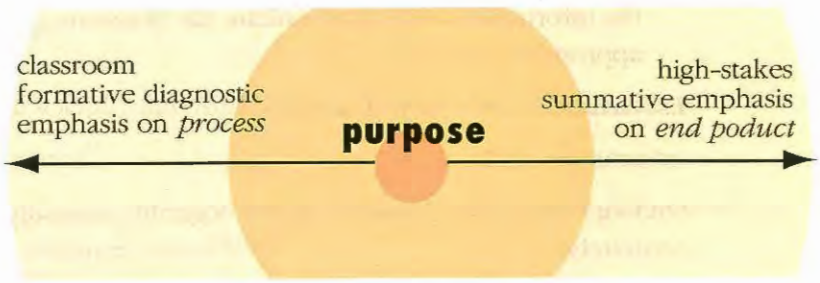
In this context, students may share their personal experiences and knowledge of a topic, formulate questions they would like answered, and then investigate the topic through reading, a field trip or perhaps interviews of local experts.

Students' project work can then be used to assess their abilities to work independently or in a group, to organise their time, and to plan and sequence tasks.

Teachers also can use the *end products* of project work to assess students' abilities to communicate findings in an appropriate form and to present results through visual displays and written reports.

When projects are used for high-stakes summative assessment, the focus usually is on the end product. The assessment criteria for an end of high school geography research report, for example, might include the application of appropriate geographic ideas to provide a framework for the investigation, the integration of processed data as findings, the integration of a range of geographic techniques in the presentation of data, and the use of conventions of report writing.

It is useful to think about these different kinds of project assessments along a 'purpose' dimension, as shown below. Usually, the higher the stakes, the greater the assessment emphasis on the finished or end product (i.e. report). High-stakes summative project assess-



ment is at the far right of the continuum. At the far left is classroom formative and diagnostic project assessment. A project set by a classroom teacher and assessed as process and end product would be near the centre of the continuum.

project choice

Within these different contexts, the project process and structure vary in their level of prescription. Sometimes students select their own topic, locate their own source material and choose the form in which they present their project report. This allows them a measure of freedom to follow their interests. Sometimes the topic is set, the method for data collection specified (for example, a questionnaire to be given to a certain number of interviewees) and a particular kind of report required. Usually, the higher the stakes, the tighter the specification of project process and end product in an attempt to ensure that all students are assessed on the same kind of investigation.

It is useful to think about project specification along a 'choice' dimension. At one end of this continuum the project is tightly structured and students have limited options. At the other end the project is unstructured or open-ended from the student's point of view.

planning project assessments

When planning project assessments teachers need to consider:

- manageability;
- relevance; and
- authenticity.

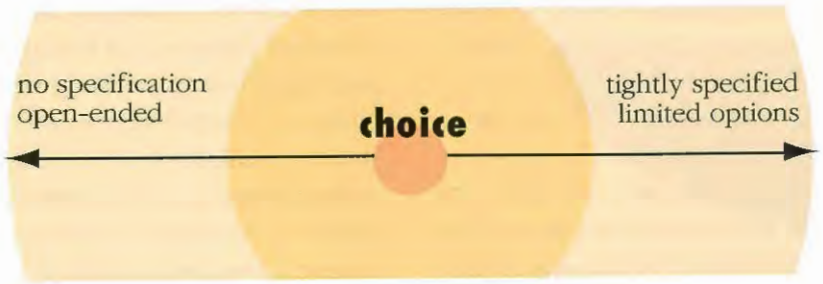
The usefulness of a project as a source of assessment evidence depends on its manageability. The usefulness of the resulting evidence for inferring a student's level of achievement depends on its relevance and authenticity.

manageability

Consideration should be given to the degree to which the investigative process and the form of the project report are specified for students. Projects work well when designed carefully. If students are given too much autonomy, then they may have difficulty deciding on an appropriate topic. They may choose a topic that is too ambitious and broad, or one for which they can find little information. They may underestimate the time required to collect data and to write a detailed report.

Projects can provide useful evidence of student achievement in a learning area. When planning project assessments teachers need to consider:

- manageability;
- relevance; and
- authenticity.



Projects are particularly useful for the assessment of general skills important to most areas of school learning.

The 'Mayer Key Competencies' describe the development of such cross-curricular skills.[11] Examples of outcomes from levels 1, 2 and 3 of the competency **'collecting, analysing and organising information'**, which could be addressed through projects, include:

- defines the needs of the audiences and the purposes of the information (level 3);
- critically investigates sources to identify and distil relevant information (level 3);
- assesses information for relevance, accuracy and completeness (level 2); and
- follows existing guidelines for the collection, analysis, and organisation of information (level 1).

relevance

In planning project assessments teachers need to consider the knowledge, skills and understandings, or outcomes, of the learning area about which the projects are to provide evidence. Projects are especially useful sources of evidence about general, or cross-curricular, skills.

authenticity

Projects are completed over a period of time, often with teacher guidance and sometimes with group input. In the classroom context, teachers need to consider how much support students obtain in completing their work. If valid assessments are to be made, the project must be the work of the student presenting it. In high-stakes assessments it is common to put in place procedures to confirm the authenticity of projects as the work of students presenting them. These procedures sometimes include opportunities for students to acknowledge the contributions of others.

judging project work

When projects are assessed, two features of the assessment process need to be considered:

- method of judgement; and
- comparability of judgements (inter-rater reliability).

method of judgement

Projects can be assessed holistically, analytically or by using a checklist of project features. An holistic judgement is a single rating which reflects an overall impression of a student's project. Analytic judgements are ratings of different aspects of a project. A geography project, for example, might be rated on both process and end

product criteria. The assessment might be staged, with the process criteria judged while the project is underway and end product criteria, judged after project completion. Students who tackle an investigation well, are organised and thorough in their data collection, but who fail to present a report effectively, might rate highly on process criteria but not so well on end product criteria. Teachers might report these analytic ratings separately or use them to make a final on-balance judgement of a student's project. Sometimes teachers assess projects using a checklist of project features.

comparability of judgements

For classroom purposes, the comparability of project ratings may not be particularly important. Teachers will want to ensure, however, that their criteria for judging student projects are clear and understood by students.

In high-stakes situations, where it is important that judgements are made consistently and fairly by different assessors, criteria for assessing student projects usually are tightly specified. If students have a wide choice of topics, the project process and report presentation also may be specified to assist assessors to apply the same standards to projects on different topics.

estimating and reporting achievement

In developmental assessment teachers monitor student progress against a preconstructed map of developing skills, knowledge and understandings (see *ARK Developmental Assessment*). Teachers make observations of students' performances in contexts relevant to the learning area outcomes. These observations are the 'evidence' used to estimate students' levels of attainment.

Developmental assessment requires an on-balance decision (inference) about a student's location on a progress map, based on available evidence. Project assessments are one source of evidence. The way in which this evidence is used to infer a level of attainment usually is determined by the purpose of the assessment: the higher the stakes, the greater the requirement for comparability, and the more tightly the 'inference process' is likely to be specified.

Projects are assessed in a variey of contexts for a range of purposes. When projects are assessed, two features of the assessment process need to be considered:

- method of judgement and
- comparability of judgements (inter-rater reliability).

Teachers use a variety of methods to observe, record and collect evidence. Project assessments are one source of evidence about a student's achievement in a learning area. A mathematics teacher might make an inference about a student's level of achievement using a combination of evidence from anecdotal records of performances in class, investigative projects, and paper and pencil tests. In some instances a student's location on a progress map might be estimated entirely from their performances on assigned projects. Estimates may be made either subjectively or objectively.

subjective estimates

When the estimate of a student's level of achievement is made subjectively, there may be only a loose connection between the available evidence (the holistic, analytic or checklist ratings of project work) and the resulting estimate of the student's location on a progress map.

objective estimates

In high-stakes situations, where high levels of inter-marker comparability are desirable, the way in which project judgements are used to estimate a student's location on a progress map may be tightly prescribed. For example, the inference may be made numerically on the basis of a marker's pattern of judgements across carefully defined criteria.

The following three articles explore different kinds of project assessment:

'a focus on process'

> describes ways to assess general and subject-specific learning outcomes which are best observed during the *process* of project work;

'a focus on end product'

> describes ways to assess learning outcomes which are best observed in the *end products* of project work (displays or written reports);

'when comparability matters'

> describes the use of project assessments in high-stakes settings where the comparability of assessments is particularly important.

The final article looks at issues of project design.

1 New Zealand Ministry of Education (1993) *New Zealand Curriculum Framework*, p. 18.

2 Curriculum Corporation (1994) *Mathematics – a curriculum profile for Australian schools* Carlton: Curriculum Corporation.

3 Curriculum Corporation (1994) *Mathematics – a curriculum profile for Australian schools* Carlton: Curriculum Corporation.

4 Curriculum Corporation (1994) *Studies of Society and Environment – a curriculum profile for Australian schools* Carlton: Curriculum Corporation.

5 Curriculum Corporation (1994) *Science – a curriculum profile for Australian schools* Carlton: Curriculum Corporation.

6 National Council of Teachers of Mathematics (1989) Curriculum and Evaluation Standards for School Mathematics.

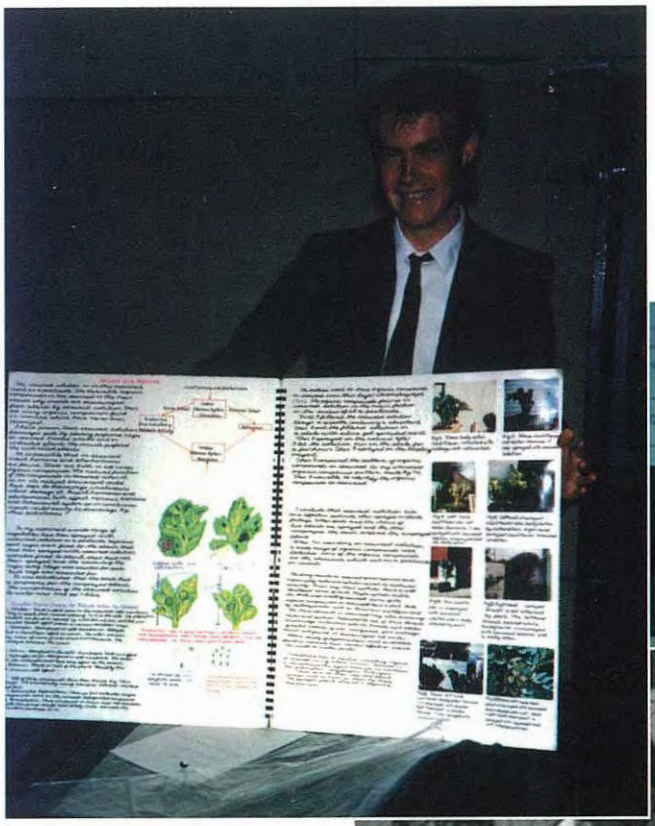
7 National Academy of Sciences (1994) Draft National Science Education Standards.

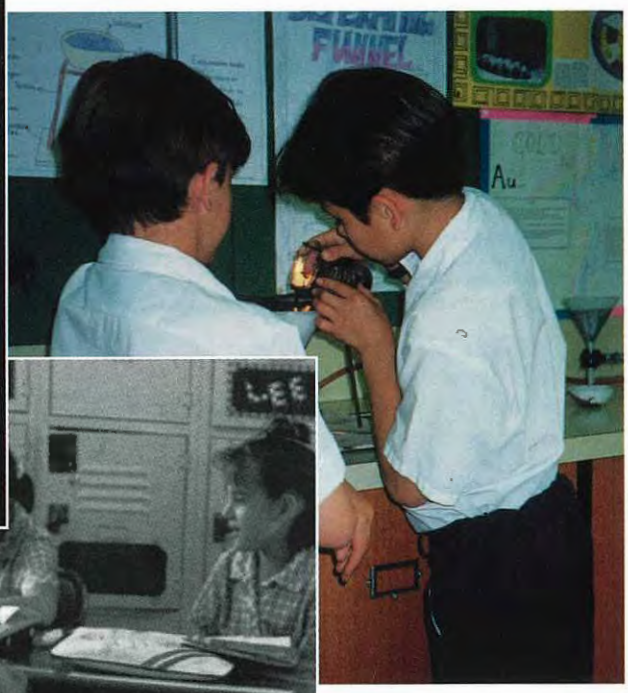
8 School Examinations Assessment Council (1991) The Department of Education and Science. Material from the National Curriculum is Crown copyright and is reproduced by permission of the controller of HMSO.

9 The Common Curriculum (1995) Ontario Ministry of Education and Training.

10 New Zealand Ministry of Education (1993) *New Zealand Curriculum Framework*, p. 18.

11 Australian Educational Council and Ministers of Vocational Education, Employment and Training (1992) *Key Competencies* Report of the Committee to advise the Australian Education Council and Ministers of Vocational Education, Employment and Training on employment-related Key Competencies for postcompulsory education and training, p. 23.

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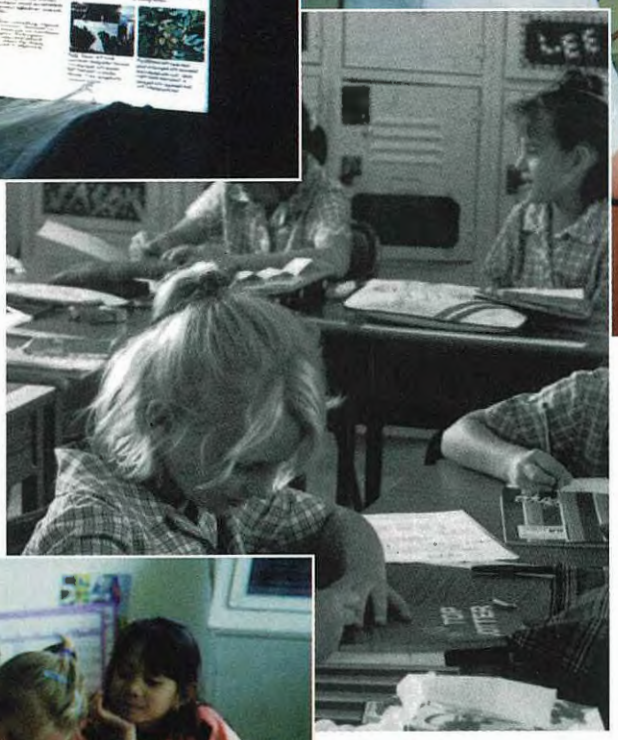
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a focus on process

Projects are investigations completed over a period of time, involving the collection, organisation and analysis of information or data, and the presentation of findings in the form of a report.

In educational settings, projects are assessed in many contexts for a range of purposes – from classroom assessment of collaborative project work for formative and diagnostic assessment to high-stakes summative assessment of individual research projects at post-graduate level.

Projects provide opportunities to assess subject-specific skills and knowledge in contexts which also require the application of more general skills or outcomes such as:

- planning and organising an investigation;
- working in a team;
- solving problems;
- evaluating the significance of findings; and
- self-direction.

Because these general skills are central to projects, teachers often focus on the process of project work as well as on the end product. They use project work to assess students' abilities to work independently (or co-operatively if the project is a group project), to organise time, and to structure tasks sequentially.

This article looks at ways of assessing the *process* of project work rather than the end product, and particularly at ways of assessing the more general skills mentioned above.

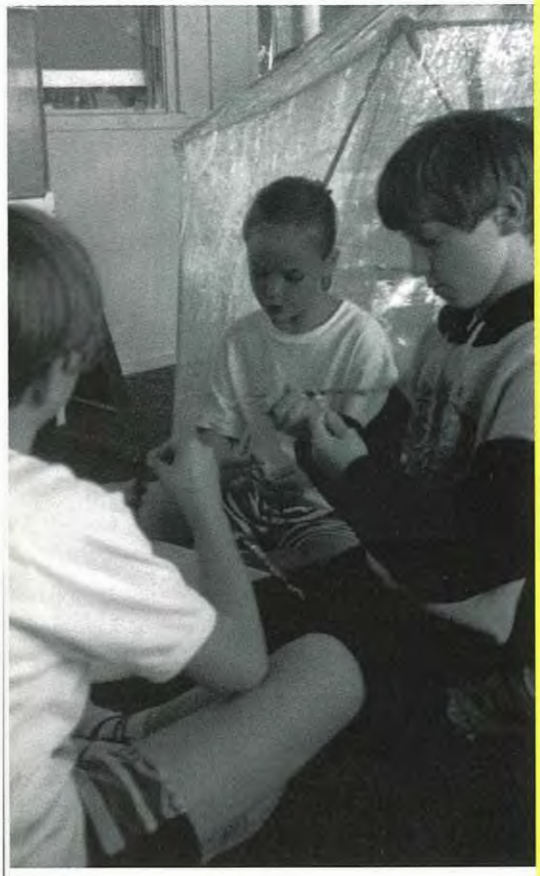
planning assessments

When planning assessments of the project process, teachers need to consider the knowledge, skills and understandings, or 'outcomes' of the learning area(s), about which evidence is to be collected. There needs to be a match between project activities and outcomes to be assessed.

Curriculum documents describe many outcomes which can be assessed in the course of project work. Examples are given on pages 2 and 12.

The usefulness of project activities as a source of evidence about these outcomes depends on project manageability. If the project process is too loosely specified and students have too much autonomy, then they may have difficulty deciding on an appropriate topic. Students may select topics which are too narrow and for which they cannot find sufficient information, or too broad and ambitious to be completed in the given time. Students may under-estimate the difficulty of collecting data and writing a complex report. Or, if the tasks students set themselves are too demanding, they may need to turn to others, parents for example, for support in completing the project, making it difficult to establish which parts of the project are the work of the student.

Projects provide opportunities to assess subject-specific skills and knowledge in contexts which also require the application of more general skills.



Outcomes that can be assessed through the process of project work

Examples from the US and Australia

Barbara White and John Frederiksen list the following general science skills which can be assessed through observations made in the course of project work.[1]

Doing Science

Being inventive

Students are creative and examine many possibilities in their work. They show originality and inventiveness in thinking of problems to investigate, in coming up with hypotheses, in designing experiments, in creating new laws or models, and in applying models to new situations.

Being systematic

Students are careful, organised and logical in planning and carrying out their work. When problems come up, they are thoughtful in examining their progress and in deciding whether to alter their approach or strategy.

Using the tools of science

Students use the tools and representations of science appropriately. The tools they choose to use (or create) may include such things as lab equipment, measuring instruments, diagrams, graphs, charts, calculators, and computers.

The Mathematics Curriculum Profile for Australian schools contains many outcomes which can be assessed through the process of project work. Here are two examples.[2]

Doing Mathematics

Working mathematically

Shows persistence, autonomy, flexibility and self-reliance when working mathematically.

Collecting data

Collaborates in deciding how data collection could help investigate situations and problems, frames helpful questions and decides what data to collect.

Project work can be used to assess general skills or outcomes such as

- collecting and organising information,
- solving problems, and
- working as a member of a team.

specifying the project process

Teachers use a number of strategies to assist students to effectively plan and complete project work. These strategies enhance the value of projects as sources of evidence about general investigative skills and include systematic procedures for:

- selecting a topic;
- 'mapping' the area to be investigated;
- detailing steps in the research process; and
- monitoring project work.

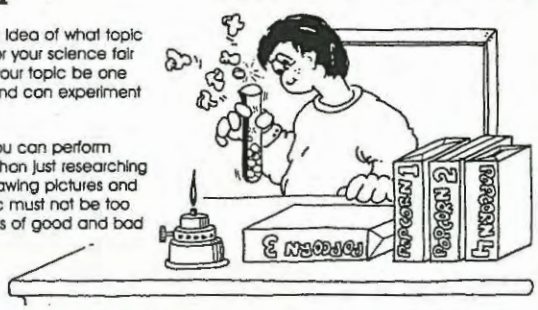
selecting a topic

Many teachers provide students with guidelines to help them select an appropriate topic. The example on the right assists students to select a science project topic that is neither too broad nor too narrow to provide useful evidence of their investigation skills.

This science fair project guide assists students to select an appropriate topic – one which is neither too narrow, nor too broad, to provide evidence of their investigation skills.[3]

A Terrific Topic!

Name _____



You probably have a good idea of what topic you would like to choose for your science fair project. It's important that your topic be one that you are interested in and can experiment with yourself.

A good topic is one that you can perform experiments on. It is more than just researching a topic, writing a report, drawing pictures and building a model. The topic must not be too general. Here are examples of good and bad topics.

Good Topic

"Which brand of popcorn pops the most kernels?" – This is a good topic because you can find the answer by doing experiments.

Poor Topic

"Bridges" – This topic is too general, or big. You could not do a good job of studying a topic that is this big. Choose a smaller, or more specific, topic, such as, "Which bridge designs can support the most weight?"

Decide which of the science fair projects listed below are "Thumbs Up" (good topics) and which ones are "Thumbs Down" (poor topics).

"The effect of fertilizer on plants"	
"How much of an apple is water?"	
"Which gets warmer – sand or dirt?"	
"Clouds"	
"Heat affects the bounce of a basketball."	
"What foods do meal worms prefer?"	
"Erupting volcanoes"	
"Ants"	

Write your own example of a good topic: _____

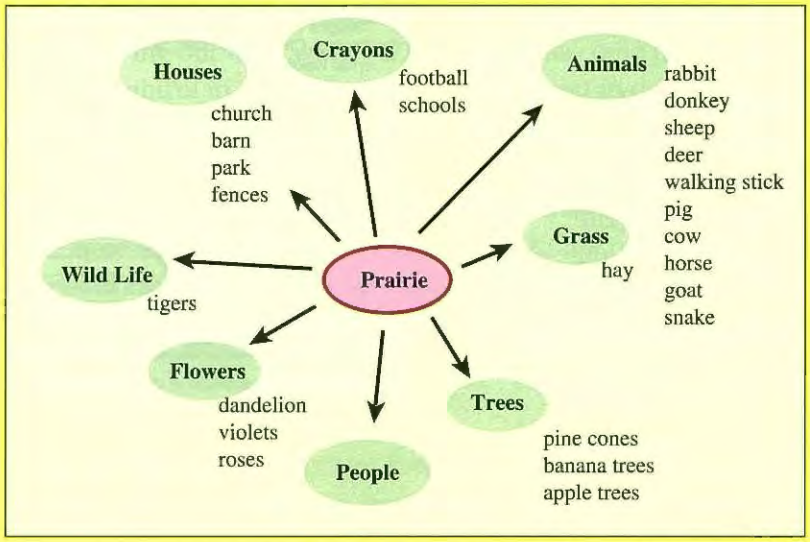
mapping the area to be investigated

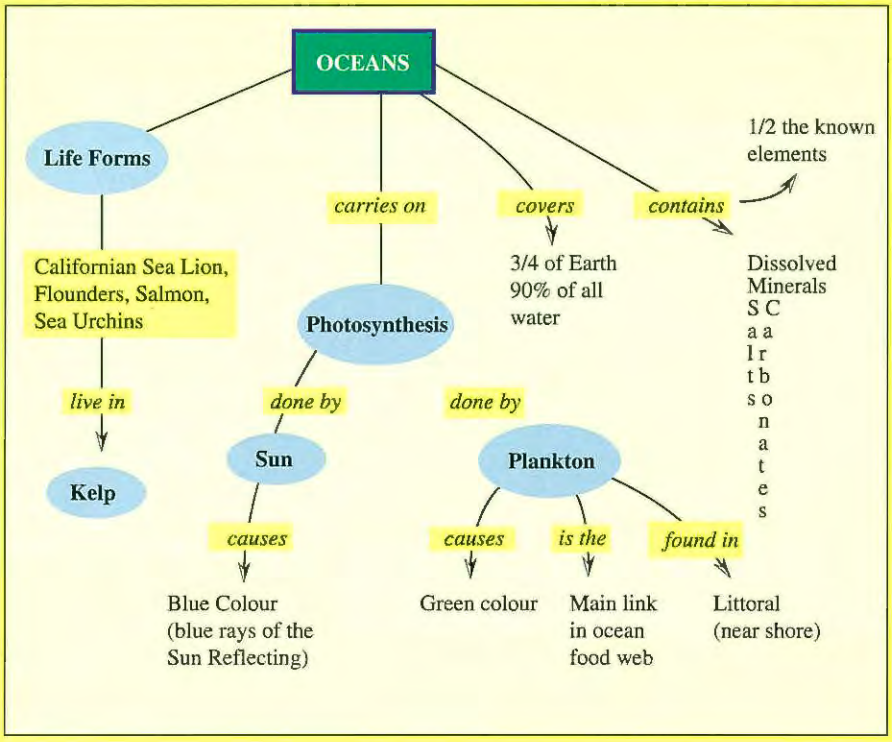
Some teachers use concept maps to help students see the relationships between ideas or areas to be investigated. These maps are visual representations of conceptual connections useful in project planning. They help students focus on areas to be explored. Concept maps can be constructed in layers with weekly additions made in different colours. Teachers use concept maps of this kind to assess students' planning processes by looking, for example, at the number of concepts listed, the use of linking words that indicate understanding of connections, the hierarchy of concepts and the style of the map.

Specifying the project process

Mapping the area to be investigated

As visual representations of conceptual connections, concept maps assist students to plan their projects.[4] The upper example is a First grade student's map of a prairie; the lower example is a Year 8 student's oceanography map.





detailing steps in the research process

Some teachers formalise the research process by providing students with individual project strategy sheets on which they outline their project proposal and working strategy. These sheets help students to focus on steps in the research process before they begin their project and can be used by teachers to assess students' project planning. The example below allows teachers to see the number of strategy drafts the student has completed, the resources and limitations as the student perceives them, and the extent of student initiative in the consultation process. Teachers of young students use less detailed strategy plans like the example on page 16.

Specifying the project process

Detailing steps in the research process

In this example of a project strategy sheet the teacher is able to see the number of strategy drafts the student has completed, the resources and limitations as the student perceives them, and the extent of student initiative in the consultation process[5].

INDIVIDUAL STUDY STRATEGY SHEET 1st, 2nd, 3rd draft

To be completed by ..... (date) after consultation with

..... (teacher's name).

NAME ..... Tutor group .....

OUTLINE PROPOSAL

General area of interest:

Possible title:

Aim of study:

WORKING STRATEGY

Working hypothesis/objectives/model:

Data collection and sources:

RESOURCES AND LIMITATIONS

Location of study:

Equipment and materials required:

Costs: possible expenses:
amount of time required:

Skills required:

Problems anticipated:

Deadlines:	Presentation requirements
Research completed by	A4 in a single file
1st draft completed by	Summary (50 words); table of contents
Final submission by	1500–2000 words (approx. 8–10 sides A4) excluding diagrams, maps, etc.

ASSESSMENT OF STRATEGY: Decisions reached after consultation:

	Teacher		Student		Comments, e.g.
	Go ahead	Re-draft	Go ahead	Re draft	Suggestions for improvement Suggestions for redrafting
Outline proposal					
Working strategy					
Consideration of resources and limitations					

Extent of student involvement (tick as appropriate)

Initiatives: mostly student's . . . . . mostly teacher's

Strategies: mostly student's . . . . . mostly teacher's

Specifying the project process

Detailing steps in the research process

Teachers of young students use simple strategy plans to assist students to plan their project work. Karen Locke, a Year 5 teacher at Glorietta Elementary School in California, has her students complete the following general strategy plan for their science fair projects.[6]

Student's Project for Science Fair Project

My Research Question is:

_____

My Hypothesis is:

_____

References I may Use:

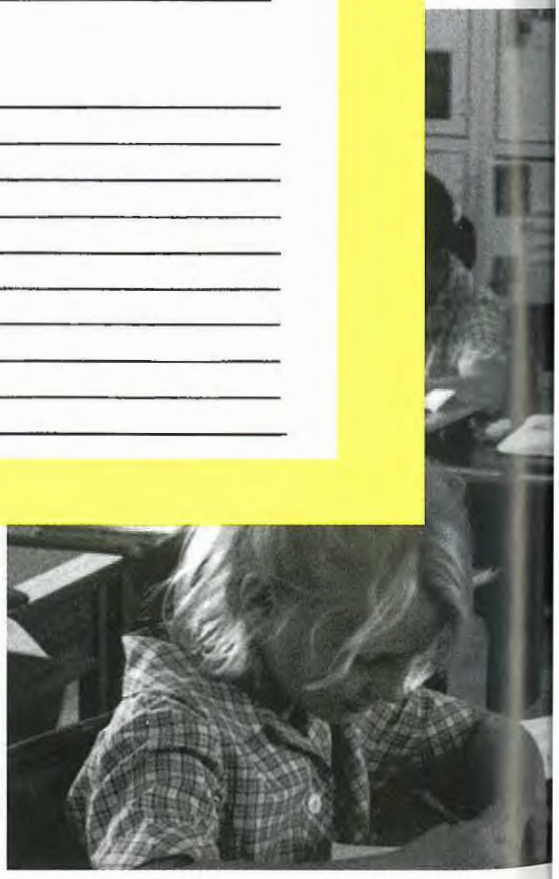
_____
_____
_____

Materials I will need:

_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

Procedure I will follow:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____



Specifying the project process

Detailing steps in the research process

Students completing the Year 10 Social Education Independent Research Report (IRR) in the Northern Territory, receive a handbook which includes this general overview of the research process.[7]

HOW TO RESEARCH AND WRITE UP AN IRR

Journal entries are written at every stage

FIRST STAGE

Focusing
Step 1 Select a topic
Step 2 Identify an issue of social significance
Step 3 Frame and focus a question

SECOND STAGE

Collecting evidence
Step 4 Work out your data collecting methods
Step 5 Collect your data

THIRD STAGE

Using the evidence
Make sense of the data by
Step 6 Sorting and displaying the evidence
Step 7 Interpreting the results

FOURTH STAGE

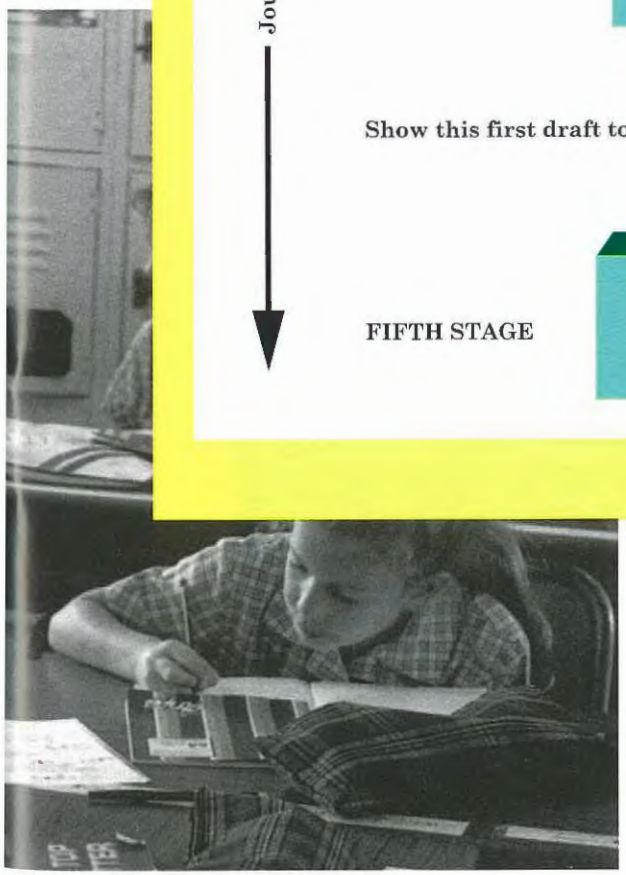
Writing a first draft
Step 8 Writing a discussion

Show this first draft to your teacher

First draft

FIFTH STAGE

Writing up the final draft
Step 9 Writing the IRR
Step 10 Presenting the IRR



monitoring project work

Teachers use a number of methods to assist students to monitor their progress on projects, and to encourage them to reflect on the strategies they use in project work. Some teachers provide a list of dates for the completion of stages of a project. Some provide progress sheets which, when completed by students, provide evidence of engagement with the task. Sometimes students are asked to track their work using a response journal or by completing a detailed checklist. Some checklists ask students to reflect on their use of resources over a period of time across projects. This strategy may assist students to see the cross-curricular skills they are applying. The evidence recorded on progress sheets, response journals and checklists can be useful in assessing students' general investigation skills.

Specifying the project process ***Monitoring project work***

Teachers at Bucklands Beach Intermediate School in New Zealand provide this forward planner to assist students to map their project work.[8]

Path Finder

Topic

Where will I find the sort of information I need?
Books, encyclopaedias, pamphlets, magazines, newspapers, vertical file journals, TV, film strips, video, computer software, slides, posters, charts, pictures, people, organisations, community sources.

Due Date

I am going to start by .....
.....

Next I am going to .....
.....

After this I will .....
.....

Then I will .....
.....

Finally .....
.....
.....
.....
.....

Teacher's Signature:

Yager provides the following example of an inventory which asks students to reflect on their use of media and other resources over a period of time and across projects.[9] It provides teachers with information about processes students use to collect information.

Directions: Carefully read each of the following statements and make a check mark in the column that best fits you.

	Never	Once in the past three months	More than once in the past three months	Number of times
1. Have you used a phone to gather information for a project?				
2. Have you obtained material from the AEA for projects?				
3. Have you obtained materials from other sources for projects?				
4. Have you used a computer for class work?				
5. Did you discuss science topics with adults?				
6. Did you use the media (TV, newspaper, radio) to help with a project?				
7. Did you take notes to help you remember?				
8. Do you take notes when doing research?				
9. Do you take notes voluntarily?				
10. Have you contacted resource people to gather information?				
11. Have you contacted a speaker to supplement your topic?				
12. Have you introduced a resource person for a presentation?				
13. Has interview been part of your information gathering?				

Specifying the project process

Monitoring project work

Students completing the Independent Research Report (IRR) for Year 10 Social Education in the Northern Territory receive a detailed handbook which includes this 'forward planner'.[10]

This forward planner has been included to assist you to work out what you should be doing and when! It is important to **read and use sections of this Handbook at each stage** and plan your time allocations at each stage. Good luck!

TASKS TO BE DONE	TO BE COMPLETED BY	Journal
• **Selecting an issue and working out my focus question** Check out sections 1 & 2 - is my issue a socially significant one?		J O U
• **Deciding on my data collection methods** Check out section 3		R N
• **Collecting my information** Check out section 4 & off I go!		A L
• **Sorting, displaying, and interpreting my results** Check out sections 5 & 6		E
• **Drafting my discussion** Check out section 7 & discuss with my teacher		N T
• **Writing my final draft** Check out section 8 & the Assessment Guide		R I
• **Handing in my IRR** Time to relax ...A job well done!		E S

Students completing the Independent Research Report (IRR) for Year 10 Social Education in the Northern Territory also keep a 'Response journal'. Each entry in the journal includes an account of what the student has been doing, reading, discussing and where and whom they have visited, and a response to these experiences including how the student thinks the work is progressing. The journal provides evidence of students' abilities to work independently through both the research and report writing stages.

judging and recording

Teachers can improve the quality and usefulness of information obtained from observations of students' project work by focusing their observations on important learning outcomes and by recording these observations systematically using checklists, holistic or analytic ratings of students' work.

As well as providing teachers with information on important learning outcomes, assessments of the process of project work also provides useful feedback to students about their skills in planning and carrying out investigations.

By involving students in the assessment process, teachers can assist individuals to develop their reflective and analytic skills. For this reason, teachers often use student self-assessments and peer-assessments, as well as their own assessments of students' general skills.

self-assessment

Some teachers provide students with self-assessment forms to encourage them to reflect on general skills used in project work. Three examples of self-assessment forms are shown on pages 22-23. The first example is an analytic rating scale that encourages students to reflect on five general skills: 'planning', 'information retrieval', 'processing', 'sharing' and 'evaluation'. The second example focuses students' reflections on contributions to the group process. The third is an extract from a scorecard which details all aspects of the project work, general skills and subject-specific information. The marking key for general skills only is shown here.

The quality and usefulness of the information obtained from observations of students' project work are improved by

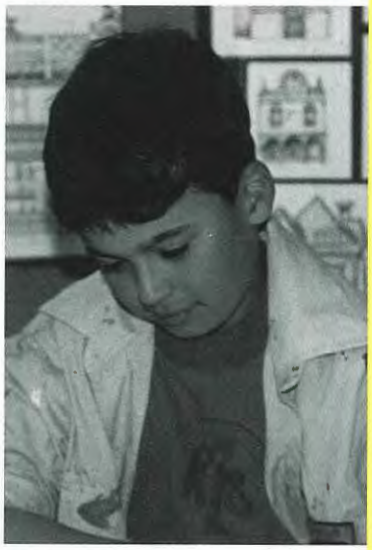
- focusing the observations on important learning outcomes, and
- recording the observations systematically.

It may be especially useful to involve a range of participants in the assessment of project processes, including:

- student,
- peer, and
- teacher.

Judging and recording — Self-assessment

Lorelle Holcroft and Robyn Coates provide this example of a student self-assessment form.[11] Using a 3-point scale, students rate their achievement of five general skills. This form was designed for mathematics projects but could be used for any learning areas.



STUDENT SELF EVALUATION

Tick the appropriate box	With Difficulty	Easily	Very Easily
Using my Planning Skills			
1. I understood the topic	☐	☐	☐
2. I made up research questions	☐	☐	☐
3. I suggested possible information sources	☐	☐	☐
4. I chose my questions	☐	☐	☐
5. I developed an Action Plan	☐	☐	☐
Using my Information Retrieval Skills			
1. I identified sources of information			
• in the school	☐	☐	☐
• outside the school	☐	☐	☐
Using my Process Skills			
1. I gathered and organised my information	☐	☐	☐
2. I found information I did not know before	☐	☐	☐
3. I answered the question(s)	☐	☐	☐
4. I edited my own work	☐	☐	☐
Using my Sharing Skills			
1. I presented my report	☐	☐	☐
Using my Evaluation Skills			
1. I carried out my Action Plan	☐	☐	☐
2. I learned the following skills which I can use for other activities.....			

Judging and recording — Self-assessment

When using the following self-assessment form, students rate their contribution to group work on a 3-point scale comparing their own contribution with that of other students in the group.[12]

		less than others	same as others	more than others
1	**How much did you contribute to your group's project?**			
2	**Did you offer ideas?**			
3	**Did you accept ideas from the group?**			
4	**On a scale of 1–10 (10=highest) rate yourself on how well you are working with others in your group.**			

Judging and recording

Self-assessment

White and Frederiksen have developed this rating scale for performance on a group science project.[13] Using a 5-point scale, students rate their performance on a number of skills used in project work. Two of the skills 'understanding' and 'doing science', are shown.

SCORECARD FOR JUDGING YOUR WORK

SCORER'S NAME: an anonymous seventh grade student

PROJECT TITLE: Mass and the Effects of an Impulse

For each category: (NA = Not Applicable)

Tick a score
Justify your score by referring to specific aspects of your work.

UNDERSTANDING

Understanding the Science

NA	1	2	3	4√	5
	not adequate			adequate	exceptional

Justify your score based on your work. I have a basically clear understanding of how mass affects the motion of a ball in general, but I don't have a completely clear sense of what would happen if friction, etc. was taken into account.

Understanding the Processes of Inquiry

NA	1	2	3	4√	5
	not adequate			adequate	exceptional

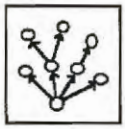
Justify your score based on your work. I used the inquiry cycle a lot in my write up, but not as much while I was carrying out my experiments.

Making connections

NA	1	2	3	4√	5
	not adequate			adequate	exceptional

Justify your score based on your work. I made some references to the real world, but I haven't fully made the connection to everyday life.

PERFORMANCE: DOING SCIENCE



Being Inventive

NA	1	2	3	4√	5
	not adequate			adequate	exceptional

Justify your score based on your work. What I did was original, but many other people were original and did the same (or similar) experiment as us.

group self-assessment

When students are working on a group project, teachers sometimes ask the group as a whole to evaluate its progress. This evaluation provides evidence of students' abilities to work in teams, an important part of much project work. Teachers might use this evidence to complement their own observations of group work. An example of a group self-assessment form is shown below.

teacher assessment

Teachers use a number of techniques to focus their observations on the processes of student work. These include

- log sheets;
- observation checklists;
- holistic and analytic marking guides for rating project performances;
- reviews of student journals; and
- anecdotal records.

Log sheets provide teachers with a regular review of students' progress. The log sheet on page 25 includes space for the teacher to comment directly on process outcomes in mathematics.

Observation checklists focus judgements on key learning outcomes. Teachers record observations as they are made in the classroom. The project checklist on page 25 targets important process outcomes in science.

Holistic and analytic marking guides focus judgements on either the project process as a whole, or on a number of aspects of the process. In the example on page 26, outcomes from the 'investigation, communication and participation' strand of the Australian studies of society and environment profile have been used to develop a marking guide for project work. Two of several possible criteria are shown.

Several other techniques for observing and recording observations of students as they work, rather than in planned assessment 'events', are discussed in the perfor-

Judging and recording ***Self-assessment***

Students who use this self-assessment form for group work in science rate two aspects of their group performance on a 3-point scale.[14] They then reflect on their overall performance.

Group assessment **Group name:**

1. How well did your group work together? ..... well good very good
2. How would you rate your group's project? ..... poor poorly very well
3. What do you think was the best part of your group's project? .....
4. How do you think your group could have improved? .....
5. Rate your group on a scale of 1-10 (10=highest) .....

Judging and recording — Teacher assessment

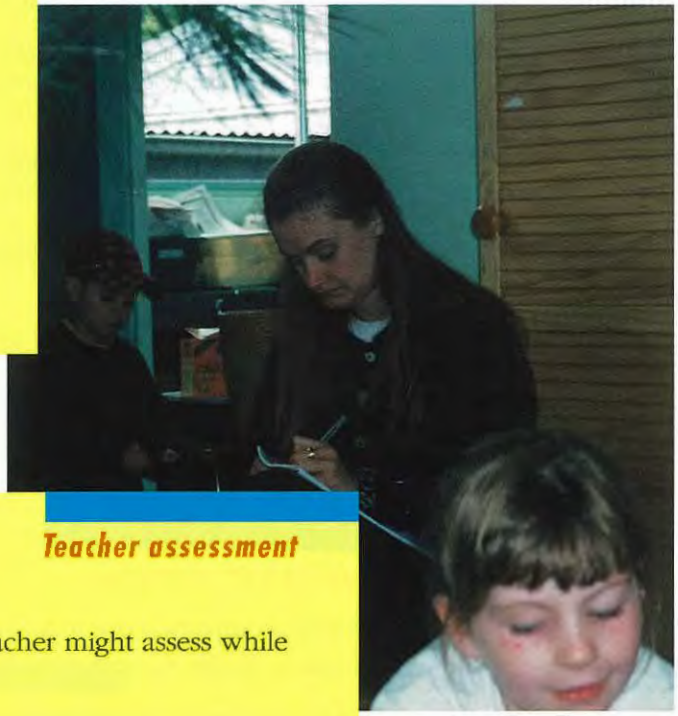
Jean Stenmark provides the following example of a log sheet in which there is space for teachers to comment directly on students' progress on a mathematics project.[15]

LOG SHEET

Group members Ellie, Henry, Lia, Rosa

Investigation title Consecutive number sums

Date	Work done	Questions	Teacher notes
9/19	made a plan to find all numbers to 100, begin by dividing up numerals.	How far do we have to go. Do we need to make a written report?	Your decision. You'll need something to show what you make your oral report to the class.
9/20	Decided it was better to work with numbers then sums (1+2+3...)		



Judging and recording — Teacher assessment

Yager and his colleagues list the following behaviours a teacher might assess while students are engaged in a science project.[16]

	Assessed behaviours	Number of times observed	Highlights
1.	Students are actively discussing issue.		
2.	Students are employing prior concepts to solve problem.		
3.	Students are exhibiting a positive attitude.		
4.	Students are demonstrating an understanding of scientific problem-solving.		
5.	Students are employing inter-disciplinary strategies to solve problem.		
6.	Students use multi-disciplinary skills to present group solution.		
7.	(additional observations)		

Judging and recording — Teacher assessment

Outcomes from the 'investigation, communication and participation' strand of the Australian Studies of Society and Environment profile have been used to develop this analytic rating scale for assessing project work. Two of several possible criteria for assessment are shown. Teachers using this guide give students a rating of 2, 3, 4 or 5 on both 'Investigation' and 'Participation'. These ratings correspond to levels 2-5 of the profile.

	Investigation	Participation
Level 5	Recognises significant issues in an area of investigation and selects suitable ways of investigating them.	Identifies causes of conflict and ineffective group work and negotiates solutions.
Level 4	Identifies the types of data and sources required by a task and decides how they will be used to gain information.	Designs suitable strategies for tasks and to assist decision making for particular purposes.
Level 3	Frames questions and identifies sources of information.	Chooses a suitable technique to achieve a group purpose.
Level 2	Selects, compares and categorises relevant information.	Explores a variety of group strategies.

Judging and recording — Teacher assessment

Students completing the Independent Research Report (IRR) for Year 10 Social Education in the Northern Territory keep a 'Response journal'.[17]

The journal provides evidence of students' abilities to work independently through both the research and report writing stages. Teachers use an analytic rating scale to evaluate the journal on six criteria, awarding a possible 15 marks from the total 100 marks for the IRR.

STAGE 5 **RESPONSE JOURNAL** meets length reqs?
a min of 1 entry/wee 9or, 2/ stage)

- **To what extent do entries:**
  - appear in a time sequence
  - recount activities undertaken at each stage in the research and writing up process
  - provide evidence of consultation with teacher during each stage in the research and writing up process
  - evaluate progress towards an identified goal at each stage
  - explain why the author chose the topic focus question
  - evaluate overall success at answering focus question once the process is completed.

mance article 'informal classroom observations' (see *ARK Performances* pages 9-18).

Student journals or diaries can provide teachers with insight into students' research skills. The marking scheme in the example below uses a 3-level scale to assess students' research strategies and reflections.

estimating and reporting achievement

Observing the process of project work can provide teachers with information about students' general skills. This information, or evidence, can be useful in estimating students' levels of achievement and in monitoring their progress.

In order to estimate and report this achievement teachers need to consider making on-balance judgements from recorded observations of students' work.

Because the processes used in project work are central to a number of learning areas, teachers sometimes consider:

- combining project evidence with other evidence, and
- monitoring skill development in project work across learning areas.

making on-balance judgements

The process of estimating a student's level of achievement in an area of learning is relatively straightforward when observations and judgements of project work address outcomes and levels on a progress map directly. In the example on page 26, rating scales have been developed for judging and recording two aspects of students' project work: 'Investigation' and 'Participation'. The rating points have been constructed to correspond to Levels 2-5 of the 'investigation, communication and participation' strand of the Studies of Society and Environment profile. If a student received ratings of 2 for both Investigation and Participation, then the best estimate of their level of achievement would be Level 2. If a student received a rating of 5 for Investigation and 3 for Participation then the best on-balance estimate of their level of achievement might be Level 4. By rating students' project work on these and other similarly constructed criteria, on-balance estimates can be made of students' overall levels of achievement.

Judging and Recording ***Teacher assessment***

Teachers assessing the New South Wales Higher School Certificate 'Independent Research Project' for Life Management Studies are encouraged to assess students' diaries as part of their assessment of the research project.[18] (Marks are allocated for the project plan, diary, and final report.) Students are provided with the criteria for assessment before undertaking their projects.

Project diary Total marks possible 5

Level 3 Well-documented process showing critical and evaluative comments about events and decisions made.	5 points
Level 2 Limited evidence of management strategies and reflection undertaken during project.	3 points
Level 1 Incomplete record of progress, comments mostly descriptive.	1 point

Lorelle Holcroft and Robyn Coates have developed this form for recording student achievement on five assessment tasks, all of which require the use of general or 'process' skills.[19] Teachers make an on-balance judgement of a student's level of achievement using evidence provided from achievement on these five tasks, one of which is a project. The levels of achievement (2, 3, 4) are the levels of the mathematics profile for Australian schools.

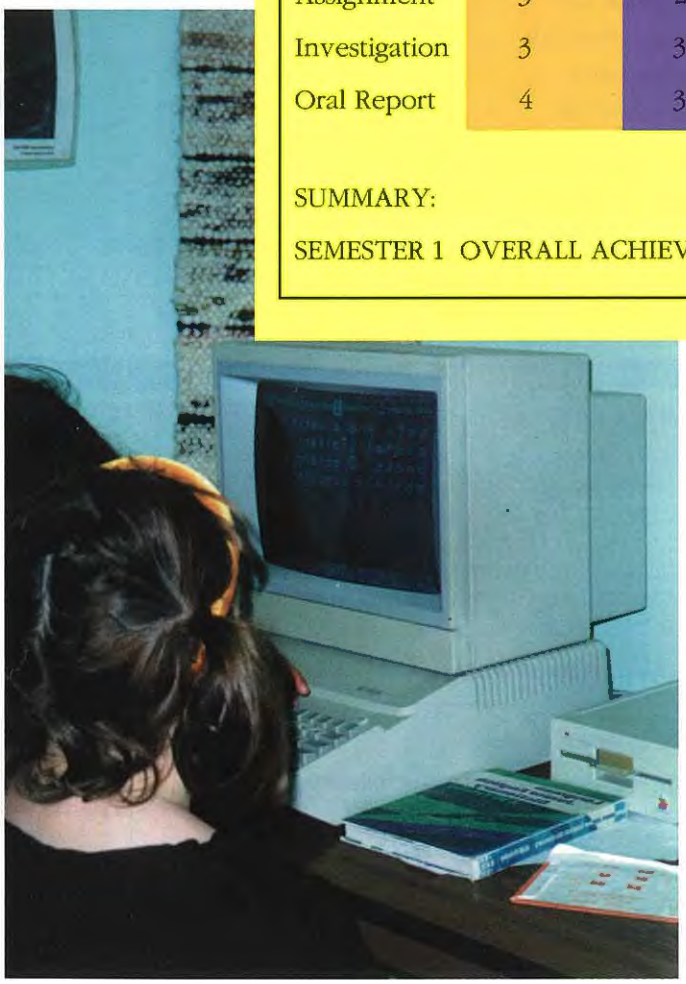
Student Name: **Nam Phuong** Year level: 5 Date: March '98

Semester 1:

Assessment Tosks	Criterion 1 Commun-ication	Criterion 2 Application & problem solving	Criterion 3 Learned procedures	Criterion 4 Cooperation and effort	Level of Achieve-ment	Comments
Written test	3	2	2	2	2	
Practical test	3	3	3	2	3	
Assignment	3	2	3	3	3	
Investigation	3	3	4	3	3	
Oral Report	4	3	3	3	3	

SUMMARY:

SEMESTER 1 OVERALL ACHIEVEMENT: **Level 3**



combining project evidence with other evidence

Many process skills required for project work also are required in other areas of school work. Teachers can collect evidence about students' communication skills, for example, through tests, assignments and oral work in the classroom as well as through observations of group project work and written and verbal project presentations.

Lorelle Holcroft and Robyn Coates have developed a form (opposite) for recording ratings of students' performances on five assessment tasks – written test, practical test, assignment, investigation, and oral report – on four separate criteria. In this way, they suggest that ratings of project work might be combined with ratings of other pieces of student work to arrive at an overall 'level of achievement' in mathematics.

monitoring skill development across learning areas

Process skills are sometimes seen as general skills which can be developed and demonstrated across different areas of school learning. When this approach is taken, particular skills such as 'collecting, analysing and organising information' become the focus, and progress maps are constructed to describe and monitor the development of these cross-curricular skills.

In this context, a project in a particular learning area might be treated as a source of evidence about students' abilities to 'collect, analyse and organise information', along with evidence from other projects in other learning areas. The task would then be one of making an on-balance estimate of a student's level of attainment in 'collecting, analysing and organising information' from all the available evidence.

1 Frederiksen, J. (1994) 'Assessment as an agent of educational reform' in *Educator* The Graduate School of Education, University of California at Berkeley, Vol. 8, No. 2, Fall 1994, p. 7.

2 Curriculum Corporation (1994) *Mathematics – a curriculum profile for Australian schools* Carlton: Curriculum Corporation.

3 Science fair projects (1990) Instructional Fair, Inc. provided by Karen Locke, Year 5 teacher, Glorietta Elementary school Orinda school district, California.

4 Yager, R., Kellerman, L., Chin Tang Liu, Blunck, S. & Veronesi, P. eds, (1993) *The Iowa Assessment Handbook*, Iowa: Science Education Centre University of Iowa, p. 27.

5 Lloyd-Jones, R., Bray, E., Johnson, G. & Currie, R. (1986) *Assessment From Principles to Action* London: Macmillan Education Ltd, p. 77.

6 Karen Locke Year 5 teacher Glorietta Elementary School, Orinda School District, California.

7 The Northern Territory Board of Studies (1995) Student Version Social Education Year 10 *Consensus Moderation Handbook*, p. 4.

8 LLoyd-Jones, R., Bray, E., Johnson, G. & Currie, R. (1986) *Assessment From Principles to Action* London: Macmillan Education Ltd, p. 80.

9 Yager, R., Kellerman, L., Chin Tang Liu, Blunck, S. & Veronesi, P. eds, (1993) *The Iowa Assessment Handbook*, Iowa: Science Education Centre University of Iowa, p. 22.

10 The Northern Territory Board of Studies (1995) Student Version Social Education Year 10 *Consensus Moderation Handbook*, p. 22.

11 Holcroft, L. & Coates, R. *Monitoring learning in mathematics* Brisbane: Mount Coot-tha School Support Centre, p. 57.

12 Yager, R., Kellerman, L., Chin Tang Liu, Blunck, S. & Veronesi, P. eds, (1993) *The Iowa Assessment Handbook*, Iowa: Science Education Centre University of Iowa, p. 21.

13 White, B. & Frederiksen, J. (1994) 'Using assessment to foster a classroom research community' in *Educator* The Graduate School of Education, University of California at Berkeley, Vol 8, No2, Fall 1994, pp. 25-26.

14 Yager, R., Kellerman, L., Chin Tang Liu, Blunck, S. & Veronesi, P. eds, (1993) *The Iowa Assessment Handbook*, Iowa: Science Education Centre University of Iowa, p. 20.

15 Reprinted with permission from Stenmark, J. (1991) eds *Mathematics Assessment Myths, Models, Good Questions, and Practical Suggestions* Virginia: National Council of Teachers of Mathematics, p. 18.

16 Yager, R., Kellerman, L., Chin Tang Liu, Blunck, S. & Veronesi, P. eds, (1993) *The Iowa Assessment Handbook*, Iowa: Science Education Centre University of Iowa, p. 6.

17 The Northern Territory Board of Studies (1995) Student Version Social Education Year 10 *Consensus Moderation Handbook*, p. 24.

18 Board of Studies NSW (1994) *Life Management Years 11-12 HSC Support Document* p. 72.

19 Holcroft, L. & Coates, R. *Monitoring learning in mathematics* Brisbane: Mount Coot-tha School Support Centre, p. 75.

a focus on end product

Teachers can use project work to assess a range of outcomes, some of which are best assessed while students are engaged in the process of project work (see pages 2 and 12) and some of which are best assessed by looking at the *end products* of project work.

This article looks at ways of assessing the end products of project work, that is, the completed project report, including the assessment of skills such as

- collecting subject-specific information;
- interpreting data; and
- presenting results.

planning assessments

If projects are to provide information for monitoring students' knowledge, skills and understandings in a learning area, then the demands of the project must match the learning area outcomes.

Some examples of outcomes which are best assessed by looking at the end products of project work are shown below. Evidence relating to the first two outcomes might be collected by examining the structure and presentation of project reports. Evidence relating to the third might be seen in the subject-specific content of students' reports. Other examples of 'end product' outcomes are shown on page 3.

Some learning outcomes are best assessed by looking at the end products of project work. Outcomes include

- collecting subject-specific information;
- interpreting data; and .
- presenting results.

Planning assessments

Focusing on end product

Curriculum documents describe many learning outcomes which can be assessed by examining the end products of project work. Here are some examples from the curriculum profiles for Australian schools:

'Recognises significant issues in an area of investigation and selects suitable ways of investigating them.' (Studies of Society and Environment: Investigation, Communication and Participation strand 'investigation')[1]

'Reads and describes information in histograms, plots and summary statistics and reports on data collection processes and results.' (Mathematics: Chance and data strand 'interpreting data')[2]

'Researches visual arts works from a variety of past and present social and cultural perspectives and shows an awareness of how histories are constructed in the visual arts.' (The Arts: Visual Arts strand 'past and present contexts')[3]

manageability

The usefulness of projects as a source of evidence about 'end product' outcomes (as with process outcomes), depends on project specification. If a project is specified too loosely and students have too much autonomy, then they may have difficulty defining an appropriate topic and obtaining sufficient information (if their topic is too narrow), or completing the project within the given time (if the topic is too broad). If students set themselves tasks which are too demanding they may turn to others for assistance, making it difficult to establish which parts of the report are the work of the student.

Planning project assessments ***Focusing on the project end product***

Interpreting Information

Robin Lloyd-Jones and colleagues list a number of skills that might be assessed through end products of project work.[4]

general interpretation skills -

selecting information relevant to the inquiry or study;
identifying the main point/s made in a source of information;
classifying information;
identifying inconsistencies and differences between two sources of information;
distinguishing fact from fiction; and
distinguishing fact from opinion.

diagrams and skills used to interpret them -

recognising relationships through simple relationship diagrams, (e.g. input-output diagram, flow chart);
recognising diagrams and miniatures and models of reality;
differentiating between rough diagram and properly drawn diagram;
differentiating between plan, elevation and cross-section; and
recognising and using scaling.

Presenting a Report

Jane Henry lists three report presentation skills[5]:

1 overall planning, (logical development, readability);

2 quality of language and diagrams, (freedom from errors); and

3 clarity of introductory review and conclusions.

specifying project end products

Teachers use a number of strategies to assist students to specify project parameters. Some of these strategies, including selecting a topic, detailing the research process, and monitoring project work are discussed on pages 13-20. Other systematic procedures which can be used to enhance the value of projects as sources of evidence about end product outcomes include:

- constraining data collection;
- guiding project presentation;
- communicating assessment criteria to students; and
- requesting acknowledgement of assistance.

constraining data collection

Some teachers tightly specify the scope and method of data collection for student projects. This assists students to focus their work and allows teachers to address particular skills or learning outcomes. A teacher of young students, for example, might provide a series of focus questions to be investigated in a project. A mathematics teacher might stipulate that students investigate a problem using particular methods.

Some teachers develop strategy sheets to focus students' thinking on data collection methods. The strategy sheet on page 34 is used as the basis for student-teacher consultation during the early stages of project planning.

The value of projects as sources of evidence about 'end product' outcomes will be enhanced by specifying the project end product.

Specifying project end products

Constraining data collection

Maria Mastromatteo describes an interdisciplinary project 'disaster week' for Grade 8 students.[6] Students are assessed on their ability to take existing information, use statistical techniques to gain meaning from information, and draw valid conclusions.

Students are guided in their investigations by a series of focus questions, such as:

- Which continent is the safest on which to live if you wish to escape an earthquake?
- Does the month of the year have any significance as to when earthquakes happen?
- Is there a correlation between how many people die in an earthquake and how high it registers on the Richter scale?

Specifying project end products

Constraining data collection

Robin Lloyd-Jones and colleagues use the following individual study strategy sheet to focus students' thinking on data collection.[7] Notice the space allowed for both the teacher's and student's comments after consultation.

INDIVIDUAL STUDY STRATEGY SHEET 1st, 2nd, 3rd draft

To be completed by ..... (date) after consultation with ..... (teacher's name).

NAME ..... Tutor group .....

OUTLINE PROPOSAL

General area of interest:

Possible title:

Aim of study:

WORKING STRATEGY

Working hypothesis/objectives/model:

Data collection and sources:

RESOURCES AND LIMITATIONS

Location of study:

Equipment and materials required:

Costs: possible expenses:
amount of time required:

Skills required:

Problems anticipated:

Deadlines:	Presentation requirements
Research completed by	A4 in a single file
1st draft completed by	Summary (50 words); table of contents
Final submission by	1500–2000 words (approx. 8–10 sides A4) excluding diagrams, maps, etc.

ASSESSMENT OF STRATEGY: Decisions reached after consultation:

	Teacher		Student		Comments, e.g.
	Go ahead	Re-draft	Go ahead	Re draft	Suggestions for improvement Suggestions for redrafting
Outline proposal					
Working strategy					
Consideration of resources and limitations					

Extent of student involvement (tick as appropriate)

Initiatives: mostly student's .. .. mostly teacher's

Strategies: mostly student's .. .. mostly teacher's

guiding project presentation

Students also can be provided with guidelines for project presentation. These guidelines sometimes take the form of diagrams illustrating report components, or written specifications detailing elements to be included (see opposite).

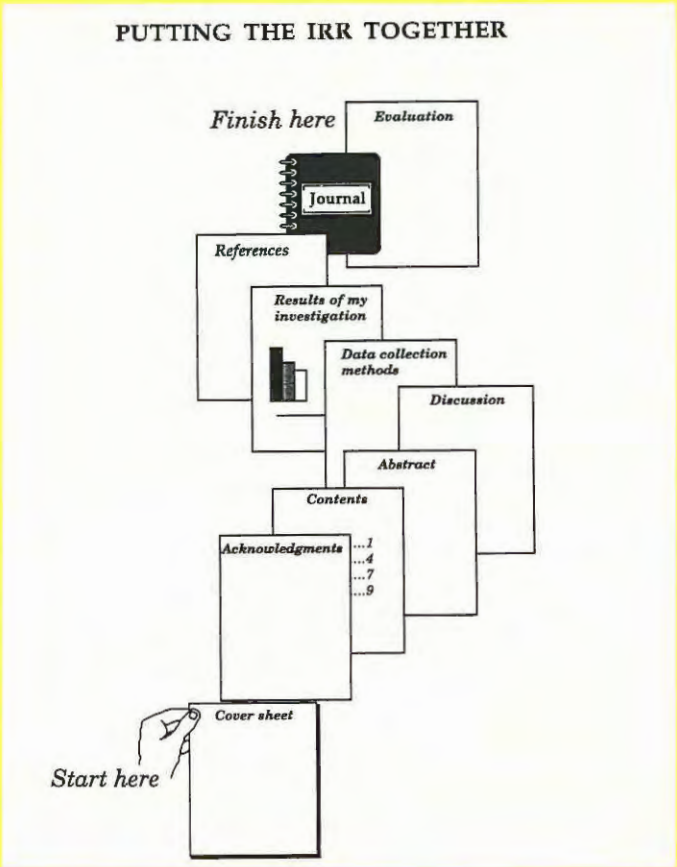
A teacher might stipulate that the results of a mathematics investigation be expressed pictorially using particular graphical displays, for example. Report specifications for more advanced students might require students to follow certain presentation conventions (see page 37).

Sometimes, if an extensive report is required, students can be guided through a process of staged review: students submit an outline of the project, a plan of the report, and a draft report, before submitting the final project for assessment. Staged reviews enable teachers to redirect work if necessary. A project which is becoming more descriptive than analytic, for example, may require a change in emphasis.

Specifying project end products

Guiding project presentations

Students completing the Independent Research Report (IRR) for Year 10 Social Education in the Northern Territory receive a detailed handbook. The following diagram illustrates the required components of the final report.[8] Students are given further assistance to complete each section. The information for 'Data collection methods' is shown below.



Data collection methods approx 500 words/2 pages

Readers need to know if your methods were 'scientific' or at least sensible! They will want to know how you collected enough information to make recommendations and why you made the ones you did. Where did your ideas come from?

First, list all primary sources. This means name the people you interviewed; state their job, title and employer. Next, describe your secondary sources. For example, what kinds of reading and/or viewing did you do about the issue?

Next recount the ways you collected data. Tell the reader the steps you took in administering any questionnaires and/or surveys, how many people were sampled, how many responses were returned; describe how you located secondary source material.

In this section you should also explain why you chose particular data collection methods and rejected others.

Systematic procedures which can be used to enhance the value of projects as sources of evidence about end product outcomes include

- constraining data collection; and
- guiding project presentations.

Specifying project end products

Guiding project presentations

Robin Lloyd-Jones and colleagues use the following illustration of a guide to project report writing which divides students' reports into six sections.[9]

WRITING THE REPORT

The **FINAL REPORT** is written on A4 paper and should be about 1000 words in length, not including reference materials like maps and diagrams. Write only on one side of the paper. Because you have a considerable amount of time to prepare your Special Study the standard of written English should be high – check spellings, but above all try to organise your work into paragraphs.

It is vital that the final report is written in your own words because you should understand everything you have written. Your teacher will ask you a few questions about your Report to make sure that you know and understand all about its contents.

Here's a guide as to how to lay out your Report. Divide your Report into 6 sections:

1 **INTRODUCTION** – This will say why you chose your topic, outlining any bias you may have. You should say what you hoped to find out and say what you thought, at the start of the Special Study, were the possible reasons and answers to the problem you were going to study.

2 You should now go on to say how you went about **GETTING THE EVIDENCE,** name all your main sources and any difficulties encountered.

3 **MAIN SECTION** – Say what your main findings were. Cross-references (where appropriate) to the appendix should now be made. This part of the Report will probably need 3 or 4 subsections of its own.

4 **CONCLUSION** – You have now shown the extent of the problem and it's in this final section that you state what the reasons are for the problem you studied and what you think the answers are. Don't skimp on this part of the Report, but remember you must present most of your evidence in part 3.

Sections 3 and 4 should attempt to answer the following 3 questions:

What is the nature of the problem being studied?

Why does the problem happen?

How can the problem be dealt with?

5 **A BRIEF LIST OF YOUR SOURCES** of information with **COMMENTS** on each source.

6 **APPENDIX** – This final part of the Report will include examples of survey sheets, letters, diagrams, etc.

Specifying project end products

Guiding project presentations

Report specifications sometimes address particular learning area outcomes. The engineering design project at the University of Melbourne is intended to encourage professional attitudes and an emphasis on the details of construction and ease of manufacture.[10] The project, which offers a financial reward, specifically looks for students with high engineering potential. Assessment is based on the originality of the project concept and presentation:

Project concept

Originality is desirable, but it should be coupled with an awareness of what is good engineering practice....

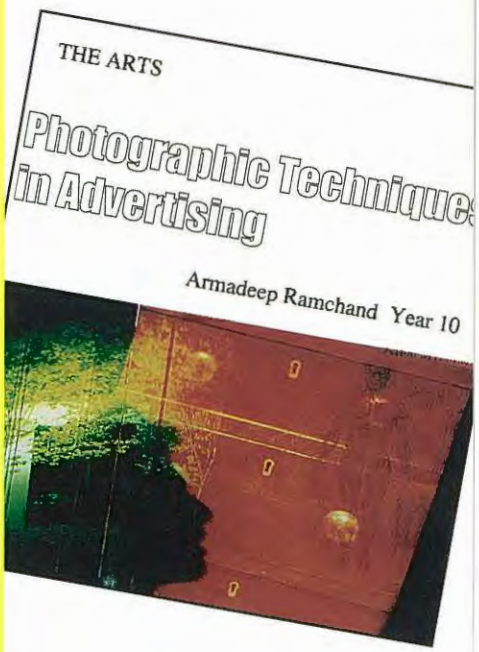
Presentation

Projects come to fruition by proper communication to many people, so it will be essential that the presentation includes:

A. a short but complete statement of the engineering essentials of the problem and its proposed solution, in concept and reasonable detail;

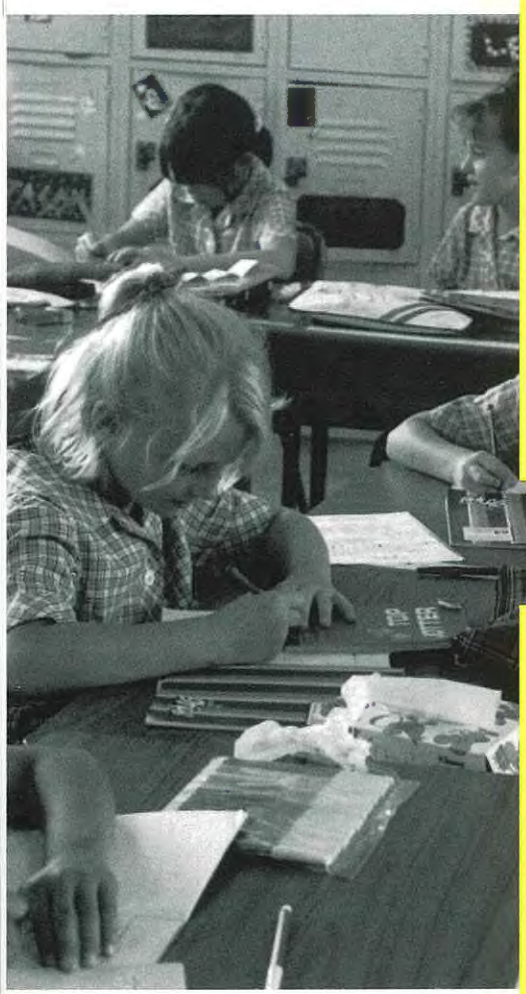
B. calculations and descriptive notes showing that all significant factors have been considered and that the proposed solution is feasible. Some attention should be given to economic, human and environmental, as well as technical matters.

C. The final drawing must be shown on engineering drawings of acceptable standard. Sketches will not be considered adequate, although supplementary freehand three-dimensional views are to be encouraged.



communicating assessment criteria

Communicating assessment criteria to students helps them to focus appropriately and so enhances the value of projects as sources of evidence about a student's ability to identify and collect relevant information, to analyse and interpret data, and to present results effectively. Sometimes assessment criteria are listed and the percentage of marks allocated to each criterion is shown to convey to students the relative importance of different components of project work. In the example on page 38, an engineering project is assessed against nine criteria. 80% of the marks are allocated to 'end product' outcomes: 50% to report content and 30% to report presentation.



Specifying project end products | **Communicating assessment criteria**

Jane Henry uses this example of an engineering project assessment form which clearly communicates the features of the project to be assessed and the weight attached to each feature in the assessment.[11]

Assessment of project work		*%*
1	Appreciation and approach to project, competence in planning	10
2	Originality, innovation, development of ideas	15
3	Practical skill in experimental or theoretical work	15
4	Extent of achieving objectives, success in overcoming difficulties	10
Report presentation		
1	Overall planning, logical development, readability	10
2	Quality of language, diagrams, freedom from errors	10
3	Clarity of introductory review and conclusions	10
Assessment of initiative		
1	Diligence, initiative, application, and supervision required	10
2	Amount of extra reading, library research	10
Total		100

Specifying project end products | **Communicating assessment criteria**

Students completing a compulsory Independent Research Report (IRR) for Year 10 Social Education in the Northern Territory receive a detailed handbook which includes lengthy explanations of assessment criteria.[12] Fifteen of a total 100 marks are allocated for presentation of results:

To what extent is the display of information:

- organised in a logical way?
  (e.g. sub-headings, paragraphs, captions, labelled axes, etc.)
- sufficient to answer the focus question?
  (e.g. tables, graphs &/or diagrams, transcripts or interviews)
- relevant to the focus question?
- analysed to highlight findings significant in terms of answering the focus question?

acknowledgement of assistance

Projects frequently involve input from a range of people, including family, teachers and members of the community. If valid assessments are to be made of a student's achievement in an area of learning, then there must be evidence that the project report is the work of the student presenting it. Teachers need to consider how much support the student had in completing the project. Was it the result of a group process? Was there a significant degree of guidance? Sometimes teachers ask students to declare the level of assistance they receive and to acknowledge the contributions of others. An example of an acknowledgment form is shown below. Authentication is especially important in high-stakes project assessment (see pages 47-54).

Because projects frequently involve input from a number of people, acknowledgement of assistance in project work is especially important.

Specifying project end products

Acknowledgement of assistance

Students completing the Year 10 Social Education Independent Research Report in the Northern Territory make the following declaration[13]:

- **Author's declaration**

I declare that the final presentation of this IRR, the earlier drafts and research upon which it is based, are my own work and that any substantial assistance I have received from anyone is indicated in my acknowledgments

- **Signature of student** _____
- **Date** _____

Class teacher's comments

_____

_____

_____

_____

_____

_____

_____

Class Teacher's signature

judging and recording

Teachers can improve the quality of information obtained from project reports by focusing their judgements on criteria which address important learning outcomes, and by recording judgements systematically. Clear assessment criteria are the basis for clear project marking guides.

Teachers judge and record the quality of project reports in three ways:

- rating the project as a whole (holistic rating);
- rating a small number of aspects of project work (analytic rating); and
- recording the presence of a larger number of project features (analytic checklisting).

Some teachers also encourage students to judge and record observations of their own project reports (self-assessment) or those of other students (peer assessment).

holistic rating

Projects can be rated holistically, that is against a single set of rating categories, to allow for an overall assessment of the quality of the project report.

Students are sometimes provided with self-assessment forms to encourage reflection on their project performance. Some teachers

Teachers judge and record the quality of project reports in three ways:

- rating the project as a whole (holistic rating);
- rating a small number of aspects of project work (analytic rating); and
- recording the presence of a larger number of project features (analytic checklisting).

Judging and recording evidence

Holistic rating (Self-assessment)

Some teachers recommend that students' project self-assessments should be assessed.[14] Using this holistic rating scale, teachers rate students' assessments of their technology projects on a scale of 0-5.

Evaluation of the project by candidates
5 A very careful evaluation including detailed self-criticism of the work where necessary. Criticisms of the original brief where necessary and suggestions for future work. Full and detailed testing of the final project done, well written up and presented.
4 A good evaluation including self-criticism where necessary. Detailed reasons given for the success of the project or details given of modifications or alternatives which would ensure a successful conclusion. Good testing done, written up and presented.
3 A good evaluation including self-criticism where necessary. Possibly suggestions about alternatives which, if followed, could have been more profitable.
2 An evaluation with no self-criticism and possible lack of comment about alternatives, which if followed, could have been more profitable.
1 Poor evaluation with little thought or intelligent comment, or containing unjustified self-congratulation. Little or no testing done.
0 No evaluation. No testing done of construction work.

recommend that these self-assessments be assessed. The holistic rating scale on page 40 is used by teachers to assess students' self-assessments of their technology projects.

analytic rating

When project reports are rated analytically, teachers consider a number of aspects of the report, and make judgements against specified criteria.

These assessment criteria can be spelt out in more or less detail. The six criteria for assessing the mathematics project on page 42, (communication, visual representation, statistical calculations, decision making, interpretation of results and drawing conclusions) are explained in single sentences. 'Communication', for example, is explained as the 'appropriate use of statistical language and symbols'.

The criteria for assessing the social education project below are explained in greater detail. The five criteria (abstract, discussion, data collection methods, results and response journal) are accompanied by a series of questions and suggested evidence of achievement in an attempt to increase the reliability of teachers' judgements of students' work.

Judging and recording report evidence

Analytic rating (Teacher assessment)

Criteria for assessing the Northern Territory Year 10 Social Education Independent Research Report are explained with a series of questions and suggested evidence of achievement.[15] This assists teachers to make judgements of students' work. The 'discussion' criterion is one of five assessment criteria.

Criterion: discussion

*** To what extent do introductory paragraphs provide:**

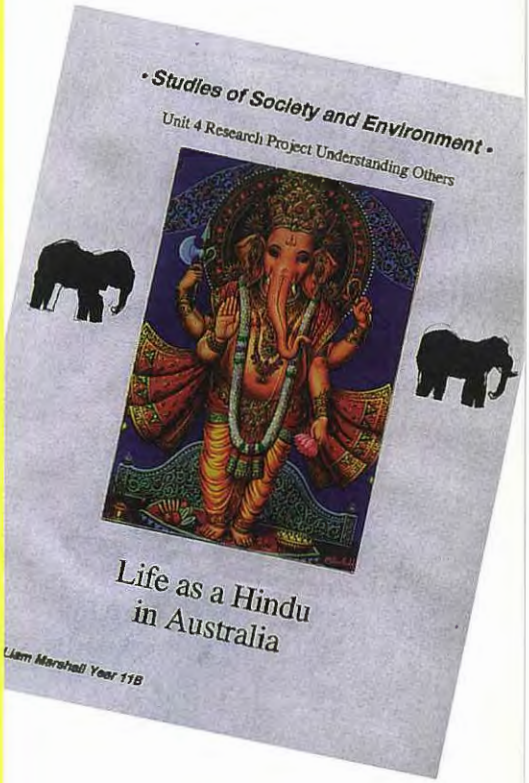
- a statement of the issue,
- background information appropriate to the topic focus e.g. brief history and/or special terms explained,
- a statement about the social significance of the issue(s) raised by the focus question

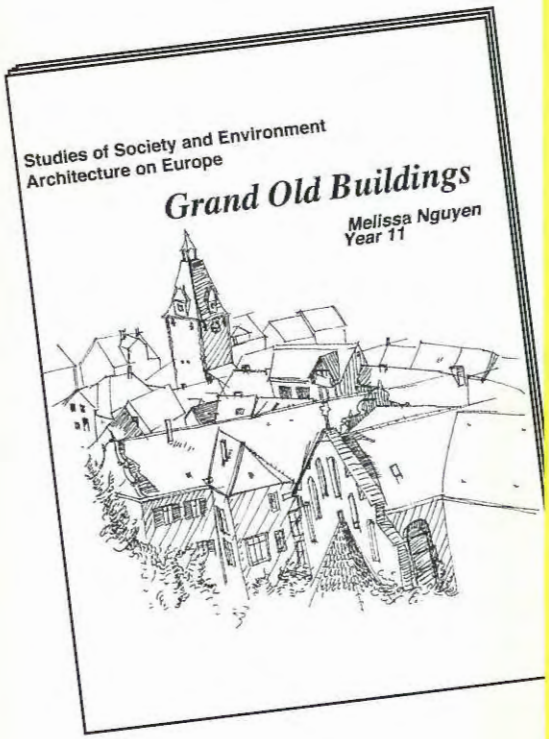
*** To what extent do paragraphs in the body of the discussion:**

- present points for and against in a logical sequence,
- elaborate each point,
- draw upon information from primary and secondary sources to support points made,
- provide sufficient information to enable a conclusion to be drawn?

*** To what extent do concluding paragraphs:**

- summarise point logically,
- present recommendations based on research,
- predict how society may be affected by the adoption of these recommendations?





Judging and recording

Analytic rating (Teacher assessment)

In Joan Garfield's marking guide for mathematics projects, a score of 0-3 points is assigned for each of six criteria: 3 points indicates correct use, 2 points partially correct use, 1 point incorrect use, and 0 means there was not enough information to evaluate, or this part of the project was missing or incomplete.[16] The extract below is the guide for the 'communication' criterion. Explanations of the criterion and scores, along with samples of students' work are given.

Criterion: Communication – the appropriate use of statistical language and symbols

Score	Interpretation

3 Correct use of language and symbols
Example: *"The histogram is skewed to the right or to the higher values. The histogram and the box plot give me the same type of information. There are no outliers and the majority of the values are at 20 or below. The box plot does give me more information, showing that 50% of the values are below 10 and 25% are between 10 and 20."*

2 Partly appropriate use of language or symbols
Example: *"The average and the trimmed average are quite comparable. I feel the average works best for me. The median is slightly higher, it is the centre of all my times but on most nights I got less than 7 hours of sleep; not more... The centre of the data can be different depending on how you find it."* There is some confusion in describing the measures of centre and using them in interpretive statements.

1 Inappropriate use: student misuses words or symbols or uses statistical words in a context that does not make sense.
Example: *"This data that I collected tells me that the central value measurements were the best way to formulate these data. Most of the information given was very close to the average and was a better way to represent this material."* It is hard to figure out what the student is trying to communicate here. Several different ideas seem to be confused.

Judging and recording report evidence

Analytic rating

Joan Garfield also provides an example of a summary sheet which can be stapled to each student's report to provide information on both the scores obtained and on why points were lost.[17]

Practical Project Rating Sheet Name Sarah H.

1. Appropriate use of statistical language and symbols: (3 pts.) 3
   Comments:
2. Appropriate construction and display of tables and graphs: (3 pts.) 2
   Comments: Missing code and label for stem and leaf plots.
3. Correctness of statistical calculations: (3 pts.) 3
   Comments:
4. Appropriate choice of tables, graphs, and summary statistics: (3 pts.) 2
   Comments: Should have used a regular boxplot to show outliers
5. Reasonable descriptions and interpretations of data: (3 pts.) 3
   Comments:
6. Appropriateness of conclusions: (3 pts.) 2
   Comments: You did not discuss the outliers and how they affected your analysis and results.

Total score: (18 pts.) 16

Some teachers provide students with feedback on the analytic ratings given to their projects. An example of a feedback summary sheet is shown above.

An example of an analytic rating scale for peer assessment is shown on page 44. The 6-point peer rating scale was developed to assess poster presentations of cross-curricular projects. The three assessment criteria are clarity of content, presentation of results, and overall visual appeal.

analytic checklisting

Another method for judging and recording report evidence is analytic checklisting. When teachers use analytic checklists they record the presence or absence of a large number of project features. In the mathematics project checklist on page 45, for example, teachers make judgements about 28 features of each project report. These features address five aspects of the report: abstract/summary, problem statement/ introduction, content, references/data sources, and presentation.

Judging and recording

Analytic rating (Peer assessment)

This rating scale was developed for assessing poster presentations of cross-curricular projects.[18] Students use the proforma to assess poster presentations of the same project as their own. Projects are rated, using a 6-point scale, on three criteria: 'Clarity of content', 'Presentation of results' and 'Overall visual appeal'.

Peer assessment of poster presentations

Use the following categories to assess the posters presented by each of the other groups who undertook the same project as your group (do not assess your own poster!) Score using the following scale of 1-6:

6 = Excellent
5 = Very good
4 = Good
3 = Fairly good
2 = Poor
1 = Very poor

Group Number					
ASSESSMENT CATEGORY					
1. Clarity of content					
2. Presentation of results					
3. Overall visual appeal					
TOTAL FOR EACH GROUP					

When teachers use this mathematics project checklist, they make judgements about 28 features of each project report.[19] The features address five aspects of the report. The first three aspects are shown.

		No	Possibly	Yes
Abstract/ summary				
1	Is there a concise statement which informs the reader?			
2	Does the statement indicate the subject matter of the project?			
3	Is mention made of the methodology used?			
4	Does the statement give the starting point for the discussion and any conclusions?			
5	Does it agree with the material of the project?			
Problem statement/ introduction				
6	Has the subject matter been adequately introduced?			
7	Has the problem/data/investigation been set in context?			
8	Is there evidence of a plan? If so, has it been followed throughout the project?			
9	Has the student understood the nature of the project as set out by the supervisor?			
Content				
10	Does it contain logical, reasoned arguments?			
11	Is the mathematics/analysis correct?			
12	Is the analysis of the standard expected, given the student's part 2 marks?			
13	Has care been taken to justify results, to compare, contrast, criticise and generalise?			
14	Has the student exhibited the drive and persistence in following through ideas?			
15	Does the project do what it set out to do?			
16	Has the student understood and acted upon advice given by the supervisor?			
17	Was the project as outlined to the student, original work? Was it advanced research?			
18	Has the student learned new mathematics, or new applications and techniques?			
19	Is it the student's own work?			

estimating and reporting achievement

Projects can provide useful information about students' levels of achievement in an area of learning. The usefulness of projects as sources of information will be enhanced by careful planning to ensure that students' projects provide evidence about relevant learning area outcomes, and by the careful design of recording schemes that focus assessments and encourage systematic recording.

This article has described three different methods for judging and recording student projects: holistic ratings, analytic ratings, and analytic checklists. Each of these methods can provide a basis for estimating students' levels of achievement in an area of learning.

using holistic ratings

An holistic rating is a single overall rating of a student's project against a set of described levels of performance. If these performance levels are constructed to correspond exactly to levels on a progress map (e.g. if students' projects are rated on a scale of 2 to 5 where this scale is constructed to correspond exactly to Levels 2, 3, 4 and 5 on a profile strand), then the single judgement of each project automatically provides an estimate of the student's level of achievement on the progress map. If the holistic ratings do not correspond exactly to levels on the map, then some mapping of the rating points on to the progress map is required to provide an estimate of a student's current level of achievement.

using analytic ratings

Analytic ratings (e.g. of data collection; interpretation of project results; and so on) also could be made against performance levels constructed to correspond exactly to levels on a profile map. Ratings of this kind provide a relatively straightforward way of estimating a student's level of achievement in a learning area from records of their performances on a project. However, because analytic ratings require separate assessments of several aspects of a project, and because these aspects may be assessed at different levels, some on-balance decision usually is required about an individual's overall level of achievement (see opposite).

using analytic checklists

If an estimate of a student's location on a progress map is to be made from an analytic checklist of project features, then the project features must constitute part of the description of the progress map – for example, as outcomes, or examples of outcomes at particular levels of achievement. This is likely to be the case only if the checklist has been preconstructed to gather evidence about the set of learning area outcomes. In using such a checklist to estimate a student's level of achievement in an area of learning, teachers make an on-balance decision across all the available evidence.

Teachers make an overall assessment of a student's level of achievement on a graphic communication research project using the following process[20]:

Step 1: making analytic ratings

Teachers rate the research project on seven criteria using a 6-point scale:

	Not shown	Very low	Low	Mod	High	Very high
1 Presentation of assignment (i.e. layout of text and illustrations annotation, headings, subheadings.....)						
2 Range of reference sources						
3 Correct essay production (bibliography, expression, spelling, appropriate use of diagrams)						
4 Depth of research						
5 Knowledge of subject matter (expressed in student's own words)						
6 Accurate analysis of images and thoroughness of interpretation						
7 Appropriate selection of visual examples for analysis						

Step 2: making an overall assessment of a level of achievement

On the basis of these ratings teachers make an overall judgement of a level of achievement E - A using the following 'level descriptors':

A The student has produced a research paper of an excellent standard which thoroughly and extensively explores the purpose and practice of graphic communications in society.

B The student has produced a research paper of a very good standard which broadly and soundly explores the purpose and practice of graphic communications in society.

C The student has produced a research paper of a good standard which explores with reasonable depth and accuracy the purpose and practice of graphic communications in society.

D The student has produced a research paper of a very satisfactory standard which adequately explores the purpose and practice of graphic communications in society.

E The student has produced a research paper of a poor standard which vaguely and superficially explores the purpose and practice of graphic communications in society.

Analytic ratings and level descriptors of this kind could be constructed to correspond exactly to levels of a profile map.

1 Curriculum Corporation (1994) *Studies of society and environment – a curriculum profile for Australian schools* Carlton: Curriculum Corporation, p. 85.

2 Curriculum Corporation (1994) *Mathematics – a curriculum profile for Australian schools* Carlton: Curriculum Corporation, p. 93.

3 Curriculum Corporation (1994) *The arts – a curriculum profile for Australian schools* Carlton: Curriculum Corporation, p. 155.

4 Lloyd-Jones, R. & Bray, E. (1986) *Assessment from Principles to Action,* London: Macmillan Education Ltd., p. 87.

5 Henry, J. (1994) *Teaching Through Projects,* London: Kogan Page in association with the Institute of Educational Technology, Open University, p. 127.

6 Reprinted with permission from Maria Mastromatteo 'Assessment of Statistical Analysis in Eighth Grade' in Webb, N. & Coxford, A. (1993) *Assessment in the Mathematics Classroom,* Virginia: National Council of Teachers of Mathematics, p. 160.

7 Lloyd-Jones, R. & Bray, E. (1986) *Assessment from Principles to Action,* London: Macmillan Education Ltd., p. 77.

8 The Northern Territory Board of Studies (1995) Student Version Social Education Year 10 *Consensus Moderation Handbook,* p. 21.

9 Lloyd-Jones, R. & Bray, E. (1986) *Assessment from Principles to Action,* London: Macmillan Education Ltd., p. 82.

10 Henry, J. (1994) *Teaching Through Projects,* London: Kogan Page in association with the Institute of Educational Technology, Open University, p. 123.

11 Henry, J. (1994) *Teaching Through Projects,* London: Kogan Page in association with the Institute of Educational Technology, Open University, p. 127

12 The Northern Territory Board of Studies (1995) Student Version Social Education Year 10 *Consensus Moderation Handbook,* p. 25.

13 as above

14 Lloyd-Jones, R. & Bray, E. (1986) Assessment from Principles to Action, London: Macmillan Education Ltd., p. 88.

15 The Northern Territory Board of Studies (1995) Student Version Social Education Year 10 *Consensus Moderation Handbook,* p. 23.

16 Reprinted with permission from Garfield, J. 'An authentic assessment of students' statistical knowledge' in Webb, N. & Coxford, A. (1993) *Assessment in the mathematics classroom,* Virginia: National Council of Teachers of Mathematics, pp. 190 & 195.

17 as above

18 Butcher, A.C., Stefani, L. A. J. & Tariq, V. N. 'Analysis of Peer-, Self- and Staff-assessment in Group Project Work' in *Assessment in Education: principles, policy & practice,* Vol. 2, No. 2, 1995, p. 170.

19 Stephens, M.& Izard, J. (1992) *Reshaping assessment practices: Assessment in the Mathematical sciences under challenge.* Proceedings from the First National Conference on Assessment in the Mathematical Sciences, Geelong, Victoria, 20-24 November 1991. Camberwell: Australian Council for Educational Research, p. 140.

20 Thanks to Mihaela Brysha, Visual communication faculty, Melbourne High School.

when comparability matters

It is sometimes important that assessments of students' projects are comparable from student to student, from assessor to assessor, and from school to school. In high-stakes settings, assessments of project work can influence admission to courses, scholarship offers, or the award of certificates. Examples include final year geography projects, university architecture and engineering projects, and projects for state mathematics and science awards. In these situations high levels of student-to-student and assessor-to-assessor comparability, or fairness, are considered desirable.

In situations where comparability is important, special consideration must be given to:

planning project assessments including consideration of

- project specification – the extent to which the project parameters (topic, timeline, materials etc.) are specified;

judging projects including consideration of

- criteria specification – the extent to which the assessment criteria are specified;
- inter-rater reliability – the extent to which different assessors are consistent in their use of assessment criteria; and
- authenticity – the extent to which the project represents the work of the student presenting it (particularly where group processes are involved);

summarising and reporting achievement including consideration of

- objectivity – the extent to which projects provide estimates of attainment in a learning area which can be generalised across project topics and assessors.

planning project assessments

Comparability matters when project assessments are used for decision making not only about what students know and can do, but also about what grades they deserve, and whether they are to receive a scholarship or gain entry to a university course, for example. If fair decisions are to be made, then project assessments must have high levels of validity and reliability.

curriculum match

High-stakes project assessment can significantly influence student learning, sending powerful messages about what is valued, particularly if a project counts for a substantial proportion of students' overall grades. (In some university courses such as architecture, projects may account for 100% of the final grade.) For this reason it is important that there is a good match between the curriculum and instructional goals of the course and the criteria for assessing projects.

planning project assessments

In contexts where comparability matters it is important that there is as little variation as possible in the demands made on different students, or in the opportunities they have to show their achievement. The greater the requirement for comparability, the more carefully project parameters are likely to be specified in an attempt to assess students on a 'level playing field'. The project specification for the Geography Research Project shown below specifies a number of conditions, including time allocation, the kinds of data allowed, and the length of the project report.

judging projects

Accurate, high-stakes decisions depend on reliable, comparable, information. Judgements of projects can be made more comparable by

- carefully specifying the criteria for assessment; and
- ensuring consistency in the interpretation of criteria.

It is also important that each assessment accurately reflects the work of the student presenting the project. Thus in high-stakes

Planning project assessments ***Curriculum match***

It is important that there is a good match between the curriculum and instructional goals of a course and the criteria for assessing projects. These six criteria were developed for the assessment of a History Research Project. They were designed to provide evidence about the broad goals of a senior History course[1]:

1 use of representations in support of an argument;
2 demonstration of knowledge of the area of study;
3 evaluation of evidence;
4 analysis of the relationship between different representations of the area of study;
5 synthesis of evidence to draw conclusions; and
6 understanding of problems associated with representing the past.

Planning project assessments ***Project specification***

The greater the requirement for comparability, the more carefully project parameters are likely to be specified in an attempt to assess students on a 'level playing field'. The following six parameters were developed to ensure that students understood and were assessed on similiar Year 12 geography research projects[2]:

1 The percentage of course time allocated to Research activity should be about 25%.
2 The report should focus on the use and management of the resource selected for investigation.
3 The local area may be defined within or outside Australia.
4 The report may be based on primary data or secondary data or a mixture of both.
5 The report must be in written form, in the range of 1500 to 2000 words. Assessment by the State Reviewer will cease at 2000 words.
6 Topic selection is based on decisions taken at school level.

contexts particular attention is given to

- ensuring authenticity of project work.

criteria specification

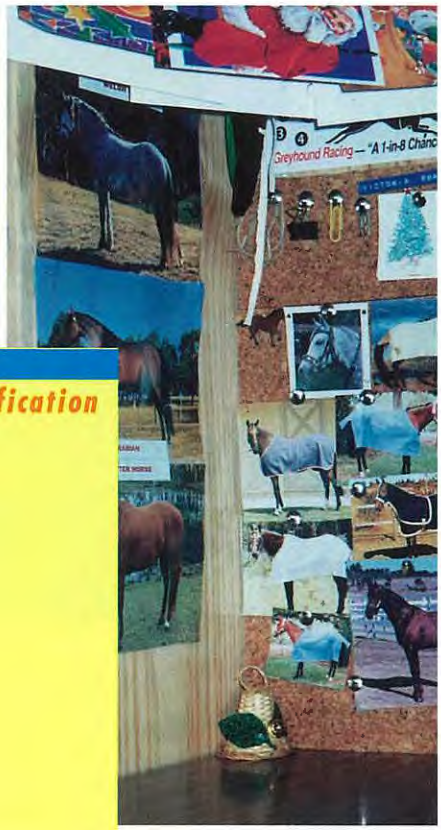
Project assessment requires judgements of quality. Two assessors judging the same project may recognise and value different qualities and so assess the project differently. Careful specification of assessment criteria assists assessors to attend to the same project features.

inter-rater reliability

To make comparable judgements assessors need to develop a shared understanding of assessment criteria. Assessors usually view and discuss examples of student work during marker training sessions. This discussion assists assessors to develop consistency in their interpretation of criteria. In some assessment programs, groups of assessors work together over a long period of time developing a shared 'culture' of assessment.

In programs where assessors are unable to meet, they may be provided with annotated samples of student work. These work samples are used as reference points for interpreting assessment criteria. Notes on how to apply the criteria also may be provided. The specifications in the example below are accompanied by a detailed explanation of the 'low', 'medium' and 'high' ratings for each criterion.

No matter how clear the assessment criteria, there is always a degree of subjectivity associated with judgements. One way to increase inter-rater reliability is to have several experienced judges compare the strong and weak points of a number of projects. In this way the expectations of less experienced assessors can be 'moderated' and attention drawn to features of a project which may not at first have been recognised.



Planning project assessments

Project specification

The Centre for the Study of Higher Education at the University of Melbourne provides guidelines for planning postgraduate research projects at the research proposal stage[3] :

- introduction;
- the research question (or hypothesis);
- subsidiary questions;
- review of the relevant research and theory;
- the research procedure;
- a trial table of contents; and
- a brief bibliography.

It is also common in high-stakes assessment programs to have more than one assessor judge each project. When two assessors are in reasonable agreement about the quality of a project, their assessments may be combined (e.g. averaged or summed). When two assessors are not in agreement, a third assessment may be sought and a decision made about how to resolve any remaining discrepancies.

Despite efforts to ensure that assessors have similar interpretations of criteria and that they apply them consistently, there often remain systematic differences among assessors, with some being systematically more lenient or harsh in their judgements of students' work. When systematic differences of this kind exist, and can be identified, adjustments can be made to take rater leniency or harshness into account.

authenticity

If a project is to provide valid evidence of a student's achievement in an area of learning, then the project must be the work of the student presenting it. Group projects raise special assessment questions: should all students in the group receive the same assessment or should individuals receive different assessments on the basis of their contribution, and if so, who should decide on the value of the contribution? In high-stakes

Judging projects

Criteria specification

Careful specification of assessment criteria makes it more likely that assessors will attend to the same project features. Assessment criteria for this teacher-assessed Health Education Research Project are tightly specified and organised under three headings to address aspects of content and presentation.[4]

Criteria for award of grades

*Understanding of the body of knowledge associated with the issue and its history by

1 describing the focus of the research and explaining why the topic became an issue
2 exploring the medical, scientific and technological aspects of the issue
3 exploring the social and cultural aspects of the issue
4 exploring the economic aspects of the issue

*Examination of responses to the issue by

5 identifying the most relevant responses to the issue
6 analysing the responses in light of the body of knowledge associated with the issue
7 comparing the issue with a past health issue or a health concern with a low community profile

*Communication of information and understanding by

8 developing conclusions which are consistent with information collected and the body of knowledge relevant to the topic
9 making recommendations for action which are consistent with the information collected and the body of knowledge relevant to the topic
10 presenting information in a coherent manner and with supporting evidence

Judging projects

Criteria specification

To make comparable judgements assessors must develop shared understandings of assessment criteria. Examiners of postgraduate research projects at the University of Melbourne are given guidelines to assist them to systematically read and evaluate project reports.[5] These guidelines take the form of questions about elements of the project report (review of the literature; design of the study; presentation of results; discussion and conclusions; fundamental questions of standard, understanding and originality). Suggested questions about the assessment of the *literature review* are:

To what extent is the review relevant to the research study?

Has the candidate slipped into 'here is all I know about x'?

Is there evidence of critical appraisal of other work, or is the review just descriptive?

How well has the candidate mastered the technical or theoretical literature?

Does the candidate make explicit the links between the review and his or her design of the study?

Is there a summary of the essential features of other work as it relates to this study?

situations it is usual to require individuals to submit a separate project report. Authentication procedures are designed to ensure that projects are the work of the students submitting them and may include a declaration of the sources (e.g. teachers, members of the community) and degree of assistance accepted.

summarising and reporting project work

Judgements of project work can provide useful indications of students' overall levels of achievement in an area of learning. This is particularly true when the criteria on which projects are assessed address most of the curriculum and instructional goals of the area. In these situations, overall project assessments can be used to estimate students' levels of achievement in the area of learning.

In high-stakes contexts assessors usually rate students' projects on a number of criteria – in other words, analytically rather than holistically. The purpose of these project assessments is to facilitate comparisons from student to student or against some pre-determined standard.

In high-stakes contexts it is important that project assessments are objective: in other words, that they are comparable from student to student, from project to project, and from assessor to assessor.

Each of the considerations discussed in this article is designed to increase the objectivity of project assessments. These considerations include:

Judging projects ***Inter-rater reliability***

Teachers assessing the VCE Geography research project are given detailed notes on applying assessment criteria.[6] Eleven criteria are grouped into five categories. Projects are rated low, medium or high on each criterion.

Description and justification of the research process is the first category assessed.

applying the criteria

When reading the guidelines for applying the criteria below, note that the advice for Medium assumes that the student has demonstrated the characteristics specified for Low; and similarly, High assumes the characteristics of both Medium and Low.

Description and justification of the research process

Criterion 1: application of appropriate key geographic ideas to provide a framework for investigating the use and management of the selected resource

High: Uses the designated key geographic ideas in integrating the investigation of the resource

Med: Explains and uses key geographic ideas as designated in the investigation of the resource

Low Mentions appropriate key geographic ideas in the investigation of the resource

Judging projects

Inter-rater reliability

The Massachusetts Science Fair uses a consensus method for assessing project entries.[7] Projects are divided into subject categories and assessed by a number of judges. Judges discuss the quality of each project allowing judges who may have noticed some important detail about a particular project to share their observation. This procedure can provide useful training for inexperienced assessors.

- specifying project parameters to minimise differences in the complexities and lengths of projects that students undertake;
- specifying the criteria on which all projects are to be assessed; and
- training assessors and providing examples to ensure that assessors have similar interpretations of assessment criteria.

In an attempt to further enhance objectivity, some programs also specify the procedures to be followed in arriving at overall project assessments. These procedures may include weightings to be applied to the various criteria, and steps to be followed in combining ratings to construct an overall assessment. An example of such a procedure is shown on the following page.

Project assessments can be used to estimate students' levels of achievement in a learning area.

Constructing overall project assessments

In the following 'Commerce in Society' project, assessors first rate each student's project as High (3), Medium (2), Low (1), or Not Shown (0) on each of ten criteria.[8] In an attempt to ensure that overall project assessments are made in the same way by all assessors, these ratings are then summed over the ten criteria to produce scores between 0 and 30. The overall project assessment is a numerically determined grade between E and A+.

Assessment Criteria

Establishment of context

1 description of the specific topic investigated
2 establishment of links between the topic and pressures for structural change
3 establishment of links between the topic and future challenges in Australian commerce

Understanding structural change

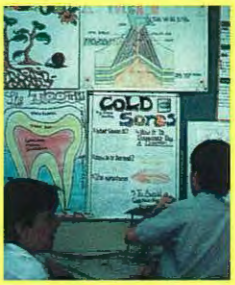
4 description of the proposed response to pressures for structural change
5 identification of forms of resistance to the proposal for change
6 identification of conflicting goals and priorities of commercial participants affected by the proposal
7 identification of alternative responses to the proposal for structural change

Evaluation of responses

8 establishment of criteria for evaluating the proposal
9 analysis of benefits and costs of proposal for sectional interests (individuals, groups and organisations)
10 analysis of benefits and costs of proposal for the community as a whole

Overall Project Assessment

A+	29-30
A	27-28
B+	25-26
B	22-24
C+	19-21
C	16-18
D+	13-15
D	11-12
E+	9-10
E	7-8



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3 Powles, M. *Postgraduate Supervision,* Centre for the Study of Higher Education, University of Melbourne, pp. 23-24..
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7 Levin K, & Levin R. (1991) 'How to Judge a Science Fair Use the Consensus Method', *Science the Teacher* ,Vol. 58, No. 2, pp. 43-45.
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designing project assessments

In developmental assessment, teachers monitor student progress against a map of developing skills, knowledge and understandings. Project assessments are one method that can be used to collect evidence of student achievement.

There are many contexts for project assessments. Different kinds of project assessment provide different kinds of evidence that teachers can use to estimate students' locations on a map.

This article lists issues that teachers need to consider when designing project assessments. These issues include questions of assessment purpose, methods for judging and recording student performance and ways to estimate students' locations on a progress map. A 'checklist' summary of the design process is included at the end of the article.

planning project assessments

What is the purpose of the assessment?

Do you want to gather evidence about processes or end product? Are you interested in information about the processes students use in project work or about the finished product or report?

How you answer this question will determine the kind of project work you offer students and your method of assessment. If you choose to focus on processes, for example, you may plan group as well as individual projects; and you may develop assessment guides to be used by individual students or their peers to record observations and judgements of student work as it occurs.

For which curriculum goals or outcomes will you collect evidence? If you are observing the processes students use in discussion and preparation for project work:

Do your observations or marking keys focus on explicit instructional or outcome goals?

Is the evidence you are collecting relevant?

If you are assessing the project report:

Is there a match between the demands of the report and the outcomes being assessed?

Is the evidence you are collecting relevant?

How tightly will you specify the project parameters?

Which elements of the project will you specify? Will you specify the topic, the kind of data collected or the way in which it is to be collected? Will you specify the kind of presentation?

How much direction will you give? Will you provide structures to assist students to select their topic, monitor their work, and present their reports? (See 'projects a focus on process'.)

In summary:
What is the focus of the project assessment?

- process or end product?
- evidence of what curriculum goals/progress map outcomes?
- is the evidence relevant?
- how tightly have you specified the process or end product?

How tightly will you specify the project parameters?

- what will you specify?
- how much direction will you give?

assessing projects

How will you judge the projects? Will you make holistic judgements, use an analytic marking guide or employ analytic checklisting?

What assessment processes will you use? Will you observe students at work, use self-evaluation, peer evaluation, or teacher evaluation marking guides (or a combination)?

What assessment criteria will you use? Do your assessment criteria give you evidence that is relevant?

Are the criteria easily communicated?

If you are using projects in a context where comparability is particularly important you will need to

- consider how tightly you specify project parameters
- ensure project authenticity
- ensure consistency of criteria interpretation (marker training and moderation procedures) and use a number of judges.

In summary:
How will you assess the projects?

- which outcomes will you target and how?
- who will assess (student, peer, teacher)?
- which criteria will you use?
- how reliable is the assessment?

summarising and reporting project work

How will you estimate and report students' locations on a progress map?

Subjective or objective estimate? Do you want to make an on-balance subjective estimate or an on-balance statistical estimate of a student's location on a progress map?

Combining evidence? Do you want to combine the project evidence with other evidence?

In summary:
How will you estimate and report a student's location on a progress map?

- subjective or objective estimate?
- combining project evidence with other evidence?

A Summary of the Project Design Process

Project design stage	Design strategies
Deciding project assessment purpose	• Describe the assessment purpose. • Review these descriptions against important curriculum objectives and progress map outcomes of the learning area.
Deciding curriculum goals or outcomes to be targeted	• List the goals or outcomes (process or end product focus or combination). • Review these against important curriculum objectives and progress map outcomes of the learning area to check relevance.
Deciding a procedure for assessing projects	• Decide who will assess (peer/self/teacher). • Develop observation and/or marking guides. • Review these guides against important curriculum objectives and progress map outcomes of the learning area to check relevance. • Review for easy communication.
Deciding a procedure for estimating and reporting locations on a progress map	• Describe the procedure for estimating locations on a progress map. • Describe the procedure for reporting locations on a progress map. • Review these descriptions against the task purpose and audience.

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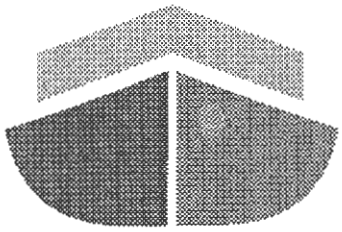

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Projects is one in a series of magazines in the ACER Assessment Resource Kit (*ARK*).

This video and magazine resource provides information about assessment issues and methods.

For further details about other magazines, videos and the workshop manual in this series contact the Australian Council for Educational Research, 19 Prospect Hill Road, Camberwell, Victoria, Australia, 3124.
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