Products

ASSESSMENT RESOURCE KIT

Purpose
Sources of Evidence
Judging & Recording
Estimating Achievement
Reporting

What is Product Assessment?
Assembling Evidence
Judging & Recording
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Designing Product Assessment

ProARK

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1 What is Product Assessment?

What is Product Assessment?

Products are items which students make, usually in technology and the visual arts. Examples include items of food and clothing, pieces of art work (drawings, paintings, sculptures) and articles made of wood, metal, plastics and ceramics.

Product assessment is the assessment of students' mastery of the processes and tools required to make products (for example, design and production processes) and the assessment of the practical and/or aesthetic qualities of the items students make.

Examples of product assessment include the assessment of students' abilities to use a range of drawing techniques; to use carpentry tools safely; to bake a cake with good texture, flavour, or shelf-life; and to build a chest of drawers which is both functional and aesthetically pleasing.

◼ Other definitions

Most student work generates an end-product of some kind. A completed essay, project, or portfolio of work, for example, is the end-product of a process which may involve planning, collecting and analysing information, drafting and revising. A music or dance performance is the end-product of a process which may involve planning, refining and evaluating. We are using the term 'product' not in this more general sense, but to describe items which students make, usually in technology and the visual arts.

Skills in planning, producing and evaluating

Curriculum documents include many learning outcomes which focus on the mastery of design or planning processes, control of production techniques (including choice of materials and use of tools), and ability to evaluate finished products for usefulness and/or artistry.

The assessment of these outcomes occurs primarily in learning areas concerned with the making of items for practical use or artistic expression, such as technology (including carpentry and home economics) and the visual arts.

Teachers sometimes ask students to make items in other learning areas. For example, students might make pancakes in a mathematics class, or complete drawings as part of an English assignment. In these contexts, however, teachers use 'products' as vehicles for assessing subject-specific knowledge and skills or for assessing more general, cross-curricular skills. Pancake making might be used to assess students' abilities to accurately weigh and measure, or to work in a small group. Drawing a scene from a novel might be used to assess students' understandings of a physical setting important to a narrative. In the learning areas of mathematics and English, teachers are not interested in assessing pancakes for texture and flavour, or students' drawings for artistic quality or technique. These incidental uses of 'products' do not constitute product assessment as we define it here.

Three phases of product development

Product development involves three phases: a preparation phase of planning and design, a production phase, and an appraisal phase for evaluating finished items. These phases provide a structure for assessing a range of learning outcomes:

- *preparation phase* – an opportunity to assess students' abilities to plan, to explore and develop ideas, and to design products;
- *production phase* – an opportunity to assess students' abilities to select and use materials, tools and techniques; and
- *appraisal phase* – an opportunity to assess students' abilities to make items

Some examples of products:
an oil painting
a ceramic teapot
a sponge cake
a wrought iron gate
a woollen coat
a metal sculpture
a cotton tapestry
a stained glass window
a car alarm
a pencil drawing
a timber and foam couch

Product assessment is the assessment of students' mastery of the processes and tools required to make products, and the assessment of the practical and/or aesthetic qualities of the items students make.

In the learning areas of technology and the arts, the three phases of product development are known by a variety of names.

	Preparation	Production	Appraisal
Arts (Australia)	Creating	Making	Presenting
Technology	Designing	Making	Appraising
Technology (UK)	Planning /Perception	Developing /Production	Appraising /Reflection

which satisfy functional and aesthetic criteria, and to evaluate their own work.

However, because the preparation, production and appraisal phases are steps in a single, integrated process, some outcomes can be assessed during more than one phase. For example, a teacher might assess a student's mastery of a range of studio methods directly during the production phase by observing how the student works, and also indirectly in the appraisal phase through the quality of the final product.

Examples of outcomes which could be assessed during these three phases of product development are shown below and on page 3.

Outcomes assessable during the preparation and production phases

Curriculum documents specify many learning outcomes which can be assessed primarily during the *preparation* and *production* phases of product development.

'Problem solving'
• tries out innovative and original ideas
• designs and makes
'Physical skills'
• uses tools and materials efficiently and safely
Essential skills: New Zealand[1]

• understands and applies media techniques and processes
Visual Arts: US[2]

'Devising'
• generates ideas for own designs using trial and error, simple models and drawings
'Techniques'
• selects and uses equipment with increasing accuracy and control to manipulate and process materials
'Producing'
• organises and implements production processes to own specifications, recognising hazards and adopting safe work practices
Technology: Australia[3]

'Experiencing the creative process'
By the end of Grade 9, students will
• select appropriate materials and use them effectively to produce or perform works in the arts (eg use heavily textured clay to model a porcupine, or wire to express the grace of a deer)
The Arts: Canada[4]

Curriculum documents from New Zealand, the US, Australia, and Canada

Curriculum documents specify many learning outcomes which can be assessed primarily during the *appraisal* phase of product development.

'Evaluating'
• assesses how well the ideas, products and processes used meet design requirements, including functional and aesthetic criteria
Technology: Australia[5]

'Exploring and developing ideas'
• reflects an awareness of aesthetic considerations in making art works
'Presenting'
• draws on a range of skills to present art works for a variety of audiences and purposes
The Arts: Australia[6]

'Problem Solving'
• designs a product, service or system to meet an identified need.... evaluates the design in terms of the criteria established for success
Applied Learning: US New Standards Project[7]

'Construction'
• makes imaginative and expressive use of three dimensional materials for designing and inventing
'Form'
• designs and makes objects for use and wear, using powers of invention and expression
Arts: Ireland[8]

At the end of Grade 4 students will be able to
• prepare simple models by using personal ideas supported by teacher's help, individual or collective work
Technology: Hungary[9]

Curriculum documents from Australia, the US, Ireland and Hungary

Contexts and purposes

There are many contexts and purposes for product assessment. For example, product assessment occurs when a teacher observes and assists a student soldering sections of a leadlight lamp shade. Here the context is ongoing classroom assessment; the purpose is to assist the student to use tools more effectively.

A teacher engages in product assessment when she evaluates the usefulness of a coin sorter, or the visual impact of a poster as part of a student's end of year technology portfolio. Here, the context is classroom assessment; the purpose is to provide the student and parent with an end of year report on the student's achievement in technology.

A group of examiners engages in product assessment when they evaluate the quality of students' drawing folios for entry into a university design course

with a limited intake. Here, the context is external assessment; the purpose is to select a small number of students for course entry.

It is useful to think about these different contexts and purposes along a 'purpose' continuum, as shown below, with ongoing, formative and diagnostic classroom assessments towards the left of the continuum and high-stakes summative assessment towards the right. Summative classroom assessment is near the centre of the continuum.
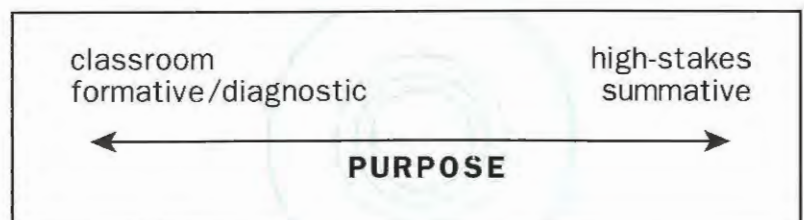
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classroom                           high-stakes
formative/diagnostic                summative

  <──────────────────────────────────>
              PURPOSE
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Assessments of a formative/diagnostic kind usually can be made at all stages of product development, from preparation (eg commenting on a student's preparatory sketches for a sculpture), to production (eg advising on improved tool use), to appraisal (eg commenting on the relative quantities of ingredients in a baked product).

Teachers' summative classroom assessments often are based on appraisals of completed products. These appraisals may focus on the utility of the completed product (eg the strength of an adjustable bike seat), the aesthetic qualities of the product (eg the texture and flavour of caramels), or on the processes used in developing the product (eg the control of brush technique and artisic composition evident in a finished oil painting).

High-stakes product assessments also tend to be based on the appraisal of completed products with an emphasis on utility and/or aesthetic quality and on the processes used in developing items. An example would be an external assessment agency's evaluation of high school art folios for evidence of students' control of techniques (production) and artistic composition (appraisal) as part of selection for entry into a tertiary art school.

The explicit assessment of developmental processes is unusual in other forms of high-stakes assessment. In high-stakes performance assessments, for example, assessors rate a final performance rather than observing students engaged in the process of planning and refining their work. It is assumed that good quality end-products result from effective planning and refinement. In other words, the assessment of process is implicit. In high-stakes *product* assessment, it is common to look for evidence of appropriate planning and production techniques in the final product.

Planning product assessments

Product assessments provide evidence from which teachers can infer students' levels of achievement in a learning area. The usefulness of this evidence depends on
• relevance and coverage; and
• amount and objectivity of evidence.

relevance and coverage

Teachers need to consider the degree to which the evidence they assemble addresses the range of outcomes (knowledge, skills and understandings) for the learning area. Conclusions about students' achievement are valid only to the extent that they are based on evidence about this full range of outcomes.

Teachers will be interested also in ensuring that the focus of their observations supports instructional goals. An assessment emphasis on the quality of end-product at the expense of the development process, for example, could distort teaching and learning.

amount and objectivity of evidence

When the assessment purpose is to estimate a student's level of achievement in an area of learning, the amount of evidence required needs to be considered. The reliability of the estimate will depend on the amount of evidence on which it is based. Generally, the more observations made, the richer the evidence and the more dependable the conclusions drawn. To enhance reliability, product assessment is often based on a portfolio of student work.

The objectivity of the estimate of a student's level of achievement will depend on the degree to which it is unaffected by the particulars of the items which students choose to make or by the persons who happen to assess those items. Reliability and objectivity

are particularly important in high-stakes contexts where students' performances influence admission to courses or scholarship offers.

Judging products

A range of schemes can be used to judge and record students' mastery of processes and tools, and the practical and aesthetic qualities of the items students make. These schemes in turn can be used by a variety of assessors—teachers, peers, students themselves (self-assessment), parents and external assessors.

The purpose and context of product assessment usually determines the choice of scheme and the assessor. For example, in a high-stakes context, where art portfolios are assessed for entry into a tertiary course, judgements usually are made by trained external assessors using holistic or analytic marking guides. In a classroom context, where students are assessed on their ability to use tools safely, on-the-spot judgements are made by teachers, perhaps using a checklist.

In deciding the most appropriate scheme for judging and recording students' work, consideration needs to be given to:
• the range of schemes available; and
• the need for comparability of judgements.

range of judging and recording schemes

Teachers usually make informal judgements of student performance during the planning and production phases. The usefulness of these informal judgements is enhanced if they are based on systematic observations of particular outcomes and students, and if written records are kept.

Teachers also make more formal holistic and analytic judgements of student work. An holistic judgement is a single rating based on an overall impression of the work. Ratings of this kind usually are made during the appraisal phase. Analytic judgements are ratings of different aspects of the work.

Analytic rating scales for products typically include criteria addressing all phases of the development process. For example, a rating scale constructed for the assessment of technology models may include criteria relating to the design and selection of materials (planning phase), the application of processes (production phase), competence with tools (production phase), and the achievement of intended goals (appraisal phase).

Sometimes products are assessed using a checklist of desired features, particularly during the appraisal phase. For example, a bathroom section completed during an introductory building course might be assessed against a checklist including features such as 'door hinges correctly positioned', 'bath set horizontally', and 'tiles cleanly grouted'. The usefulness of this kind of evidence for estimating a student's level of achievement will be enhanced if the items checklisted provide direct evidence about intended learning outcomes.

the need for comparability of judgements

Judgement is fundamental to the assessment of completed products, particularly when aesthetic or artistic quality is considered. Two people can judge the same painting very differently. To ensure that assessments are fair, it is important to minimise differences between assessors. In the classroom context, whether one teacher makes the same judgement of a product as another teacher using the same marking guide may not be particularly important—although teachers will want to ensure that assessment criteria are as clear as possible and understood by students. In

In deciding the most appropriate scheme for judging and recording students' work, consideration needs to be given to:
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• the need for comparability of judgements.

high-stakes contexts, reliable judgement is crucial.

Usually, the greater the requirement for comparability, the more tightly the assessment criteria are specified. Markers may be trained and the marking process monitored to ensure a high level of inter-marker agreement. In some high-stakes settings products are assessed by several judges.

Concerns about comparability of judgements of creativity and expressiveness, and the effect such judgements may have on students, has led some teachers to argue that art products should be assessed purely for technical competence. However, if creativity and expressiveness are desired outcomes of art education, and they can be defined,(eg using media in new ways), then assessment is possible.

Estimating and reporting achievement

In developmental assessment teachers monitor students' progress against a pre-constructed map of developing skills, knowledge and understandings. Teachers make observations of students' performances in contexts that are relevant to the learning area outcomes described on that map. 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. Product assessment provides one kind of evidence. The way in which this evidence is used to infer a level of attainment depends on 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.

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 (judgements of products) and the resulting estimate of the student's level of achievment.

A visual arts teacher might make an inference about a student's level of attainment from a portfolio of drawings, or using a combination of evidence including investigative reports, projects or paper and pen tests. In some instances a student's location on a progress map might be estimated from a single product.

objective estimates

In high-stakes situations, where high levels of inter-marker comparability are desirable, the way in which judgements of products are used to estimate a student's level of attainment may be tightly prescribed to ensure that the estimate is made objectively. For example, the inference may be made numerically on the basis of a marker's pattern of judgements across carefully defined criteria.

The following articles examine product assessment in more detail.

Assembling Evidence explores ways of efficiently collecting relevant information during the preparation, production and appraisal phases of product development.

Judging & Recording Evidence explores ways of effectively judging and recording student work during the preparation, production and appraisal phases of product development, including:
- using a range of judging and recording methods;
- gathering evidence from a range of assessors, including students and parents; and
- considering special constraints where the comparability of assessments is important.

Estimating Attainment & Reporting considers ways to estimate and report levels of student achievement against the outcomes and levels of a progress map.

A final article looks at issues in designing product assessments.

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1   New Zealand Ministry of Education (1993) *New Zealand Curriculum Framework*, p. 19.

2   Draft Visual Arts Standards 5-8 (1995) 'Struggling for Standards' *Education Week* Special Report, April 12, p. 52. Reprinted with permission from *Education Week*, 1995.

3   Curriculum Corporation (1994) *Technology – a curriculum profile for Australian Schools*, Carlton: Curriculum Corporation. Permission has been given by the publisher, Curriculum Corporation. The profile is available from Curriculum Corporation, 141 Rathdowne Street, Carlton, Victoria, Australia, 3053 http://www.curriculum.edu.au Email: sales@curriculum.edu.au Tel: +61 3 9207 9600   Fax: +61 3 9639 1616

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

5   Curriculum Corporation (1994) as Note 3 above

6   Curriculum Corporation (1994) *The arts – a curriculum profile for Australian Schools* Carlton: Curriculum Corporation.

7   New Standards Performance Standards (1997) University of Pittsburgh National Center on Education and the Economy, p. 162.

8   Arts Education Draft (1995) National Council for Curriculum and Assessment, Dublin Ireland.

9   Ministry of Culture and Education, Hungary (1996) *National Core Curriculum*, p. 225.
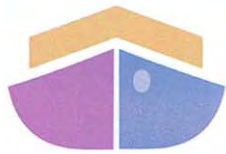
Assembling Evidence

Products are items which students make, usually in technology or the visual arts. Examples include pieces of art work, items of food and clothing, and articles of wood, metal, plastic and ceramics.

These items are assessed in different contexts for a range of purposes—from classroom assessment of collaborative product development for formative and diagnostic purposes, to high-stakes summative assessment of students' work for entrance into university courses. The assessment of products occurs predominantly in the learning areas of the Arts and Technology.

Products are planned, completed, and evaluated in three phases: a preparation phase, a production phase, and an appraisal phase. These phases of product development provide teachers with opportunities to assess a range of learning outcomes, including skills in:
• exploring and developing design ideas;
• selecting appropriate materials;
• using a range of tools and equipment;
• demonstrating design options that are innovative or creative; and
• using selected styles and forms in art work.

This article looks at issues in planning product assessments as sources of evidence about student achievement.

Relevance

When planning product assessments, teachers need to consider the knowledge, skills and understandings, or 'outcomes' of the learning area about which evidence is to be collected.

To provide valid measures of

Relevance: outcomes assessable during preparation and production phases of product development

Examples from UK, Australian and Hungarian curriculum documents

Preparation phase
• Pupils are increasingly able to research, organise and experiment with relevant resources and materials to develop their ideas.
Art UK Key Stage 3 Investigating and Making[1]

• Pupils modify and refine their work to realise their intentions, and plan and make further developments, taking account of their own and others' views.
Art UK Key Stage 3 Investigating and Making[2]

• When designing and making, pupils generate ideas that draw on a wider range of sources of information, including those not immediately related to the task, and an understanding of the form and function of familiar products. They develop criteria for their designs which take into account appearance, function, safety, reliability and the uses and purposes for which they are intended, and use these to formulate a design proposal. They make preliminary models to explore and test their design thinking, and use formal drawing methods to communicate their intentions.
Design and Technology UK Key Stage 3 Designing[3]

• Explores the visual arts of different cultures to generate and develop ideas for making art works.
Visual Arts Australia Creating, Making and presenting, Exploring and developing ideas[4]

• Ability to choose formal and technical methods, and creativity in accordance with the student's personality
Hungary Attainment Targets, Expression fine arts[5]

Production phase
• Prepares simple models by using personal ideas supported by teacher's help, individual or collective work
Hungary Attainment Targets, Technology[6]

Relevance: outcomes assessable during the appraisal phase of product development

Examples from Australian, US and Hungarian curriculum documents

Appraisal phase
Uses a range of skills, techniques, technologies and processes and integrates them with the technical and structural elements of their chosen form of expression
Western Australia, The Arts, Expressing[7]

Reflects upon and assesses the characteristics and merits of their work and the work of others.
US, Visual Arts, Standard 5[8]

Ability to prepare an explanatory drawing on the functioning of simple mechanical tools (pruning shears, pliers).
Hungary, Visual communication[9]

Create a design for a system that shows how its components work together.
Victoria, Australia, Technology[10]

Operate the system commenting on its ability to fulfil design requirements.
Test the effectiveness of his or her own products and assess the efficiency of the processes used.
Victoria, Australia, Technology[11]

student achievement, assessments must provide adequate coverage of the range of valued learning outcomes. Focusing on a limited range of outcomes can distort teaching and learning. In the Arts, for example, it is important to assess the aesthetic qualities of items students make, even though these qualities are complex and elusive, as well as to assess students' technical skills which are generally more easily observed.

Curriculum documents describe many outcomes which can be assessed during the three phases of product development. Examples are given on pages 9 and 10.

Ensuring outcome coverage

The value of product development as a source of evidence about learning outcomes is enhanced when teachers systematically address outcomes in their planning. Task designs can be 'mapped' against outcome frameworks to ensure that evidence collected is not only relevant but also addresses the full range of outcomes. Strategies for ensuring relevance and coverage include:

• targeting particular outcomes; and

• addressing outcomes during each product development phase.

targeting particular outcomes

Teachers ensure the relevance of evidence by targeting particular outcomes when designing tasks for students. Single tasks are structured to allow observation of a small number of outcomes. Over a period of time, a series of tasks provides evidence about a wider range of learning outcomes. Ideally, each task provides opportunities for students to demonstrate skills across several achievement levels.

The technology task from the Victorian Curriculum and Standards Framework support materials (page 11) is designed to address a number of Level 4 technology outcomes. Ways in which teachers might adapt the task to target Level 3 and Level 5 outcomes are suggested.

addressing outcomes during each product development phase

Teachers ensure outcome coverage by addressing outcomes during each product development phase. The example on page 12 shows the outcomes

In the Victorian Technology framework, outcomes are categorised into three 'strands': materials, information, and systems. This design brief 'to design a bag to take to a school camp' addresses outcomes from the materials strand. Students examine a familiar product and consider the environmental implications of materials used in its manufacture.[12]

Four outcomes are targeted:

- explain how the characteristics of materials influence product design;
- prepare designs and justify the selection of the preferred options (the first aspect only of this outcome is addressed);
- organise and apply a range of techniques for safely working with materials to meet the requirements of the preferred design; and
- test the effectiveness of his or her own products and assess the efficiency of the processes used.
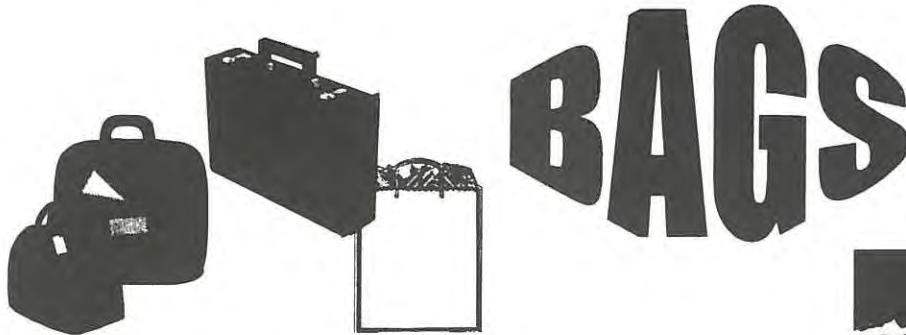
For the up-coming school camp we will all require a bag that can be carried in a manner that leaves the hands free and of a size that will hold a drink bottle, lunch, a jumper/light coat and possibly a camera. Rather than your parents buying you a suitable bag or some of you coming to camp unprepared some of our parents have offered to make a bag for each of you if we provide them with a prototype. We will use my favourite teddy bear as the model for our prototypes. The class will decide on which bag should be produced by the parents.

You may choose to work with one or two other students to produce your bag. You will be supplied with some fabric in the school's colours from which to construct your bag. A sample should be made from scrap material or paper to ensure suitability before commencing your final product.

In completing this task you will be:

- considering materials that are suitable for making bags
- considering the impact of the use of these materials on the environment
- documenting your proposed bag as a 3D representation and a procedural plan
- using appropriate tools and equipment including needles and scissors
- using suitable joining methods
- redesigning the plan to improve quality of product
- reporting on the suitability of the product.

Targeting particular outcomes — Technology

addressed in four phases of product development, as described in the Victorian Curriculum and Standards Framework for Technology: designing, investigating, producing and evaluating.

Assembling a range of evidence

Generally, the more observations a teacher is able to make and record, the richer the assessment evidence and the more dependable the conclusions drawn.

In assembling evidence during the three phases of product development teachers draw on a range of sources. These sources may include observations made by students themselves, by their peers and possibly by their parents. The ways in which teachers use these sources are discussed on page 27.

Some teachers ensure that a range of evidence is collected by planning in advance the combination of sources to be used over a year. For example, they specify what evidence they will collect

In the Victorian Technology curriculum framework, four phases of product development are described: investigating, designing, producing and evaluating. To ensure outcome coverage, teachers are provided with a model to assess design briefs against curriculum expectations for each phase.[13]

Addressing outcomes during each product development phase — Technology

Investigating

Curriculum focus

Students **investigate everyday systems**, recognising the roles of people in their development and operation. They **explain the inputs, processes and outputs of simple systems.** They investigate how various energy sources can be used to make the system work. They begin to predict and explore the effect on the output of changing the process while maintaining the same inputs.

Learning outcome

Describe inputs, processes and outputs of simple systems.

Designing

Curriculum focus

Students produce **plans**, drawings and models that **illustrate the basic parts and processes of their proposed systems.** They choose from a variety of energy sources (springs, water, batteries, mechanical) and consider techniques, materials and equipment needed for their tasks. They make suggestions as to what effects altering the processes would have on the outputs.

Learning outcome

Create a design for a system that shows how its components work together.

Investigating

- *examine a range of umbrellas*
- *draw a diagram of an umbrella that shows how it operates*

Designing

- *draw a design of an umbrella for teddy*
- *label the design to show the materials to be used and to show how the parts will work together to produce a functional umbrella*

Design and construct an umbrella for a teddy bear.

Evaluating

- *test the umbrella*
- *give an oral report describing how umbrella functions and comment on whether it functions as intended, and modifications that could be made*

Producing

- *follow design to construct umbrella*
- *make modifications as required*

Evaluating

Curriculum focus

Students compare their product with their original plans. They **report the results of the functioning of the system and how well it serves the purposes for which it was intended.** Students may demonstrate or explain the effects of varying the process. They **outline any modifications they may have made** during construction.

Learning outcome

Operate the system commenting on its ability to fulfil design requirements.

Producing

Curriculum focus

Working to their plans, students use appropriate equipment in a safe manner to **construct their systems from everyday and/or commercial materials.** They **modify and incorporate new ideas to deal with difficulties.** They experiment with varying the process and look for changes in output.

Learning outcome

Construct and modify his or her own systems, using appropriate techniques.

Aspects of curriculum focuses addressed by this design brief are in bold typeface

at the beginning of each year, during each lesson, once a term, irregularly (depending on the tasks students are completing), and at the end of the year.

Assembling evidence efficiently

The usefulness of product development tasks as sources of evidence about learning outcomes depends on task specification. Tightly specified tasks provide teachers with information about particular skills.

A carefully specified task also provides students with a structure around which to plan their work. If tasks are speci-fied too loosely and students have too much autonomy, then they may have difficulty in deciding on appropriate tasks. In the learning area of technology, in particular, students may set themselves tasks which are too complex to complete.

Teachers use a number of strategies to collect particular evidence and to assist students to plan and complete their products. These strategies include:

- constraining the design brief;
- specifying the stages of item development; and
- making the assessment criteria explicit.

Some sources of evidence during the three phases of product development:		
Preparation phase	**Production phase**	**Appraisal phase**
teachers' anecdotal notes	teachers' anecdotal notes	students' portfolios
students' journals	students' journals	students' reflections
students' work plans	student/peer checklists	student/peer checklists
student/peer checklists		parents' evaluations
teacher-student conferences		students' work samples

constraining design briefs

Some teachers constrain product design briefs to assist students to focus their work. A teacher of inexperienced students, for example, may provide a detailed booklet which students complete as they plan and finish steps in the item development process (see below). In the example on page 14, more experienced students are given less direction.

Sometimes the design brief is constrained to allow teachers to address particular skills or learning outcomes. The assignment information sheet (page 14) specifies a particular kind of drawing.

specifying the stages of product development

Some teachers provide students with a detailed description of steps in the product development process. This helps students to focus on the steps they will

need to complete, and provides them with a model for planning.

The example on page 15 is an extract from a full page guide which details the three phases of item development for the design and construction of a bag: the initial planning phase ('What will your bag look like?'), the production phase shown here, and the evaluation phase ('Your product on display'). Notice that the guidelines include a specified time for teacher consultation. When students develop their own design brief, negotiating development stages at the beginning of the process is particularly important.

The example on page 16 is an extract from a Year 7 home economics task: to plan, prepare and cook an uncomplicated main meal at home. Students choose a meal in consultation with parents, complete a time plan, and prepare and cook the meal. They and

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Assembling evidence efficiently

Constraining design briefs

Students completing the Collie Senior High School Design and Technology brief to design and make a toothbrush holder are given the following guidelines.[14]

The holder must satisfy the following specifications:
• be made from pine (42 x 19);
• use no more than 400mm of pine (including waste);
• hold 5 toothbrushes;
• construction to include a housing joint;
• to be either free-standing or wall-mounted;
• glued assembly only.

As they work on their brief, students complete a small booklet under the following headings:
• research and information (relevant data that will affect the shape and size of your design);
• parts (a complete list of all materials needed to make your design)
• first sketches and ideas (shapes only at this stage, try lots of possibilities)
• procedure (the order of the processes needed to make your design)
• solution sketch (This is it! This is the shape that you will make. Your sketch must include the main sizes.)
• evaluation (Did your design work out the way your wanted it to?).

Students completing Technology and Enterprise briefs at Bridgetown High School are provided with guidelines of the following kind.[15]

Design 4   Technology and Enterprise 5811
Date: Name: Form:
Design and make a wheeled toy

Use some of the following new processes:
trenching;
splay cutting;
hole saw drilling; and, where applicable,
the other technology processes used this year.

Timber:
radiata pine (max) 200 x 80 x 30
radiata pine offcuts 19mm thick
Ø 6 or Ø 10 dowel max length 300mm

Student outcomes
This project enables students to demonstrate Student Outcome Statements within the range 3.1–5.8.

Design factors:
You list and explain the factors (eg safety) which will need to be considered in your design.

Teachers design tasks to provide evidence about particular skills.
This extract from an assignment information sheet for Year 10 Graphic Communication students specifies the task clearly.[16] Notice how students are explicitly directed to demonstrate particular drawing skills.

Visual Communication Faculty – Graphic Communication
Assignment Information Sheet

Task information:
Create diagrams on a sheet of A3 cartridge paper which show your ability to produce drawings which use the one-point perspective drawing systems.
Construction will use the general grid layout and, most importantly, the drop plan perspective method....

Focus on:
• correct layout of title block inc. information text (place the title block on the back of the page);
• standard of lettering – correct visual spacing between letters, consistent slope, size (height), and shape (style) of letters;
• very light construction lines (use a pencil with a very sharp point);
• very accurate outlines (again use a pencil with a very sharp point);
• correct use of scales;
• accuracy of line work and construction;
• overall cleanliness and neatness of drawing;
• correct technical construction of drawing.

their families evaluate the result (see the following article, page 28). Students are provided with detailed guidelines for each step in the process. Steps 3, 4 and 5 are shown on page 16.

making assessment criteria explicit

Another strategy for helping students to focus their efforts and so enhancing the value of product development as a source of evidence about students' abilities to design, complete and evaluate their work, is to make assessment criteria explicit. Sometimes students are shown not only the assessment criteria but also the rating scale to be used. In the second example on page 16, submitted drawings are rated against nine criteria using a 6-point scale from 'not shown' to 'very high'.

When comparability matters

When assessments are used to make comparisons between individuals (for example, in scholarship examinations or entrance examinations into courses with limited places), special attention must be

paid to the *fairness* of the assessment. Does the evidence accurately reflect an individual's knowledge and skills?

When assessments are used to make comparisons between groups (for example, when monitoring changes in educational standards over time), special attention must be paid to the *reliability* of the evidence. Is the evidence accurate enough to detect small changes in achievement?

In contexts where comparability matters, strategies are used to maximise fairness and reliability. Some strategies are used when student work is being judged (pages 28-30) and levels of attainment estimated (pages 34-35). Other strategies are used when evidence is being assembled. These strategies include:
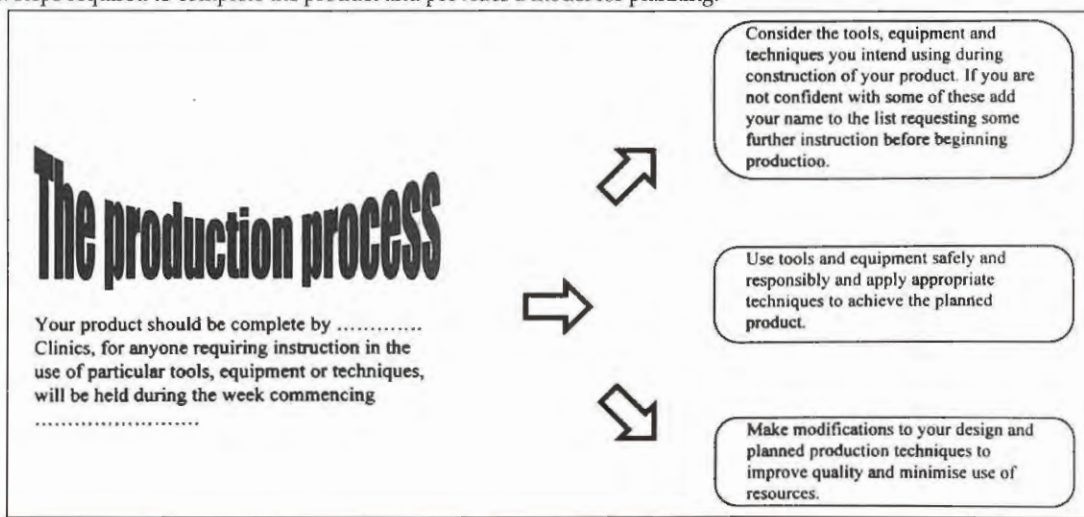
• using a range of evidence in specified categories;
• specifying products; and
• detailing assessment criteria.

Assembling evidence efficiently

Students can be provided with a detailed description of the product development process. This assists them to focus on steps required to complete the product and provides a model for planning.[17]

Specifying the stages of product development

The production process

Your product should be complete by ....
Clinics, for anyone requiring instruction in the use of particular tools, equipment or techniques, will be held during the week commencing
....

Consider the tools, equipment and techniques you intend using during construction of your product. If you are not confident with some of these add your name to the list requesting some further instruction before beginning production.

Use tools and equipment safely and responsibly and apply appropriate techniques to achieve the planned product.

Make modifications to your design and planned production techniques to improve quality and minimise use of resources.

Students completing a Year 7 home economics task to 'plan, prepare and cook an uncomplicated meal at home', are provided with detailed guidelines for each step in the product development process.[18] Steps 3, 4 and 5 are shown here.

Step 3 Food Order
List all foods required and the correct amounts for the number of people you are cooking for. Be sure to organise the food well in advance.

	Supermarket	Fruit and vegetables	Butcher
Amount			

Step 4 Time Plan
Prepare a time plan including time for collection of ingredients, periodic cleaning of benches, preparation time, cooking time/heating oil, oven, water, presentation time/serving, final cleanup. List all utensils.

Utensils:
Special requirements:

Time	Task

Step 5 Plan all crockery, linen, cutlery, flower arrangements etc for the meal.

using a range of evidence in specified categories

To ensure that assessments accurately reflect a student's knowledge and skills, evidence can be assembled from several pieces of work within specified categories.

In high-stakes art assessments, students often are required to present a portfolio of work. In the example on page 17 students seeking credit towards US university art courses on the basis of examinations taken at high school submit a portfolio of products in three specified categories: original work, concentration, and breadth. In the second example on page 17, students participating in the New Zealand National Education Monitoring Project complete work in six specified categories.

specifying products

To ensure that student work is evaluated on 'a level playing field', and that

Students completing this Year 10 graphic communication assigument receive detailed assessment information.[19] Explicit assessment criteria assist students to focus their efforts.

Assessment information – symbology (concept related symbols ie ideographs)

Criteria for assessment	V. High	High	Medium	Low	V.Low	Not Shown
Layout of title block						
Standard of lettering						
Extent & effectiveness of developmental work						
Quality of finish of resolved image						
Quality of drawing construction						
Rendering techniques and use of medium/media						
Imaginative and inventive response to topic						
Accuracy of line work and construction in general						
Overall cleanliness and neatness of presentation						
Relationship of image to target audience						

small changes in system performance can be monitored over time, product development tasks are sometimes tightly specified. Students completing the task on page 18 as part of the New Zealand National Educational Monitoring Project were given the same drawing stimulus, the same instructions, and the same time to complete their work.

detailing assessment criteria

In some high-stakes contexts, rather than being assessed on tightly specified tasks, students are given details of the way in which their products will be assessed. Explicit assessment criteria clarify the assessment purpose in an attempt to ensure that all students have the same understanding of what is being assessed. In the example on page 18 Year 12 students in Technological Design and Development are given 13 criteria on which their final product will be assessed. Details of the way in which each criterion will be judged are provided.

When comparability matters

Using a range of evidence in specified categories

The US Advanced Placement program is designed to give students credit towards university courses on the basis of examinations taken at high school.[20]

In Art, students are required to present a portfolio of work in specified categories.

Students submit a drawing portfolio of products in three categories:
• quality (the development of a sense of excellence in art);
• concentration (a commitment in depth to a particular artistic concern); and
• breadth (a variety of experiences in the formal, technical, and expressive means available to an artist).

The portfolio must contain six original works of a particular size (original work), as many as twenty slides on a single theme (concentration) and from fourteen to twenty slides illustrating breadth.

When comparability matters

Using a range of evidence in specified categories

In the New Zealand National Education Monitoring Project in Art a number of tasks were administered to students at both the Year 4 and Year 8 levels.[21] Seven of the tasks were hands-on making activities, four involved responding to art works, and one task required students to classify and identify the sequence of steps in related art making processes.

The hands on activities (Making Art) included a range of evidence from the following categories. Students worked independently to complete the tasks within a set time.

Making Art

Pencil drawing	10 minutes
Crayon drawing	25 minutes
Painting	45 minutes
Collage	30 minutes
Print Making	30 minutes
Clay modelling	40 minutes

To ensure comparability, Year 4 and Year 8 students participating in the New Zealand National Educational Monitoring Project complete the same specified drawing under the same conditions.[22]

Triceratops Pencil Drawing
Resources: (each student) one model triceratops (15 cm long), polystyrene block, 4B pencil, one piece of B4 cartridge drawing paper, drawing base board.

Task description:
The model triceratops was positioned on a white block of polystyrene at the centre of the student's table. The student was instructed to make a pencil drawing of the triceratops standing on the block, just as they saw it in front of them. The models were placed so that all students would view them from the same angle. They were given the opportunity to handle and examine the model before commencing the drawing.

Instructions:
It is important that you do not touch the triceratops while you are making your drawing.
Make sure it is left in the same position all the time.

Try to make your drawing of the triceratops as real as possible. Just as you see it.

It's a good idea to start with very light lines, then make them clearer when you are satisfied with the way you have drawn them.
You don't need to use an eraser.
Just change your lines if you need to.

You have 10 minutes, and I want you to spend all of the 10 minutes on your drawing, so that it's as good as you can make it. I will let you know when you have 5 minutes left.

Specifying products

Students completing the Year 12 Common Assessment Task in Technological Design and Development are given details of 13 criteria on which their final product will be assessed 'High', 'Medium' or 'Low'.[23]   The assessment advice to teachers elaborates 'High' and 'Low' performance only.

Criterion 11 Demonstration of competence in the use of a range of tools, equipment and machines.

High: The production will show a high degree of skill and competence in the use of the selected tools, equipment and machines, demonstrating accuracy, precision and finish. In addition, the production will show
• an understanding of the relationship between the tools, equipment and machines and the processes applied
• an understanding of the reason for their selection and use for a particular purpose
• a knowledge of their correct and safe use.

Low: The production will show competence in the use of the selected tools, equipment and machines, demonstrating accuracy, precision and finish. In addition, the production will show
• some understanding of the relationship between them and the processes applied
• some understanding of the reason for their selection and use for a particular purpose
• some knowledge of their correct and safe use.

Detailing assessment criteria

1   UK School Curriculum and Assessment Authority (1996) *Exemplification of Standards Art: Key Stage 3.*

2   UK School Curriculum and Assessment Authority (1996) as above

3   UK School Curriculum and Assessment Authority (1996) *Exemplification of Standards Design and Technology: Key Stage 3.*

4   Curriculum Corporation (1994) *The Arts — a curriculum profile for Australian Schools*, Carlton: Curriculum Corporation.

5   Ministry of Culture and Education, Hungary (1996) *National Core Curriculum.*

6   Ministry of Culture and Education, Hungary (1996) as above.

7   Western Australian Department of Education (1996) *Student Outcome Statements — The Arts.* Reproduced by courtesy of the Education Department of Western Australia.

8   Draft Visual Arts Standards 5-8 (1995) 'Struggling for Standards' *Education Week* Special Report April 12, p. 52. Reprinted with permission from *Education Week*, 1995.

9   Ministry of Culture and Education, Hungary (1996) *National Core Curriculum.*

10 Victorian Board of Studies (1995) *Curriculum and Standards Framework: Technology*, Carlton: Board of Studies.

11 Board of Studies (1995) as above

12 *Using the CSF Technology Support Material*, Carlton: Board of Studies Reproduced with permission of the Board of Studies, Victoria.

13 *Using the CSF Technology* (1996) Carlton: Board of Studies. Reproduced with permission of the Board of Studies, Victoria, p. 11.

14 Collie Senior High School, Western Australia.

15 Bridgetown High School, Western Australia.

16 Mihaela Brysha, Melbourne High School, Victoria, Australia.

17 *Using the CSF Technology Support Material.* as Note 12 above

18 Sue Birch, Eltham College, Victoria, Australia.

19 Mihaela Brysha, Melbourne High School, Victoria, Australia.

20 Carnes, V. (1992) *Teacher's Guide to Advanced Placement Courses in Studio Art*, Princeton, New Jersey: Educational Testing Services.

21 Flockton, L. & Crooks, T. (1995) *Art Assessment Results 1995 National Education Monitoring Report 2*, New Zealand: Ministry of Education.

22 Flockton, L. & Crooks, T. (1995) as above

23 Victorian Board of Studies (1994) *Assessment Advice for 1994 School Assessed Common Assessment Tasks Supplement*, March.

Judging & Recording Evidence

In developmental assessment, teachers estimate students' levels of achievement, and monitor their progress, against a map of developing skills, knowledge and understandings. These estimates are based on observations and judgements of students' work.

Teachers have many opportunities to observe and judge student work, from day-to-day observations made in the course of teaching to more formal judgements of planned assessments. The evidence that teachers assemble, however, is always limited either to the observations they happen to make, or by the number of planned tasks that students attempt.

Teachers can enhance the quality and usefulness of assembled evidence by judging and recording student work systematically: that is, by focusing observations on important learning outcomes, *and* by keeping efficient records of these observations.

To systematically judge and record the quality of product development, teachers use a range of methods—from observation notes on students' behaviour as they work, to ratings of completed items. In deciding on an appropriate method for judging and recording student work, teachers need to consider how well the method is suited to the outcomes being assessed, to the phase of product development, and to the level of comparability sought.

Judgements made by different assessors—students themselves, students' peers and parents—can provide teachers with different perspectives on the quality of student work.

This article looks at issues in
- selecting an appropriate method to judge and record the quality of student work;
- deciding who will make judgements of student work; and
- making judgements in contexts where comparability is important.

Selecting a method for judging and recording student work

Teachers use a variety of methods to judge and record the quality of student work. These methods include
- anecdotal notes;
- analytic ratings;
- holistic ratings; and
- checklists.

Each of these methods is appropriate for the assessment of particular outcomes and phases of product development. For example, a teacher assessing students' abilities to use tools safely during the production phase may find anecdotal notes useful. A teacher judging and recording the quality of finished products (appraisal phase) may find ratings of student work against specified criteria more appropriate.

Anecdotal notes

Anecdotal notes are the notes teachers make as they observe students during their day-to-day teaching. Anecdotal notes are especially useful for recording achievements which cannot readily be assessed by looking at the end-products of student work. Examples of such achievements include the ability to work cooperatively, to use tools safely, and to select from a range of materials during the 'production' phase.

A range of methods can be used to record observations, including file cards, computer records, annotated class lists, and observation grids or sheets. In the example on page 22, Jenny Feely records observations on computer sticky labels. Jacqui Smith uses an observation sheet (page 22).

The quality and usefulness of anecdotal notes can be improved by focusing on outcomes and observing students systematically.

> Teachers enhance the quality and usefulness of assembled evidence by judging and recording student work systematically: that is, by focusing observations on important learning outcomes, *and* by keeping efficient records of these observations.

Anecdotal notes are especially useful for recording evidence about learning outcomes which cannot readily be assessed by looking at the end-products of student work.

Analytic ratings are judgements made of several aspects of student work Analytic ratings are especially useful for making judgements during the planning and evaluation phases.

Focused anecdotal notes can be collected by first choosing outcomes of interest and then deciding on the kinds of observations that might provide evidence about those outcomes. For example, evidence about the outcome 'organises and implements production process to own specifications, recognising hazards and adopting safe work practices', might be assembled by keeping notes on the extent to which students maintain a tidy work environment, use tools safely, and understand basic ergonomic principles and apply them to their situation. A teacher could watch for these targeted behaviours.

Because it is not possible to observe all students each lesson, teachers sometimes 'spotlight' particular students, observing five students per lesson, for example. Working systematically through the class in this way helps alert teachers to 'invisible' students about whom little might otherwise be recorded.

Analytic ratings

Analytic ratings are judgements made of several aspects of student work. When making analytic ratings, teachers consider the quality of the work from a number of perspectives (or criteria). For

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Anecdotal notes

Focusing on outcomes

Jenny Feely focuses her observations on learning outcomes which she can observe during the product development phase[1]. She records her anecdotal notes on computer sticky labels.

outcome: uses tools safely during construction
23.6.94 Cameron
Asked to use cutting board to cut cardboard and asked other children to move out of the way. Cut away from his body.

outcome: evaluates personal efforts in the design/build/test/ modify/use process
25.6.94 Lakhina
Found that her switch design would not allow both lights to light at once. Decided to have one light or other on separate switches.

Anecdotal notes

Focusing on outcomes

Jacqui Smith uses a class observation sheet to record evidence relating to 'designing making and appraising' outcomes[2].

	Shandi	Kelli	Jarrod C	Tuan	Matthew
Investigating					
1 Determines the appropriateness and potential of products and processes for communities and environments	●	☐	☐	●	☐
Devising					
2 Creates and prepares design proposals that include:	☐	☐	☐	●	●
- options considered and reasons for the choices made		●		●	☐
- images used to visualise ideas and work out how they might be realised	☐	☐	●	●	☐
- ideas for enhancing the potential of a product or process					
Producing					
3 Organises and implements production processes to own specifications, recognising hazards, adopting safe work practices	☐	●	☐	●	☐

example, the work of UK students studying photography for the General Certificate of Secondary Education (GCSE) is assessed from two perspectives or criteria: technical quality and visual quality (see below).

Analytic ratings are especially useful for making judgements during the planning and appraisal phases of product development. During these phases the design for a proposed product or the end-product itself can be evaluated.

Analytic ratings sometimes are based on a small number of criteria focused on particular skills. For example, the work of students completing the graphic communication assignment below is judged against three criteria for symbol design: range of different symbol designs, computer manipulation of symbol and addition of typeface, and conversion of symbol into colour (either computer generated or in gouache).

In contrast, the studio work of students completing the pre-university International Baccalaureate Diploma Programme in Art/ Design is judged against six criteria which draw on a wide range of perspectives including measures of attitude as well as skill: imaginative and creative thinking and expression, persistence in research, technical skill, understanding of the characteristics and function of the chosen media, understanding of the fundamentals of design, and evaluation of own growth and development (see page 24).

Various rating schemes can be used to record judgements of the quality of student work. In the second example on page 23, student work is rated High,

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Analytic ratings

Attending to different perspectives

The work of UK students studying photography for the General Certificate of Secondary Education (GCSE) is assessed from two perspectives or criteria: technical quality, and visual quality.

Perspectives / Criteria
1   technical quality
This criterion covers camera technique, including:
sharpness of image
appropriate use of shutter speeds
appropriate use of apertures

2   visual quality
This criterion covers composition of the photograph, including:
line
tone
colour

Analytic ratings

A small number of perspectives

Students completing the Year 10 graphic communication 'symbol assignment' are assessed for 'symbol design'. Teachers evaluate the quality of the work against three criteria using a 3-point scale, High, Medium and Low[3].

Criteria		High	Medium	Low
1	range of different symbol designs			
2	computer manipulation of symbol and addition of typeface (Photoshop, Streamline and Illustrator)			
3	conversion of symbol into colour (either computer generated or in gouache)			

The quality and usefulness of analytic ratings can be improved by ensuring that the assessment criteria provide information about important learning outcomes, and that the rating categories are supported by descriptions of achievement.

The quality of work submitted for the pre-university International Baccalaureate Diploma Program in Art and Design is judged from a range of perspectives. Work is assessed against six criteria using a 5-point scale[4].

A small number of perspectives

Criteria		Achievement Levels				
		1	2	3	4	5
1	Imaginative and Creative Thinking and Expression					
2	Persistence in Research					
3	Technical Skill					
4	Understanding of the Characteristics and Function of the Chosen Media					
5	Understanding of the Fundamentals of Design					
6	Evaluation of own Growth and Development					

Students completing the Year 10 advanced graphic communication assignment: pictorial drawing (one point perspective) are assessed against nine criteria relating to technical skill and presentation. A 5-point rating scale is used[6].

Focused criteria

Criteria	V High	High	Med	Low	V Low	Not Shown
1 correct layout of title-block (including information text)						
2 standard of lettering (both title block & drawing annotation)						
3 light construction of lines						
4 accurate outlines						
5 correct layout and projection of views						
6 correct use of scale						
7 accuracy of line work						
8 overall cleanliness and neatness of drawing						
9 correct technical construction of drawing						

Medium, or Low on the three assessment criteria. In the second example above, nine criteria are rated from Very High to Very Low.

basing assessment criteria on learning outcomes

When assessing students' product development skills, teachers collect evidence about learning outcomes through specific tasks. The criteria used to assess students' performances on these specific tasks are exemplifications, or specific instances, of the general outcome being addressed. The more closely the assessment criteria exemplify the outcome, the more useful the evidence about student achievement.

For example, the general visual arts learning outcome, 'uses art elements, skills, techniques and processes to structure art works appropriate to chosen styles and mediums', could be assessed through any number of tasks. In the first example on page 25, students complete three resolved images for a unit of a Year 10 painting course. The images in water colour, acrylic paint, or oil paint are assessed against four criteria including 'exploration of a variety of techniques appropriate to the media' and 'sensitive and skilful application of painting methods and techniques'. These criteria are exemplifications of the more general outcome above.

In Unit 1 of a Year 10 course in Painting Methods students complete three resolved images in water colour, acrylic paints or oil paints[5].

The painting task provides an opportunity to observe achievement of the general outcome: 'uses art elements, skills, techniques and processes to structure art works appropriate to chosen styles and mediums'. The four assessment criteria are exemplifications, or specific instances, of the general outcome being assessed.

Criteria

1   exploration or a variety of techniques appropriate to the media

2   complexity of understanding regarding the use of design elements

3   sensitive and skilful application of painting methods and techniques

4   effective use of an individual means of representation

Student work completed as part of the Western Australian Art and Design course is assessed against nine criteria based on identified learning outcomes for the area. Each criterion is rated on a 3-point scale: Satisfactory, High, Very High. The rating categories are supported by a description of performance at each level[7]. The rating categories for the criterion based on the learning outcome: *solves simple design problems* are shown here.

Very High
    The student acknowledges art influences and demonstrates inventiveness, sensitivity and originality in the development of designs through consideration of function, form, and available technologies.

High
    The student makes independent observations and acknowledges art influences in relation to function, form and available technologies in the solution of design problems.

Satisfactory
    The student demonstrates and communicates an awareness of the design process, identifies and responds to a range of design approaches and appropriately uses different media in the design process.

supporting analytic rating categories with descriptions

The quality and usefulness of analytic ratings can be improved by supporting rating categories with descriptions of achievement. In the second example above, the rating categories Satisfactory, High and Very High are supported by descriptions of achievement.

Holistic ratings

Holistic ratings are single overall judgements of student work. In the assessment of product development, holistic ratings are most often used for judging the appraisal phase, including judging the quality of finished pieces of work, and students' abilities to evaluate their work. In the example on page 26, a five-point holistic rating scale is used to assess the extent to which the student's artwork communicates ideas.

supporting holistic rating categories with descriptions

Holistic rating schemes are most useful when accompanied by descriptions of achievement for each rating category. In the example on page 27, levels on a 6-point scale for the assessment of a scientific drawing (Very poorly done to Surpasses the standards of excellence for the grade level) are supported by detailed descriptions of the quality of drawings in each category.

Holistic ratings

In the Western Australian Monitoring Standards in Education Program, students in Years 3, 7 and 10 complete a visual arts process test[7].

As well as making a series of analytic ratings, assessors make a single holistic judgement of the quality of the student's artwork: 'to what extent does the student's artwork communicate ideas?' For this assessment (appraisal phase) they use a 5-point scale.   Each rating category is supported by a detailed description.

To what extent did the student use planning to explore and develop ideas?

4   Highly Developed
    strong message with confident use of art elements; outstanding skills; good sense of 'finish'

3   Well Developed
    has obvious central purpose; displays some skill in use of art elements; conveys a sense of mood or feeling

2   Sound Development
    some use of art elements to communicate central idea; has unity and linking of images; recognisable overall purpose; no mood or feeling

1   Beginning to Develop
    some isolated recognisable images related to an idea; lacks overall clarity of purpose; no links between images

0   No Development
    no meaning; no mood or feeling; no ideas; unrecognisable images

Checklists

Teachers sometimes makes lists of relevant outcomes for each product development phase and then make judgements about whether or not students have achieved each outcome. Checklists can be used in assessing all phases of product development.

If the outcomes listed are worded in a general way, (eg 'plans and carries out the steps of the production process') then teachers need to consider how many observations they will make, and in how many contexts, before they judge a student to have achieved the outcome. If the outcomes are specific, (eg 'sews a hem') then teachers need to ensure that the outcomes are adequate explications of more general outcomes against which they are monitoring students' progress.

An example of a simple checklist for a sewing unit in technology is shown below. Teachers use this checklist to make judgements about what students can do, not to evaluate a particular product. Checklists of this kind sometimes require further explanations

Checklists

Teachers assessing a sewing unit use a simple checklist. The specific outcomes are explications of more general outcomes against which progress is monitored[9].

	Yes	No
• operate a sewing machine		
• stitch straight lines, curved lines and corners		
• use pins, needles and scissors safely		
• use iron and ironing board		
• hand stitch hem		

for useful judgement. For example, in order to 'operate a sewing machine' does a student need to be able to sew in a straight line, or to make buttonholes? Checklists of this kind are particularly useful for psychomotor outcomes.

Student, peer and parent assessment

When using analytic judgments, holistic judgements, or checklists to assess product development, teachers sometimes consider judgements made by others: by students themselves, by students' peers, or by parents.

These judgements can provide teachers with particular kinds of information. For example, students' judgements of their own work can pro-vide teachers with evidence of students' abilities to analyse, reflect and evaluate. Parents' judgements can provide teachers with information about products developed in out-of-school contexts—an evening meal prepared and served at home for the family, for example.

In Example 1 on page 28, students evaluate a meal they have prepared and served at home, and have the meal evaluated by two other members of the family. Evaluations take the form of comments under provided headings.

In Example 2 on page 28, students complete a more formal appraisal responding with comments and then assigning a mark for their achievement in each of the three phases of product development. They also indicate the

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Supporting holistic rating categories with descriptions

Holistic ratings

In this rubric for the assessment of scientific drawing a 6-point rating scale is used. Each rating category is supported by a detailed description of the quality of the drawing*.

6 *Surpasses the standards of excellence for the grade level*
The drawings are striking in how realistically the student has drawn the object/s. Amazing detail is provided. A very precise scale is used consistently. The scale uses the metric system where possible. Labels are used to help convey information. The principles of artistic composition are well employed in this drawing.

5 *Evenly excellent*
The drawings show the details of the structure of the object/s. The student has drawn the object/s to a scale that is clearly marked. A metric scale is used when possible. Enough views of the object/s are drawn to provide the viewer with a complete picture of the structures under study. Accurate details of color, pattern, and texture are shown. If appropriate, the relationship between the object/s and its/their environment is shown. Labels are used accurately to provide needed information. An accompanying text accurately and clearly explains the science that is intended to be shown. The drawings are neat and presentable, and the space of the paper is well used.

4 *Mostly excellent, lacking in one or two elements*
The drawings are like those receiving a rating of 5, except that there are one or two important elements that are not excellent.

3 *Mostly weak but with some better elements*
The drawings are like those receiving a rating of 2, except that there are one or two elements that are well done.

2 *Evenly weak*
The drawings do not show much detail of structure. The drawings are not done to a consistent scale. The scale is not metric when metric measurements should have been used. Details of colour, pattern and texture are not used well. Labels are incorrect or lacking. An accompanying text to explain the science intended to be shown is missing or inaccurate. The drawings are not neat.

1 *Very poorly done*
The drawings are very poorly done.

Example 1

Students preparing and serving a meal at home evaluated their work under a series of headings. They then had members of their family complete an evaluation sheet[10].

Evaluate your meal using the following guide:
1 organisation
2 ease of preparation of the recipes
3 timing of the meal (Were all foods ready on time?)
4 presentation of the dishes
5 flavour, texture, colour combinations
6 amount of cleaning up required
7 suggested improvements you could make

Have your meal evaluated by two different people from your family
eg mother/father or brother/sister.

Please write a few sentences commenting on—the choice of menu, food and taste, presentation, quality of the finished meal and cleaning up.

| Comment 1 | Signed |
| Comment 2 | Signed |

Self and family assessment

Example 2

Students completing the following appraisal sheet evaluate their work by answering a series of questions (including a comment on peer evaluation), assigning a score out of five for each phase of product development, and indicating the outcomes they think are demonstrated[11].

1 What do you like about your design?
2 What sections of the work did you do the best?
3 What are the results from your testing of your product?
4 What was the opinion of another person who tested your product?
   What did they say about the finish, the workmanship, the design?
   Person's name:

5 Self-assessment of product

A *design* /5	B *making* /5	C *appraisal* /5
ideas	hand skills	quality of final work
sketches	use of machines	eg accuracy
final drawings	safety and accuracy	testing, writing up
	marking out	presentation

6 What outcome/s have you demonstrated?

Self and peer assessment

Example 3

Teachers and students use the following evaluation form to assess technology products[12]. First a judgement is made of the level achieved for each phase of product development. The second judgement is of the quality of work (presentation and finish). Students make a final comment reflecting on their work and the opinion of another person who has evaluated their finished product.

Levels
Indicate the level that has been achieved with this product (level 1– 6)

design, make & appraisal	self	peer	teacher
devising			
producing			
evaluating			

information
nature
techniques

materials
nature
techniques

systems
nature
techniques

Quality of work
Indicate the quality achieved with this product (1– 5)

	self	peer	teacher
design presentation			
construction and finish			

Comments
What was the opinion of another person who tested or evaluated your product?
Write about the design, the quality of the work and the finish of your product.

outcomes they think they have demonstrated.

In Example 3 on page 29, students, their peers and the teacher make judgements of the level achieved for each phase of product development (level 1-6), and the quality of the work (1-5). Students then make a final reflection on their work.

When comparability matters

In some contexts special attention is paid to the comparability of assessors' judgements. In high-stakes settings where judgements of students' work influence scholarship offers or admission into courses, it is particularly important that judgements are fair; that is, that judgements are not affected by a particular assessor's attitudes or values.

Similarly, where judgements are used to monitor levels of student achievement across education systems and over time, special efforts are made to ensure comparability of judgements.

Strategies to ensure high levels of comparability include

• specifying assessment criteria, and
• training markers in consistent use of assessment criteria.

specifying assessment criteria

If markers recognise and value different qualities in completed products then they may assess the same product differently. The assessment a piece a work receives would then depend on the person assessing it. Specifying the assessment criteria assists markers to attend to the same product features thus enhancing comparability of judgements.

In the example on page 31 markers assessing the triceratops pencil drawing for the New Zealand Education Monitoring Project are directed to attend to four features of the drawings: main features, 3-dimensional quality, detail and expressiveness.

training markers

To make comparable judgements of products, assessors need to develop a shared understanding of the assessment criteria. Assessors usually view and discuss examples of student work to develop consistent understandings of the criteria and rating categories. Detailed explanations of rating categories often are provided for each criterion.

In some programs, where assessors work together over a long period of time, a 'culture' of assessment develops. Inexperienced assessors are gradually inculcated into this culture through observations of other assessors at work rather than through formal training sessions.

Despite efforts to ensure similar understandings of assessment criteria and rating categories, differences among assessors often remain. For this reason, it is common in high-stakes assessment programs to have more than one assessor judge the items which students make and to combine their judgements. Statistical analyses of judges' ratings also can be conducted to study rater behaviour and to adjust for systematic differences in rater harshness or leniency.

As part of the New Zealand Education Monitoring Project, Year 4 and Year 8 students complete a pencil drawing of a triceratops model[13]. To ensure that markers attend to the same features when judging drawings, the assessment criteria are carefully specified.

Key attributes:

main features   main body part and features observed and recorded; different body parts appropriately shaped and in reasonable proportions

3-dimensional quality   appropriate placement and size of near and far legs, horns; &c; use of shading

detail   fine detail of features observed and included; appropriate tonal marking (texture, pattern and line)

expressiveness   lifelike quality; confident treatment; enriched through subtle individual interpretation

what the student sees

When comparability matters
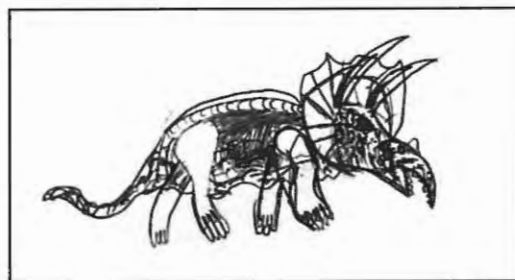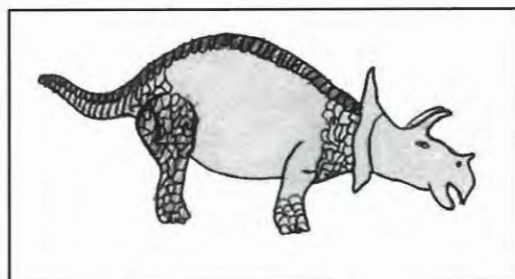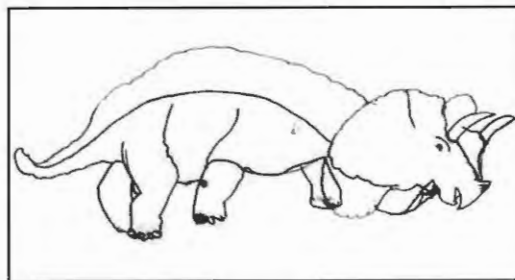
1   Wilson, J. and Fehring, H. (1995) *Keying Into Assessment,* Melbourne: Oxford University Press, p.79.

2   Jacqui Smith Balajurra Community College, Western Australia.

3   Year 9 graphic communication assignment, Methodist Ladies' College, Victoria, Australia.

4   International Baccalaureate Diploma Art/Design assessment criteria, teachers note, April 1996, p. 20 ©Copyright 1996, International Baccalaureate Organisation, Geneva, Switzerland. Reprinted with permission.

5   Richard Whillmott, Art Department, Melbourne High School, Victoria, Australia.

6   Michaela Brysha, Art Department, Melbourne High School, Victoria, Australia.

7   Monitoring Standards in Education Program, Education Department, Western Australia.

8   Educators in Connecticut's Pomperaug Regional School District 15 (1996) *A teacher's guide to performance-based learning and assessment* Alexandria VA: Association for Supervision and Curriculum Development.

9   Secondary Education Authority Syllabus Manual Year 11 and Year 12 Accredited Courses (1997) Secondary Education Authority, Western Australia p.10.

10 Sue Birch, Eltham College, Victoria, Australia.

11 Bridgetown High School, Western Australia.

12 Bridgetown High School, Western Australia.

13 Flockton, L. & Crooks, T. (1995) *Art Assessment Results 1995 National Education Monitoring Report 2* New Zealand Educational Assessment Research Unit: University of Otago pp.11-12.

In developmental assessment, judgements of student work are used to estimate and report achievement against a 'progress map'. A progress map describes the direction of student growth and details the knowledge, skills and understandings students develop as they progress through an area of learning. To assist teachers to monitor growth, progress maps often are marked out in levels.

A progress map describes a path of typical development so there is rarely a perfect match between what is described on the map and observations made for particular individuals. A *best estimate* of a student's level of achievement must be made from the available evidence.

Items that students make can provide useful information about students' levels of achievement in an area of learning, especially in technology and the visual arts. Preceding articles in this magazine discuss ways to enhance the usefulness of products as sources of information about student achievement. The validity, reliability and objectivity of estimates of students' achievement depend on the quality of evidence used to derive them.

The *validity* of an estimate depends on the relevance of the observations on which it is based. When teachers plan product assessments they need to ensure that the process by which students make items, and the items they make, provide evidence about relevant learning area outcomes.

The *reliability* of an estimate depends on the amount of information on which it is based. Generally, the more evidence used to make an estimate, the more reliable the estimate.

The *objectivity* of an estimate depends on the extent to which it is unaffected by choice of tasks or choice of assessors.

This article looks at ways in which

evidence of student achievement can be brought together and used to estimate and report levels of attainment on a progress map.

The first part of the article describes how students' levels of attainment can be estimated from four kinds of observations and judgements:
- holistic ratings of student work;
- analytic ratings of student work;
- checklists of outcomes achieved; and
- anecdotal records.

The second part of the article illustrates ways in which these estimates of attainment can be reported. Reports can be developed to address the needs of different audiences including:
- parents;
- education systems; and
- the general public.

Estimating attainment using holistic ratings

Records of student achievement sometimes take the form of holistic ratings — single overall judgements of student work. When making holistic ratings of student work, teachers match the features of the work to described levels on a rating scale. Examples of holistic rating scales are shown on pages 26-27.

When the levels on a rating scale are constructed to correspond to levels on a progress map, each rating provides a direct estimate of a student's location on that map. Sometimes holistic ratings of several pieces of student work are available. These multiple ratings can be used to make a more reliable on-balance estimate of a student's level of achievement.

In making an on-balance judgement across multiple ratings, teachers make 'best fit' decisions. For example, a student completing four product development tasks, might achieve three Level 3 ratings and one Level 4 rating. This would not be unusual. A ' best fit' judgement would place the student's

The validity, reliability and objectivity of estimates of students' achievement depend on the quality of evidence used to derive them.

Holistic rating

level 4
- understands finished plans
- makes detailed structural and executive design according to technical rules

level 3
- understands simple plans
- measures accurately to nearest mm
- prepares a plan for simple design using projections

level 2
- draws a basic plan
- measures accurately to nearest cm
- reads dimensions from drawings

6

5

4

3

2

1

level of attainment

level of attainment at upper Level 3. In contrast, a student may achieve very different result on each of the four tasks: Level 2, Level 3, Level 5, and Level 3. In making a 'best fit' judgement from these ratings, a teacher would need to consider the 'red herring' Level 5 rating. Did the student perform unusually well on this task? If so why? Has the student been assisted to complete the work perhaps?

Estimating attainment using analytic ratings

Records of student achievement sometimes take the form of analytic ratings: judgements of the quality of different aspects of a student's work. When teachers use an analytic rating scale, they consider student work from a number of different perspectives (criteria) and rate the work on each criterion using a set of rating categories such as Low, Medium, and High.

An example of an analytic rating scale is shown on page 35. In assessing Year 10 graphic communication assignments, teachers use this analytic rating scale to assess seven aspects of each stu-

dent's assignment using the rating categories Low (1), Medium (2), and High (3). Each assignment is then given an overall score which is the sum of these seven separate ratings and, on the basis of this score, a grade between E and A+.

Numerical aggregations of this kind are common in high-stakes contexts where it is important that students' ratings are treated consistently (eg to ensure that different assessors do not allocate different grades to students with identical ratings).

The ten grades E, E+, D, ... A+ represent levels of increasing performance on this assignment. If these grades could be described and mapped on to a more general progress map in graphic communication, then the ten grades on this assignment could be used to make estimates of students' levels of attainment on this more general graphic communication map. And, because students' low ratings on some criteria can be compensated for by high ratings on other criteria, the overall assignment scores and corresponding grades would provide 'on-balance' estimates of attainment.

If more than one set of analytic rat-

Teachers using this analytic rating scale developed to assess a Year 10 graphic communication assignment, rate seven features of the work using a 3-point scale: Low, Medium, High. On the basis of these ratings an on-balance estimate of each student's level of graphic communication achievement is made[1].

	1	2	3
	Low	Med	High

<u>symbol design</u>
range of different symbol designs
computer manipulation of symbol & addition of typeface
conversion of symbol to colour

<u>signage using gouache</u>
development of signage concepts and media trials
final presentation of colour signage with use of design elements and principles

<u>application of symbol</u>
development of letterhead, business card and envelope
final presentation of letterhead, business card and envelope

overall result

A+	A	B+	B	C+	C	D+	D	E+	E
21-20	19-18	17-16	15-14	13-12	11-10	9-8	7-6	5-4	3-2

Analytic ratings

ings is available (eg if teachers have assessed more than one assignment for each student against these seven criteria), then these multiple ratings can be combined to provide a still more reliable on-balance estimate of each student's level of attainment in the learning area.

Estimating attainment using checklists of outcomes

Records of student achievement sometimes take the form of checklists of outcomes achieved. If the outcomes listed correspond to outcomes on a progress map, then a record of outcomes achieved provides information about a student's location on that map.

When working from a record of outcomes achieved, teachers need to decide how many outcomes from a level a student must demonstrate before they are considered to have 'achieved' that level. Must they demonstrate some, most, or all outcomes?

Sometimes clear rules are set for assigning students to a level. For example, in the First Steps program students

need to exhibit all key indicators of a phase (level) before they are considered to be operating in that phase[2]. Where there are no rules, teachers make an on-balance judgement of the most appropriate level on the basis of the available evidence.

Estimating attainment using anecdotal records

Records of student achievement sometimes take the form of anecdotal records — the notes teachers make as they observe students during their day-to-day teaching.

When teachers' systematically recorded observations provide evidence about outcomes on a progress map, these records can provide a basis for on-balance judgements of students' levels of attainment on that map.

As with other records, teachers need to decide how many outcomes from a level a student must demonstrate before they are considered to have 'achieved' that level.

Reporting

When teachers, schools and education systems base their reporting procedures on the principles of developmental assessment, reports are built around the concept of a progress map.

Reports to *parents* are likely to:

• provide estimates of individuals' levels of achievement on a progress map;

• interpret levels of achievement descriptively in terms of the kinds of knowledge, skills and understandings typical of students at each level;

• display achievements graphically; and

• interpret achievements by reference to the achievements of other students of the same age or grade.

Example 1

In this parent report, student achievement is reported as a level on a progress map. The student achieved level 5 in the areas of Designing, Making and Appraising; and Materials, and level 4 in Information, and Systems. This information is accompanied by detailed description of the kinds of knowledge, skills and understandings which the student demonstrated[3].

TECHNOLOGY

NAME: *Wayne Smith*   DATE: *8 June 2004*   YEAR: *8*

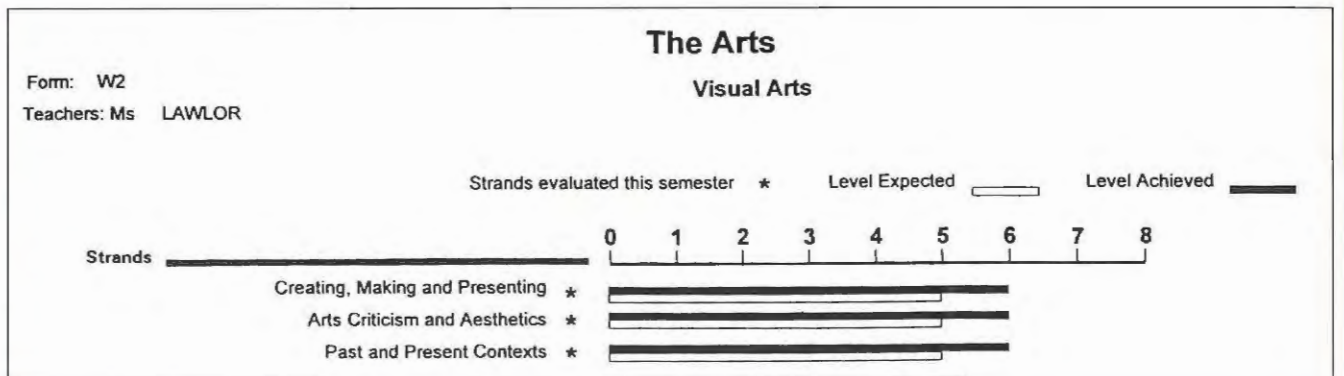| KNOWLEDGE AND CAPABILITIES	INDICATORS OF ACHIEVEMENT	LEVELS
Wayne has demonstrated understanding of some of the impacts of technology on the community and the environment.	*Wayne has worked consistently and confidently through a number of activities so far this year.*	Designing, Making and Appraising
He can work alone or in a group to achieve a common goal.	*For example, he:*	**5**
He assesses the effect of his designs, products and production processes.	• *used a construction kit to investigate the workings of a ratchet. He used this knowledge to design a lifting device.*	Information
He is becoming increasingly adept at selecting and using techniques to manage and measure the performance of systems, and to assemble components.	• *examined how different cultures present and cook their food.*	**4**
	• *tested a range of fabrics to be used for a waterproof covering for an outdoor table.*	Materials
He can organise and present information in a variety of ways.	• *made a set of wooden bookends using his own design process.*	**5**
He uses a range of strategies to generate design proposals, exploring alternatives and explaining his ideas to others.	• *disassembled and recorded how an electric circuit in a buzzer works.*	Systems
	• *presented a demonstration of his lifting device to the class.*	**4**

ADDITIONAL COMMENTS:

Wayne has demonstrated his understanding of the design-make-appraise approach to problem solving. He uses tools and equipment competently and safely. He needs more experience in use of specialist terms, conventions and symbols.   **Teacher**

Example 2

In this parent report student achievement is illustrated graphically for each of three strands in the visual arts. The level at which students are expected to achieve is shown also[4].

The Arts

Visual Arts

Form: W2

Teachers: Ms LAWLOR

Strands evaluated this semester ★   Level Expected _____   Level Achieved _____

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

Strands

Creating, Making and Presenting ★

Arts Criticism and Aesthetics ★

Past and Present Contexts ★

Reports to *education systems* and the general public are likely to

• display achievements graphically, indicating groups' estimated locations on a progress map.

Three examples of reports to parents in the learning areas of Technology and the Arts are shown on pages 36-38. Example 1 is a report of a student's achievements in Technology. The student is reported to have performed at Level 5 in Designing, Making and Appraising; Level 4 in Information; Level 5 in Materials; and Level 4 in Systems. This summary of the student's achievements is accompanied by detailed descriptions of the kinds of knowledge, skills and understandings he has demonstrated.

Example 2 is a pictorial report of a student's achievements in the Visual Arts. This student performed at Level 6 is each of the three strands shown here (Creating, Making and Presenting; Arts Criticism and Aesthetics; Past and Present Contexts). The report shows the full range of possible achievement levels. It also shows the level of achievement (Level 5) expected of students at this stage in their schooling.

Example 3 is a report of a student's achievements in Design and Technology. It shows the student's estimated levels of attainment in the strands Designing, Making and Appraising; Information; Materials; and Systems. As in Example 2, the full range of possible achievement levels is shown. This report uses a vertical line to show whether the student is just into, well into, or has achieved a level. For example, this student's achievements place her just into Level 3 on Systems, but just into Level 4 on Designing, Making and Appraising. The shaded region on each strand shows the range within which 80% of students in the class are achieving.

A progress map also provides a frame of reference against which the achievements of groups of students can be plotted and compared, and in terms of which educational standards can be monitored over time. The Monitoring Standards in Education (MSE) program in Western Australia reports the performances of representative samples of Year 3, 7 and 10 students throughout the state against progress maps in a number of learning areas.

The display on page 39 (Example 4) is taken from an MSE report of student achievement in Technology and Enterprise. The survey included some teachers using the new Technology and Enterprise curriculum (SOS), and other teachers using the more traditional (non-SOS) approach to technology and enterprise. The intention of the survey

was to provide baseline data against which future performances could be compared.

The display summarises the performances of Year 3 and Year 7 students in the Design, Make and Appraise strand of Technology and Enterprise. On the left of the display are the Outcome Statement levels; in the centre, the MSE scale. The shaded columns mark the ranges within which 80% of students performed. The dark section of the column marks the middle 30% of students. The triangle indicates the mean level of attainment.

Example 3

This parent report shows pictorially the student's level of achievement in relation to the class range of achievement. The position of the vertical black line indicates the student's level of attainment within each level[5].

DESIGN AND TECHNOLOGY

TEACHERS INVOLVED		STUDENT Mary

DESIGN BRIEFS	COMPLETED	CAUSED DIFFICULTY
CHILD'S TOY Design and construct a toy to be used by a 5 year old child CONTEXT—Leisure and Lifestyle	✓	
HOLD ALL Design and manufacture a flexible package that will hold a range of objects CONTEXT—Clothing and Accessories	✓	
MARKET DAY DISPLAY Design and manufacture an information package for the end of year Market Day CONTEXT—Information and Communication		✓

STRANDS	LEVELS OF ACHIEVEMENT							
	1	2	3	4	5	6	7	8
DESIGNING, MAKING AND APPRAISING			▨	▮ ▨	▨			
INFORMATION		▨	▮ ▨	▨				
MATERIALS		▨	▨ ▮	▨				
SYSTEMS	▨	▨	▮ ▨					

Mary readily adapts to both group and independent work situations. She ensures that all relevant information and needs are considered when working through the design process. Mary is keen to explore a variety of materials for her designs. She usually ensures work practices are safe and correct tools are used.

Teacher

▨ 80% of students in class in this range   ▮ Individual student achievement

Example 4

In Western Australia educational standards are monitored against progress maps (described in terms of Outcome Statements) in various areas of the curriculum.

This display summarises the performances of Year 3 and Year 7 students in the Design, Make and Appraise strand of Technology and Enterprise. On the left of the display are the Outcome Statement levels; in the centre, the MSE scale. The shaded columns mark the ranges within which 80% of students performed. The dark section of the column marks the middle 30 % of students. The triangle indicates the mean score. SOS students are those working with the new Technology and Enterprise philosophy[6].
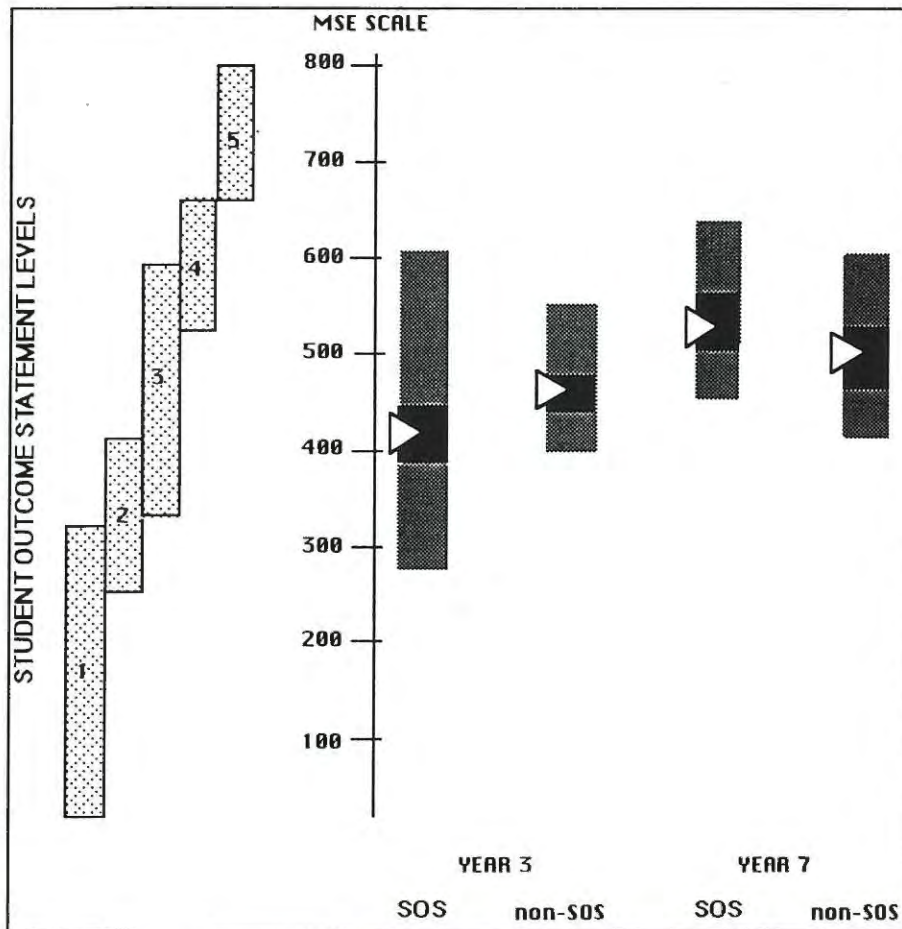
1   Methodist Ladies' College, Melbourne.

2   Western Australian Ministry of Education (1991) First Steps Developmental Continuum.

3   Department of Education, Community and Cultural Development (1996) *Reporting on Student Development* (Support materials for the implementation of the Reporting to Parents Policy in schools and colleges), Tasmania: DECCD, p. 22.

4   Bridgetown High School, Western Australia, Year 10 report, 1995.

5   NSW Department of School Education (1994) *Preliminary Ideas on Assessment and Reporting*, Curriculum Directorate: NSW Australia, p. 65.

6   Western Australian Department of Education (1996) *Technology and Enterprise Assessment Project,* Perth Australia p. 17.

Designing Product Assessments

In developmental assessment, teachers monitor student progress against a map of developing skills, knowledge and understandings. Product assessments are one method that can be used to collect evidence of student achievement. Different kinds of product assessment provide different kinds of evidence which teachers can use to estimate students' locations on a progress map.

This article lists issues which teachers need to consider when designing product assessments. These issues include questions of assessment purpose, methods for judging and recording student performance, and ways of estimating and reporting students' levels of achievement. A 'checklist' summary of the assessment design process is included at the end of the article.

Planning product assessments

What is the purpose of the assessment?

1. Do you want to assemble evidence about the preparation, production or appraisal phases of product development?

How you answer this question will determine the times at which you observe students' work, the kinds of observations you make and the methods you use to judge and record students' work.

2. For which curriculum goals or outcomes will you assemble evidence?
Is the evidence you are assembling relevant? That is, does it focus on explicit instructional or outcome goals?

Does the evidence you are assembling address the full range of outcomes across the phases of product development?

3. How tightly will you specify the product development parameters? Which elements of the product will you specify?

How much direction will you give? Will you specify the stages of product development? Will you constrain the brief to target particular learning outcomes or to make product assessments more comparable?

In summary

What is the purpose of the product assessment?
- preparation, production or appraisal?
- evidence of which curriculum goals/outcomes?
- how tightly specified?

Judging and recording

1. How will you judge and record student work? Will you use anecdotal notes, analytic ratings, holistic ratings or checklists?

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

3. Which assessment criteria will you use? Do your assessment criteria provide evidence which is relevant?

How great is the need for comparability of judgements?

If you are assessing products in a context where comparability is particularly important you will need to ensure consistency of assessment criteria interpretation (marker training) and perhaps use a number of judges.

In summary

How will you judge and record student work?
- Which method will you use (anecdotal notes, holistic or analytic schemes, checklists)?
- Who will assess (student, peer, parent, teacher)?
- Which criteria will you use?
- How comparable will assessments be?

Summarising and reporting student work

How will you estimate and report students' levels of achievement on a progress map?

1. From which evidence will you estimate a student's level of achievement? Will you use holistic ratings or analytic ratings of student work; checklists of outcomes achieved, or anecdotal records?

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

3. How will you report student achievement? Will you interpret levels of achievement descriptively? Will you display achievements graphically?

In summary

- from which evidence?
- subjective or objective?
- report descriptively and/or graphically?

A Summary of the Product Assessment Design Process

Design stage	Design strategies
Deciding the assessment purpose	Describe the assessment purpose.
	Review these descriptions against important curriculum objectives and outcomes of the learning area.
Deciding curriculum goals or outcomes to be targeted	List the goals or outcomes (preparation, production or appraisal phases).
Deciding when in the product development process to collect evidence	Review these against important curriculum objectives and outcomes of the learning area to check relevance.
Deciding on a procedure for judging and recording evidence	Develop observation and/marking guides. Review these guides against important curriculum objectives and outcomes of the learning area to check relevance.
	Decide who will assess (self, peer, teacher).
Deciding on a procedure for estimating levels of achievement	Describe the procedure for estimating levels of achievement.
Deciding on a procedure for reporting levels of achievement.	Describe the procedure for reporting levels of achievement.
	Review these descriptions against the task purpose and audience.

ASSESSMENT RESOURCE KIT (ARK)

ORDER FORM
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Camberwell Vic 3124 AUSTRALIA
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