



Agricultural Technology Years 7–10

Advice on Programming and Assessment

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Published by
Board of Studies NSW
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Sydney NSW 2001
Australia

Tel: (02) 9367 8111
Fax: (02) 9367 8484
Internet: www.boardofstudies.nsw.edu.au

November 2003

ISBN 1 7409 9859 6

2003587

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1 Introduction

This support document has been designed to help teachers understand key aspects of the new *Agricultural Technology Years 7–10 Syllabus* and to provide guidance for implementation. The document shows how these aspects can be incorporated in teaching and learning programs, and how these programs are underpinned by the principles of *assessment for learning* (*Agricultural Technology Years 7–10 Syllabus*, p 47).

The document provides advice about constructing a program that will cover the scope of Agricultural Technology for a stage. It sets out a process for planning and sequencing units of work, and developing teaching and learning activities.

The sample stage program plans and the sample units of work in this document demonstrate ways in which teachers can build a teaching and learning program and develop units of work to ensure coverage of the scope of the syllabus.

The document contains two Stage 5 sample units of work:

- Vegetable Production Enterprise – In this unit students will be involved in the growing and harvesting of a range of vegetables and learn about related aspects of the production process.
- Layers Enterprise – In this unit students will develop knowledge, understanding and skills related to the intensive farming of animals. The management and monitoring of an egg-laying flock is used to illustrate the techniques and practices associated with good animal husbandry.

These sample units can be used as models for planning units of work. They include:

- relevant outcomes and content
- assessment activities that have been designed and integrated into the units of work
- different types of possible feedback
- a variety of teaching and learning experiences
- opportunities for student reflection.

An assessment activity from each unit has been selected to show how assessment can fit into teaching and learning sequences. They are described in some detail to illustrate the process of *assessment for learning*. Teachers would not provide this level of detail in day-to-day classroom situations. The units of work and activities may be modified or amended to suit the needs, interests and abilities of students.

For a small percentage of students with special education needs who are undertaking Life Skills outcomes and content, support materials will be provided which will assist in the development of a meaningful and relevant program of study related to the *Agricultural Technology Years 7–10 Syllabus*. Units of work adapted for students undertaking Agricultural Technology Life Skills will be included in a consolidated document that will be distributed to schools early in 2004.

2 Establishing a Scope and Sequence Plan

A fundamental step in the design of effective teaching and learning programs is the development of a scope and sequence plan. This plan provides an overview of the units to be taught and details the placement, sequence and duration of units. When establishing a scope and sequence plan there are a number of important considerations.

Syllabus requirements

The major emphasis in the *Agricultural Technology Years 7–10 Syllabus* is on students being actively involved in the practical application of knowledge, understanding and skills to agricultural enterprises. Practical activities should be the major focus of students' experiences. When developing programs of work, teachers should consider the range of agricultural enterprises that could be undertaken to satisfy syllabus requirements.

Agricultural teachers should:

- build upon the previous learning experiences of the students, with content increasing in sophistication and student autonomy increasing as they progress through the course
- provide students with a range of experiences over the duration of the course
- cater for the needs, interests and abilities of students and/or for areas of community significance
- provide an avenue for the delivery of all essential syllabus content within the context of the practical activities undertaken throughout the course
- ensure that agricultural enterprises are undertaken in accordance with relevant guidelines and directives of their individual education authorities and/or schools.

Flexibility

The syllabus structure acknowledges that schools require flexibility to design programs that best meet the needs of the students within the school curriculum structure and that allow for the most effective utilisation of resources. Geographical factors will affect the sequencing and the scope of the selection of agricultural enterprises suitable for study.

Further considerations

Teachers need to be aware of, and account for, the relevant guidelines and directives of their education authorities and/or schools. Teaching programs should recognise and reflect relevant state and Commonwealth legislation, Regulations and standards including Occupational Health and Safety, Chemical Safety in Schools and Animal Welfare guidelines. Teachers need to be aware of activities that may require notification, certification, permission, permits and licences.

Advice for creating a scope and sequence plan for a 200-hour course

- Consider the number and type of enterprises to be studied with consideration to those appropriate to your school in terms of:
 - existing resources
 - teacher expertise
 - student interest
 - existing programs or local community support.
- Identify how all of Core A and Core B can be integrated into the number of agricultural enterprises selected, ensuring that the practical applications can be addressed within the range of enterprises being undertaken. To satisfy the mandatory requirements of a 200-hour course students must complete the essential content specified in Core A and Core B within the context of a **minimum** of four agricultural enterprises.

- Produce a program covering the 200 hours, as in the sample Stage 5 scope and sequence plan for Years 9 and 10 that follows.
- In developing and delivering teaching programs, teachers should be aware of and adopt relevant guidelines and directives of their education authorities and/or schools. Teaching programs should recognise and reflect relevant state and Commonwealth legislation, regulations and standards including Occupational Health and Safety Standards, Chemical Safety in Schools and Animal Welfare guidelines. Teachers need to be aware of activities that may require notification, certification, permission, permits and licences.

Note: For schools choosing to offer the 100-hour course, a variation would need to be developed that includes all of Core A into a minimum of two agricultural enterprises.

For the following possible scope and sequence plans for Years 9 and 10, examples have been selected to show that:

- an agricultural enterprise may be revisited or undertaken across an extended time frame
- sections of Core A and Core B can be integrated into appropriate parts of an individual agricultural enterprise to be taught so that all of the core content is taught over the two years
- agricultural enterprises may be planned for teaching over different lengths of time (eg from 6 weeks to over 20 weeks).

2.1 Sample Stage 5 Scope and Sequence Plan – 200-hour Course

	Year 9	Year 10
Term 1	<p>Beef Cattle Enterprise</p> <p>In this unit of work students will discuss the guidelines for the breeding and management of beef cattle and undertake the preparation and fitting of a suitable animal for shows and sales.</p> <p>Students will research the ancestry of cattle breeds and evaluate the qualities and suitability of different breeds for Australian conditions and for local and overseas markets.</p>	<p>Vegetable Production Enterprise*</p> <p>In Australia, vegetables are grown either as a conventional ground crop, or as is becoming more the norm, a high tech hydroponic greenhouse crop. This second method of commercially producing vegetables has many advantages over conventional soil produced crops eg the ability to extend the growing season by several months. This allows for a wider variety of crops to be selected for potential markets.</p> <p>In this unit of work, students will be involved in the growing and harvesting of a range of vegetables and learn about related aspects of the production process such as plant pests and diseases, soils, climate, plant nutrition, irrigation, processing, storing and marketing.</p>
Term 2		
Term 3	<p>Wheat Production Enterprise</p> <p>Students will develop an understanding of the nature of the wheat industry in Australia and examine the relationships between grain handling, quality control and marketing, storage and the impact of new varieties.</p> <p>Students will also follow the path of wheat products through the practical processes of milling and evaluate flour yield and dough properties. They will discuss the quality of flours required for bread-making and noodle-making.</p>	<p>Layers Enterprise*</p> <p>This enterprise takes students through a range of knowledge and skills for intensive farm animals. The managing and monitoring of an egg-laying flock is used to illustrate the techniques and practices associated with good animal husbandry.</p> <p>Students will raise a chicken from one day old to approximately ten weeks, thus becoming aware of the varied husbandry practices required to raise a young animal.</p> <p>Over the ten weeks, the students collect and record a range of readings on developmental characteristics for the chicken, and produce a graph for the weight changes over time.</p>
Term 4		

*The sample units of work Vegetable Production Enterprise and Layers Enterprise are described in detail on pages 22–28 and pages 31–37.

Syllabus outcomes mapped against enterprise-based units of work

Stage 5 Outcome	Beef Cattle	Vegetable Production	Pastures and Field Crops	Layers	Landscaping
5.1.1	x	x			x
5.1.2		x	x		
5.2.1	x		x		
5.3.1		x		x	
5.3.2	x			x	
5.3.3		x	x		x
5.3.4	x			x	
5.4.1			x		x
5.4.2			x		x
5.4.3	x			x	
5.5.1			x		x
5.5.2		x		x	
5.6.1		x			x
5.6.2	x			x	

Note: This is an example only. Only the focus outcomes have been mapped. Other syllabus outcomes may be addressed within each unit.

3 Advice on Assessment

3.1 Assessment for Learning

The Board’s revised syllabuses advocate *assessment for learning*. Assessment that enhances learning recognises that learners use their current understanding to discover, develop and incorporate new knowledge, understanding and skills. *Assessment for learning* helps teachers and students to know if that current understanding is a suitable basis for future learning.

Assessment occurs as an integral part of teaching and learning. Teacher instruction and assessment influence student learning and learning processes. This involves using assessment activities to clarify student understanding of concepts, and planning ways to remedy misconceptions and promote deeper understanding.

Assessment for learning encourages self-assessment and peer assessment. Students can develop and use a range of strategies to actively monitor and evaluate their own learning and the learning strategies they use.

The feedback that students receive from completing assessment activities will help teachers and students decide whether they are ready for the next phase of learning or whether they need further learning experiences to consolidate their knowledge, understanding and skills. Teachers should consider the effect that assessment and feedback have on student motivation and self-esteem, and the importance of the active involvement of students in their own learning.

By integrating learning and assessment, the teacher can choose which aspects of a student’s performance to record. These records can be used to monitor the student’s progress, determine what to teach next and decide the level of detail to be covered. At key points, such as the end of the year, this information is also available for the teacher to use to form a judgement of the student’s performance against levels of achievement. This judgement can be used to inform parents, the next teacher and especially the student, of the student’s progress. Consequently, teachers using their professional judgement in a standards-referenced framework are able to extend the process of *assessment for learning* into the assessment of learning.

Principles of assessment for learning

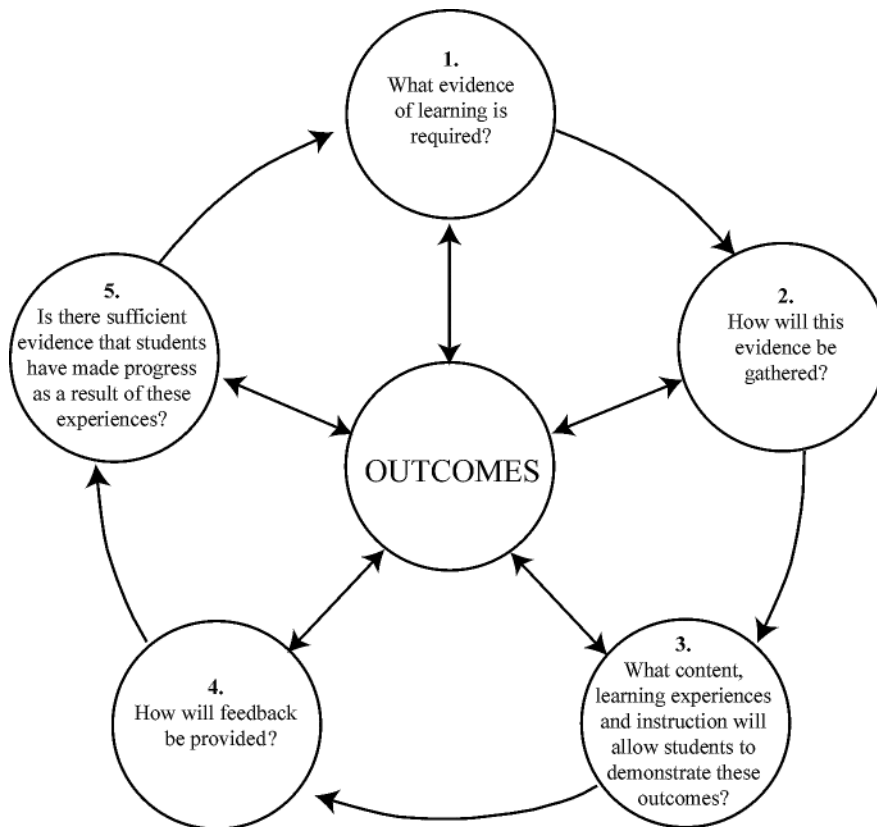
Assessment for learning:

- AP1 emphasises the interactions between learning and manageable assessment strategies that promote learning
- AP2 clearly expresses for the student and teacher the goals of the learning activity
- AP3 reflects a view of learning in which assessment helps students learn better, rather than just achieve a better mark
- AP4 provides ways for students to use feedback from assessment
- AP5 helps students take responsibility for their own learning
- AP6 is inclusive of all learners.

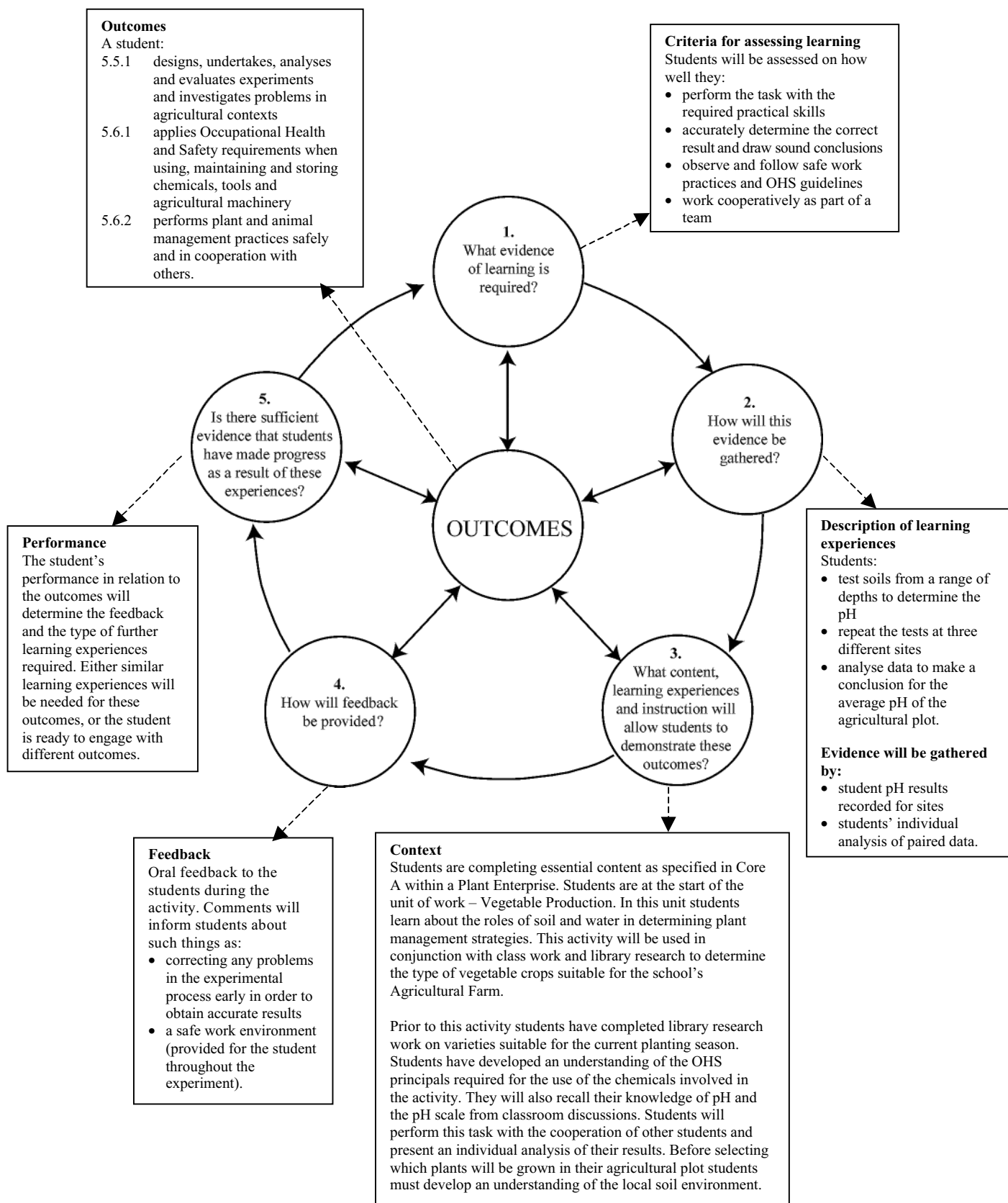
Details on how these principles translate in practice can be found on page 47 of the *Agricultural Technology Years 7–10 Syllabus*. One activity in this document has been annotated to show how the principles of *assessment for learning* feature in that activity. It can be found on pages 14–15.

3.2 Planning for Effective Learning and Assessment

The diagram below summarises a model for integrating learning and assessment. It emphasises that outcomes are central to the decisions teachers make about the learning to be undertaken and the evidence of learning that needs to be collected. This evidence enables teachers to determine how well students are achieving in relation to the outcomes and to provide students with feedback on their learning. Evidence of learning assists teachers and students to decide if students are ready for the next phase of learning or if teachers need to adapt programs to provide further learning experiences to consolidate students' knowledge, understanding and skills.



The diagram below shows how this process has been applied in the design of the sample activity Soil pH Testing from the unit on Vegetable Production Enterprise (pages 29–30).



3.3 Designing Effective Learning and Assessment

Designing effective learning experiences requires the selection of activities that develop students' knowledge, understanding and skills and that allow evidence of learning to be gathered. Methods of gathering evidence could include informal teacher observation, questioning, peer evaluation and self-evaluation, as well as more structured assessment activities. Assessment should be an integral part of each unit of work and should support student learning.

When designing assessment activities, teachers should consider whether the activity:

- has explicitly stated purposes that address the outcomes
- is integral to the teaching and learning program
- shows a clear relationship between the outcomes and content being assessed
- allows students to demonstrate the extent of their knowledge, understanding and skills
- focuses on what was taught in class and what students were informed would be assessed
- provides opportunities to gather information about what further teaching and learning is required for students to succeed
- provides valid and reliable evidence of student learning and is fair.

3.4 Annotated Assessment for Learning Activity

The *Assessment for Learning Principles* provide the criteria for judging the quality of assessment materials and practices. The Stage 5 sample assessment activity, Soil pH Testing, has been annotated to show these principles.

Sample assessment for learning activity: Soil pH Testing

Context

Students are completing essential content as specified in Core A within a Plant Enterprise. Students are at the start of the unit of work - Vegetable production. In this unit students learn the role of soil and water in determining plant management strategies. This activity will be used in conjunction with class work and library research to determine the type of vegetable crops suitable for the School's Agricultural Farm.

Prior to this activity students have completed library research work on varieties suitable for the current planting season. Students have developed an understanding of the OHS principals required for the use of the chemicals involved in the activity. They will also recall their knowledge of pH and the pH scale from classroom discussions. Students will perform this task with the cooperation of other students and present an individual analysis of their results. Before selecting which plants will be grown in their agricultural plot students must develop an understanding of the local soil environment.

The activity forms an integral part of the learning process and builds on previous experiences.
AP1, AP2, AP3

This activity has a clear purpose with clear links to learning goals.
AP1, AP2

Outcomes

A student:

- 5.5.1 designs, undertakes, analyses and evaluates experiments and investigates problems in agricultural contexts
- 5.6.1 applies Occupational Health and Safety requirements when using, maintaining and storing chemicals, tools and agricultural machinery
- 5.6.2 performs plant and animal management practices safely and in cooperation with others.

Syllabus outcomes are identified, with both understanding and skills targeted.
AP1, AP3

Description of activity

Students will perform a standard Soil Test to determine the pH of the selected site for vegetable production. Students will work in pairs and compare their data with that from other groups. Each pair of students will test different sites within the student Agricultural Plots. Three depths within each site will be tested. Students will individually analyse their results to suggest which vegetable crops to grow in their vegetable plots. This activity will be completed within 1–2 hours.

Criteria for assessing learning

(These criteria would normally be communicated to students with the activity)

Students will be assessed on their ability to:

- perform the task with the required skill
- accurately determine the correct result and draw sound conclusions
- observe and follow safe work practices and OHS guidelines
- work cooperatively as part of a team.

The open nature of this activity allows for a range of student responses and is inclusive of all learners.
AP6

The link between the marking guidelines and criteria for judging performance and the outcomes is clear and explicit.
AP1, AP3

Guidelines for marking

The following guidelines for marking show one approach to assigning a value to a student’s work. Other approaches may be used that better suit the reporting process of the school. Categories, marks, grades, visual representations or individual comments / notations may all be useful.

Range	A student in this range:
11–15 (High)	<ul style="list-style-type: none"> demonstrates a high level of proficiency and skill when undertaking practical processes and techniques consistently collects accurate information and evaluates it to draw correct conclusions demonstrates a clear ability to work as part of a team which works independently from the teacher independently follows all OHS procedures and performs the task without any risk to them or other students.
6–10 (Satisfactory)	<ul style="list-style-type: none"> demonstrates the skills needed for undertaking practical processes and techniques collects results without teacher direction and generally draws correct conclusions cooperates as part of a team which may need guidance by the teacher follows all OHS procedures after direction by the teacher and performs the task without any risk to them or other students.
1–5 (Progressing)	<ul style="list-style-type: none"> demonstrates some knowledge of the skills needed for undertaking practical processes and techniques requires assistance to collect and use results sometimes cooperates as part of a team requires supervision when using equipment and in following the OHS procedures.

Assessment guidelines reflect the nature and intention of the activity and are expressed in terms that provide feedback to students.
AP4

Feedback

Oral feedback will be given to the students during the activity on such things as:

- correcting any problems in the experimental process early in order to obtain accurate results
- reinforcing safe work practices.

At the conclusion of the activity, the teacher will provide written feedback on such things as:

- practical skills, safe work practices and teamwork
- accuracy of conclusions drawn from experimental results.

Future directions

Students will continue to undertake study relating to the production of a vegetable crop, with the main purpose of successfully producing at least one product.

Further suggested areas of study relating to this activity include the use of the Data Logger and pH probe to determine the pH of the soil water. From this the results can be graphed for a number of sites across the Agricultural Farm.

Students would use pH results to investigate if problems exist and develop possible solutions. This would link to the additional content of Core B where students learn about the effect of soil conditioners eg lime. They could then design and undertake an experiment examining the effect of lime on soil pH.

The activity shows the knowledge, skills and understanding to be built on.
AP1

The activity encourages students to take responsibility for their own learning.
AP5

Resources

Student Soil pH Testing sheet.

Assessment for Learning Principles

The following table shows some of the criteria that have been used to annotate the assessment for learning activities in this document. This list of criteria is not exhaustive; it has been included to provide support in understanding the *Assessment for Learning Principles*.

It is not envisaged that teachers will use this table as a checklist each time an assessment activity is developed. However, this could be a valuable tool for use in staff development activities.

<p>Assessment principle 1</p> <p><i>The activity emphasises the interactions between learning and manageable assessment strategies that promote learning.</i></p>	<p>Related criteria</p> <ul style="list-style-type: none"> • The activity has a clear statement of purpose. • The activity lists the outcome(s) to be addressed. • The activity is appropriate for the outcomes being assessed. • The activity forms part of the learning and has clear links to learning goals. • The activity shows the knowledge, skills and understanding that are being built on.
<p>Assessment principle 2</p> <p><i>The activity clearly expresses for the student and teacher the goals of the learning activity.</i></p>	<p>Related criteria</p> <ul style="list-style-type: none"> • The link between the marking guidelines and/or criteria for judging performance and the outcomes is clear and explicit. • The language of the marking guidelines and/or criteria for judging performance and the outcomes is clear and explicit. • The activity clearly indicates the knowledge, skills and/or understanding to be developed.
<p>Assessment principle 3</p> <p><i>The activity reflects a view of learning in which assessment helps students learn better, rather than just achieve a better mark.</i></p>	<p>Related criteria</p> <ul style="list-style-type: none"> • The activity has the capacity to engage the learner. • The activity has been designed to target skills and understandings that lead to deeper learning as well as knowledge. • The activity models an approach that has the activity as an integral component of the learning.
<p>Assessment principle 4</p> <p><i>The activity provides ways for students to use feedback from assessment.</i></p>	<p>Related criteria</p> <ul style="list-style-type: none"> • Marking guidelines and/or criteria for judging performance reflect the nature and intention of the activity and will be expressed in terms of the knowledge and skills demanded by the activity. • Marking guidelines and/or criteria for judging performance enable meaningful and useful information on performance, relative to the outcomes, to be gathered and reported.
<p>Assessment principle 5</p> <p><i>The activity helps students take responsibility for their own learning.</i></p>	<p>Related criteria</p> <ul style="list-style-type: none"> • The activity models ways that self-assessment and peer assessment can be used as valid means of assessment.
<p>Assessment principle 6</p> <p><i>The activity is inclusive of all learners.</i></p>	<p>Related criteria</p> <ul style="list-style-type: none"> • The activity is inclusive of gender, ethnicity, and a variety of socio-economic and geographical groupings.

3.5 Sharing Learning and Assessment Intentions

Students must be aware of what they need to do to demonstrate evidence of learning. This information could be conveyed informally or formally by the teacher, as appropriate for the learning activity. Students should be informed of the criteria that will be used to assess their learning. They should be clear about the meaning of the language used, and the subject-specific terminology. They also need to be clear about any sources or stimulus material that are appropriate to the activity.

It may be helpful to give students models of good responses and templates, or procedures to help them demonstrate the extent of their knowledge, understanding and skills.

3.6 Effective Feedback to Students

The aim of feedback is to communicate to students how well their knowledge, understanding and skills are developing in relation to the outcomes. Feedback enables students to recognise their strengths and areas for development, and to plan with their teacher the next steps in their learning. They are then given opportunities to improve and further develop their knowledge, understanding and skills.

Teacher feedback about student work is essential for students and is integral to the teaching and learning process. Student self-reflection and peer evaluation can also provide valuable feedback to students. Students should be provided with regular opportunities to reflect on their learning.

Feedback should:

- focus on the activity and what was expected
- be constructive, providing meaningful information to students about their learning
- correct misunderstandings
- identify and reinforce students' strengths and state clearly how students can improve.

Forms of feedback include:

- oral discussion with class, groups or individual students
- written annotations
- general comments to the class about those aspects of the activity in which students excelled and those aspects that still need addressing
- examples of good responses
- peer evaluation and self-evaluation.

3.7 Recording Evidence for Assessment

Recording student performance needs to be manageable. Teachers should make decisions about which aspects of student performance on an activity should be recorded, and in what format. The teacher can use this information to ascertain students' progress, what needs to be taught next and to what level of detail, and to form a judgement of student achievement at key points.

Record-keeping should reflect the reporting processes of the school and may take the form of individual comments or notations, marks, grades or visual representations for the activities.

A scale such as the one below may be a useful way to summarise the extent of students' learning. This example shows how individual students performed on the same assessment activity.

Student	Activity – Soil pH Testing		
Alex			x
Barran	x		
Cam			x
Dee	x		
Eden		x	
Finna	x		
	Progressing	Satisfactory	High

This method can be adapted to capture evidence of an individual student's strengths and weaknesses on various elements of one activity, or the performance of a particular student, class, group or cohort of students, across a range of assessment activities.

4 Programming Units of Work

The sample units of work have been developed using the following process:

- 1 identify the outcomes that will be addressed in the unit
- 2 decide on the focus of the unit of work
- 3 decide on the evidence of learning that will be required, how students will demonstrate learning in relation to the outcomes and how this evidence will be gathered and recorded
- 4 select the relevant syllabus content for the identified outcomes relating to the knowledge, understanding and skills that students will develop
- 5 plan the learning experiences and instruction, and identify the *assessment for learning* strategies that will provide the evidence of learning, checking that:
 - a range of assessment strategies is used
 - meaningful feedback in a variety of forms can be given to students
 - opportunities are provided to reflect on student progress and modify future learning experiences accordingly.

5 Sample Units of Work

The sample units of work that follow are designed to assist teachers in planning for the implementation of the *Agricultural Technology Years 7–10 Syllabus*. The units provide programming ideas for selected syllabus content.

The sample units show ways in which teachers can meet the needs, interests and abilities of their students, while assessing their progress towards a demonstration of outcomes. The sample units also illustrate ways in which assessment activities may be integrated into the teaching and learning sequence. They will assist teachers to understand the importance of:

- being explicit about the outcomes and content they are addressing
- being explicit about the evidence required to demonstrate student learning
- providing meaningful feedback to students
- adapting teaching and learning programs to students' demonstrated needs
- having a sound basis for modifying future teaching and learning programs (in light of students' demonstrated needs).

The sample units provide opportunities for students to engage in questioning and dialogue, self-assessment, peer assessment and reflection. Through these activities students can become clear about their own learning, understanding and needs.

Note that the assessment activities are described here in some detail to illustrate the process of *assessment for learning*. Teachers would not provide this level of detail in day-to-day classroom situations.

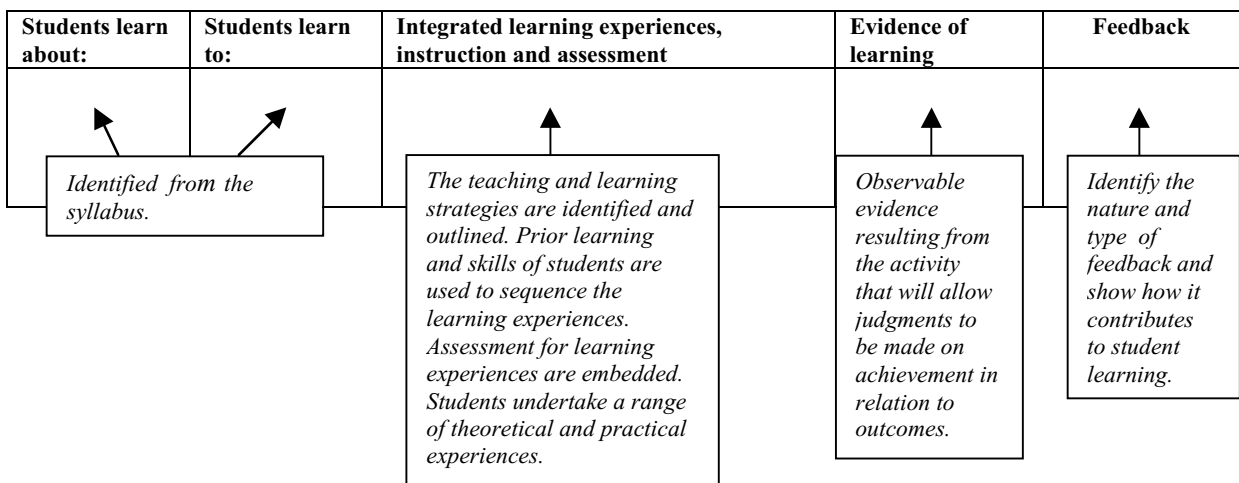
Sample Unit of Work Proforma – Agricultural Technology

Schools may choose to use or adapt the proforma style provided below. The proforma below has been annotated to show the characteristics of each part.

Front page:

Unit Title:	
Description:	<i>An overview of the unit of work.</i>
Suggested Unit Length:	<i>Planned number of teaching weeks to address the content at appropriate depth.</i>
Targeted Outcomes:	Resources:
<i>List of syllabus outcomes targeted in this unit of work.</i>	<i>Identified list of resources, including websites, useful to teachers and students.</i>

Planning pages:



5.1 Stage 5 Sample Unit of Work: Vegetable Production Enterprise

<p>Unit Title: Vegetable Production Enterprise</p> <p>Description: In Australia, vegetables are grown either as a conventional ground crop, or as is becoming more the norm, a high-tech hydroponic greenhouse crop. This second method of commercially producing vegetables has many advantages over conventional soil produced crops, eg the ability to extend the growing season by several months. This allows for a wider variety of crops to be selected for potential markets. In this unit of work, students will be involved in the growing and harvesting of a range of vegetables and learn about related aspects of the production process, such as plant pests and diseases, soils, climate, plant nutrition, irrigation, processing, storing and marketing.</p> <p>Suggested Unit Length: An ongoing enterprise over four school terms.</p>	
<p>Targeted Outcomes</p> <p>5.1.1 explains why identified plant species and animal breeds have been used in agricultural enterprises and developed for the Australian environment and/or markets</p> <p>5.1.2 explains the interactions within and between agricultural enterprises and systems</p> <p>5.2.1 explains the interactions within and between the agricultural sector and Australia’s economy, culture and society</p> <p>5.3.1 investigates and implements responsible production systems for plant and animal enterprises</p> <p>5.3.3 explains and evaluates the impact of management decisions on plant production enterprises</p> <p>5.5.1 designs, undertakes, analyses and evaluates experiments and investigates problems in agricultural contexts</p> <p>5.5.2 collects and analyses agricultural data and communicates results using a range of technologies</p> <p>5.6.1 applies Occupational Health and Safety requirements when using, maintaining and storing chemicals, tools and agricultural machinery.</p> <p>5.6.2 performs plant and animal management practices safely and in cooperation with others.</p>	<p>Resources:</p> <ul style="list-style-type: none"> • Australian Quarantine and Inspection Service (AQIS) • Arthur Yates & Co, <i>Yates Garden Guide</i>, HarperCollins, Pymble, NSW. • Brown, L, Hindmarsh, R & McGregor, R, c1998–c1993, <i>Dynamic Agriculture (Bk 1)</i>, 1st edn, McGraw Hill, Sydney. • Bannerman, S, Thornthwaite, S & Gant, L, 2001, <i>Enterprising Agriculture</i>, Macmillan Education Australia, South Yarra, Vic. • <i>Landline</i> (ABC TV) • <i>Bush Tucker Man</i> (video) • Sydney Market Authority • <i>Prime Notes</i> (CD-ROM) • Australian Bureau of Agricultural Resource Economics (ABARE) • Department of Primary Industry (DPI) <p>Websites:</p> <ul style="list-style-type: none"> • AgFacts – www.rirdc.gov.au/agfacts • AQIS – webmaster@aqis.gov.au • NSW Agriculture – www.agric.nsw.gov.au • Prime Notes – www.dpi.qld.gov.au • Commonwealth Bureau of Meteorology – www.bom.gov.au

In developing units of work for a 200-hour course, the content from Core A, Core B and the Additional content may be combined. In this unit of work only content from Core A has been included. The following code indicates the source of the content: (A) = Core A.

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
<ul style="list-style-type: none"> animal breeds and plant species specific to chosen agricultural enterprises (A) 	<ul style="list-style-type: none"> identify the characteristics of animal breeds and plant varieties specific to chosen enterprises (A) 	<ul style="list-style-type: none"> Students perform a research task on varieties of plants suitable for the current planting season. 	<p>Completed library assignment submitted by students.</p>	<p>Written feedback to students on plant varieties listed and suitability for planting.</p>
<ul style="list-style-type: none"> climatic factors affecting plant and animal production including: <ul style="list-style-type: none"> – humidity – solar radiation – wind patterns – temperature – rainfall (A) 	<ul style="list-style-type: none"> measure and assess climatic factors affecting plant and animal production (A) tabulate and graph climatic conditions in the local region relative to a chosen enterprise (A) 	<ul style="list-style-type: none"> Students make notes on equipment used to measure climatic factors including: <ul style="list-style-type: none"> – wet/dry bulb thermometer – light meter – data logger – experiment/investigation of mulch and temperature effects. Students use website to collect local climatic data, including rainfall and temperature. Students collect climatic information using school weather station. 	<p>Student notes demonstrate understanding of the purposes of the equipment.</p> <p>Student successfully completes table and graph of climatic data.</p>	<p>Oral and written feedback to students on equipment assessed.</p> <p>Oral comments and written annotations on table.</p>
<ul style="list-style-type: none"> the impacts of a range of cultures including Aboriginal cultures on Australian agricultural production (A) 	<ul style="list-style-type: none"> identify some impacts of a range of cultures including Aboriginal cultures on Australian agricultural production (A) 	<p>Teacher</p> <ul style="list-style-type: none"> leads discussion on the change of Australian lifestyle due to multiculturalism gives homework task: students list restaurant cuisine found in local area or town leads display using a variety of vegetables from different cultures. <p>Students</p> <ul style="list-style-type: none"> from different multicultural backgrounds describe a national dish complete internet research on Aboriginal bush foods and other cultural foods plan a native bush foods garden for the agriculture plot organise a BBQ with native herbs and spices, or using food from other cultures. 	<p>Students produce a research assignment.</p> <p>Students produce landscape plans of a site within the school with the possibility of one being used to establish a bush-foods garden.</p> <p>Students harvest bush foods, eg yams, native tomatoes, lilly pilly.</p>	<p>Written feedback by teacher.</p> <p>Peer assessment/native community feedback on native bush-foods garden.</p> <p>Teacher provides written feedback on taste-testing score sheets.</p>

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
		<ul style="list-style-type: none"> Students watch a video on the Bush Tucker Man. 	Students complete a worksheet on the video, showing a grasp of the key concepts.	Teacher provides written annotations on video worksheet.
<ul style="list-style-type: none"> the correct usage and maintenance of agricultural equipment (A) the correct method of operating and maintaining agricultural machinery (A) 	<ul style="list-style-type: none"> use agricultural equipment, machinery and techniques correctly and safely (A) 	<ul style="list-style-type: none"> Tools/equipment are used, maintained and stored in accordance with OHS requirements. Teacher-led instruction/worksheets for safe use of a rotary hoe and other garden implements. In-field demonstration of the use of garden implements, including OHS procedures. 	Students gain skills in the use of a rotary hoe within the school's agriculture plot.	Student attainment of rotary hoe user's certificate.
<ul style="list-style-type: none"> the basic requirements of agricultural plants and animals (A) intensive and extensive production systems for a plant or an animal product (A) 	<ul style="list-style-type: none"> grow and monitor plants and animals (A) apply production systems for a plant or animal product (A) 	<p>Students</p> <ul style="list-style-type: none"> learn and understand the agriculture plot rules grow at least one vegetable crop demonstrating the following skills: <ul style="list-style-type: none"> choosing a site preparing a seedbed soil pH testing providing adequate drainage/aeration correct planting depth providing shelter from strong winds incorporating organic matter incorporating fertiliser propagation from seed transplanting direct drilling identify alternative vegetable-growing systems. briefly define intensive and extensive production systems identify the vegetable production enterprise as an example of an intensive productive system. 	<p>Students show an understanding of agriculture plot rules by completing a quiz.</p> <p>Students plant, care for and harvest vegetable crop/s.</p> <p>Students successfully perform simple hydroponic-growing trial.</p>	<p>Teacher gives written feedback on quiz to aid student understanding of plot rules.</p> <p>Teacher gives written feedback on vegetable plot.</p> <p>Teacher provides oral feedback to students on procedures and products.</p> <p>Class discussion on new vegetable varieties researched by students.</p>

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
<ul style="list-style-type: none"> plant structure and function (A) 	<ul style="list-style-type: none"> identify plant structure and relate this to production (A) identify plants relevant to agricultural production (A) 	<p>Students</p> <ul style="list-style-type: none"> draw and label the stages of germination draw and label monocotyledon and dicotyledon plants, and relate structure to function plant identification practical in the agriculture plot. 	<p>Student prepare notes on main plant types.</p> <p>Students complete summary table.</p>	<p>Oral feedback and discussion between teacher and students.</p> <p>Written feedback on the quality of student summary.</p>
<ul style="list-style-type: none"> the management and control of significant pests and diseases (A) 	<ul style="list-style-type: none"> identify common pests and diseases (A) implement and evaluate strategies for the management and control of plant pests and diseases for a chosen agricultural enterprise (A) 	<ul style="list-style-type: none"> Students research pests and diseases common to the vegetables grown in the agriculture plot/local area. Students research Integrated Pest Management Control (IPMC) for one pest or disease. 	<p>Students give an oral presentation of their research including the life cycle of a selected pest.</p> <p>Summary of pest/disease submitted by each student.</p> <p>Students create an insect collection.</p> <p>Students define and give an example of integrated pest management.</p>	<p>Written feedback sheet on student oral presentation.</p> <p>Written feedback on the student summary.</p> <p>Oral feedback on the progress and variety of insect collection.</p> <p>Oral feedback on the integrated pest management example.</p>
<ul style="list-style-type: none"> the role of soil and water in determining plant management strategies (A) 	<ul style="list-style-type: none"> examine soil texture, structure, pH and profiles (A) 	<p>Assessment Activity 1 This assessment activity involves the sampling of soil from the vegetable plot and determining the pH. Students</p> <ul style="list-style-type: none"> work in pairs and undertake a soil pH test for the three depths within each vegetable plot, ie surface soil, 5 cm deep, 10–15 cm deep students analyse their results to determine which vegetable crops to grow in their plots take core samples to identify the soil types in the agriculture plot apply appropriate testing procedures for determining soil texture and structure. 		

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
<ul style="list-style-type: none"> seasonal variation in crop/pasture production (A) plant and animal management practices (A) 	<ul style="list-style-type: none"> demonstrate and apply harvest techniques to plant production (A) work cooperatively to perform management operations (A) 	<ul style="list-style-type: none"> Students successfully grow and harvest a vegetable crop. 	<p>Students produce crops to specifications.</p>	<p>Certificate given to student with ‘the best’ and ‘the biggest’ vegetables.</p>
<ul style="list-style-type: none"> planning and conducting first-hand investigations in agricultural situations (A) technologies that assist in record keeping and monitoring of enterprise performance (A) 	<ul style="list-style-type: none"> investigate an agricultural problem and develop possible solutions (A) conduct a controlled experiment to investigate an enterprise-related problem (A) gather data using technologies (A) interpret results from graphs and tables of agricultural data (A) prepare and present information to justify a particular point of view (A) 	<ul style="list-style-type: none"> Students library research and briefly describe: <ul style="list-style-type: none"> soil nutrient decline soil acidification. <p>Assessment Activity 2 This assessment activity involves students:</p> <ul style="list-style-type: none"> identifying a problem (limiting factor) within their vegetable production unit, eg pest, disease, nutrition, climate, etc designing an experiment which could be carried out to find a solution to the problem named above performing a Pot Trial: an investigation of the effects of fertiliser on soil pH and plant growth producing an experiment report on the Pot Trial presented with an overview and discussion. 	<p>Students demonstrate knowledge of soils by creating a chart of vegetables and their suitable soil pH.</p> <p>Teacher assessment of the analysis and evaluation of the experiment results.</p> <p>Students successfully carry out a pH test, Pot Trial and fertiliser mix.</p> <p>Students grow and harvest beans grown in sand and watered with fertilisers.</p> <p>Students produce a practical report (using a computer) to reveal an understanding of the experiment.</p> <p>Students use a pH probe to test the pH of soil water or use a soil test kit.</p> <p>Students relate their results from the Pot Trial to vegetable production.</p>	<p>Teacher-led discussion on suitable vegetable crops for the agriculture plot.</p> <p>Oral feedback from discussion of the advantages and disadvantages of student recommendations to solve the problem.</p> <p>Teacher provides written comments on the practical report.</p> <p>Printout of data has teacher annotations.</p> <p>Oral feedback to students.</p>

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
<ul style="list-style-type: none"> the interactions between plants, animals, soils, climate and micro-organisms (A) 	<ul style="list-style-type: none"> identify and discuss interactions within and between agricultural enterprises on the school farm (A) use drawings, diagrams and flow charts to show relationships between plants, animals, soils, climate and micro-organisms for specific enterprises studied (A) 	<p>Students use:</p> <ul style="list-style-type: none"> manure from the school’s steers compost to improve soil organic matter and soil structure thereby modifying the microclimate legumes as green manure crop vermicast. <p>Class notes on:</p> <ul style="list-style-type: none"> nitrogen cycle carbon cycle composting. <ul style="list-style-type: none"> Students watch a Stage 6 support video. 	<p>Students effectively perform:</p> <ul style="list-style-type: none"> recycling of farmyard manures management of compost construction of a worm farm. 	<p>Oral feedback by teacher on student use of recyclables.</p> <p>Peer and teacher feedback to improve student agriculture plot.</p>
<ul style="list-style-type: none"> the role of agriculture within the Australian economy (A) relevant export and domestic markets (A) the range of training and employment opportunities in agriculture (A) 	<ul style="list-style-type: none"> investigate the significance of agricultural industries and products produced in the local region and their intended markets (A) investigate the effect of agricultural enterprises on employment patterns (A) 	<ul style="list-style-type: none"> Class discussion on the importance of vegetable production in Australia using ABARE statistics. Students use <i>The Land</i> newspaper vegetable market report. Students use a job guide to create a list of employment opportunities. Class identifies the main vegetable enterprises and their intended markets in the local area or state. Excursion to central market for fresh produce, eg Flemington, Newcastle produce markets, local markets. 	<p>Student contribution to discussion and grasp of the main concepts.</p> <p>Graphs on trends in market prices of vegetables reveal an understanding of major market trends.</p> <p>Students develop a vegetable collage.</p> <p>Students demonstrate knowledge of the job market through tabulation of jobs and relevant qualifications needed.</p> <p>Students complete a worksheet on the excursion.</p>	<p>Oral feedback to students on clarity of expression of concepts.</p> <p>Teacher input into class discussion on current trends in markets.</p> <p>Teacher provides oral feedback on effectiveness of collage.</p> <p>Oral and written feedback on list of jobs.</p> <p>Written feedback by teacher on excursion worksheet.</p>

Agricultural Technology Years 7–10: Advice on Programming and Assessment

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
<ul style="list-style-type: none"> the impact of global factors on Australian agriculture (A) 	<ul style="list-style-type: none"> investigate the significance of agricultural industries and products produced in the local region and their intended markets (A) 	<ul style="list-style-type: none"> Students investigate a current issue overseas that could effect vegetable production, eg a climate factor (drought, flood) or disease outbreak. Students use secondary sources including the internet. 	Students produce a summary of their investigation.	Teacher provides their written feedback to students on summary.
<ul style="list-style-type: none"> technologies that assist in record-keeping and monitoring of enterprise performance (A) 	<ul style="list-style-type: none"> make accurate observations and record relevant data relating to specific enterprises (A) utilise computer technologies in the analysis and presentation of agricultural data (A) 	<ul style="list-style-type: none"> Students familiarise themselves with various pieces of equipment: barometer, rain gauge, wet/dry bulb thermometer, electronic scales, piezometer, soil probe, thermometer, etc. Students record data onto a computer. 	Students record and graph results.	Teacher provides annotations on graph and report.
<ul style="list-style-type: none"> the safe handling and storage of agricultural chemicals (A) 	<ul style="list-style-type: none"> interpret chemical labels (A) 	<p>Students</p> <ul style="list-style-type: none"> perform a chemical audit of the agricultural plot are given Material Safety Data Sheets (MSDS) on all chemicals identified complete a worksheet on the interpretation of chemical labels. 	<p>Students complete a table showing chemicals and their purpose.</p> <p>Worksheets reveal understanding of chemical labels.</p>	Teacher provides written feedback to students on the table and worksheets.

5.1.1 Sample assessment for learning activity: Soil pH Testing

Vegetable Production Enterprise

Context

Students are completing essential content as specified in Core A within a Plant Enterprise. Students are at the start of the unit of work Vegetable Production. In this unit students learn about the roles of soil and water in determining plant management strategies. This activity will be used in conjunction with class work and library research to determine the type of vegetable crops suitable for the school's Agricultural Farm.

Prior to this activity students have completed library research work on varieties suitable for the current planting season. Students have developed an understanding of the OHS principals required for the use of the chemicals involved in the activity. They will also recall their knowledge of pH and the pH scale from classroom discussions. Students will perform this task with the cooperation of other students and present an individual analysis of their results. Before selecting which plants will be grown in their agricultural plot students must develop an understanding of the local soil environment.

Outcomes

A student:

- 5.5.1 designs, undertakes, analyses and evaluates experiments and investigates problems in agricultural contexts
- 5.6.1 applies Occupational Health and Safety requirements when using, maintaining and storing chemicals, tools and agricultural machinery
- 5.6.2 performs plant and animal management practices safely and in cooperation with others.

Description of activity

Students will perform a standard Soil Test to determine the pH of the selected site for vegetable production. Students will work in pairs and compare their data with that from other groups. Each pair of students will test different sites within the student agricultural plots. Three depths within each site will be tested. Students will individually analyse their results to suggest which vegetable crops to grow in their vegetable plots. This activity will be completed within 1–2 hours.

Criteria for assessing learning

(These criteria would normally be communicated to students with the activity.)

Students will be assessed on their ability to:

- perform the task with the required skill
- accurately determine the correct result and draw sound conclusions
- observe and follow safe work practices and OHS guidelines
- work cooperatively as part of a team.

Guidelines for marking

The following guidelines for marking show one approach to assigning a value to a student's work. Other approaches may be used that better suit the reporting process of the school. Categories, marks, grades, visual representations or individual comments/notations may all be useful.

Range	A student in this range:
11–15 (High)	<ul style="list-style-type: none">• demonstrates a high level of proficiency and skill when undertaking practical processes and techniques• consistently collects accurate information and evaluates it to draw correct conclusions• demonstrates a clear ability to work as part of a team which works independently from the teacher• independently follows all OHS procedures and performs the task without any risk to them or other students
6–10 (Satisfactory)	<ul style="list-style-type: none">• demonstrates the skills needed for undertaking practical processes and techniques• collects results without teacher direction and generally draws correct conclusions• cooperates as part of a team which may need guidance by the teacher• follows all OHS procedures after direction by the teacher and performs the task without any risk to them or other students
1–5 (Progressing)	<ul style="list-style-type: none">• demonstrates some knowledge of the skills needed for undertaking practical processes and techniques• requires assistance to collect and use results• sometimes cooperates as part of a team• requires supervision when using equipment and in following the OHS procedures.

Feedback

Oral feedback will be given to the students during the activity on such things as:

- correcting any problems in the experimental process early in order to obtain accurate results
- reinforcing safe work practices.

At the conclusion of the activity, the teacher will provide written feedback on such things as:

- practical skills, safe work practices and teamwork
- accuracy of conclusions drawn from experimental results.

Future directions

Students will continue to undertake study relating to the production of a vegetable crop, with the main purpose of successfully producing at least one product.

Further suggested areas of study relating to this activity include the use of the data logger and pH probe to determine the pH of the soil water. From this the results can be graphed for a number of sites across the Agricultural Farm.

Students would use pH results to investigate if problems exist and develop possible solutions. This would link to the additional content of Core B where students learn about the effect of soil conditioners, eg lime. They could then design and undertake an experiment examining the effect of lime on soil pH.

Resources

- Student soil pH testing sheet

5.2 Stage 5 Sample Unit of Work: Layers Enterprise

<p>Unit Title: Layers Enterprise</p> <p>Description: This enterprise takes students through a range of knowledge and skills for intensive farm animals. The managing and monitoring of an egg-laying flock is used to illustrate the techniques and practices associated with good animal husbandry.</p> <p>Suggested Unit Length: 8–10 weeks</p>	
<p>Targeted Outcomes: A student:</p> <p>5.2.1 explains the interactions within and between the agricultural sector and Australia’s economy, culture and society</p> <p>5.3.1 investigates and implements responsible production systems for plant and animal enterprises</p> <p>5.3.2 investigates and applies responsible marketing principles and processes</p> <p>5.3.4 explains and evaluates the impact of management decisions on animal production enterprises</p> <p>5.4.2 evaluates management in terms of profitability, technology, sustainability, social issues and ethics</p> <p>5.4.3 implements and justifies the application of animal welfare guidelines to agricultural practices</p> <p>5.5.1 designs, undertakes, analyses and evaluates experiments and investigates problems in agricultural contexts</p> <p>5.5.2 collects and analyses agricultural data and communicates results using a range of technologies</p> <p>5.6.2 performs plant and animal management practices safely and in cooperation with others.</p>	<p>Resources:</p> <ul style="list-style-type: none"> • NSW Department of Education and Training, Curriculum Support Directorate, 2001, <i>Animals in schools: animal welfare guidelines for teachers</i>, 2nd edn, NSW Department of Education and Training, Ryde NSW. • OTEN resources • <i>Prime Notes</i> (CD-ROM) <p>Web sites:</p> <ul style="list-style-type: none"> • AgFacts – www.rirdc.gov.au/agfacts • NSW Agriculture – www.agric.nsw.gov.au • AQIS – webmaster@aqis.gov.au • RSPCA – www.rspca.org.au • <i>Prime Notes</i> – www.dpi.qld.gov.au

In developing units of work for a 200-hour course, the content from Core A, Core B and the Additional content may be combined. The following codes indicate the source of the content in this unit of work: (A) = Core A, (B) = Core B.

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
<ul style="list-style-type: none"> breed selection (A) 	<ul style="list-style-type: none"> identify breeds relevant to a specific enterprise (A) 	<ul style="list-style-type: none"> Students use live birds, diagrams and photos to recognise important layer breeds. Students identify the characteristics of each breed and evaluate them for layer production and describe characteristics of: <ul style="list-style-type: none"> egg colour flightiness egg yield egg size and shape 	<p>Students are able to name recognised breeds.</p>	<p>Oral feedback to students on identification skills.</p>
<ul style="list-style-type: none"> the calendar of operations in a production cycle (A) 	<ul style="list-style-type: none"> monitor production levels throughout a production cycle (A) apply production systems to a plant or animal product (A) 	<p>Assessment Activity 1 Assessment activity begins with the monitoring of the growth and development of chickens. Students</p> <ul style="list-style-type: none"> describe the normal productive life of a bird describe the daily routine of a layer farmer raise a batch of replacement pullets (long-term ongoing project). 	<p>Students design and demonstrate a calendar of operations for egg laying suitable for a school farm. Students write an account in the life of a chicken farmer.</p>	<p>Written feedback to students on suitability of their calendar design and written account.</p>
<ul style="list-style-type: none"> the benefits of a calendar of operations indicating management practices and when they will occur throughout the year (A) 	<ul style="list-style-type: none"> monitor production levels throughout a production cycle (A) 	<p>Students</p> <ul style="list-style-type: none"> list and describe the routine management operations involved in egg production, including <ul style="list-style-type: none"> egg collection feeding manure removal culling and replacing. Students investigate the role of force moulting flocks in maintaining yearly production of eggs. <p>Students</p> <ul style="list-style-type: none"> monitor the number and size of eggs produced and compare with industry standards weigh a sample of eggs collected and compare the egg size with the age of the bird. 	<p>Student’s evaluations of a free range and shed management system reveal understanding of the relevant issues.</p> <p>Student’s flock production record shows understanding of the monitoring process.</p>	<p>Written feedback to students on their evaluation of egg production methods.</p> <p>Written feedback to students on accuracy of the flock production record.</p>

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
<ul style="list-style-type: none"> animal welfare codes of practice applicable to a chosen agricultural enterprise (A) animal welfare codes and their effect on the management and extensive systems (B) 	<ul style="list-style-type: none"> apply correct livestock handling methods (A) implement and document practices in accordance with animal welfare codes (B) evaluate animal housing conditions in accordance with identified codes of practice (A) 	<p>Students</p> <ul style="list-style-type: none"> catch and hold chickens correctly weigh and record developmental characteristics of chickens. <p>Students learn the importance of record-keeping in animal production.</p> <ul style="list-style-type: none"> Students use a batch/flock record sheet. Students keep a detailed diary of all animal husbandry activities conducted throughout this unit of work. <p>Students</p> <ul style="list-style-type: none"> identify and describe the components of a good brooder research different housing systems available for poultry production. are made aware of the codes of practice for intensive animal housing by referring to the <i>Animals in Schools</i> publication explain how layers are managed in a free range and intensive condition, by <ul style="list-style-type: none"> modifying the lighting conditions in order to maximise production researching appropriate housing for production. 	<p>Students demonstrate confidence in catching and holding chickens. Students are able to weigh and measure chickens.</p> <p>A detailed logbook has been kept which includes information such as feed type used, dates and numbers of any deaths, time spent handling chicks, any signs of disease.</p> <p>Students are able to set up and monitor the condition of a brooder.</p> <p>Students are able to present their findings in an appropriate format, eg text with graphics, a PowerPoint presentation or an oral presentation. Successful animal identification has been achieved (or students are aware of the total numbers in animals present at any point in time).</p> <p>Students are able to modify the lighting regime in a layer shed.</p>	<p>Teacher provides oral feedback to students on areas where their technique may be improved.</p> <p>Students receive brief written feedback about the detail of the entries in their logbook.</p> <p>Teacher provides oral feedback to students on monitoring a brooder.</p> <p>Written feedback is provided on the student presentation and the content of their research. This feedback notes any areas of weaknesses or incorrect information provided.</p> <p>Oral feedback to students on lighting modifications.</p>

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
<ul style="list-style-type: none"> climatic management in the production cycle (A) climatic factors affecting animal production (A) 	<ul style="list-style-type: none"> measure and assess climatic factors affecting animal production (A) 	<ul style="list-style-type: none"> Students evaluate the techniques used in different management systems (battery production, free range, open shed, deep litter), to cater for climactic factors including: <ul style="list-style-type: none"> – ventilation – light intensity – daily photoperiods – air temperatures. Students discuss the advantages and disadvantages of free-range and battery production systems. 	<p>Students produce a range of findings from their investigations and depth of evaluation.</p> <p>Students produce a table showing comparisons of management systems and their effect on their climatic factors.</p>	<p>Written and oral reporting to students on their evaluation of climatic factors.</p> <p>Written feedback on the range of advantages and disadvantages in the table.</p>
<ul style="list-style-type: none"> the management and control of significant pests and diseases (A) 	<ul style="list-style-type: none"> identify common animal pests and diseases (A) 	<ul style="list-style-type: none"> Students research, using written resources (eg Ag Facts online), the symptoms, possible causes and treatment/prevention of common poultry disease such as coccidiosis, intestinal worms, cannibalism, lice and mites. Students research from newspaper articles and websites the effect of outbreaks of Newcastle’s Disease on the poultry industry. Students investigate the need for Australian quarantine laws. 	<p>Students produce a table or spreadsheet of pests and diseases and their symptoms, causes and treatment and prevention.</p> <p>Students review an article or website demonstrating key aspects of Newcastle’s Disease.</p>	<p>Written annotations on the printout of the table for pests and diseases.</p> <p>Oral and written feedback to students on their review.</p>
<ul style="list-style-type: none"> the management and control of significant pests and diseases (A) 	<ul style="list-style-type: none"> implement and evaluate control programs using strategies for pests and diseases (A) 	<ul style="list-style-type: none"> Students observe the vaccination of day-old chickens. 	<p>Students are able to examine birds safely within OHS guidelines for handling dead or sick birds, and using chemicals.</p> <p>Students produce a brief report on a selected disease.</p>	<p>Oral feedback on techniques and practices used when handling birds.</p> <p>Written feedback on the disease report research.</p>

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
<ul style="list-style-type: none"> digestive systems and reproductive systems of monogastric and ruminant animals (A) 	<ul style="list-style-type: none"> identify and outline the functions of animal digestive and reproductive systems (A) 	<p>Students</p> <ul style="list-style-type: none"> identify the reproductive and digestive organs and describe the functions of each, using diagrams, photos and birds identify the structures in an egg and relate them to their function in embryo development describe the normal development of a chicken embryo hatch a batch of chickens recognise that eggs are produced as part of a hen’s normal reproductive cycle recognise the normal egg production cycle recognise that the reproductive cycle can be manipulated using lighting regimes (day/night length). 	<p>Students identify structure and function of organs in a report.</p> <p>Students describe a normal laying cycle.</p> <p>Students set up an appropriate lighting regime and produce a brief report predicting changes in the reproductive cycle.</p>	<p>Written feedback to students by annotations on their report.</p> <p>Oral and written feedback on changes predicted due to lighting regimes.</p>
<ul style="list-style-type: none"> nutritional requirements of animals (B) 	<ul style="list-style-type: none"> design a feeding program for the production cycle of an animal (B) 	<p>Students</p> <ul style="list-style-type: none"> investigate and explain the types of foodstuffs used in poultry feeds describe the protein and energy requirements of chick, pullet and egg-laying birds and relate this to suitable feed types. compare nutrition information from feed bags identify when feeds should change to meet the changing demands of birds. 	<p>Students recognise the nutritional requirements of birds at different stages and feed the birds correctly.</p>	<p>Oral and written feedback on nutritional needs met due to the birds’ changing needs.</p>
<ul style="list-style-type: none"> the role of transport, handling and packaging in marketing a chosen agricultural product (A) 	<ul style="list-style-type: none"> select transport, handling and packaging methods for marketing a chosen agricultural product (A) 	<p>Students</p> <ul style="list-style-type: none"> describe the events in processing eggs from collection to sale collect, grade, clean, package and market school eggs draw a flow chart showing the events in a marketing chain for egg production examine the information contained on egg cartons. 	<p>Students produce a flow chart of a marketing chain to demonstrate the stages of egg processing.</p>	<p>Written feedback on description and flowchart of the marketing chain.</p>

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
<ul style="list-style-type: none"> profitability as a measure of management success (A) 	<ul style="list-style-type: none"> assess the profitability of a local agricultural enterprise (A) 	<ul style="list-style-type: none"> Students research the costs and return associated with their layer enterprise and compare this with industry standards. Students appreciate that egg production is a balance between producing the maximum number of eggs while maintaining the most appropriate management systems. Students identify the technology in layer production: <ul style="list-style-type: none"> – feeding systems – egg collection systems – egg grading and packaging – transport and storage. 	<p>Students are able to identify costs and returns, and calculate profitability. Students compare their enterprise financially with industry standards. Students conduct regular inspections of cages.</p> <p>Students conduct disease monitoring, prevention and treatment program.</p> <p>Students conduct pest eradication.</p>	<p>The teacher gives written feedback to students on:</p> <ul style="list-style-type: none"> the accuracy of their calculations any costs not identified.
<ul style="list-style-type: none"> relevant export and domestic markets (A) 	<ul style="list-style-type: none"> investigate the significance of agricultural industries and products produced in the local region and their intended markets (A) 	<p>Students</p> <ul style="list-style-type: none"> describe the vertical integration evident in the layers industry identify employment opportunities and describe job roles in the layer industry identify the products from the layer industry: <ul style="list-style-type: none"> – eggs – birds – litter collect a range of products that contain or need eggs. 	<p>Students produce a report including their description, identification and collection of products.</p>	<p>Written feedback on the identification of products and collected products for egg production.</p>
<ul style="list-style-type: none"> planning and conducting first-hand investigations in agricultural situations (A) 	<ul style="list-style-type: none"> investigate an agricultural problem and develop possible solutions (A) conduct a controlled experiment to investigate an enterprise related problem (A) gather data using a range of technologies (A) interpret results from graphs and tables of agricultural data (A) 	<p>Students</p> <ul style="list-style-type: none"> design and conduct an experiment investigating the effect of variables on egg production: <ul style="list-style-type: none"> – addition of green feed on yolk colour – added calcium on egg breakages – addition of corn on yolk colour – housing (barn versus free range) research a typical problem associated with commercial egg production. 	<p>Students are able to:</p> <ul style="list-style-type: none"> set up and carry out appropriate trials and report on them report findings of their research. 	<p>Oral feedback and advice on possible modifications to the experimental design.</p> <p>Written and oral feedback on draft experiment report.</p> <p>Written feedback on aspects of the final presentation of student’s research results.</p>

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
<ul style="list-style-type: none"> technologies that assist in record-keeping and monitoring of enterprise performance (A) 	<ul style="list-style-type: none"> make accurate observations and record relevant data relating to specific enterprises (A) utilise computer technologies in the analysis and presentation of agricultural data (A) 	<p>Assessment for Learning Activity 2 Use diagrams, graphs and photos to monitor the growth and development of chickens (begun earlier).</p> <ul style="list-style-type: none"> Students devise an appropriate method of recording weights of chickens. Students use scales and calculators. Students compare their calculated growth rates with industry standards. 	<p>Students are able to demonstrate proficiency in catching, holding and weighing birds.</p> <p>Students present findings in an appropriate format, such as a multimedia presentation.</p>	<p>Oral feedback on monitoring techniques used.</p> <p>Oral and written feedback on handling and measuring skills.</p> <p>Written feedback on student presentation.</p>
<ul style="list-style-type: none"> analysing trends, patterns and relationships in data and information (B) 	<ul style="list-style-type: none"> communicate an understanding of trends, patterns and relationships in data to a specified audience (B) 	<ul style="list-style-type: none"> Students present their findings to an audience. 	<p>Students present (in graphical form) data collected while monitoring bird growth.</p>	<p>Written feedback on students' graphs.</p>
<ul style="list-style-type: none"> social issues and ethics involved with the production of chosen agricultural enterprises (A) 	<ul style="list-style-type: none"> discuss a number of social and ethical issues that would be confronted in chosen agricultural enterprises (A) 	<ul style="list-style-type: none"> Students engage in a debate or discussion about particular ethical issues related to intensive poultry production. 	<p>Students are able to identify and discuss a number of ethical issues, eg housing ventilation and density, inhibition of natural behaviours, adequate supply of feed and water.</p>	<p>The teacher responds with oral feedback during or at the conclusion of the discussion. The teacher highlights some of the best points made by students and suggests other points which may have been missed.</p>

5.2.1 Sample assessment for learning activity: Graphing Layer Growth

Egg-laying Enterprise

Context

This unit introduces skills with small, easy to handle animals that would best suit early Year 9 students. Much of the knowledge and skills introduced in this unit may be developed in future units that study larger animals.

Students studying Poultry Egg Laying as one of their farm enterprises develop skills in handling and caring for young animals, monitoring animal growth and collecting and presenting relevant agricultural data. The main activity requires students to raise a chicken from one day old to approximately 10 weeks. The students are responsible for the day-to-day husbandry practices required to raise young animals and many theory-based and practical activities are generated from this ongoing project.

Students have collected and recorded readings for the mass of one chicken over the previous four to five weeks. They have also measured and recorded some developmental characteristics of the chicken, which are used in a separate activity on animal development. The students are now able to draw a graph in order to show the growth of the chicken over time.

Outcomes

A student:

- 5.3.1 investigates and implements responsible production systems for plant and animal enterprises
- 5.4.3 implements and justifies the application of animal welfare guidelines to agricultural practices
- 5.5.2 collects and analyses agricultural data and communicates results using a range of technologies

Description of Activity

Students record the mass and developmental changes of their chicken and construct a graph showing the growth of a layer bird over a period of 10 weeks. Students initially graph data collected over the first four to five weeks, but then update their table and graph on a lesson-by-lesson basis over the remaining time. Students have the opportunity to refine or even redo their graph as the course progresses. This is a short, once a lesson activity designed to develop the graphing skills of students over time. As the students complete their graph each lesson, they are asked to identify problems with the chickens' growth and these problems are discussed with the teacher. Common problems maybe discussed with the whole class.

Criteria for assessing learning

(These criteria would normally be communicated to students with the activity.)

Students will be assessed on their ability to:

- record data on a table
- construct appropriate axes, heading and scale for the graph
- accurately plot correct values and draw a line graph
- update the graph as new data becomes available
- interpret their graph, identify and discuss any problems with the teacher.

Guidelines for marking

The following guidelines for marking show one approach to assigning a value to a student’s work. Other approaches may be used that better suit the reporting process of the school. Categories, marks, grades, visual representations or individual comments/notations may all be useful.

Range	A student in this range:
9–12 (High)	<ul style="list-style-type: none">• records data accurately in a table• correctly constructs axes and all labels• independently updates the graph correctly over time, modifying scale, axes, etc as required• independently interprets graph, discussing growth and development using appropriate terminology
5–8 (Satisfactory)	<ul style="list-style-type: none">• records data accurately in a table• correctly constructs axes and some labels• accurately updates the graph over time• interprets graph and discusses aspects of growth and development with teacher
1–4 (Progressing)	<ul style="list-style-type: none">• records data in a table• constructs axes and labels with assistance• updates the graph with assistance• interprets the graph regarding growth and development with teacher prompting

Feedback

Written feedback from the teacher in the form of brief written annotations on the student’s table and graph commenting on accuracy of interpretation and quality of presentation.

Oral feedback is given to the students during the activity. Comments will inform students about such things as:

- accuracy and appropriateness of the table
- accuracy and appropriateness of the graph scale
- construction and interpretation of the line graph
- appropriate care and handling of chickens
- issues associated with chicken growth and development.

Future directions

The graph generated by the students is combined with other developmental information and used to produce a short written report and used in class discussions about animal growth and development.

This activity provides skills and knowledge that can be applied in many subsequent farm enterprises. The ability of students to accurately graph and then interpret the growth patterns of plants and animals over time is a fundamental skill. Computer and other technologies can be used to extend the student’s ability to collect, record and present agricultural data when studying other farm enterprises.

The evaluation of the growth of chickens can be used to modify animal husbandry practices such as changing feed type and brooding.