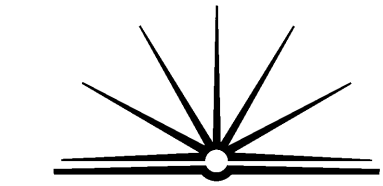

Information and Software Technology
Years 7–10

Advice on Programming and Assessment

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Contents

1 Introduction

This support document has been designed to help teachers understand key aspects of the new *Information and Software 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* (*Information and Software Technology Years 7–10 Syllabus*, p 55).

The document provides advice about constructing a program that will cover the scope of Information and Software 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:

- **Database Design Project** – Students complete a project portfolio of various activities that demonstrate their skills and understanding of database design and function. The duration of the unit is 10–15 weeks. The unit addresses Option 3 Database Design and integrates core content including Data Handling.
- **Digital Media Project** – In this 6–8 week unit, student work is focused on the production of materials to be incorporated into a graphics package for a publishing company. The culmination of the project is a PowerPoint presentation and peer evaluation of the final graphics package. The unit addresses Option 4 Digital Media and integrates study from the core content topics of People, Hardware and Design, Produce and Evaluate.

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 *Information and Software Technology Years 7–10 Syllabus*. Units of work adapted for students undertaking Information and Software 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

When establishing a scope and sequence plan teachers should consider the following.

Syllabus requirements
- 100-hour course: students must complete a minimum of two projects and a maximum of four projects.
- 200-hour course: students must complete a minimum of four projects and a maximum of eight projects.
- All outcomes must be addressed by the end of the course, with the 'learn about' and 'learn to' content taught in units of work based on projects.

Flexibility
The syllabus allows flexibility in the delivery of content, and particularly in the selection of learning experiences and activities. Units of work may vary in length of time (see the sample scope and sequence plan on page 7). Schools may decide to combine options and integrate relevant core content areas into more comprehensive units of work.

Further considerations
Schools also need to consider the specific needs and interests of their students and the local community, as well as building on any existing school activities or programs. For example, an existing Information Technology VET program, where the school computer network is examined, may influence a school to select the Networking Option. Schools may also consider local businesses or community groups that may be able to provide a focus for project work (eg development of a membership database for a local sporting club).

Advice on creating a scope and sequence plan for a 200-hour course
- Consider the eight option topics and select a minimum of four, appropriate to your school in terms of:
  - existing hardware and software
  - teacher expertise
  - interests of students
  - existing programs or local community support.

- Identify the areas of core content that will be integrated into the option topics selected. Determine the number of projects (between the minimum four and maximum eight) to be delivered across the 200-hour course.

- Schools choosing to offer the 100-hour course need to devise a program to integrate all of the core content into a minimum of two options.

The following sample 200-hour scope and sequence plan illustrates a number of features:
- An option topic may be revisited (Digital Media in Years 9 and 10).
- Options may be combined (Options 4 and 5 in Year 10).
- Sections of the core are to be integrated into appropriate parts of the option topics to be taught (eg C1 indicates content taken from Core Topic 1).
- The integrated core and option topics are delivered through projects.
- Projects may be planned for teaching over different lengths of time (eg from 6 weeks to more than 20 weeks).

2.1 Sample Stage 5 Scope and Sequence Plan (for a 200-hour course)

<table>
<tr><th colspan="3">Year 9</th></tr>
<tr><td>Term 1</td><td>Option 4 Digital Media Project (8 wks)

Description: Students develop skills in design and production through a project in which they complete a range of challenges. These challenges include the design and production of a logo, animated banner and a map to meet the needs of an imaginary publishing business. Prior to completion of the project, students will examine and analyse a variety of digital media products and their uses. Core content is integrated as shown (at right).

Outcomes – 5.1.1, 5.2.2, 5.2.3, 5.3.1, 5.5.1</td><td>Students learn about:
• project development
• data types for digital media products
• manipulation techniques
• factors affecting file size
• roles and responsibilities (C6)
• user interface design (C7)
• solutions and evaluation (C1)
• data sources (C3)</td></tr>
<tr><td>Term 2</td><td>Option 3 Database Design Project (15 wks)

Description: Students are presented with a variety of scenarios for which they are to design and produce database solutions. The completed activities are presented as a portfolio project that demonstrates the student's progress and their understanding of issues such as privacy, accuracy and security. Skills in importing, searching, sorting, creating queries and macros, as well as producing calculations, reports, forms and evaluating database performance, are integrated into the project. Core content is integrated as indicated in the unit of work (see pages 20 to 40).

Outcomes – 5.1.1, 5.1.2, 5.2.1, 5.2.2, 5.3.1, 5.3.2, 5.4.1, 5.5.1, 5.5.3</td><td>Students learn about:
• database development
• software systems (C7)
• types and examples of software (C7)
• impact of past, current and emerging technologies (C2)
• environmental considerations (C2)
• data and information (C3)
• data forms and types (C3)
• legal and ethical issues (C5)
• collecting, organising and storing data
• integration
• data coding and security (C3)
• file extensions
• data storage and function (C3)
• roles and responsibilities (C6)
• careers in information technology (C6)
• methods of processing and analysing data
• methods of presenting information
• user interface design (C7)
• integration
• features of software (C7)
• software (C1)
• communication techniques (C1)
• solutions and evaluation (C1)</td></tr>
<tr><td>Term 3</td><td>Option 1 Artificial Intelligence (AI), Simulation and Modelling Project (14 wks)

Description: Students are presented with a number of real-world scenarios. Methods of solving problems, including the use of an expert system or a neural network are compared. Students manipulate variables in a simulation program in order to observe trends and subsequent results. In small groups models are investigated to solve nominated problems. The completion of a portfolio over the project provides evidence of learning, and individual and group contributions to the project are evaluated. Core content is integrated as shown (at right).

Outcomes – 5.1.1, 5.2.1, 5.2.2, 5.2.3, 5.3.1</td><td>Students learn about:
• artificial intelligence
• areas of AI
• requirements of AI
• ethical and legal issues (C5)
• types of software (C7)
• factors affecting hardware (C7)
• modelling and simulations
• requirements of models and simulations
• advantages and limitations
• using model and simulation programs
• defining and analysing the problem (C1)
• producing solutions (C1)
• data sources (C3)
• social issues (C5)
• collaboration and group work (C1)</td></tr>
<tr><td>Term 4</td><td></td><td></td></tr>
</table>

<table>
<tr><th colspan="3">Year 10</th></tr>
<tr><td>Term 1</td><td>Option 7 Robotics and Automated Systems Project (10 wks)

Description: Students explore a range of automated systems and robots. Drawing on skills and knowledge developed through these class activities, students design and construct a robot for a particular purpose. The program needed to drive the automated system or robot is a second part of the project. A portfolio of ideas, plans and completed designs is maintained to demonstrate project development. Core content is integrated as shown (at right).

Outcomes – 5.1.2, 5.2.1, 5.2.2, 5.2.3, 5.3.2</td><td>Students learn about:
robotics
types and purpose of robots
use and function of robots
automated control
hardware components (C4)
sensing devices and actuators
controlling devices
microprocessors (C4)
hardware solutions (C4)
functions that hardware performs (C4)
classification of hardware systems (C4)
trouble shooting (C4)
data transmission types (C3)
industrial issues (C5)
project development</td></tr>
<tr><td>Term 2</td><td>Option 4 Digital Media and Option 5 Internet and Website Development Project (28 wks)

Description: This project takes the products produced in Year 9 Digital Media as a starting point for creating a website.
Students undertake a study of the historical development of the internet. Tools and uses of the internet are explored particularly in the area of the World Wide Web. Students manipulate tools to design, produce and evaluate a website for a given purpose. Evaluation of student learning is based on a portfolio of plans and designs, along with the production and demonstration of the final website. Core content is integrated as shown (at right).

Outcomes – 5.1.1, 5.2.1, 5.2.2, 5.2.3, 5.3.1, 5.3.2, 5.5.1, 5.5.2, 5.5.3</td><td>Students learn about:
purpose of digital media products (Op 4)
types of digital media products (Op 4)
digitisation process of data types (Op 4)
display and distribution (Op 4)
evaluation of digital media products (Op 4)
internet and intranet (Op 5)
internet use (Op 5)
internet software (Op 5)
types of protocols (Op 5)
World Wide Web (Op 5)
control of access to info. on the web (Op 5)
data compression techniques (C3)
interface design (C7)
designing possible solutions (C1)
website development (Op 5)
features of a website (Op 5)
management (C1)
project development (Op 4 & 5)</td></tr>
<tr><td>Term 3</td><td></td><td></td></tr>
<tr><td>Term 4</td><td></td><td></td></tr>
</table>

Note: Option 3 Database Design Project and Option 4 Digital Media Project are described in detail on pages 20–48.

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.

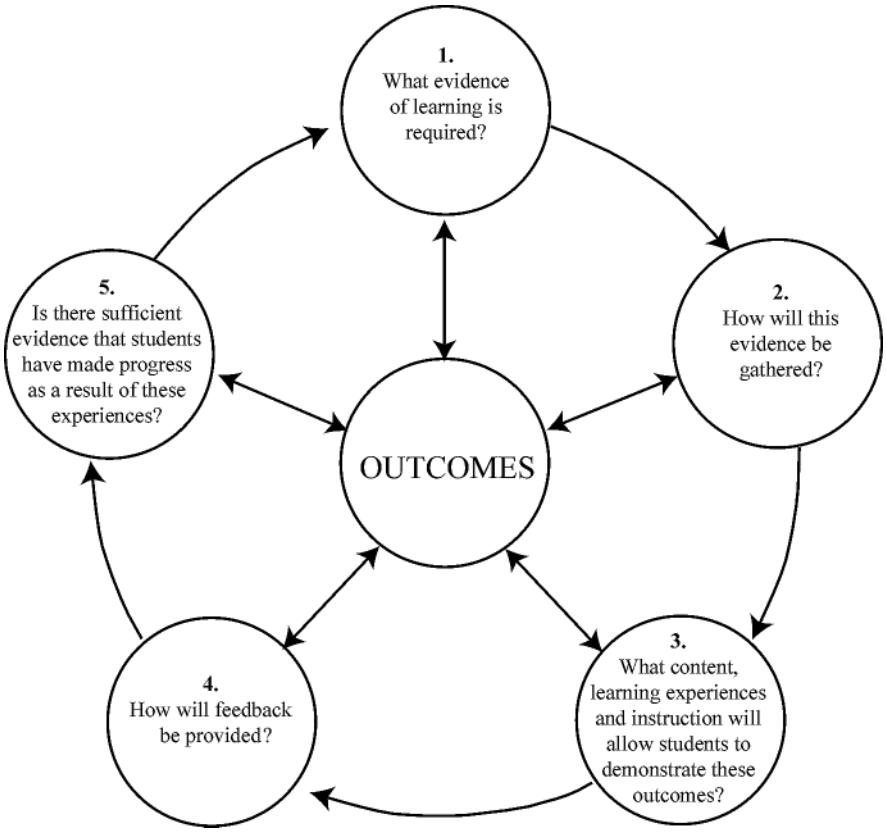
Principles of assessment for learning
Assessment for learning:

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.

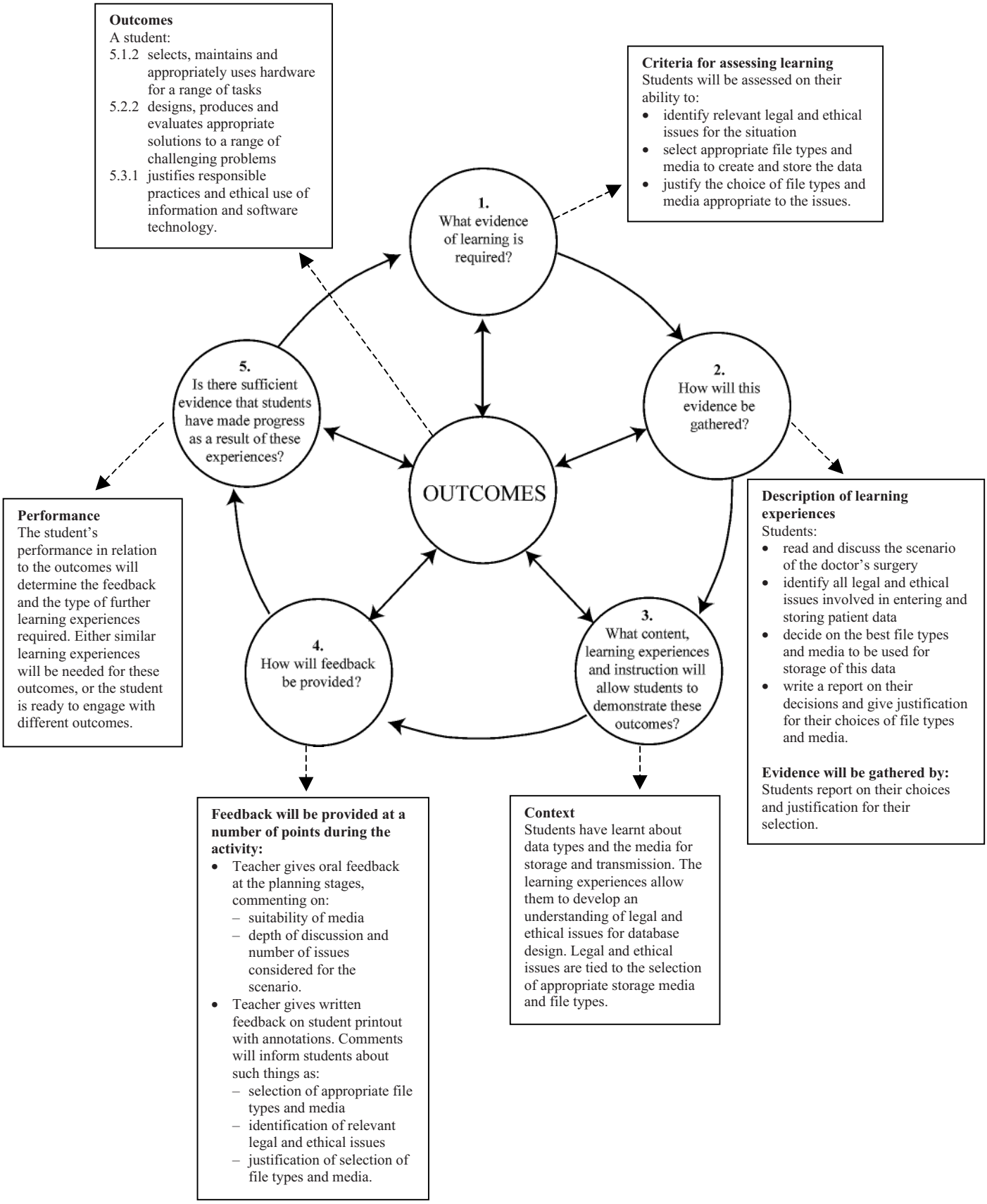
Details on how these principles translate in practice can be found on page 55 of the *Information and Software Technology Years 7–10 Syllabus.* One activity in this document has been annotated to show how the principles of *assessment for learning* feature in that activity. It can be found on pages 13–14.

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 assessment activity Database Data Storage, taken from the sample unit Database Design Project (pages 20–39).



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, Database Data Storage, has been annotated to show these principles.

Context
Students have been introduced to databases and have studied the role of data and information within database systems. This is one of the activities that would be included into the project portfolio, illustrating an early stage in the teaching and learning sequence when feedback is essential for the student. This feedback assists the student to clarify understanding of concepts, remedy misconceptions and plan for deeper understanding. Students have learnt about the different types of data and how they are represented and stored digitally on a computer. Students have undertaken a number of learning activities to develop an understanding of the legal and ethical issues that pertain to databa… arlier activity had students write a data policy document for a … these issues in the conte… purpose of … epts together and have … decisions in … iate storage media for a …

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

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

Outcomes
A student:
5.1.2 selects, maintains and appropriately uses hardware for a range of tasks
5.2.2 designs, produces and evaluates appropriate solutions to a range of ch… problems
5.3.1 justifies responsible practices and ethical use of information and softw…

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

Description of activity
Students study the given scenario for the use of a large database system in a doctor's surgery. They decide on appropriate storage types and media for the different components and operations of the database. This includes input and output file types and media (including transmission media), database storage media, and backup storage media. They then discuss legal and ethical issues relating to the scenario and justify their selection of media in terms of these issues. They present their decisions and justification in the form of a written report (1–2 pages). The suggested duration for this activity is 1–2 periods.

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

Criteria for assessing learning
(These criteria would normally be communicated to students with the acti…
Students will be assessed on their ability to:

- select appropriate file types and media for the input, storage and output/transmission of database data/information.
- identify relevant legal and ethical issues relating to the scenario.
- justify the selection of file types and media in terms of their relationship with identified legal and ethical issues.

The link between the marking guidelines and criteria for judging performance and the outcomes is clear and explicit. AP2, 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.

The link between the marking guidelines and criteria for judging performance and the outcomes is clear and explicit. AP2, AP3

Range	A student in this range:
8–10 (High)	• selects all appropriate file types and media for storage of data and information • identifies a broad range of relevant legal and ethical issues for the scenario • independently justifies the selection of file types and media for storage in relation to the legal and ethical issues
4–7 (Satisfactory)	• selects most appropriate file types and media for storage of data and information • identifies a range of relevant legal and ethical issues for the scenario • describes the selection of file types and media for storage in relation to the legal and ethical issues
1–3 (Progressing)	• selects some file types or media for storage of data and information • identifies some relevant legal and/or ethical issues for the scenario • requires assistance to justify the selection of file types and media for storage in relation to the legal and ethical issues.

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

Feedback

Brief written annotations on the student report where necessary, comme
- selection of appropriate file types and media
- identification of relevant legal and ethical issues
- justification of the selection of file types and media.

Oral feedback to the students during the activity. Comments will inform students about such things as:
- suitability of media depending on its planned use
- depth of discussion and number of issues considered for the scenari

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

Future directions

Through this activity students are developing an ability to critically evaluate and justify their decisions in terms of relevant legal and ethical issues. They are developing a better understanding of database systems in context, which they will use later in the unit when they are required to develop their own database software solutions. They will be required to carry out similar activities for all other modules covered in the course.

The activity shows the knowledge, skills and understanding to be built on. AP1, AP2

Resources
- Briefing sheet outlining the details of the particular scenario.
- Feedback grid sheet, to be submitted with their report.
- Internet sites:
  - nsd.uib.no/English/privacy/ (NSD Homepage)
  - lboro.ac.uk/admin/committees/ethical/gn/deas.htm (Loughborough University Data Collection and Storage)
  - jmir.org/2000/1/e8 (Journal of Medical Internet Research, 2000)

Assessment for learning principles

The following table shows some of the criteria that have been used to annotate the assessment for learning activity 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.

Assessment principle 1	Related criteria
The activity emphasises the interactions between learning and manageable assessment strategies that promote learning	• 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

Assessment principle 2	Related criteria
The activity clearly expresses for the student and teacher the goals of the learning activity	• 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

Assessment principle 3	Related criteria
The activity reflects a view of learning in which assessment helps students learn better, rather than just achieve a better mark	• 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

Assessment principle 4	Related criteria
The activity provides ways for students to use feedback from assessment	• 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

Assessment principle 5	Related criteria
The activity is designed so as to help students take responsibility for their own learning	• The activity models ways that self and peer assessment can be used as valid means of assessment

Assessment principle 6	Related criteria
The activity has been designed so as to be inclusive of all learners	• 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 – Database Storage		
A			x
B	x		
C		x	
D	x		
E		x	
F	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.

Sample unit of work proforma

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

Front page:

Unit title:	
Description:	*An overview of the unit of work.*
Suggested unit length:	*Planned number of teaching weeks to address the content at appropriate depth.*
Targeted outcomes:	**Resources:**
List of syllabus outcomes targeted in this unit of work.	*Identified list of resources, including websites, useful to teachers and students.*

Planning pages:

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
Identified from the syllabus.		*The teaching and learning strategies are identified and outlined. Prior learning and skills of students are used to sequence the learning experiences. Assessment for learning experiences are embedded. Students undertake a range of theoretical and practical experiences.*	*Observable evidence resulting from the learning experience that will allow judgments to be made on achievement in relation to outcomes.*	*Identify the nature and type of feedback and show how it contributes to student learning.*

5 Sample Units of Work

The sample units of work that follow are designed to assist teachers in planning for the implementation of the *Information and Software 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.

5.1 Stage 5 Sample Unit of Work: Option 3 Database Design Project

Unit title: Database Design (Option 3)

Project description: Students are presented with a variety of scenarios for which they are to design and produce database solutions. The completed activities are presented as a portfolio project that demonstrates the student's progress and their understanding of issues such as privacy, accuracy and security. Skills in importing, searching, sorting, creating queries and macros, as well as producing calculations, reports, forms and evaluating database performance, are integrated into the project.

Suggested unit length: 10–15 weeks

Targeted outcomes:	**Resources:**
A student: 5.1.1 selects and justifies the application of appropriate software programs to a range of tasks 5.1.2 selects, maintains and appropriately uses hardware for a range of tasks 5.2.1 describes and applies problem-solving processes when creating solutions 5.2.2 designs, produces and evaluates appropriate solutions to a range of challenging problems 5.3.1 justifies responsible practices and ethical use of information and software technology 5.3.2 acquires and manipulates data and information in an ethical manner 5.4.1 analyses the effects of past, current and emerging information and software technologies on the individual and society 5.5.1 applies collaborative work practices to complete tasks 5.5.3 describes and compares key roles and responsibilities of people in the field of information and software technology	• First Fleet database CSV and text file from: First Fleet On-line University of Wollongong © 1999 http://cedir.uow.edu.au/programs/FirstFleet/ • Computer laboratory • Database and word-processing software • Sample databases • Internet access

Students learn about:	**Students learn to:**	**Integrated learning experiences, instruction and assessment**	**Evidence of learning**	**Feedback**
Purpose of the database				
Database development • purpose of the database	• define and describe a database • explain the purpose of a database	• Students examine a variety of databases in both digital and non-digital form. They define and analyse their purpose, eg phone book, internet, recipes, library catalogue cards.	Given a database, students are able to describe what it does, understanding its purpose.	Teacher provides oral clarification and positive reinforcement of student responses.

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
Software systems • the purpose of a software system	• define and describe a software system • explain the purpose of a software system	• Teacher introduces DBMS software, and looks at its features and purpose. Relate this to the above examples.	Students can relate the DBMS to an example by comparing its features.	Teacher provides oral feedback on student's ability to compare features.
Types and examples of software • application software including graphics	• distinguish between types of software	Students: • contrast DBMS (features and purposes) with other software • look at some examples of data in a word processing document and DBMS • compare both forms.	Students are able to understand the purpose of the database, and how it differs from other packages.	Teacher gives oral feedback from observation and questioning about differences in applications.
• impact of past, current and emerging information and software technologies on the individual and society including different cultural groups such as Aboriginal and Indigenous	• explore and discuss relevant past, current information technologies for the option topic • evaluate the appropriateness of a current and emerging information and software technology for a specific purpose	Students: • investigate examples of databases that have evolved from non-digital forms. Examples include the library catalogue system, phonebook and family histories • make a table to list the advantages and disadvantages of each example • discuss possible emerging database technologies, such as hyper-text based data retrieval and expert systems/AI, eg use www.askjeeves.com as stimulus.	Students are able to identify the past, present and future technologies in databases, and make a judgement on their impact on society.	Oral feedback from discussion about the range of technologies. Teacher checks list of advantages and disadvantages for accuracy and provides oral feedback.

Students learn about:	**Students learn to:**	**Integrated learning experiences, instruction and assessment**	**Evidence of learning**	**Feedback**
Environmental considerations such as • disposal of obsolete technologies • recycling	• assess the effects of past, current and emerging information and software technologies on the individual, society and the environment	• Discuss and assess the impact of databases on paper use and other resources.	Students demonstrate an awareness of environmental issues by working in an appropriate manner and minimising paper use.	Oral feedback from teacher about student awareness of environmental issues. Teacher provides oral feedback of student use of resources.
Components of a database, inputs of the database, and outputs of the database (reports, forms, data/information)				
Data and information • importance of information to society, particularly in electronic form	• define and compare data with information • explain the process of deriving information from data	Students: • explain and define data and information • create a survey to enter data and produce a conclusion on the basis of the results • discuss the process of data being converted from data into information, clearly defining each.	Students can identify: • data and information in a scenario • the processes involved in the transformation of data into information.	Teacher provides written comments and annotations based on the survey task.
Data forms • analogue and digital	• convert data between analogue and digital forms	Students: • discuss digital and analogue in terms of discrete and continuous data • record sounds with a microphone, into the computer. Teacher: • explains converting the analogue sound into a digital media • plays the sounds back, demonstrating digital into analogue through the speakers. Students write a recount of the process.	Students can recount the process of transforming data from analogue to digital and vice versa.	Teacher provides written comments on student's recount of the process of transforming data. Feedback may also be provided by peer assessment with a set criteria decided upon by the class.

Students learn about:	**Students learn to:**	**Integrated learning experiences, instruction and assessment**	**Evidence of learning**	**Feedback**
Data types such as: • text and hypertext • graphics • audio • video • animation	• describe and manipulate data types for a range of purposes	Students: • create a table that describes the data types related to databases, and where they are used, eg text, number, data, and currency • collect data samples and classify according to their data types.	Students are able to transfer data from one type into another, in a variety of situations.	Oral feedback on student ability to manipulate data for a range of purposes.
Legal issues such as : • copyright/licensing • intellectual property • security and protection including viruses • legislation such as Anti-discrimination, Equal Employment Opportunity, Occupational Health and Safety	• examine legal issues as they apply to the development of information and technology software solutions	Students: • use a variety of sources (eg computing magazines, the internet and newspapers) to find articles and case studies that relate to relevant legal and ethical issues • identify the issues involved and discuss them • write a data policy document for a doctor's surgery. This needs to reflect the appropriate social and ethical issues.	Students can identify and discuss appropriate legal issues as they apply to certain database scenarios. Students maintain a journal to collect ideas and encourage reflection on the issues.	Oral responses to questioning demonstrates student understanding of legal issues. Teacher provides brief written feedback on student analysis of legal issues.
Ethical issues such as: • code of practice and conduct • accuracy, validity and bias of data	• research and report on ethical issues relating to the development of information and software technology solutions • examine and judge the accuracy, validity and bias of data and information	Students: • via a variety of websites, research contentious social issues (for example passive smoking) • discuss the accuracy, validity and bias of data and information.	Students can identify and discuss appropriate ethical issues as they apply to certain database scenarios. Students are able to discuss these issues, and relate them to the responsibilities of database users.	Teacher provides oral feedback on student ability to discuss ethical issues.

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
Database development • components of a database • inputs of the database • data types required to solve a problem	• describe the relationships between a database, file, record, field and data, character • list input data • create a data dictionary to illustrate and describe data types	'First Fleet Database' Activity • Students are given a .CSV or .TXT file containing the data from the 'First Fleet Database'. This should be used as stimulus for a discussion about data types and methods of organisation. • Students analyse the organisation of the data and relate this to the concepts of a file, record, field, data type and data format. • Teacher introduces the concept of a data dictionary; then students analyse the raw data, suggest appropriate field names and field lengths and work out descriptions of the data and data types to create a complete data dictionary for this data • Students create and populate the database using two different methods: – manually enter a few records – import the CSV or TXT data using the import feature of the chosen database. • Discuss the issue of accuracy and suggest ways that the frequency of problems can be reduced.	Students create data dictionaries as part of the planning process of the database, and then use this with the key concepts to create a database for a particular purpose. Students identify the key database components of a set of input data and create a data dictionary. Students manually enter data into a database created from the specifications of the data dictionary. Students import data from a file into their database created from the specifications of the data dictionary. Students can suggest and implement a means to validate data in a database.	Teacher provides written annotations on data dictionary activity. Oral feedback from teacher on data types and organisation. Oral feedback from teacher on student ability to import files.

Students learn about:	**Students learn to:**	**Integrated learning experiences, instruction and assessment**	**Evidence of learning**	**Feedback**
Collecting, organising and storing data • sources of data to solve a problem • database storage on a storage medium considering file size, portability and updatability • validation and verification checks of data	• document and acknowledge data sources • use validation and verification checks on the data for a database • input data and store for a given problem	Students: • create the database for the data dictionary created above, setting up any validation and verification checks and necessary formatting • import the First Fleet data from the text file. Students need to enter some of the data manually • document and acknowledge the data sources used in the learning task.	Students use a data dictionary to create a database and then input data into that database. Students are able to acknowledge the source of their data, and understand the reasons for doing this.	Oral feedback from teacher on student ability to: • create the database • input data • acknowledge data source and reasons for its use.
Integration • importing from existing electronic data	• import data from a different source	• Students import a graphic from a selected source.	Students can import and position a graphic in the database.	Teacher provides written feedback on ability to import and position a graphic.
Data coding such as: • decimal and binary • bits and bytes such as kilobytes, megabytes, gigabytes and terabytes • ASCII	• describe and compare coding methods • discuss the units used when measuring data storage • perform simple calculations on data coding	• Overview the binary and decimal number system, comparing each. • Overview methods of coding numerical and textual data in binary form, through looking at the ASCII system and the conversions of decimal to binary and binary to decimal. • Produce a table with entries for each unit of measure, its abbreviation and size in bytes.	Students are able to carry out coding conversion calculations on ASCII text and numerical data.	Teacher provides oral feedback on the process. Teacher and/or peer evaluation of table based on criteria set by teacher.

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
File extensions such as: • doc • *db • bmp • xls	• recognise file extensions and their use within chosen options	• Discuss different files types used with databases and their file extensions using a table, eg .csv, .txt, .*db (the headings for the table are Use, Data Format, Extension).	Students have an understanding of the different file types and extensions and their relationship to database software.	Teacher provides oral feedback on student understanding of file types and extensions.
Data storage and function • primary storage such as RAM and ROM • secondary storage such as random and sequential access • secondary storage media such as tape, disk and optical media	• contrast primary and secondary memory • describe the functions of primary and secondary memory • select and use the appropriate data storage media for a given situation in an ethical manner • state the reasons for the range of data storage and media formats	• Define primary and secondary memory/ storage and its purpose. • Define the different media types. • Create a database of storage devices with the following fields: – Name of device – Picture – Description – Category (prim. or sec.) – Media type – Storage size/capacity (MB) – Access time – Typical application/use – Source/reference • Populate this database with data researched from the internet and class discussion/notes. • Discuss the reasons for the variety in storage media. **Sample assessment for learning activity 1 – Database Data Storage (see page 39)** Given a scenario, eg a doctor's surgery, students decide on appropriate storage type/media for the different operations of the database system and identify any related legal and ethical issues.	Students are able to describe primary and secondary storage, and then use it in an appropriate and ethical manner for a given situation.	Teacher gives written feedback on the use of hardware in an appropriate situation. Teacher provides oral clarification and positive reinforcement of student responses.

Students learn about:	**Students learn to:**	**Integrated learning experiences, instruction and assessment**	**Evidence of learning**	**Feedback**
Roles and responsibilities of people working in the information and software technology field such as • data entry operators • systems analysts • users **Careers in information technology**	• describe key roles within the information and software technology field and critically analyse possible role stereotypes • develop role descriptions of people working in the field of information and software technology • explore career opportunities and pathways for people within the field of information and software technology	• Students, working in pairs, create a report that uses thorough research from different sources (including job advertisements and the internet), about current database-related IT career paths. In the report students must include: a) Job title and description b) Salary c) Experience and qualifications • Students will also present and discuss their findings orally to the rest of the class. Note that this is a task that can be continued/reused across a number of topics.	Students are able to describe the vast array of roles and their purposes in the IT industry. Students can make informed judgements about possible role stereotypes.	Teacher gives oral and written feedback on ability to: • describe key roles in the IT field • analyse possible role stereotypes.
Methods of processing and analysing data				
• editing, searching, sorting records	• edit existing fields and records within a database • construct query searches and sorts on given data	**Editing** • Briefly discuss the ways in which databases can be edited, ie creating, modifying and deleting fields and/or records. • Following a teacher demonstration, students add a 'Price' field to the 'Storage Devices' database. Enter the typical price for each item in the database.	Students can successfully create, modify and delete fields and records.	Teacher provides oral feedback on student ability to edit fields and records.

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
• editing, searching, sorting records (continued)	• edit existing fields and records within a database • construct query searches and sorts on given data (continued)	**Sorting** • Overview the concept of sorting and methods of sorting data, eg ascending/ descending, alphabetic, numeric, by date, etc. • Give examples of commonly used databases and their method of sorting, eg phone book – ascending alphabetic. • Provide students with hard copy examples of other sorted data (eg class list, fake mark book) and have them identify the sort field and sort method. • Students carry out sorting exercises on the 'First Fleet' database to answer some simple questions. • Discuss how sorting can help in analysing data. **Queries** • Overview the concept of a 'query'. • Introduce queries through the use of 'filters'. Conduct some simple filtering exercises using the 'Storage Device' database they created earlier. Refine the queries/filters by using progressive filtering of data, eg filter on 'Secondary' for the storage type and then on 'Magnetic' for the storage medium. • Discuss how queries/filters assist with analysing data.	Students can identify sort order and field from a sample of sorted data. Students can successfully design and carry out a sort on a database to interpret or gain meaning from data. Student responses indicate an understanding of the use of sorting to analyse data. Student definitions indicate their understanding of the concept of a query and its use in analysing data. Students demonstrate an understanding of the use of different operators in queries.	Teacher provides oral feedback on student ability to sort records. Teacher provides oral feedback on student ability to sort and order fields. Teacher provides written annotations/marks on student ability to sort data to gain meaning. Teacher provides feedback on ability to define a query and use it to analyse data.

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
		• Overview: – logical operators, including AND, OR and NOT – comparative operators including >, <, >=, <=, LIKE • Give students a hard copy of the 'Storage Devices' (or similar) database and a list of questions to be answered that require the use of these operators, conducting their own 'manual' queries. • Teacher demonstrates how to enter query values for different field types, eg text strings in quotes, dates, etc. Briefly overview the use of 'wild card' characters in criteria such as * and ? • Students create several queries on the 'Storage Devices' database (with questions from the paper/manual activity as stimulus). • Teacher demonstrates how to view their queries in 'SQL view' as an insight into what actually occurs in a query (if in Access). • Informal questioning to gauge student understanding.	Students can successfully design and carry out a query on a database to interpret or gain meaning from data based on set criteria. Student responses to questioning demonstrate an understanding of the different forms of a query, ie query, filter, SQL.	Teacher gives written feedback on 'Storage Devices' query creation.
• mathematical calculations	• design and perform calculations on data • create macros to perform repetitive tasks	**Calculations** • Overview the use of calculations in queries and briefly discuss the advantages/ disadvantages of using calculations within databases as compared to other types of applications, such as spreadsheets.	Student responses indicate an understanding of the concept of calculation within queries.	Teacher provides oral feedback on calculations during class questioning and discussion.

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
• mathematical calculations (continued)	• design and perform calculations on data • create macros to perform repetitive tasks (continued)	• Teacher demonstrates the use of aggregate functions/calculations such as sum, average and count in queries. • Students create a query that lists the average 'Price', average 'Storage Capacity' and count of total number of records in the 'Storage Devices' database. • Teacher demonstrates how to create a new query field that calculates the price per MB for each storage device in the 'Storage Devices' database, ie price per MB = 'Price'/'Storage Capacity'. Sort by this field to determine the most cost-effective method of storage. **Macros** • Introduce the concept of macros and their general use across all applications. • Demonstrate the construction and use of a macro in a database. Construct a macro to run, print and close one of the queries that were created earlier for the 'Storage Devices' database.	Students can successfully design and carry out calculations within a query to interpret or gain meaning from data. Student responses indicate an understanding of the purpose of a macro. Students can successfully create macros to run queries within a database.	Teacher provides oral feedback on ability to: • design and carry out calculations in a query • interpret or gain meaning from data. Teacher provides oral feedback on use of macros after direct observation of students at work. Teacher provides oral feedback on creation and use of macros to run queries.

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
		Consolidation Task • Students are given questions to answer through analysis of the 'First Fleet' database. Students have to create sorted queries to perform on the database. They create macros to run and print these queries, answering the questions and attaching their printouts for submission to the teacher for assessment.	Students can consolidate their knowledge of sorting, queries and macros in a combined task. Students can create sorted queries, and macros to activate them, thereby being able to interpret data and answer set questions.	Teacher gives written feedback on student analysis of 'First Fleet' database.
Methods of presenting information				
• outputs of the database: reports, forms, data/information	• identify outputs when designing a database	• Overview the methods used for outputting information from a database (electronic and hardcopy). Use examples of the same data presented in different forms, eg on-screen form, report, mail merge. • Discuss and create a list of possible items of information to be obtained from a school database of students, teachers and classes/courses. Determine whether these are best presented in hardcopy form or on-screen.	Student responses indicate an understanding of the different database tools/ components used to output information in both electronic and hardcopy form. Students can identify appropriate outputs from a database and the most practical form for presenting this data.	Teacher provides oral feedback on student identification of outputs.
• presentation of reports: header, body text, footer	• prepare a range of report layouts for presentation	**Reports** Teacher: • overviews concept and purpose of a database report	Students can identify the main parts of a database report.	Teacher provides oral clarification during class questioning and discussion.

Students learn about:	**Students learn to:**	**Integrated learning experiences, instruction and assessment**	**Evidence of learning**	**Feedback**
• report layouts • design features on forms and reports	• create an effective design for database forms	• outlines the parts of a report (ie header, footer, body, text) using samples to demonstrate • models good report design, using samples of good and poor reports • discusses report design considerations of typeface, sequence and structure of information, use of white space, etc • highlights the importance of date stamping of hardcopies • outlines the process for creating reports and creates a simple report to print the contents of the 'Storage Devices' database as well as some of the other queries that were created earlier. • Highlight the fact that the input for a single report can be from any number of tables and/or queries. • Students create reports for the queries they created for the 'First Fleet' database earlier. **Forms** • Overview concept and purpose of a database form. Discuss the general function of database forms in providing a 'user interface' to the database that allows the user to easily view and edit data. Introduce the concept of a database 'front-end' and 'back-end'. Use sample databases to assist in discussion.	Students can successfully create a database report from a query. Reports created by students demonstrate an understanding of what constitutes good report design practice. Students can identify the main parts of a database form.	Teacher provides written annotations on ability to: • identify key parts of a database • create a database report from a query • create an effectively designed report

Students learn about:	**Students learn to:**	**Integrated learning experiences, instruction and assessment**	**Evidence of learning**	**Feedback**
		• Outline the different types of user interfaces and determine the type of interface used in database forms (ie G.U.I.). • Students create a form for viewing/editing storage device details in the 'Storage Device' database created earlier. • Outline the basic elements of a form, eg header, footer, body, labels, textboxes, buttons, icons and pictures. Use a worksheet identifying screen elements on a sample form. Then identify these elements on the forms just created. • Teacher demonstrates how to edit a form in 'form design view'. Students create a button to run the printing macro created earlier for the 'Storage Devices' database. Students demonstrate how to move, resize and align screen elements and forms.	Students demonstrate an understanding of the function of forms in providing an interface to the database. Students can successfully create a database form using a form wizard. Students can create and edit form elements and arrange them on a form.	Teacher provides oral feedback on uses of forms from databases.
Interface design • the function of the user interface • interactivity with the user • communication with application and operating systems	• explain the function of the user interface • compare and contrast the types of user interfaces	• Present students with a handout outlining interface design principles. Discuss these principles with reference to form design and form elements. • Students critically evaluate samples of good and bad interface screen design (including examples from other applications or even websites). • Students create a form for viewing the 'First Fleet' database. Add buttons for running the various queries and reports created earlier. The form should follow sound interface design principles.	Students can critically appraise the design of an interface in terms of accepted design principles. Students can create a database form, incorporating a number of elements, which demonstrates sound interface design.	Teacher provides oral feedback on design principles during class questioning and discussion. Teacher provides written annotations on 'First Fleet' form design.

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
Integration • exporting data for other uses	• create a mail merge from stored data	• Outline the concept and function of mail merge using real-world examples, eg credit card letters, competition sweepstakes. • Teacher demonstrates the construction of a mail merge document. Create a mail merge with the 'First Fleet' database to send a personalised letter to all convicts telling them of their criminal conviction and the ship they will be sailing on. • Students create a database with the following fields: Surname, Given Name, Title, Gender, and Address. Students populate the database, entering fictitious data in the address field to protect student privacy. They add a 'Yes/No' field to their database called 'Invite', choosing who they wish to invite to their birthday party by ticking this field in the database. They create a query that displays only those people they wish to invite to their birthday party. They then create a party invitation in a word processor and mail merge it with the query.	Students can relate the use of mail merge to real-world examples. Students can successfully create a mail merge document and merge it with an existing database.	Teacher provides oral feedback on mail merge during class questioning and discussion. Teacher gives written comments on mail merge printout from both learning activities.
Ethical issues such as: • code of practice and conduct • privacy and security • accuracy, validity and bias of data	• research and report on ethical issues relating to the development of information and software technology solutions	• Class brainstorms ethical issues, based on previous activities. • Class debates whether 'Using mail merge to send letters has improved the way we communicate'.	Students can carry out an informed discussion and present logical arguments based on the ethical issues involved with the use of databases.	Teacher provides oral feedback on student understanding of ethical issues.

<table>
<tr><th>Students learn about:</th><th>Students learn to:</th><th>Integrated learning experiences, instruction and assessment</th><th>Evidence of learning</th><th>Feedback</th></tr>
<tr><td>Features of a software such as:
• search facilities
• micro capabilities
• macro capabilities
• editing capabilities
• data portability</td><td>• compare and contrast the features of packages, including relationships to other packages
• list the features of software packages appropriate to particular users and a range of tasks</td><td>• Students create a table of features of database software with a brief description of each.
• Discuss how each of these features relate to features in other software packages, eg word processing, spreadsheets, internet, etc.

For example:<table><tr><th>Feature</th><th>Description</th><th>Comparison</th></tr><tr><td>Searching</td><td>To retrieve specific pieces of information based on certain criteria. Conducted through the use of filters and queries.</td><td>Most other programs limited to ‘Find’. Internet search engines have similar, but not as powerful, features.</td></tr><tr><td>Sorting</td><td>To arrange information in either ascending or descending order. Can also be carried out as part of a query.</td><td>Spreadsheets very similar. Not present in other packages.</td></tr><tr><td>…….</td><td>…….</td><td>…….</td></tr></table></td><td>Students demonstrate an understanding of the main features of database software.

Students can make comparisons between database features and similar features in other software applications.</td><td>Teacher provides oral feedback on the database features selected by students.</td></tr>
<tr><td colspan="5">Software</td></tr>
<tr><td>Developing software solutions
• defining a problem
• designing a solution
• evaluating a solution</td><td>• apply set criteria to choose the most appropriate software solution
• apply an approach to develop software solutions
• select and justify the use of existing software for a software solution</td><td>• Examine in detail, the processes of selecting, designing and evaluating a software solution.
Using an example of an e-business such as Amazon.com, students:
• analyse the business structure
• write a report that describes the main features of the database and how it functions at the centre of the online service studied during the case study</td><td>Students write a report that describes the basic structure and function of the database in the context of the case study.</td><td>Teacher gives written feedback on student description of the basic structure and function of the database.</td></tr>
</table>

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
		• justify the decision to use the selected software solution by outlining the activities that occur during each step of development: – defining the problem – designing a solution – evaluating the solution.	Students demonstrate an understanding of how each step in the development process applies to the chosen solution and justifies the decision to use the selected software solution.	Teacher provides oral feedback during class questioning and discussion.
Databases: design, produce and evaluate				
Defining and analysing the problem • identification of need or problem to be solved • constraints that impact on problem solving: – technical such as hardware – operational – financial – ethics	• identify the need or problem to be solved • analyse the problem and a range of possible solutions • identify and analyse the factors that may impact on the solution	Students: • model the main elements of the design process by designing a database solution for monitoring the inventory of a DVD hire shop • identify the need or problem to be solved • analyse a range of solutions • identify the constraints and discuss how they impact on the solution.	Students can define and analyse a simple problem and identify the main constraints that impact on the solution.	Teacher provides written feedback on student ability to define and analyse a problem and identify the main constraints.
Designing possible solutions such as: • concept mapping • brainstorming • observation • research	• generate ideas using a range of methods • examine and modify existing solutions	• Introduce the methods of designing possible solutions and then have the students work through the process using each method.	Students create a concept map, participate in a brainstorming exercise, observe how the system operates and research the possibilities.	Teacher gives written feedback on student concept maps and research.

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
				Teacher provides oral feedback during brainstorming and observation exercises and discussion.
Database development • purpose of the database • components of a database • inputs of the database • outputs of the database: reports, forms, data/ information • data types required to solve a problem	• define and describe a database • explain the purpose of a database • list input data • identify outputs when designing a database • create a data dictionary to illustrate and describe data types	• Working in small groups, students design an inventory database for a DVD hire shop. • Each group creates a design folio that describes the purpose of the database, the components of the database, the inputs and outputs of the database. They must also create a data dictionary that describes the important features of the data.	Students can produce a design folio or design brief for a purpose-built database. Students produce a data dictionary for a purpose-built database.	Teacher provides written annotations on student design folio. Teacher gives written feedback on student data dictionary.
Producing possible solutions such as: • prototyping • input/output/ processes table	• model possible solutions using a range of methods	• Students create a prototype of the inventory database for a DVD hire shop that fits the specifications called for in the student's original design brief.	Students create a prototype of the inventory database for a DVD hire shop.	Teacher provides written feedback on prototype database.
Communication techniques including: • written • graphical and visual	• document decision-making and problem-solving in the development of solutions	• Students create documentation for the prototype that will be included in the design folio: – written descriptions and explanations – graphics, diagrams and concept maps.	Students produce a design brief for a purpose-built database that contains written and graphical explanations.	Teacher gives written annotations on student design brief.

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
Evaluation criteria • functionality of solution • quality of information such as accuracy, relevance, integrity and timeliness	• establish criteria for the evaluation of solutions • evaluate solutions using established criteria	• Examine the importance of establishing criteria for the evaluation of a database solution. • Describe methods of evaluating the criteria of: – functionality of solution – accuracy of information – aesthetics. • Write an evaluation that addresses the established criteria. • Students use criteria to evaluate the prototypes of other class members.	Students can recall the importance of establishing criteria for evaluation. Students create a written evaluation addressing the established criteria and then use it to gather feedback on their prototype database solution.	Teacher provides oral feedback on criteria selected. Teacher gives written annotations on student evaluation. Peers evaluate each other's databases and provide oral feedback.
Methods of evaluation • individual	• use feedback evaluation in order to modify solutions	• Use the evaluation to gather feedback that is then used to modify their prototype solution.	Students make and document changes to their prototype based on the findings of the evaluation feedback.	Teacher provides written feedback on final prototype database and documentation.

5.1.1 Sample assessment for learning activity 1: Database Data Storage

Context
Students have been introduced to databases and have studied the role of data and information within database systems. This is one of the activities that would be included in the project portfolio, illustrating an early stage in the teaching and learning sequence when feedback is essential for the student. This feedback assists the student to clarify understanding of concepts, remedy misconceptions and plan for deeper understanding. Students have learnt about the different types of data and how they are represented and stored digitally on a computer. Students have undertaken a number of learning activities to develop an understanding of the legal and ethical issues that pertain to databases and database design. An earlier activity had students write a data policy document for a doctor's surgery that addressed these issues in the context of a given scenario. The purpose of this activity is to tie these concepts together and have students make considered decisions in the ethical selection of appropriate storage media for a given database.

Outcomes
A student:
5.1.2 selects, maintains and appropriately uses hardware for a range of tasks
5.2.2 designs, produces and evaluates appropriate solutions to a range of challenging problems
5.3.1 justifies responsible practices and ethical use of information and software technology.

Description of activity
Students study the given scenario for the use of a large database system in a doctor's surgery. They decide on appropriate storage types and media for the different components and operations of the database. This includes input and output file types and media (including transmission media), database storage media, and backup storage media. They then discuss legal and ethical issues relating to the scenario and justify their selection of media in terms of these issues. They present their decisions and justification in the form of a written report (1–2 pages). The suggested duration for this activity is 1–2 periods.

Criteria for assessing learning
(These criteria would normally be communicated to students with the activity.)

Students will be assessed on their ability to:
- select appropriate file types and media for the input, storage and output/transmission of database data/information
- identify relevant legal and ethical issues relating to the scenario
- justify the selection of file types and media in terms of their relationship with identified legal and ethical issues.

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:
8–10 (High)	• selects all appropriate file types and media for storage of data and information • identifies a broad range of relevant legal and ethical issues for the scenario • independently justifies the selection of file types and media for storage in relation to the legal and ethical issues
4–7 (Satisfactory)	• selects most appropriate file types and media for storage of data and information • identifies a range of relevant legal and ethical issues for the scenario • describes the selection of file types and media for storage in relation to the legal and ethical issues
1–3 (Progressing)	• selects some file types or media for storage of data and information • identifies some relevant legal and/or ethical issues for the scenario • requires assistance to justify the selection of file types and media for storage in relation to the legal and ethical issues.

Feedback

Brief written annotations on the student report where necessary, commenting on:

- selection of appropriate file types and media
- identification of relevant legal and ethical issues
- justification of the selection of file types and media.

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

- suitability of media depending on its planned use
- depth of discussion and number of issues considered for the scenario.

Future directions

Through this activity students are developing an ability to critically evaluate and justify their decisions in terms of relevant legal and ethical issues. They are developing a better understanding of database systems in context, which they will use later in the unit when they are required to develop their own database software solutions. They will be required to carry out similar activities for all other modules covered in the course.

Resources

- Briefing sheet outlining the details of the particular scenario.
- Feedback grid sheet, to be submitted with their report.
- Internet sites:
  - nsd.uib.no/English/privacy/ (NSD Homepage)
  - lboro.ac.uk/admin/committees/ethical/gn/deas.htm (Loughborough University Data Collection and Storage)
  - jmir.org/2000/1/e8 (Journal of Medical Internet Research, 2000)

5.2 Stage 5 Sample Unit of Work: Option 4 Digital Media Project

Unit title: Digital Media (Option 4)

Project description: This unit of work is an introductory project based on a design brief. It involves the creation of graphical images to be incorporated into a graphics package for a publishing company. The unit involves the development of skills and knowledge in working with graphics, and sufficient time must be allocated to allow students to gain experience and skills in graphic manipulation in both draw and paint packages.
This project requires the development of various media products, expressed as a series of challenging activities – Challenges 1 to 5.

Suggested unit length: 6–8 weeks

Targeted outcomes:	**Resources:**
A student: 5.1.1 selects and justifies the application of appropriate software programs to a range of tasks 5.2.1 describes and applies problem-solving processes when creating solutions 5.2.2 designs, produces and evaluates appropriate solutions to a range of challenging problems 5.2.3 critically analyses decision-making processes in a range of information and software solutions 5.3.1 justifies responsible practices and ethical use of information and software technology 5.3.2 acquires and manipulates data and information in an ethical manner 5.5.1 applies collaborative work practices to complete tasks 5.5.2 communicates ideas, processes and solutions to a targeted audience 5.5.3 describes and compares key roles and responsibilities of people in the field of information and software technology	• Software packages: Paint, Draw, Animation and Presentation • Internet access • WebQuest or hand-out sheets

Students learn about:	**Students learn to:**	**Integrated learning experiences, instruction and assessment**	**Evidence of learning**	**Feedback**
Project development • processes and techniques	• design, produce and evaluate a simple project for a real-world application	• Teacher introduces the students to a design brief involving the creation of graphic images for an online publishing company.	Students demonstrate basic practical skills in graphic manipulation in draw and paint packages.	Teacher gives oral feedback to individual students on their use of draw and paint packages.

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
Data types for digital media products • used in specific digital media products	• recognise and select data types used in digital products • produce samples of work for a range of data types	• Students brainstorm how to successfully incorporate graphic elements into a publishing company design. In pairs they create a list of design considerations for their product. • Teacher discusses design principles and demonstrates examples using professional websites and other published material. • Students view and analyse samples of websites and other published material listing key aspects of design – including structure, colour, appropriateness of text and graphics.	Students analyse graphic elements and identify exemplary design concepts. Students describe examples of appropriate graphic design principles viewed in the samples.	Teacher provides oral and written feedback on student ability to identify graphic elements and exemplary design concepts. Teacher provides oral feedback on students' descriptions.
Manipulation techniques • cropping, rendering, special effects	• manipulate data types for specific digital media products	**Challenge 1** This challenge involves creating an appropriate company logo, which reflects the company profile. • Students hand draw several prototypes of a company logo on paper, and then in pairs discuss the most relevant design to be used for the publishing company. • Using a graphics package, students create and manipulate a design, based on the prototypes, to be used for the company logo.	Students develop proficiency in designing a range of solutions for the company logo. Students demonstrate their skills in using a variety of graphic tools. Students select and justify the appropriateness of their design.	Teacher gives oral and written feedback on the range of student designs. Teacher provides oral feedback on use of various graphic tools. Teacher provides written feedback on student self-evaluation of design.

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
Manipulation techniques • cropping, rendering, special effects	• manipulate data types for specific digital media products	**Challenge 2** This challenge involves students using a paint program to re-create a section of a street map to be used in representing the company's office location. • Teacher displays printed sections of street maps to students. Samples of maps may be downloaded from the Telstra whereis internet site (www.whereis.com.au). • Students select a sample map, choosing a section on which to base their location map, and create it in a paint program. • The logo created in Challenge 1 is resized and imported in to the top corner of the map page to identify the company with their location.	Students select and justify the most appropriate software to manipulate the map, then produce a graphical representation of the map. Students demonstrate the ability to integrate and manipulate graphic images for a specific purpose.	Teacher provides oral feedback on graphical representation of the map. Teacher provides annotations on printout of map and logo. Clarification of student achievement is provided by oral feedback.
Manipulation techniques • cropping, rendering, special effects	• manipulate data types for specific digital media products	**Challenge 3** This challenge involves students creating a set of graphics to be used in the company website. They produce a banner with the company name and appropriate link buttons for the website. • Teacher introduces students to a range of professionally designed websites. Students identify and discuss best practice for graphics for the web. • Design principles, such as simplicity, consistency of elements, colours, textures and effects are discussed. • Students create a set of banner and link buttons for the publishing company website using a paint program.	Students are able to discuss and list the criteria for graphics used in web design. Students produce graphic elements, which demonstrate the design principles discussed.	Teacher provides oral feedback on student ability to identify and discuss criteria for graphics. Teacher provides oral feedback on graphic elements produced.

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
Factors affecting file size • file format – GIF, WAV, MPEG, etc • memory size • processing speed • colour palette	• describe factors affecting file size and observe the effects on the digital media • select and use appropriate file formats for digital media	• Students save graphics in two different file formats, to compare and contrast file size and image quality of the graphics.	Students are able to identify the differences in saving graphics in a variety of file formats. Students demonstrate an ability to save graphics in two file formats.	Teacher provides oral and written feedback on student ability to save graphic files in a variety of file formats.
Data types for digital media products • used in specific digital media products	• recognise and select data types used in digital products • produce samples of work for a range of data types • describe how data types combine to produce and enhance a digital media product	**Challenge 4** This challenge involves students creating an animated graphic using animation software. • Students view examples of animated images used in websites. They discuss their quality and the appropriateness of using animated images in the web designs. • Students in small groups brainstorm and document solutions for the use of animated images in the online publishing company. • Teacher demonstrates the method of creating an animated graphic in an animation package. • Students create a static image, which will be used as a base for a ten-frame animation. • Students create an animated sequence by making changes to the original static image. • Students test their sequence and make any necessary modifications.	Students describe and justify appropriate animated images used in professional web design. Students demonstrate examples of appropriate and effective animations from sampled websites. Students create a static image to be used in an animated package. Students demonstrate an ability to create and modify images in an animated sequence.	Teacher provides oral feedback on student analysis of animated images. Teacher provides oral feedback on static image animated sequence.

Students learn about:	Students learn to:	Integrated learning experiences, instruction and assessment	Evidence of learning	Feedback
Project development • processes and techniques	• design, produce and evaluate simple projects for a real world application	**Sample assessment for learning activity 2 – Graphics Package Presentation (see page 46) Challenge 5** This challenge involves students presenting their work to the class. Students use presentation software to display and discuss their graphics package. This includes the company logo, location map, website banner, link buttons and animated graphic. • Teacher introduces evaluation criteria to students. This includes the appropriateness and relevance of the graphics to the design brief, design consistency and visual quality of the images included in the package. • Students itemise evaluation criteria items. • Teacher demonstrates the method of importing graphics into a presentation program. A ready-made template could be distributed to students to aid in presenting their graphics package. • Students import their graphic elements into the presentation package. They annotate their graphic solutions with a series of comments justifying their choices and outlining the possible use of their package. • Students present the project to the class and justify their choices for their solution in relation to the design brief. • Students in the class provide peer feedback on the presented graphics solutions.	Students establish and apply criteria for the evaluation of their solution. Students create an annotated slide presentation in order to reflect and document their solution. Students apply and assess collaborative work practices when developing solutions. Students carry out peer assessment of individual and group contribution to the package.	Teacher provides oral feedback on criteria established. Peers and teacher provide oral and written feedback on individual presentations. Teacher provides oral feedback based on observation of work practices. Formal written feedback of completed folio for project.

5.2.1 Sample assessment for learning activity 2: Graphics Package Presentation

Context
This is the final activity in a project to create and present a range of media. Students have already completed four of the five challenges or activities involved in this unit of work, including designing and producing a company logo, a location map, a website banner, link buttons and an animated graphic. In this fifth activity, students use previously created components to produce their graphics package for the online publishing company 'Creative Publishing' and present their solutions to the class. Peer evaluation is used, to assist students with their appreciation of the relevant design principles and with using evaluation to improve their final product. The teacher will introduce evaluation criteria, including appropriateness and relevance of the graphics to the design brief, design consistency and visual quality of the images in the package. This presentation is the culmination of the project and provides the materials to be used later in the creation of a website.

Outcomes
A student:
5.1.1 selects and justifies the application of appropriate software programs to a range of tasks
5.2.1 describes and applies problem-solving processes when creating solutions
5.2.2 designs, produces and evaluates appropriate solutions to a range of challenging problems
5.3.2 acquires and manipulates data and information in an ethical manner
5.5.2 communicates ideas, processes and solutions to a targeted audience.

Description of activity
Students are to present their graphics which include a company logo, a location map, a website banner, link buttons and an animated graphic to the class. Students may use a presentation software package such as PowerPoint to present and display their graphics package.

Students will make a list of evaluation criteria and use it to provide peer feedback to other students' graphic solutions. They will evaluate the best features of their design including annotated points about structure, style, colour, appropriateness of text and graphics. They will provide justification for their choices of images and chosen software applications. Drawing on peer feedback, students will identify areas for improvement, and suggest suitable modifications.

Criteria for assessing learning
(These criteria would normally be communicated to students with the activity.)

Students will be assessed on their ability to:
- describe and apply a set of evaluation criteria for the evaluation of the graphics package solution
- incorporate effective design considerations (such as structure, simplicity, consistency of elements, colours, textures and effects)
- import and manipulate graphics into a presentation software package
- use feedback from peer evaluation to identify weaknesses and suggest appropriate modifications
- describe and justify the appropriateness of the graphics package to the design brief and target audience.

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)	• describes and applies criteria for evaluation of a graphics package • incorporates effective design considerations and principles into their graphics package • demonstrates sound technical skills in importing and manipulating graphics • constructively uses student feedback to plan appropriate modifications to their presentation • justifies the most appropriate design for the graphics package relating to the design brief and targeted audience
6–10 (Satisfactory)	• describes and applies some criteria for evaluation of a graphics package • incorporates some design considerations and principles into their graphics package • demonstrates some technical skills in importing and manipulating graphics • uses student feedback to plan some appropriate modifications to their presentation • justifies the design for the graphics package relating to the design brief and targeted audience
1–5 (Progressing)	• identifies and applies some criteria for evaluation of a graphics package • incorporates minimal design considerations into their graphics package • demonstrates limited technical skills in importing and manipulating graphics • with assistance uses student feedback to plan some modifications to their presentation • provides limited justification of design choices.

Feedback

Students will be given both oral and written feedback from the teacher. Peer evaluation will also occur as students discuss other students design solutions based on a set of evaluation criteria.

The teacher will provide oral feedback to students on their:

- list of suitable criteria for the evaluation of their solution
- ability to import their graphic elements into the presentation software and convert any file formats as required.

Written feedback will inform students on their ability to:

- produce a graphics package incorporating effective design considerations and principles such as structure, simplicity, consistency of elements, colours, textures and effects
- plan modifications to their presentation following student feedback
- produce and justify an appropriate design solution to the design brief and targeted audience.

Future directions

During the activity students develop skills in applying evaluation criteria to assess their solutions and the solutions of their peers. They need to further improve their skills in manipulating appropriate data types to produce and enhance their digital media solution. Collaborative work practices are encouraged through peer feedback. Students also need to improve their skills in communication through explaining their ideas and solutions to a targeted audience. Further activities should also give students the opportunity to improve their literacy skills in writing.

This learning activity can lead students into creating and building an online website for a publishing company.

Resources

- Paint and Draw packages
- Internet access
- Peer assessment sheet
- Internet sites:
  - Logo design — www.123logo.com/logo-designs.htm; www.creativeprp.com/story/feature/2857.html
  - Banner design — www.htmlcook.com/traffic_banners_design.htm; www.wdvl.com/Internet/Commerce/BannerAds/
  - Animated graphics — www.geocities.com/SiliconValley/Way/9721/gifs.html; www.uselessgraphics.com/; www.donotenter.com/cool/ucgraphics/animated/