Queensland the Smart State
Education and Training Reforms for the Future

Queensland Government
Education Queensland

ICTs for Learning

Years 10–12
Practical Ideas for Teachers

Information and Communication Technologies

ICTs for Learning

Acknowledgments

Material collated and production coordinated by Barbara Gant (Senior Project Officer, ICTs for Learning) from information and materials provided by:

Phil Burley
Jane Carr
Stacy Cottam
Tasmin Cowling
Peter Evans
Mark Gillow
David Graham
Lissa Hodson
Gayleen Jackson
Chris Jeffs
Sel Kerans
Cheryl Kerr
Lindy McKeown
Cathy Nash
Damien O'Brien
Jacqui Osborne
David Reid
Barry Rieck
Doug Roach
Bob Rodgers
Jeff Souter
Trish Wade
Kirsty Weston.

For information regarding the ICTs for Learning strategy, please contact:

ICTs for Learning
Coorparoo Education Precinct
347 Old Cleveland Road
Coorparoo Q 4151

Ph: 1300 650 015

Web: www.education.qld.gov.au/ictsforlearning

ISBN 1-920829-07-5

ID 20030384

Information and Communication Technologies for Learning

Years 10–12
Practical Ideas for Teachers

ICTs for Learning

Foreword from the Minister for Education Anna Bligh MP

Dedicated and skilled teachers are the most valuable resource in our classrooms and are essential for ensuring the continued success of using information and communication technologies (ICTs) as tools for learning. The purpose of the ICTs for Learning Strategy is to support teachers and schools in creating the conditions where ICTs are integrated into daily teaching practice and curriculum delivery.

Learning and development is a key focus of the second year of the ICTs for Learning Strategy. Computers and cabling are not enough if our teachers are not adequately skilled in their use to enhance learning.

This year, in addition to the funds contained in the enhanced ICTs for Learning Annual Grants, Education Queensland will spend in excess of $2 million in supporting schools and teachers in the area of learning and development.

The ICT Learning and Development Strategy provides a range of professional development opportunities and resources to support teachers in developing ICT curriculum integration skills. Further explanation of the strategy can be found in the 2003–2004 ICTs for Learning School Information Kit distributed to you in July.

The *ICTs for Learning Practical Ideas for Teachers* booklets have been designed as an integral part of the ICT Learning and Development Strategy. These booklets describe approaches to ICT curriculum integration with practical, step-by-step examples of ICT use across a range of curriculum areas and year levels. They will assist teachers in planning, teaching and assessment and provide another avenue for teachers to move towards the destination of effective ICT integration.

I encourage all schools to make use of these valuable resources to support teacher practice. I know that you will engage fully with the ICT Learning and Development Strategy and continue your commitment to making ICTs a tool for teaching and learning in your school.

Anna Bligh MP
Minister for Education

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Introduction

ICTs for Learning – Overview of Learning and Development Strategy

Information and Communication Technologies (ICTs) are one of three major components in the reform package entitled *Queensland the Smart State – Education and Training Reforms for the Future.*

This three-year transition strategy is assisting teachers and schools to create the conditions under which ICTs can be integrated as everyday tools for learning and delivering curriculum.

A key action for the second year of the strategy is the implementation of the ICTs Learning and Development Strategy. This comprehensive framework provides a broad range of professional learning pathways and resources that will help all teachers to develop the skills needed to integrate ICTs into the curriculum.

This booklet has been designed as part of the ICTs Learning and Development Strategy. It aims to assist teachers to use ICTs in their planning, teaching and assessment by providing a range of practical, step-by-step examples of how ICTs can be used across a range of curriculum areas and levels. The examples have been developed through a framework of productive pedagogies and integration across all key learning areas. Further examples, unit plans, teacher stories and ICTs learning objects can be found in the online database of examples of ICTs curriculum integration, part of Education Queensland's Curriculum Exchange. This database includes examples of integration that will challenge and support teachers beginning to use ICTs as well as the advanced operators providing leadership in schools. Teachers should also consider how integration of ICTs in the curriculum is linked to:

Lifelong learning

- Knowledgeable person with deep understanding
- Complex thinker
- Active investigator
- Responsive creator
- Effective communicator
- Participant in an interdependent world
- Reflective and self-directed learner

Productive pedagogies

- Intellectual quality
- Supportive classroom environment
- Recognition and valuing of differences
- Connectedness

Cross-curricular priorities

- Numeracy
- Literacy
- Lifeskills
- Futures perspective

This booklet should be used as part of a school's total ICTs for Learning strategy. Each teacher also has access to a wide range of both systemic and locally developed learning and development activities through ICTs for Learning and the ICTs Learning Guarantees for Teachers.

This booklet is a valuable tool that will help teachers to:

- select learning strategies and resources that cater for students' learning needs and styles
- create learning experiences that enable students to actively use ICTs to organise, research, interpret, analyse, communicate and represent knowledge
- utilise resources within their schools
- adopt and use new knowledge, skills and attitudes
- explore new approaches to integrating ICTs
- develop creative ways of using ICTs, inspired by ideas in this booklet
- demonstrate how ICTs link to productive pedagogies
- work with colleagues to explore and discuss new and innovative techniques for integrating ICTs into the curriculum.

Using this booklet

The activities that have been included in this booklet can be used across a number of key learning areas and across various levels. They can be followed step by step or used as a starting point for developing new ideas. Activities can also be modified depending on the context and particular needs of students. Students with a disability may need assistance with some of the activities.

These examples should be embedded into a current unit of work. Examples of units of work that embed ICTs are available from the Curriculum Exchange.

Understanding young adult learners and ICTs

Each student is unique and has individual needs and interests that differ according to age, gender, physical abilities, capabilities, aspirations, dispositions, experiences and learning preferences. Sociocultural backgrounds further characterise the individual learner. The development of curriculum programs should be responsive to and extend children's learning and provide a guide for the planning of integrated and holistic programs including the use of ICTs in the curriculum.

By actively supporting and facilitating students' learning, teachers can provide opportunities for self-directed play and expression using a variety of ICTs. Providing access to a range of open-ended and adaptable software programs can increase the ways in which students acquire, clarify, generate and extend understandings, capabilities and dispositions and support the development of students' feelings of independence, confidence and competence when facing new challenges.

As capable learners, young adults are:

- developing very sophisticated thinking skills and strategies, including metacognitive strategies, that enable them to compare critically, analyse, synthesise, generalise and hypothesise to solve abstract problems
  - they may use ICTs to investigate information, discern patterns and discrepancies and to hypothesise and treat hypotheses
- in the transition process between dependent and independent or inquiry-based learning
  - they may work cooperatively and without teacher intervention on ICTs-based tasks
- eager to be treated as adults
  - they may select and use a variety of increasingly sophisticated ICTs without teacher intervention
- distinguishing between memorising information and understanding and applying information
  - they may understand the difference between operational skills and applying the processes necessary to ensure the successful completion of a task
- concerned with the relevance of learning experiences and how they support their pathways to the future
  - they may interact with and differentiate between social applications, educational software and industrial standard software
- starting to develop time and stress management skills
  - they may use software to organise tasks and study schedules and complete set tasks within time constraints
- questioning power relationships that exist in Australian society, government, law and the economy
  - they may negotiate with teachers, peers and other personnel on the appropriate use of ICTs
- valuing and exercising initiative and creativity
  - they may use ICTs to develop new knowledge, skills and dispositions and devise a new purpose for the information obtained.

Supporting students with a disability

Some students may need assistance to be able to engage in ICTs activities because they have a disability that makes using conventional technology difficult.

Some students may not be able to participate in ICTs activities because they have disabilities that make using conventional technology difficult. Other students may associate technology with frustration, fatigue, injury and a high error rate.

Assistive technology enables students with a disability to participate in ICTs for Learning activities. The scope of assistive technologies is vast and provides, for example, an alternative method of input that is more suitable to a student's learning style, by increasing accuracy, input and output rates.

When students with a disability participate in ICTs activities such as those outlined in this booklet, it is important to focus on their abilities and provide avenues, technologies and strategies that will allow all students to maximise their participation, engagement and success.

Responding to the diversity of students

When preparing ICTs activities, it is important to identify and accommodate both the learning styles and the sensory and cognitive access, response, input and output needs of all students. Assistive technologies and appropriate learning strategies should be considered when identifying hardware, software and sequenced learning for ICTs activities. If a word processor is needed for an activity, consider the range of software programs that could be used to provide and present information for a range of learning styles and abilities, rather than limiting students to a mainly text-based program. If an activity requires the use of pictures or images, consider how the information could be provided in an alternative format to allow students with a vision impairment to participate in the activity. If an activity requires input through a computer's keyboard or mouse, consider alternative methods of data input that accommodate students with a range of input needs.

All the activities in this booklet have the capacity to be undertaken by all students; any activities that are developed as a result of reviewing this booklet should also have the capacity to be undertaken by all students. It is critical for a student's successful participation in ICTs activities that their needs and ability are recognised. This includes identifying suitable technology for each student and developing appropriate learning strategies that maximise participation and learning outcomes. Obtaining input from support staff such as advisory visiting teachers, education advisers, learning support teachers, occupational therapists, physiotherapists and speech-language pathologists will ensure that all students are given every opportunity to participate and succeed in ICTs activities.

Ideas

A claymation

Suggested levels	Years 10–12
Key learning areas	The Arts
Purpose	To plan and create a claymation that illustrates an event, theory or happening.
Hardware and software	• Digital camera that allows photos to be taken in a series (this means the image counter continues from where it left off when you downloaded rather than starting at one again) • Mind mapping software such as Inspiration or MindManager • Video editing software such as QuickTime Pro, iMovie or Microsoft Movie Maker • Tripod for camera
Sequenced learning activities	Students: • use software such as Inspiration to create a storyboard for their animation • use clay to create backgrounds and characters • set the camera up on the tripod and check the framing • check the camera is set up to take photos in a series • position the characters and backgrounds for the first scene and take two photos of the scene. The software will usually run the animation at a reasonably quick speed, so it is a good idea to take two pictures as this slows down the animation and allows greater detail to be observed. The animation is usually run at six slides per second, so 60 slides will run for only ten seconds. • position the characters for the next scene and photograph it • save all the photos in one folder/directory on the computer • use appropriate software to open an image sequence • select six images per second • click on the play icon on the movie field • save their animation into the folder with the photos • submit their animation to a film festival or competition (optional).
Links to support materials	Clay animation kit www.clevelanss.qld.edu.au/ldc/claymation/index.html Multimedia Online – Module 2: Acquiring images for multimedia http://education.qld.gov.au/tal/curriculum_exchange/students/learnonline/multimedia/mod2a01.html Teaching Media Production www.geocities.com/Hollywood/Hills/1902/index3.html

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A claymation

Suggested levels	Years 10–12
	The Clay Animation and Stop Motion How to Page www.animateclay.com/ ThinkQuest www.thinkquest.org/library/lib/site_sum_outside.html?tname=22316&url=22316/home.html TIPS: Year 5 Claymation http://education.qld.gov.au/tal/tips/01800.htm
Comments	Teachers who have little or no experience in movie making could seek help from a Learning and Development Centre ICTs coordinator. These animations could be submitted as short films to film festivals and competitions. See: www.fti.asn.au/events/festivals.php www.ncc.asn.au/web_resources/comp_festivals.htm

A PowerPoint puzzle

Suggested levels	Years 10–12
Key learning areas	The Arts
Purpose	To unpack a graphic in PowerPoint, animate it and have other students guess what it is.
Hardware and software	• Computers • Microsoft PowerPoint • Video projector
Sequenced learning activities	Students: • select or develop a graphic based on the current unit of work and insert it into a blank PowerPoint slide • double click on the graphic to convert it to a Microsoft Office drawing object (only some graphics can be converted). This will show how many small segments of colour make up the graphic. • select 'Slide Show, Custom Animation' and, in the Order and Timing folder, reorder the order of the graphic parts so that the smaller parts come in first. This makes it more difficult for the audience to guess what the graphic is as only small pieces of the puzzle appear at one time. • set the animation to advance automatically at one second • run their animation and invite a partner or other class members to view it and guess the item that is being unpacked on the screen.
Links to support materials	Links www.soniacoleman.com/Tutorials/links.htm Multimedia Online: Module 3: Working with images http://education.qld.gov.au/tal/curriculum_exchange/students/learnonline/multimedia/mod3a01.html TIPS: Using PowerPoint presentations in the upper grades http://education.qld.gov.au/tal/tips/00973.htm www.computertips.com www.computertips.com/Microsoftoffice/MsPowerPoint/19971128002.htm
Comments	Give students a time limit as they often spend more time than is necessary reordering the animation. This exercise explores further elements of design, not usually visited on paper. It lets students see how graphics are developed and how images can be formed in our minds based on expectations and previous experience.

Australian cultural heritage webpage

Suggested levels	Year 10
Key learning areas	Studies of Society and Environment, English, The Arts, Technology
Purpose	To create a webpage on the 'Australian national identity' that demonstrates knowledge of the different influences on and perspectives of Australian culture.
Hardware and software	• Computer with Internet access • Digital camera • Word processing program such as Microsoft Word • Web design program such as FrontPage, Macromedia Contribute or Dreamweaver
Sequenced learning activities	Students: • interview people from different cultural backgrounds about Australian national identity • take digital photos of their interviewees • write up their interviews • research the history of the Australian national identity using primary and secondary sources of information such as newspapers, websites and CD-ROMs • reflect on the various positions and opinions expressed by their interviewees and in the sources of information • use web design software to create a webpage that contains their interviews and digital photographs and reflects opinions on Australian national identity • publish the website on the school intranet.
Links to support materials	Creating Web Pages www.cln.org/themes/webpages_intro.html Dreamweaver for beginners http://education.qld.gov.au/tal/tips/01796.htm Hot Topics: Aboriginal Australians – quick links http://education.qld.gov.au/tal/tips/hot_topics/01136.htm Hot Topics: Australian identity – quick links http://education.qld.gov.au/tal/tips/hot_topics/01134.htm Tutorial on Creating Web Pages with FrontPage Editor www.siec.k12.in.us/~west/online/website/ Using applications http://education.qld.gov.au/tal/tips/01780.htm Writing HTML www.mcli.dist.maricopa.edu/tut/
Comments	Webpages are easy to create and maintain. They can provide current information to a wide audience.

A virtual sciencelab

Suggested levels	Years 11–12
Key learning areas	Science/Biology
Purpose	To engage with simulation software and Internet sites and to physically interact with the environment.
Hardware and software	• Computer with Internet connection • Virtual Fly Lab • Presentation program such as Microsoft PowerPoint • Word processing program such as Microsoft Word
Sequenced learning activities	Students: • review and consolidate their prior knowledge of genetic inheritance and related concepts such as genes and their DNA structure, meiosis and fertilisation • work offline to plan their experiment carefully, with certain outcomes in mind • work in pairs to access the Virtual Flylab site and, using two pairs of mutations, perform crosses to reveal the genetic characteristics of the mutations • perform their experiments and gather data • analyse the data and devise further crosses if needed • use a word processing program to prepare a scientific report on their findings related to the characteristics of their allocated mutations • use the data collected to create a PowerPoint presentation • present an expository oral that includes relevant discussion, criticism, judgment and conclusions of their research.
Links to support materials	TIPS: Biology: Genetics http://education.qld.gov.au/tal/tips/01316.htm Virtual Fly Lab http://biologylab.awlonline.com
Comments	This simulation software provides opportunities for students to engage in complex reasoning processes such as decision making, critical thinking and creatively evaluating the worth of data before drawing conclusions. The curriculum focus area for this project is Biology, but because students also present reports and perform expository orals it has cross-curricular links to English and Information Technology.

Catenary curve

Suggested levels	Year 12
Key learning areas	Mathematics
Purpose	To investigate a general catenary curve. A general catenary curve can be described by the equation $y=\frac{a}{2}\left(e^{\frac{x}{a}}+e^{\frac{-x}{a}}\right)+c$ where 'a' and 'c' are real non-zero constants and 'x' is a real variable. It is a curve used to describe the shape of hanging ropes, chains and cables.
Hardware and software	• Computer • Maths software such as Maths Helper, Graphmatica, Winplot • Graph paper • Length of cotton about twice the width of a computer screen and a small amount of Blu-Tack
Sequenced learning activities	Students: • load the graphing software • set up the *x* axis scales to the domain $-10 < x < 10$ and the *y* axis scales to the range $-5 < y < 10$ (Do not change these settings at any stage) • use c=1 and a=2 as reference or starting values of the coefficients and investigate the curves given by the equation • experiment with selected values of 'a' from –4 to +6, including fractional values and a few integer values of 'c' • record how the graphs of catenaries vary when different 'a' and 'c' values are used • use graph paper to illustrate their descriptions • re-graph if necessary so that the points (-10,10), (10,10) and (0, -5) are included on the screen • move the cursor to as close to the point (-10,10) as possible – place a very small amount of Blu-Tack (about a match head) over the point • move the cursor to the point (10,10) and place a piece of Blu-Tack over it • take the length of cotton and press one end on to the left-hand piece of Blu-Tack • allow the cotton to drape down to the bottom of the screen (so that it passes the *y*-axis at about the point (0, -5)) and attach the other end to the other piece of Blu-Tack (Don't worry about the excess cotton hanging down the right hand side of the screen.) • experiment to find a catenary that very closely follows the hang of the cotton • record the equation.

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Catenary curve

Suggested levels	Year 12
Links to support materials	Graphmatica www8.pair.com/ksoft/ Maths Helper Plus www.teacherschoice.com.au/software.htm Winplot freeware http://math.exeter.edu/rparris/winplot.html
Comments	The exercise can be used as an investigation or assignment and has been used for assessment under examination conditions. It illustrates the use of mathematical modelling of the real world and is suitable for Senior Mathematics students who have covered exponential functions and have some experience with suitable graphing software. Use of the software allows rapid investigation of alternatives. Numerous alternative investigations could be devised from material available at www-gap.dcs.st-and.ac.uk/~history/Curves/Curves.html.

Challenge Mathematics

Suggested levels	Year 10
Key learning areas	Mathematics
Purpose	To use spreadsheet software to record data and produce graphs.
Hardware and software	• Computer • Spreadsheet program such as Microsoft Excel • Word processing program such as Microsoft Word • Presentation program such as Microsoft PowerPoint
Sequenced learning activities	The Problem A 12 m x 12 m sheet of galvanised metal is to be made into an open topped 'tank' to be used as the lining for a fishpond. This lining will be made by cutting squares from the four corners and folding up the edges. Students: • use a word processing package to draw a fully labelled diagram, with dimensions clearly marked, starting with the cut-out corners being 50 cm x 50 cm (to scale) • calculate what the volume of the tank would be if different sized squares were cut from the corners (use squares ranging from 0.5 m up to 5 m) • use a spreadsheet program to present these values in table form • use the spreadsheet software's graphing facility to display the results in a volume (y axis) vs (x axis) graph • calculate what size cut-out squares should be removed to create a tank with the maximum capacity • draw conclusions by examining tabled and graphed data • record the dimensions required to create a tank with a maximum volume/surface area • present their data and findings in PowerPoint presentations for final assessment (optional).
Links to support materials	Dynamic Zone FX: Excel Tutorial www.dzfx.com/workshops/list/2/Microsoft_Excel-Office_2000-XP/ Graphmatica www8.pair.com/ksoft/ Maths Helper Plus www.teacherschoice.com.au/software.htm Spreadsheets in the Math Class www.math.byu.edu/~lfrancis/readings302/Spreadsheets.html 3 Street Excel Tutorial www.3street.org/excel/index.html

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Challenge Mathematics

Suggested levels	Year 10
	Winplot freeware http://math.exeter.edu/rparris/winplot.html
Comments	Students needed to become familiar with using a basic spreadsheet program and producing graphs using the software. They worked in pairs/threes on the computers to gain the necessary skills. An extension activity could include an algebraic approach and the use of a graphics package such as Winplot (free), Graphmatica or Maths Helper.

Compare and contrast matrix

Suggested levels	Years 10–12
Key learning areas	Science, Mathematics
Purpose	To use a table to compare and contrast items.
Hardware and software	• Computer • Microsoft Word or Excel • Graphic organiser software such as Inspiration
Sequenced learning activities	Students: • identify an opportunity to compare and contrast items, such as biologically different animal species, geologically different locations or different chemical compositions • identify possible sources of information, such as the Internet, library references, CD-ROMs and books • determine the information that they need to gather and create a table with the appropriate number of columns and rows • label the columns • identify the items they are comparing and contrasting and label the rows • enter data into the matrix • use this data as evidence when documenting their research for an assignment or study.
Links to support materials	Graphic Organizers www.niu.edu/bks/content/crsepacks/grphc_org.shtml Graphic Organizers and Rubrics www.cheney268.com/Learning/Organizers/GraphicOrganizers.htm Lissa Explains it All www.lissaexplains.com/intro.shtml TCR's Big6 ToolKit www.tcrhomeschool.com/tcr-sales/big6.html Using Applications http://education.qld.gov.au/tal/tips/01780.htm webmonkey for kids http://hotwired.lycos.com/webmonkey/kids/ (> Lessons>Layout>Tables)
Comments	Students can use these matrixes for a variety of purposes across their studies.

Concept maps

Suggested levels	Years 10–12
Key learning areas	Science, Studies of Society and Environment
Purpose	To describe a problem set by the teacher and record their prior knowledge on a concept map. The sophistication of this process is determined by the age and experience of the students.
Hardware and software	• Computer • Printer • Mind mapping software such as Inspiration or MindManager
Sequenced learning activities	Students: • enter the title of the problem or task into the main idea box of their diagram • create a cluster diagram using key words from the problem or task • add information based on what they already know about the topic to each of these first level headings • add questions to each of these first level headings that they can use to direct their further research • conduct research and add notes and further topics for investigation to the diagram • reorganise the map as they go along to better fit their new learning and understanding • periodically print their mind maps and discuss them in student–teacher conferences as formative assessment.
Links to support materials	Inspiration www.inspiration.com Integrating ICTs into the SOSE curriculum http://education.qld.gov.au/tal/tips/01925.htm MindManager www.mindjet.com The Concept Mapping Homepage http://users.edte.utwente.nl/lanzing/cm_home.htm
Comments	This strategy helps students connect their problem to the world, recognises their prior knowledge, helps teachers see where students are starting as they begin the research cycle in relation to a particular problem and identifies areas for student development. A before and after mind map can graphically represent student learning.

Designing a menu

Suggested levels	Years 10–12
Key learning areas	Health and Physical Education, Technology/Home Economics
Purpose	To apply understandings of a balanced diet and camp and special dietary requirements to plan suitable menus.
Hardware and software	• Computers with Internet access • Word processing program such as Microsoft Word
Sequenced learning activities	Students: • investigate the foods that are needed to maintain a healthy lifestyle, explore the five food groups and identify which foods belong to each group • explore the relationship between food intake, energy expenditure, stages of growth and health • develop a camp menu based on their knowledge of nutritional foods and expected energy expenditure. The menu should cover four breakfasts, morning teas, lunches, afternoon teas, dinners and suppers. • form groups to develop a restaurant menu that caters for specific dietary requirements • open http://search.officeupdate.microsoft.com/TemplateGallery/ct90.asp, go to the section called 'Menu for a Restaurant' and identify the different requirements needed for a restaurant menu • work in groups to create a series of meals for the menu, ranging from breakfast to supper • change the titles, fonts and pictures on the template to suit their own needs • display their menus in the classroom and share them with other members of the year level • prepare an item from the menu for a culminating activity (optional).
Links to support materials	AIS Sports Nutrition www.ausport.gov.au/ais/nutrition/ AskERIC: Health database www.askeric.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Health/Nutrition/NUT0003.html EdNA for Schools www.edna.edu.au/schools/themes/health.html Hot Topics: Food around the world – quick links http://education.qld.gov.au/tal/tips/hot_topics/01475.htm Internet resources in food science and technology www.dfst.csiro.au/fdnet20a.htm

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Designing a menu

Suggested levels	Years 10–12
	PE central www.pecentral.org/ Template Gallery http://search.officeupdate.microsoft.com/TemplateGallery/ct90.asp Woolworths: the fresh food people www.woolworths.com.au/
Comments	The restaurant menu was developed as an extension to the existing menu plan that the students were designing for camp.

Digital storybooks

Suggested levels	Years 10–12
Key learning areas	English, Technology
Purpose	To construct and illustrate a narrative for a specific audience.
Hardware and software	• Computer • Digital camera or scanner • Presentation program such as Microsoft PowerPoint • Word processing program such as Microsoft Word
Sequenced learning activities	Students: • study the elements of different types of stories for specific audiences – for example, children's picture books, illustrated books or comic strips for teenagers • write their own narrative in Word • interpret their narrative visually using a range of art mediums, such as coloured pencils, collage, felt pens and pastels or a paint program • import their images into PowerPoint (by digitally photographing and saving their non-electronic images) • copy the narrative text into textboxes and arrange the images and text on the slides • insert an audio track, including sound effects and narration • insert hyperlinks and experiment with non-linear progression through the slide show • explore the options for publishing and selling their e-books.
Links to support materials	Curriculum: Support/PowerPoint www.mamkschools.org/central/class/GradeK/mannion/..%5C..%5C..%5C..%5Ccurriculum/curriculum/technology/support/powerpoint/powerpoint.htm Ebook Apprentice.com www.ebookapprentice.com/ Pick-a-Path Stories in PowerPoint www.tki.org.nz/r/ict/ictpd/pick_a_path_e.php Producing a Book for Junior Students www.tki.org.nz/r/ict/ictpd/producing_junior_book_e.php
Comments	Students working at different levels will use a variety of effects in their presentations. Students can explore how to create, publish and sell their e-books at www.ebookapprentice.com.

Electronic images

Suggested levels	Year 11
Key learning areas	The Arts, Technology
Purpose	To use techniques such as pasting, cutting and copying to reinterpret a series of images to create an electronic image.
Hardware and software	• Computer • Digital camera or scanner • Imaging software such as Photoshop or Paintshop Pro
Sequenced learning activities	Students: • choose a theme/topic that is of personal interest such as nature, sport, relationships, technology, religion, history • take a selection of digital images based on this topic • download and save their photos • use an imaging program to experiment with different effects • cut and paste interesting sections from different photos to create one photo montage. Sections should be chosen for their meaning and personal associations. • write down reasons for their decisions • manipulate the montage using the software's cropping, sizing and filter tools • print the montage on to glossy photo paper • display their montage in an art exhibition or create an electronic photo album.
Links to support materials	AskERIC: Portraiture and Technology www.askeric.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Arts/Art_History/ARH0010.html Multimedia Online http://education.qld.gov.au/tal/curriculum_exchange/students/learnonline/multimedia/ Photo montage illustration www.ideasiteforbusiness.com/andy/ip.htm
Comments	A montage is a selection of similar materials, such as photographs or fragments of cut-out illustrations, that are arranged into an interesting composition. Photo montages are often seen in journalism. Students could use their image in a multimedia presentation or on a website. These images could also be used to market products.

Exploring community and identity through novels

Suggested levels	Year 10
Key learning areas	English, Studies of Society and Environment
Purpose	To explore themes of community and identity and present a tutorial to the rest of the class based on one novel from a suggested reading list.
Hardware and software	• Computer • Graphic organiser software such as Inspiration • Presentation program such as Microsoft PowerPoint
Sequenced learning activities	Students: • choose and read one novel from a reading list • analyse the novel using graphical organiser software templates (create a story web, character profile, Venn diagrams) • explore big questions such as: What does it mean to be Australian/a migrant/a woman/man and how has this changed over time? (depending on the novel they have read) • design and construct a tutorial for the rest of the class using a presentation program.
Links to support materials	ABC's of the writing process www.angelfire.com/wi/writingprocess/ Applying Big6 Skills, Information Literacy Standards and ISTE NETS to Internet Research www.surfline.ne.jp/janetm/big6info.htm Forensic Mapping www.tki.org.nz/r/ict/ictpd/forensic_mapping_e.php Inspiration www.inspiration.com Internet4classrooms. On-line practice modules www.internet4classrooms.com/on-line.htm The Concept Mapping Homepage http://users.edte.utwente.nl/lanzing/cm_home.htm Using applications http://education.qld.gov.au/tal/tips/01780.htm Using PowerPoint www.microsoft.com/office/powerpoint/using/default.asp Using PowerPoint presentations in the upper grades http://education.qld.gov.au/tal/tips/00973.htm

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Exploring community and identity through novels

Suggested levels	Year 10
References	Suggested novels: • *To Kill a Mockingbird*, Harper Lee (Penguin, 1963) • *Looking for Alibrandi*, Melina Marchetta (Penguin, 1992) • *The Cay*, Theodore Taylor (Bodley Head, 1969) • *Adventures with My Worst Best Friend*, Max Dann (Oxford University Press, 1982) • *Lord of the Flies*, William Golding (Faber, 1958)
Comments	Students will need a working knowledge of graphical organiser and presentation software. Students may wish to work in pairs. Students might like to watch movie versions of these novels rather than read them.

Exploring fuels

Suggested levels	Years 11–12
Key learning areas	Science/Chemistry, Studies of Society and Environment/Study of Society
Purpose	To investigate the manufacture of fuels and petroleum-based products by conducting research and experiments and discussing preferred directions for 'burning' and 'building'.
Hardware and software	• Computer with Internet access • Word processing program such as Microsoft Word • Spreadsheet program such as Microsoft Excel • Presentation program such as Microsoft Publisher/PowerPoint/FrontPage
Sequenced learning activities	Students: • discuss the nature of fuels • use the Internet and other resources to investigate the chemical composition of fuels and the process of refining • use the Internet and other resources to investigate other petroleum products, their by-products and their use as a raw material in the production of other goods • participate in field trips, sessions with guest speakers or online communication with experts • discuss preferred directions for 'burning' and 'building' and conduct experiments to support these findings • present their findings to the school community by either producing a display or creating a webpage for the school's website based on their activities.
Links to support materials	Addition Polymerisation www.kcpc.usyd.edu.au/discovery/9.2.1/index.html Department of Industry, Tourism and Resources, Australia > Resources and Energy > Geoscience Australia www.industry.gov.au/ Fossils into fuels www.schoolscience.co.uk/content/4/chemistry/fossils/index.html How Oil Refining Works http://science.howstuffworks.com/oil-refining.htm/printable
Comments	Students could discuss their projects with other students or industry experts through The Learning Place.

Labmate for Year 11 Physics

Suggested levels	Years 11
Key learning areas	Science/Physics
Purpose	To use the Labmate interface and associated software to graphically present, interpret and process data gained during experiments, while investigating Newton's laws of motion.
Hardware and software	• Computer • Labmate • Word processing program such as Microsoft Word
Sequenced learning activities	Students: • calibrate the motion sensor and do as many runs of the experimental investigation as they wish • save the data from the experimental investigations • view the displacement–time data • look at the corresponding velocity–time and acceleration–time graphs generated by Labmate – several graphs can be simultaneously displayed on the same set of axes, allowing ready comparison of data • select and print a representative run and its displacement–time data • use this data to create a written report in a word processing program • manually plot the displacement data on graphing paper to check the Labmate results • use the displacement data to calculate the points that would be needed for drawing the velocity–time and acceleration–time graphs.
Links to support materials	Using Labmate interface software/hardware in secondary science http://education.qld.gov.au/tal/tips/pdfs/tn013.pdf
Comments	Data monitoring/logging requires hardware attached to the computer and software. The Labmate package consists of hardware and software which is used to conduct experiments. Because the Labmate set-up is easy to use, students are not intimidated. No specialist knowledge is required so all students can and do use the computer. Students readily shift roles, manipulating equipment, maintaining safe procedures or operating the keyboard. The computer is simply another bit of laboratory equipment. The emphasis is on the experiment itself, while the computer passively records, processes and displays the results. Other experiments can be carried out with different probes – for example, inverse square law with light probe, Newton's law of cooling with temperature probe, gas laws with pressure sensor or simple harmonic motion with strain gauge.

Meeting online experts through The Learning Place

Suggested levels	Years P–12
Key learning areas	All
Purpose	To discuss a topic with an expert in the field.
Hardware and software	• Computers with Internet access
Sequenced learning activities	Teacher: • Goes to http://education.qld.gov.au/learningplace and joins the Learning Place. • Clicks on the 'Communication' link and then on 'Create a project'. • Completes the basic project properties form. Once a project room is created, you can change these details at any time through the 'Project admin' link. • Clicks 'Create'. This action will generate a project room, display it in the project area and provide a project admin link when you login to the project. You can use the project admin link to change the details of your project. • Creates student logins and runs a practice session. • Provides the online guest with a login and runs a practice session. • Organises a time for students to chat with the guest. This can be done in a forum or chat room in the project area. Students login and chat with the guest.
Links to support materials	The Learning Place http://education.qld.gov.au/learningplace Project rooms http://education.qld.gov.au/itt/service/communication/project.html In the classroom http://education.qld.gov.au/itt/service/communication/chat/classroom.html
Comments	Online guests provide students with direct access to people with current and informed knowledge on a topic. Guests could include scientists, authors, refugees, illustrators, doctors, company directors, firemen, athletes, musicians and other students to name a few. You could also use the online communication tools on the Learning Place to participate in collaborative projects, surveys, general discussions and meetings.

Modelling ecosystems

Suggested levels	Years 11–12
Key learning areas	Science/Biology, Agricultural Studies/Technology
Purpose	To use computer tools to model ecosystems in conjunction with field trips, guest speakers and study of data and current affairs.
Hardware and software	• Computer with Internet and email access • Word processing program such as Microsoft Word • Spreadsheet program such as Microsoft Excel • Presentation program such as Microsoft Publisher/PowerPoint/FrontPage
Sequenced learning activities	Students: • explore the nature of ecosystems by contacting experts and guest speakers • use CD-ROMs and the Internet to access information about ecosystems and examples of models of ecosystems • use sources such as the Internet to investigate news stories and case studies about the impact introduced species and other factors have had on ecosystems • use ecosystem modelling software (optional) • select a local case study and undertake a field trip to collect data, observations and photos • develop a presentation of the local case study that includes a model of the ecosystem function and information about the threats and introduced species • present their presentation to the school community/publish it on the intranet.
Links to support materials	Access Excellence Activities Exchange www.accessexcellence.org/AE/ Amazon Interactive www.eduweb.com/amazon.html Aquatox: Linking Water Quality and Aquatic Life: A Simulation Model for Aquatic Ecosystems www.epa.gov/waterscience/models/aquatox/ Community Ecology www.cse.csiro.au/research/Program4/community_ecology/community_ecology_index.htm Ecological Modelling www.dhi.dk/Consulting/EnvironmentEcology/Modelling/EcologicalModelling.htm On the prairie www.bellmuseum.org/mnideals/prairie/

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Modelling ecosystems

Suggested levels	Years 11–12
	TIPS: Biology: Genetics http://education.qld.gov.au/tal/tips/01316.htm Using applications http://education.qld.gov.au/tal/tips/01780.htm
Comments	Students could discuss their projects with other students through The Learning Place.

Music videos

Suggested levels	Years 10–12
Key learning areas	The Arts/Music, Media
Purpose	To interpret and critically analyse music video texts, develop a capacity to understand the many methods of communicating meaning and demonstrate these skills in the processes and skills involved in the production of a video.
Hardware and software	• Computer with Internet access • Video camera • Video editing software such as iMovie
Sequenced learning activities	Students: • research three different types of music icons – the solo artist, the boy or girl pop group and the band. Examples include: – The solo artist – Madonna, Kylie Minogue, Shakira, Ricky Martin – The boy or girl pop group – Bardot, Spice Girls, Five – The band – U2, Linkin Park, Powderfinger, Garbage • view music video clips and analyse their structure, special effects, timing, narrative and choreography • view video clips and analyse their shot composition, length, fashion and make-up, narrative or non-narrative style, camera angles, use of camera movement, special effects, use of text, use of symbolic, technical and audio code and conventions • research the characteristics of the music video genre • research aspects of a particular music style that they wish to include in their video clip • visit websites and find out how music videos are produced and how popular music icons are promoted • analyse CD covers, music magazine articles and interviews, photographs and symbols • watch dance performances and identify musical instruments that are commonly used by bands • practise dance moves which are specific to the style of music chosen • analyse fashion magazines to gain an understanding of new hair, make-up and clothing styles • record a live event • use different transitions in editing • use the information gathered in the research stage to develop the video clip • create a new public image for a popular music group • produce promotional material such as press releases, posters and reviews for a magazine they have produced • market their ideas to an entertainment agency.

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Music videos

Suggested levels	Years 10–12
Links to support materials	Multimedia Online http://education.qld.gov.au/tal/curriculum_exchange/students/learnonline/multimedia/ Music and advertising: A comprehensive and cross-curricular unit of work for upper primary students http://education.qld.gov.au/tal/tips/01927.htm QSA The Arts module: Pump up the volume www.qsa.qld.edu.au/yrs1_10/kla/arts/pdf/modules/me_5_putv.pdf Television Production www.internetcampus.com/tvp_ind.htm The art of video editing www.bctv.net/telcom/tel40text/3editing.html The Source www.thesource.gov.au/ TIPS: Dance and the digital revolution http://education.qld.gov.au/tal/tips/01960.htm
Comments	Students found this a very exciting and enjoyable activity. They produced some excellent quality film clips.

Photographic analysis

Suggested levels	Years 10–12
Key learning areas	The Arts/Media, Film and Television
Purpose	To display their understanding of visual language through the choices they make when using a digital camera (shot type, subject matter, composition).
Hardware and software	• Digital camera • Presentation program such as Microsoft PowerPoint • Imaging software such as Photoshop or Paintshop Pro
Sequenced learning activities	Teacher: • explains the elements and principles of image composition, such as line, shape, colour, tone, texture, balance, harmony, contrast and focal point. Students: • put these elements and principles into practice while taking photographs with a digital camera; they experiment with different subject matter and composition – for example, shot size, camera angle and framing • analyse their photographs with the teacher by viewing them on the computer screen or data projector • constructively criticise each other's photographs • evaluate the criticisms and use the opinions and new knowledge to improve their original photographs using the tools in the imaging software • import their photographs into PowerPoint, either into a Wizard or a student-created template • enter the key points from the analysis of the photographs into a textbox under each photograph.
Links to support materials	Gestalt Theory and Photographic Composition www.apogeephoto.com/mag1-6/mag2-3mf.shtml Multimedia Online http://education.qld.gov.au/tal/curriculum_exchange/students/learnonline/multimedia/index.html Photographic Composition www.tpub.com/photography1/ph20972.htm Television Production www.internetcampus.com/tvp_ind.htm
Comments	Students could use imaging software to enhance each photograph.

Presenting different viewpoints

Suggested levels	Year 10
Key learning areas	Studies of Society and Environment
Purpose	To compare the viewpoints of people from different backgrounds and identify the local landmarks of value.
Hardware and software	• Computer • Digital camera • Presentation program such as Microsoft PowerPoint or HyperStudio
Sequenced learning activities	Students: • interview two local people from different backgrounds • establish the local landmarks that are significant to these people • take digital photos of these landmarks • prepare a presentation that illustrates the history and meaning of the landmarks from each person's viewpoint • present their work to the class • participate in a focused conversation with the class in which they compare and discuss some of the differences between the two people and the reasons for these differences.
Links to support materials	Australian Landmarks www.midcoast.com.au/~ttc/landmarks.html Cultural and linguistic diversity http://education.qld.gov.au/curriculum/advocacy/access/equity/students/inclusion/cultural/ Multimedia Online http://education.qld.gov.au/tal/curriculum_exchange/students/learnonline/multimedia/ Technology & Teaching www.pbs.org/teachersource/teachtech.htm TIPS: Using PowerPoint presentations in the upper grades http://education.qld.gov.au/tal/tips/00973.htm
Comments	As an extension to this activity, students could develop a submission to their local council seeking to protect or restore some of these landmarks.

Programming robots

Suggested levels	Years 10–12
Key learning areas	Technology, Computer Studies, Science/Physics
Purpose	To design, build and program a product that will perform basic movements and functions and solve a problem.
Hardware and software	• Computer • Word processing program such as Microsoft Word • Spreadsheet program such as Excel • Graphic organiser program such as Inspiration or MindManager • Lego Dacta, RoboLab, Team Challenge Set including RCX, IR transmitter, USB cable
Sequenced learning activities	Teacher: • introduces the problem: Granny is bedridden and cannot get quickly to the door for her visitors. She is losing her hearing and cannot always hear the doorbell. Design a secure system that will alert Granny to her visitors and allow her to open the door from her bed. Students: • identify the issues that arise from the problem and use a word processing program to describe them • write out a plan of action on a Gantt chart • design the solution using a graphic organiser program • build the solution using the Team Challenge Set, Lego Dacta or RoboLab • program basic movements and functions – for example, a light to flash when the doorbell is rung, a motor to open the door, a touch sensor for a panic button • use peer evaluation and self-evaluation to write a critique of their solution • explore options for marketing and licensing their inventions.
Links to support materials	Computers on television and in films http://education.qld.gov.au/tal/tips/01145.htm Marketing and Licensing Inventions http://inventors.about.com/cs/licensingmarketing/ Using applications http://education.qld.gov.au/tal/tips/01780.htm
Comments	This activity works best with groups of two. Three often leaves one student in supervisory mode. The whole purpose is to give students experience with actually creating robots.

Sound effects for a play

Suggested levels	Year 10
Key learning areas	English, The Arts, Technology
Purpose	To produce an original play – perhaps a radio play initially – including sound effects for a live audience.
Hardware and software	• Computer/PDA • Basic MIDI authoring software (optional) • Basic sound recording software (accessories) • Microphone/headsets with microphone • 16 bit soundcard • Word processing program such as Microsoft Word • Spreadsheet program such as Microsoft Excel • Graphic organiser software such as Inspiration
Sequenced learning activities	Students: • write a draft script for their play and use graphic organiser software to create a storyboard, indicating where music and sound effects are to be embedded into the script • develop the characters and make notes about them using a word processing program or record details on a PDA • prepare a Gantt chart, including tasks that need to be done and the job allocations for each member of the team • edit, spell check, format and save a final version of the script • perform and record the script and save it as a .wav file • select appropriate music/sound effects and record them as .wav files • use basic MIDI authoring software/sound recording software to join the script recording and background music • submit their film to a film festival or competition (optional).
Links to support materials	Music and advertising http://education.qld.gov.au/tal/tips/01927.htm TIPS: Midi in the classroom http://education.qld.gov.au/tal/tips/ealthelp/midi.htm Topdownloads – Software Index Page www.topdownloads.net/software/ TuCows: Windows > Multimedia > Audio mixers www.tucows.com/audio_mixers_default.html Using applications http://education.qld.gov.au/tal/tips/01780.htm

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Sound effects for a play

Suggested levels	Year 10
Comments	The quickest and easiest way to obtain MIDI files is to download them from the Internet. Go to any search engine and search for MIDI. Be careful of using these files in performances or recordings offered for sale as copyright restrictions do apply.

2D digital animation

Suggested levels	Year 10
Key learning areas	Technology
Purpose	To create, edit and incorporate 2D graphics into multimedia presentations.
Hardware and software	• Digital camera or scanner • Graphics program such as Microsoft Paint, Paintshop Pro or Photoshop • Animation software such as Platypus Animator or Paintshop Pro • Presentation program such as Microsoft PowerPoint or FrontPage
Sequenced learning activities	Teacher: • suggests appropriate bitmap images – for example, a sketch of a bouncing ball that moves from top left to bottom and bounces off the page, a series of photographs of a clay animation • explains that the images must be exactly the same size otherwise the avi file will not run successfully. Students: • design a series of bitmap images (clip art, digital photos or drawn images) using a graphics program • save the images as Image1, Image2 and so on • open an animation program, import the images, add sound and create an avi movie • adjust the speed of the animation by changing the number of frames per second • incorporate their animation into a multimedia presentation • develop a website to market the custom-made images/gifs.
Links to support materials	Graphics, animation, warping and morphing http://education.qld.gov.au/tal/tips/01869.htm Magic Morph www.topshareware.com/Magic-Morph-download-1906.htm Making Multimedia http://education.qld.gov.au/tal/tips/ealthelp/docs/makemm.doc Multimedia Online http://education.qld.gov.au/tal/curriculum_exchange/students/learnonline/multimedia/index.html Visual design in multimedia: Exercise 6: Sound and 2D animations http://education.qld.gov.au/tal/curriculum_exchange/students/learnonline/multimedia/docs/mod4ex06.pdf

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2D digital animation

Suggested levels	Year 10
Comments	Once the animation is created, delete the bitmap images as they take up storage space. Images can also be morphed – see links for Magic Morph website. More advanced students can implement this concept using other multimedia platforms – Macromedia Flash, video editing software and so on.

Tracking test results

Suggested levels	Year 10
Key learning areas	Mathematics
Purpose	To use spreadsheet software to track test results and explore different ways in which these results can be represented.
Hardware and software	• Computer • Spreadsheet program such as Microsoft Excel
Sequenced learning activities	Students: • set up their own spreadsheet covering the weeks in the term and the number of tests they have each week • track and record their progress during the term • use the information on the spreadsheet to create a column graph of their results and find their average weekly score in each subject • explore different graphs and tools to further enhance their information • discuss their interpretation of their results with the teacher at the end of the term • develop a tracking device that could be used in a business context.
Links to support materials	Spreadsheet: A Variety of Activities! www.fi.edu/fellows/fellow4/may99/spreadsheet.html Spreadsheeting www.mourilyass.qld.edu.au/spread.pdf Spreadsheets www.mste.uiuc.edu/courses/ci407su99/cd/files/excel/excel.html Using applications http://education.qld.gov.au/tal/tips/01780.htm
Comments	This activity applies real data and can also be used by the teacher to track student progress.

Video documentaries

Suggested levels	Year 10
Key learning areas	The Arts, Health and Physical Education, Science
Purpose	To produce a video documentary based on a school sports event or an assignment for a subject such as Health and Physical Education or Science.
Hardware and software	• Digital video camera • Video editing software such as QuickTime Pro, iMovie or Microsoft Movie Maker
Sequenced learning activities	Students: • choose an assignment they wish to complete as a documentary • research the topic • view documentaries and analyse their structure (narration, shot types and composition, use of a presenter, transitions used) • film images for their documentary • record their narration on to video • use a video capture card to import their images and narration into a video editing program • lay down the narration and insert the images so they correspond with the audio • save their project as an Mpeg and export it to videotape or CD-ROM.
Links to support materials	English Online search results: Storyboards http://english.unitecnology.ac.nz/results.html?limit_to=%2Fresources%2Funits%2F&search=storyboards Multimedia Online http://education.qld.gov.au/tal/curriculum_exchange/students/learnonline/multimedia/Television Production www.internetcampus.com/tvp_ind.htm The art of video editing www.bctv.net/telcom/tel40text/3editing.html
Comments	Similar results can be achieved using digital still cameras and PowerPoint. A virtual experiment could be produced.

Virtual share trading

Suggested levels	Year 10
Key learning areas	Mathematics
Purpose	To monitor the share value of particular companies on the Australian Stock Exchange (ASX).
Hardware and software	• Computers with/without Internet connection • Spreadsheet program such as Microsoft Excel • Printer
Sequenced learning activities	Students: • select a company that is listed with the ASX • create a spreadsheet labelled with that company's name • calculate how many shares they would receive at today's prices if they purchased $1000 worth of shares • insert this information into the spreadsheet and enter formula to complete the calculations • check the share value each week and chart the movement of the shares • at the end of ten weeks, calculate the current value of their shares and work out their profit or loss using the spreadsheet's function keys (for more information visit SpreadSheets www.mste.uiuc.edu/courses/ci407su99/cd/files/excel/excel.html) • create a graph showing the change in the value of their shares over the period • write a statement explaining whether their investment was successful and whether they made a profit or a loss and by how much.
Links to support materials	ASX http://asx.com.au/asx/homepage/index.jsp Spreadsheet: A Variety of Activities! www.fi.edu/fellows/fellow4/may99/spreadsheet.html The Stock Market Game www.smg2000.org/
Comments	I have used this exercise with several classes and found their level of interest very high. They became more aware of businesses around them and in the news. Many of them discussed this activity with their parents. It could form part of a Studies of Society and Environment unit where students operate a business.

The Curriculum Exchange

http://education.qld.gov.au/tal/curriculum_exchange/

The Curriculum Exchange is your gateway to quality online teaching and learning resources and information. It will enable you to:

- access quality online curriculum resources for all year levels and curriculum areas, both at school and at home
- transform learning in the classroom and support improved learning outcomes by providing access to quality online resources
- improve your ability to integrate ICTs into the curriculum
- help your school reach its systemic benchmark for the integration of ICTs in learning, teaching and the curriculum
- obtain help with recent advances in online learning, productive pedagogies, new basics and other curriculum innovations.

The online resources and services include:

TIPS

Teaching ideas, strategies and activities provided by Queensland teachers.

EduList

Links to websites that have been evaluated for their Queensland curriculum application.

MacquarieNet

An online reference service containing Australian and international reference works and daily news feeds from Australia's leading news providers – AAP and ABC online.

Online database of examples of ICTs curriculum integration

More than 800 best-practice examples of how ICTs can be used across all key learning areas and year levels.

Hot topics

Selected curriculum and teaching practice tools, including websites, modules, WebQuests and learning activities.

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An online course that introduces students to the range of media elements that can be combined to produce successful multimedia productions.

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