Victorian Essential Learning Standards

Interdisciplinary Learning Strand

INFORMATION AND COMMUNICATIONS TECHNOLOGY

REVISED EDITION JANUARY 2008

Victoria
The Place To Be

VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

Contents

Revised Edition January 2008

This edition incorporates minor amendments to the domain introductions and learning focus statements to indicate their relationship with the National Statements of Learning.

Interdisciplinary Learning

The Interdisciplinary Learning strand identifies a range of knowledge, skills and behaviours which cross disciplinary boundaries and are essential to ensuring students are prepared as active learners and problem-solvers for success at school and beyond. This strand focuses on ways of thinking, communicating, conceiving and realising ideas and information. It assists students to develop the capacity to design, create and evaluate processes as a way of developing creativity and innovation.

Within the Interdisciplinary Learning strand the learning domains are:

Communication

Communication helps to construct all learning and is central to the capacity to demonstrate and convey what one has learned in different contexts and to different people. This domain assists students to understand that language and discourse differ in different disciplines and that there is a need to learn the particular literacies involved in each.

Design, Creativity and Technology

Students develop the knowledge, skills and behaviours related to investigating and designing using appropriate planning processes and design briefs; creating and developing ideas, applying information, and seeking and testing innovative alternatives; producing, including the selection and safe use of appropriate tools, equipment, materials and/or processes to meet the requirements of design briefs; analysing and evaluating both processes and products including, where relevant, any broader environmental, social, cultural and economic factors.

Information and Communications Technology

The knowledge, skills and behaviours in this domain enable students to use information and communications technology (ICT) to access, process, manage and present information; model and control events; construct new understandings; and communicate with others. Students use ICT and strategies to monitor learning patterns, to process data to create solutions and information products that demonstrate understanding, and to share their work with others in ethical, legal and respectful ways.

Thinking Processes

This domain encompasses a range of cognitive, affective and metacognitive knowledge, skills and behaviours which are essential for effective functioning in society both within and beyond school. The study of thinking enables students to acquire strategies for thinking related to enquiry, processing information, reasoning, problem solving, evaluation and reflection.

Information and Communications Technology

Introduction

Information and communications technology (ICT) is the hardware and software that enables data to be digitally processed, stored and communicated. ICT can be used to access, process, manage and present information; model and control events; construct new understanding; and communicate with others.

Information and Communications Technology, as an interdisciplinary domain, focuses on providing students with the tools to transform their learning and to enrich their learning environment. The knowledge, skills and behaviours identified for this domain enable students to:

- develop new thinking and learning skills that produce creative and innovative insights
- develop more productive ways of working and solving problems individually and collaboratively
- create information products that demonstrate their understanding of concepts, issues, relationships and processes
- express themselves in contemporary and socially relevant ways
- communicate locally and globally to solve problems and to share knowledge
- understand the implications of the use of ICT and their social and ethical responsibilities as users of ICT.

Learning in this domain enables students to focus on the task to be accomplished rather than on the technology they are using to do the work. Through the selection and application of appropriate equipment, techniques and procedures, they process data and information skilfully to create information products in forms that are meaningful for themselves and their audience. These products effectively demonstrate their knowledge and understanding of the concepts, issues, relationships and processes that are the subject of the task.

Students are provided with tools and strategies to monitor learning patterns and problem solving strategies. This provides a sound foundation for transforming personal learning. They gain an understanding of Internet protocols and strategies for exchanging information, which enables them to share and challenge their own and other people's ideas and solutions with a global audience.

Definitions of underlined terms are provided in the Glossary (page 23)

Structure of the domain

The Information and Communications Technology domain is organised into six sections, one for each level of achievement from Level 1 to Level 6. Each level includes a learning focus statement and, where applicable, a set of standards organised by dimension. A glossary is included which provides definitions of underlined terms (see page 23).

Learning focus

Learning focus statements are written for each level. These outline the learning that students need to focus on if they are to progress in the domain and achieve the standards at the levels where they apply. They suggest appropriate learning experiences from which teachers can draw to develop relevant teaching and learning activities.

Standards

Standards define what students should know and be able to do at different levels and are written for each dimension. In Information and Communications Technology, standards for assessing and reporting on student achievement apply from Level 2. Standards are organised by dimensions from Level 3.

Dimensions

Standards in the Information and Communications Technology domain are organised in three dimensions:

- ICT for visualising thinking
- ICT for creating
- ICT for communicating.

ICT for visualising thinking

In the *ICT for visualising thinking* dimension students use ICT tools to assist their thinking processes and reflect on the thinking strategies they use to develop understanding.

ICT provides a rich and flexible learner-centred environment in which students can experiment and take risks when developing new understanding. Its extensive capabilities allow students, by visually coding and representing their thinking, to clarify thoughts, and to identify patterns and form relationships between new and existing knowledge.

Definitions of underlined terms are provided in the Glossary (page 23)

ICT tools that facilitate visual thinking are ones that allow ideas and information in all areas of the curriculum to be easily and quickly drafted, filtered, reorganised, refined and systematically assessed in order to make meaning for students.

Students use linguistic and non-linguistic representations, such as graphic organisers, ICT-generated simulations and models and ICT-controlled models to help structure their thinking processes and assist in constructing knowledge.

Using ICT, students record their decisions and actions when solving problems and clarifying thoughts. They monitor the changes in their thinking and evaluate their own and others' thinking strategies. Students review these records to assess their suitability for new situations.

ICT for creating

The *ICT for creating* dimension focuses on students using ICT tools for creating solutions to problems and for creating information products. Through the selection and application of appropriate equipment, techniques and procedures, students learn to:

- process data and information to create solutions to problems and information products that demonstrate their knowledge and understandings of the concepts, issues, relationships and processes related to all areas of the curriculum
- manage their files to secure their contents and enable efficient retrieval
- plan and monitor the progress of extended tasks.

Students learn to use ICT efficiently to capture, validate and manipulate data for required purposes. In order to improve the appearance and functionality of information products and solutions, they apply commonly accepted conventions. They examine the ethical and legal implications of using ICT in a range of settings such as the home, school and the workplace. Students evaluate the usefulness of ICT for solving different types of problems and reflect on the effectiveness of their own use of ICT.

Definitions of underlined terms are provided in the Glossary (page 23)

ICT for communicating

The *ICT for communicating* dimension focuses on students using ICT to:

- present ideas and understandings to audiences
- communicate with known and unknown audiences
- support knowledge-building among teams.

Students use ICT to support oral presentations to live local audiences and to present ideas and understandings to unknown, remote audiences. They use ICT to communicate with others, both known and unknown, with the purpose of seeking and discussing alternative views, acquiring expert opinions, sharing knowledge and expressing ideas. Students also locate information from a range of online and multimedia resources to support their own learning.

ICT supports knowledge-building among teams and enables team members to collaborate, enquire, interact and integrate prior knowledge with new understanding.

Protocols for receiving, transferring and publishing ideas and information are needed to promote communication that respects intended audiences.

National Statements of Learning

The Victorian Essential Learning Standards (VELS) incorporate the opportunities to learn covered in the national Statements of Learning (www.curriculum.edu.au/mceetya/the_statements_of_learning,11893.html). The Statements of Learning describe essential skills, knowledge, understandings and capacities that all young Australians should have the opportunity to learn by the end of Years 3, 5, 7 and 9 in English, Mathematics, Science, Civics and Citizenship and Information and Communication Technologies (ICT).

The Statements of Learning were developed as a means of achieving greater national consistency in curriculum outcomes across the eight Australian states and territories. It was proposed that they be used by state and territory departments or curriculum authorities (their primary audience) to guide the future development of relevant curriculum documents. They were agreed to by all states and territories in August 2006.

During 2007, the VCAA prepared a detailed map to show how the Statements of Learning are addressed and incorporated in the VELS. In the majority of cases, the VELS learning focus statements incorporate the Statements of Learning. Some Statements of Learning are covered in more than one domain. In some cases, VELS learning focus statements have been elaborated to address elements of the Statements of Learning not previously specified. These elaborations are noted at the end of each learning focus statement.

Level 1

Learning focus

As students work towards the achievement of Level 2 standards in Information and Communications Technology (ICT), they learn the safe use of ICT tools, including leaving electrical connections alone, sitting upright in front of a computer, and handling storage devices such as disks and memory sticks carefully. They learn the correct terms to name ICT equipment and, through use, become familiar with common icons on the computer desktop. They develop hand–eye coordination through using a mouse to control the pointer on the screen.

With assistance, students work with different types of data, such as text, numbers and images, to create simple information products and share their ideas. They develop their navigation skills by responding to stimulus in multimedia resources that develop literacy and numeracy skills. They find and compare examples of ICT equipment at home and investigate the purpose of ICT symbols and icons.

Definitions of underlined terms are provided in the Glossary (page 23)

Standards

In the Information and Communications Technology domain, standards for assessing and reporting on student achievement are introduced at Level 2. The learning focus statement for Level 1 provides advice about learning experiences that will assist students to work towards the achievement of the standards at Level 2.

Level 2

Learning focus

As students work towards the achievement of Level 2 standards in Information and Communications Technology (ICT), they use ICT to acquire new knowledge and skills in all areas of the curriculum and to create and present information in meaningful ways. For example, students access a website to participate in a food pyramid game, and then present their understanding of food groups in a slide show that contains an image of a lunchbox filled with the appropriate food items. When using multimedia resources, students begin to think critically about these resources and how they help learning.

In their learning of new material, students experiment with some simple ICT tools and techniques for visualising their thinking. They learn to organise and classify information and ideas, and present them in a manner that is meaningful to them. This may entail cutting and pasting, dropping and dragging, and colour coding in order to group similar items, to sequence events and to identify examples that illustrate key ideas.

To improve the presentation of text and images, students begin to apply simple techniques, such as bolding, centring and changing case. They explore a range of different information products and identify intended audiences. Students display their own information products in a way that suits different audiences.

Students develop an understanding of the importance of checking the accuracy of facts that are going to be processed; this being necessary for producing accurate output. Students collect first-hand data and, with assistance, enter it into their spreadsheet files and manipulate it. For example, after collecting the heights of fellow students or the number of classmates with particular eye colours, students manipulate the data by summing or colour-coding cells, and then present the processed data as a chart. Individually, and as a class, they make summary statements about the characteristics of the processed data.

Working in a networked environment, students develop the practice of using a file-naming system that is both meaningful to the students, and avoids confusion over who owns particular files.

Students begin to explore contemporary ways of communicating ideas and information by composing and sending simple electronic messages such as emails.

Definitions of underlined terms are provided in the Glossary (page 23)

Standards

At this level standards are not organised by dimensions.

Information and Communications Technology (ICT)

At Level 2, students manipulate text, images and numeric data to create simple information products for specific audiences. They make simple changes to improve the appearance of their information products. They retrieve files and save new files using a naming system that is meaningful to them. They compose simple electronic messages to known recipients and send them successfully. With some assistance, students use ICT to locate and retrieve relevant information from a variety of sources.

Level 3

Learning focus

As students work towards the achievement of Level 3 standards in Information and Communications Technology (ICT), they develop skills in using ICT for problem solving, expressing ideas, and presenting information to different audiences. Working in all areas of the curriculum, students explore a range of ICT tools (for example, basic editing tools such as word processing) and simple techniques for visualising thinking. They also use simple graphic organisers such as concept maps and sequence charts to provide a framework for visualising thinking. In particular they use tools that assist in sequencing, and in identifying relationships between, ideas, facts and concepts. Students save their visualising thinking files to folders and when new but similar learning situations arise, they retrieve them and use them as a starting point for these situations. Students reflect on the usefulness of such tools and strategies in new circumstances.

Students compare the purposes and structures of information presented in different media, such as print, on-screen, or as an action; for example, a moving robot. Individually, students learn to process data in the form of text, images and sound to create planned information products, such as invitations, short stories, presentation files (for example, a Microsoft PowerPoint file), animations and title pages for books. Students begin to use manual (for example, proofreading) and electronic (for example, spellchecker) techniques to identify typographical errors and make appropriate corrections. They use criteria, such as the accuracy and attractiveness of their information products, to make judgments about how well they meet their purposes. Students use software tools to assist with problem solving. For example, students create a questionnaire using word-processing software to collect data about the ages and ethnicity of residents in their local area as part of their Humanities study. Their understanding of this data is then demonstrated in a presentation file. Students work collaboratively to develop their ICT skills.

When using ICT to assist with problem solving and for producing information products, students investigate and apply some practices that are ergonomically sound, such as adjusting the height of chairs to ensure that elbows are at an appropriate angle and using keying techniques that minimise wrist harm and maximise the efficiency of data entry.

Students begin to manage their files using simple ways of organising them for easy retrieval; for example, creating folders based on topics or forms such as stories, images, and projects. They compare their systems with those of other students and acknowledge and accept different approaches that work for the user. Students are introduced to the simple security strategy of using passwords to protect access to their files when working on a network.

Definitions of underlined terms are provided in the Glossary (page 23)

Students continue to develop their skills in using ICT to communicate knowledge by exchanging email messages with others. When seeking new information on topics of importance or interest in all areas of the curriculum, students apply a set of procedures (such as simple key words) for locating information on the intranet and the Internet, and they determine the value of these resources by developing and applying simple criteria (for example, considering the age of the intended audience). They transfer this knowledge when they evaluate their own products.

National Statements of Learning

This learning focus statement, in conjunction with aspects of the Thinking Processes learning focus statement, incorporates aspects of the Year 3 National Statement of Learning for ICT.

In addition students examine relevant values in particular ICT environments and identify issues and practices for using ICT in a safe and responsible manner. (National Statements of Learning for ICT)

Standards

ICT for visualising thinking

At Level 3, students use ICT tools to list ideas, order them into logical sequences, and identify relationships between them. Students retrieve their saved visualising thinking strategies and edit them for use in new, but similar situations. They explain how these strategies can be used for different problems or situations.

ICT for creating

At Level 3, students organise their files into folders classified in a way that is meaningful to them. Students explain the purpose of passwords for accessing files stored on networks. They follow simple plans and use tools and a range of data types to create information products designed to inform, persuade, entertain or educate particular audiences. They create information products to assist in problem solving in all areas of the curriculum. With minimal assistance, students use ICT tools to capture and save images. They use simple editing functions to manipulate the images for use in their products.

They make ongoing modifications to their work to correct the spelling of frequently used words and to rectify simple formatting errors. They evaluate the final information product and describe how well it meets its purpose. Students make adjustments to their equipment and apply techniques that are ergonomically sound.

ICT for communicating

At Level 3, students initiate and compose email messages to known and unknown audiences and, where appropriate, send replies. Students create folders in their mailbox to organise the storage of email messages they wish to keep. They locate information on an intranet, and use a recommended search engine and limited key words to locate information from websites. They develop and apply simple criteria to evaluate the value of the located information.

Level 4

Learning focus

As students work towards the achievement of Level 4 standards in Information and Communications Technology (ICT), they apply known ICT tools for visualising thinking in new ways to make links between existing and new knowledge. They begin to use new tools, such as ICT-controlled models, a programming language or simulation software, such as microworlds, spreadsheets and domain specific modelling software, to represent and explore processes, patterns, and cause-and-effect relationships. They learn to use tools, such as database software and graphic organisers, to organise and analyse data and information. For example, after interviewing people of Asian cultural backgrounds, students might identify similarities and differences between Australian and Asian customs by using a double-cell diagram, which forms a visual structure to aid thinking.

Students reflect on their experience in using such ICT tools, comparing how they learned with these tools with how they might learn from books, and comparing the virtual worlds created through these models with real life.

Students use ICT tools to produce information products that demonstrate their knowledge and skills for all areas of the curriculum. For example, based on the inferences drawn by using a double cell diagram to analyse the similarities and differences between Australian and Asian customs, students could present their new understanding in multimedia form (an information product).

Students develop their use of ICT to assist with problem solving. For example, when creating a model solar-powered boat that meets specified criteria, students support their problem solving strategies by using software to create alternative two-dimensional designs.

Students explore new software functions that promote efficiency and effectiveness. For example, students use the 'find and replace' function to locate and change repeated words or formats (efficiency) and they use borders to separate different sets of information (effectiveness). They develop skills in using three-dimensional multimedia tools for problem solving, discuss how the three-dimensional functions improve the effectiveness of solutions, and brainstorm situations in which these tools can be used. Students develop skills in using ICT systems for controlling events in a predetermined way by writing programs that, for example, control a turtle or robot, manipulate objects in a game or three-dimensional virtual environment, or respond to environmental changes captured by sensors.

Definitions of underlined terms are provided in the Glossary (page 23)

Students use design tools, such as layout diagrams, annotated drawings and storyboards, to document solutions and the layout of information products. They begin to use ICT presentation conventions, incorporating them into their solutions and information products where appropriate. They test their products against commonly accepted ICT evaluation criteria and, with assistance, refine their work to meet both the criteria and audience needs. They develop and maintain a digital bank of evidence (for example, an electronic portfolio), that demonstrates their learning. This requires students evaluating, selecting and organising files that showcase their learning and that are up-to-date and structured in an orderly way. Students apply file management procedures that assist in securing their files (for example, backing up on storage media such as disks or memory sticks), and in allowing the easy retrieval of files by using naming conventions that are meaningful. Students continue to use ergonomic practices that assist in minimising physical harm, such as doing exercise to reduce injury due to repetitive actions.

Students begin to work in a collaborative global environment. They share their developing knowledge with their peers through email, and seek advice from others through frequently asked questions (FAQs), websites or by directly emailing experts. Students consider these methods of sharing information with a wider audience, and develop knowledge of protocols for sending and receiving electronic information through the Internet by creating and sending emails with attachments and uploading files to protected public places on intranets or the Internet.

When problem solving, students use recommended search engines and begin to refine search questions to locate information quickly on the Internet. This involves applying criteria for assessing the integrity of information, such as the reliability of the web host and the accuracy of the information.

National Statements of Learning

This learning focus statement, in conjunction with aspects of the Thinking Processes and Communication learning focus statements, incorporates aspects of the Year 5 National Statement of Learning for ICT.

Definitions of underlined terms are provided in the Glossary (page 23)

Standards

ICT for visualising thinking

At Level 4, students apply ICT tools and techniques to represent and explore processes, patterns and cause-and-effect relationships. Students use ICT tools and techniques that support the organisation and analysis of concepts, issues and ideas and that allow relationships to be identified and inferences drawn from them.

Students review their stored thinking strategies in order to identify similarities and differences in their thinking patterns. They document in their bank of digital evidence how these visualising thinking strategies help them to understand concepts and relationships.

ICT for creating

At Level 4, students safely and independently use a range of skills, procedures, equipment and functions to process different data types and produce accurate and suitably formatted products to suit different purposes and audiences. They use design tools to represent how solutions will be produced and the layout of information products. Students select relevant techniques for minimising the time taken to process data, and apply conventions and techniques that improve the appearance of the finished product. Students modify products on an ongoing basis in order to improve meaning and judge their products against agreed criteria.

Students create and maintain an up-to-date, logically structured bank of digital evidence of their learning. They password protect and back up important files and use file naming conventions that allow easy retrieval.

ICT for communicating

At Level 4, students use email, websites and frequently asked question facilities to acquire from, or share information with, peers and known and unknown experts. When emailing, they successfully attach files and they apply protocols for sending and receiving electronic information. They successfully upload their work to a protected public online space. Using recommended search engines, students refine their search strategies to locate information quickly. They evaluate the integrity of the located information based on its accuracy and the reliability of the web host.

Level 5

Learning focus

As students work towards the achievement of Level 5 standards in Information and Communications Technology, they learn to use a variety of ICT tools and techniques to assist with filtering, classifying, representing, describing and organising ideas, concepts and issues. For example, a graphic organiser such as an interaction outliner can be used to help structure thinking about the actions, reactions and outcomes of two groups associated with an issue; and rule-using software such as databases and spreadsheets enable the filtering and classifying of data and information in order to make more informed decisions. Students begin to use ICT tools and peripherals, such as dataloggers, to support the input of data for sensing, monitoring, measuring or controlling sequences and events. Through practice, students become skilled in judging the capabilities and limitations of these tools and techniques as aids to learning.

In addition, students use ICT tools to retrace the decisions made and actions taken when learning and problem solving; for example, by using a range of symbols, charts, images, sound and text, students can create a flow chart that maps their thinking processes and actions. Students reflect on the effectiveness of these saved thinking process maps and retrieve relevant ones to guide future applications.

Students become efficient users of ICT for planning collaborative projects that involve creating information products and solving problems. Using software such as word processors and spreadsheets, and using techniques such as tables and shading, they develop project plans that sequence tasks, estimate timelines and record task responsibilities where teams are involved. Team members record and monitor progress through shared electronic files. Students use the operating system facilities to manage their desktop workspace and organise their files in a way that assists their personal learning style. They learn to save and retrieve compressed files and develop an understanding of the characteristics of different file formats, such as .jpeg, .gif and .avi.

Students develop their knowledge about the characteristics of data by manipulating various data types, such as text, sound, numbers and images (still and moving), to create formatted information products; for example, essays and reports, animated slide shows, and websites, brochures and cartoons. They plan the design of products, influenced by generally accepted ICT presentation conventions, and develop criteria for evaluating the effectiveness of each presentation style. These include meeting audience/user needs and communicating a message effectively. Students make ongoing modifications to their products to improve their efficiency and effectiveness, such as testing the

Definitions of underlined terms are provided in the Glossary (page 23)

functionality of parts of a solution, correcting typographical errors and editing to clarify the meaning of the message.

Students apply their knowledge of data characteristics to solving problems; for example, when calculating the time it takes to travel to a distant planet using various fuels, they elect to use spreadsheet software because it is designed to manipulate numeric data, unlike word-processing software, which is designed to format text.

Students explore the distinction between legal and illegal uses of ICT and create information products that comply with ICT intellectual property law. This particularly relates to copyright.

Students develop and manage their digital bank of evidence, developing, for example, an electronic portfolio for a range of audiences, including teachers, parents and potential employers, and use this to demonstrate and monitor their learning progress in all areas of the curriculum.

They select appropriate search engines and use complex search strategies (for example, Boolean) to locate information from the Internet and other sources, and they evaluate the credibility, accuracy, reliability and comprehensiveness of this information. They organise and store gathered information to enable easy retrieval. They access online interactive e-learning tools to help them to develop knowledge in all areas of the curriculum.

Students use email software functions to organise their email mailbox. For example, they clean up, archive and sort email to allow the efficient and secure storage and retrieval of relevant messages and/or attachments. They access appropriate websites and online forums such as blogs and chat sites, to locate information and to share ideas, applying protocols that respect other users and that protect the personal safety of students. They publish their work on the Internet after it has been tested and evaluated.

National Statements of Learning

This learning focus statement incorporates the Year 7 National Statement of Learning for ICT.

Standards

ICT for visualising thinking

At Level 5, students select and apply ICT tools and editing functions that support the filtering, classifying, representing, describing and organising of concepts, issues and ideas. They use rule-using software to assist with problem solving and decision making.

Students retrieve and modify successful approaches to visualising thinking for use in new situations. They explain what features of the new situations influenced their decisions to use particular ICT tools and techniques.

Definitions of underlined terms are provided in the Glossary (page 23)

Students use a range of data types, including sound and still and moving images, to record the decisions made and actions taken when developing new understanding and problem solving. They evaluate the strengths and weaknesses of their decisions and actions in the given situations.

ICT for creating

At Level 5, students independently use the operating system to manage their desktop workspace. They organise their folders logically, appropriately name and locate files for sharing with others and apply techniques to facilitate the easy handling of large files.

When creating information products, students prepare designs that identify the structure and layout of the products, the evaluation criteria, and the plans for managing collaborative projects. Students independently apply a range of processing skills, functions and equipment to solve problems and create products which contain minimal functional, typographical, formatting and readability errors. During the processing stage of collaborative work, students monitor project plans and record reasons for adjusting them. They apply criteria to evaluate the extent to which their information products meet user needs and comply with intellectual property laws. They use ICT in a safe, efficient and effective manner.

Students keep their bank of digital evidence up-to-date, and ensure it is easy to navigate, complies with ICT presentation conventions and demonstrates a diversity of ICT skills and knowledge.

ICT for communicating

At Level 5, students select the most appropriate search engines to locate information on websites. They use complex search strategies to refine their searches. They judge the integrity of the located information based on its credibility, accuracy, reliability and comprehensiveness.

Students share their ideas through their blog, website or other public forums, which are correctly formatted, comply with ICT conventions and demonstrate an awareness of the characteristics that contribute to products meeting their purpose.

Students organise their email mailbox into a logical structure and maintain it. They evaluate the merits of contemporary communication tools, taking into account their security, ease of use, speed of communication and impact on individuals.

Level 6

Learning focus

As students work towards the achievement of Level 6 standards in Information and Communications Technology, they use complex ICT tools and techniques to visually represent, model, reframe and refine their thinking to assist in developing new understanding. For example, they can represent causal reasoning by using graphic organisers such as cause-and-effect diagrams, influence diagrams and explore and represent the interdependence between different components of a situation by using expert systems, spreadsheets and microworlds. By changing the values of some variable components, students can visualise the effect of these on the constant components to assist their understanding.

In addition to recording and evaluating the decisions and actions taken when developing new understanding and solving problems, students learn to assess their suitability for new situations and make adaptations where necessary.

Working in real and virtual teams, students collaboratively develop conventions for storing and presenting information (such as style guides, filenames, file structure, file access rights) to create information products and solve problems set in real-world contexts in all areas of the curriculum. They investigate threats to data security, such as accidental loss (failure to follow file management procedures), stealing (files from a network), and data corruption by viruses and hackers. This investigation could focus on the preventative actions taken by businesses within the local community to protect their data and information. They apply ICT techniques and privacy law principles to protect individual and team files from unauthorised access and accidental damage.

Students, individually and in teams, use ICT to make detailed project plans that sequence tasks to be done, resources needed and timelines for completion. They annotate these plans to explain changes made during the execution of tasks. When selecting hardware and software for each task, students consider the capabilities and limitations of these tools and recognise that their choice is influenced by the characteristics of the data to be manipulated. Students consider new or emerging ICT used in workplaces, and how their new capabilities would change the way students process data and information when developing information products.

Students consistently apply commonly accepted ICT presentation conventions and use efficient procedures and techniques to solve problems, and create quality information products that fulfil their purpose. For example, templates, macros and keyboard shortcuts reduce the time taken to process data and

Definitions of underlined terms are provided in the Glossary (page 23)

increase the accuracy of creating solutions and products. Also, using checklists helps confirm the completeness of products and proofreading assists in detecting typographical and readability errors.

Students accept and respect differences in others' approaches to using ICT for solving problems and designing products, and respect cultural diversity among users of ICT; for example, using icons on a website to indicate functions such as print and mail, which are universally recognised, and using symbols that are not offensive to different cultures. Students use ICT techniques to make their information products accessible to a wide audience, taking into account special needs. For example, providing options to view a website in different font sizes assists visually impaired people, and transcripts of audio material assist the hearing impaired.

Students develop criteria to evaluate their own and others' work and use them to assess quality and the extent to which the purpose is fulfilled. For example, students compare the quality of their website with a commercial one, taking into account the knowledge and skills typical of professional website designers.

Students build on skills developed in previous levels to share ideas with the teacher and others through a range of electronic communication means such as email, contributing to forums, SMS messaging, and interacting with websites such as Wikipedia (http://en.wikipedia.org/wiki/Main_Page), which allow viewers to make modifications to the content. Students expand their skills in locating information on websites by using general and specialised directories. They refine their searching techniques to get more precise results by using within suitable search engines, proximity operators, which specify where one term in a document must appear in relation to another term. They develop knowledge and understanding about the ethical use of ICT through practical experience, observation of their own and others' behaviour, and by researching strategies for protecting vulnerable users from accessing or receiving unwanted information from the Internet.

National Statements of Learning

This learning focus statement incorporates the Year 9 National Statement of Learning for ICT.

Definitions of underlined terms are provided in the Glossary (page 23)

Standards

ICT for visualising thinking

At Level 6, students use a range of ICT tools and data types to visualise their thinking strategies when solving problems and developing new understanding. They use visualising thinking tools and apply ICT techniques to support causal reasoning and to model and describe the dynamic relationship between variable and constant data values to test hypotheses.

Students are efficient and effective in their use of appropriate ICT tools and editing techniques for assisting in visualising thinking. When solving problems, students discriminate between such tools and strategies based on their suitability for problem solving in new situations.

ICT for creating

At Level 6, students appraise different strategies for organising and managing resources involved in problem solving and creating information products. They use ICT to devise detailed plans that sequence tasks to be done, resources needed, and timelines for completion. They annotate their plans to explain changes made during the project.

Individually, and as team members, students apply a range of techniques, equipment and procedures that minimise the cost, effort and time of processing ICT solutions and maximise the accuracy, clarity and completeness of the information. They apply strategies that protect their files from being corrupted, stolen or accidentally lost. Their products demonstrate a clear sense of purpose and respect for the audience. Students apply processing practices that take into account their legal obligations and ethical considerations. They compare their own solutions with others and justify suggestions to improve quality.

ICT for communicating

At Level 6, students exchange ideas and considered opinions with others through online forums and websites. Students apply techniques to locate more precise information from websites, including searching general and specialised directories, and applying proximity operators. They use accepted protocols to communicate regularly online with peers, experts, and others, expressing their messages in language appropriate to the selected form of communication, and demonstrating respect for cultural differences.

Glossary

audience/user needs
Attributes of an information product that are stipulated by, or suitable for, the intended users (for example, functions easy to use, language and content are appropriate).

blog (or weblog)
A personal website that is updated frequently with commentaries or personal viewpoints about one or a range of topics (adult-created blogs are usually highly interactive, as other readers can lodge their feedback on the website; non-interactive blogs are recommended for students).

Boolean [logic]
A system of logical thought; the operators OR, AND and NOT are used to refine a search (for example, if you want to find information on rivers, but not the Murray River , the search string would read 'river NOT Murray').

cause-and-effect diagrams
Graphic organisers that enable the visual representations of possible causes of problems or events, and the effects of those causes.

conventions
Commonly understood or accepted ways of doing something (for example, including a postcode in an address; displaying file size and download time required for video links in a webpage).

criteria
For information products include suitability for audience, accuracy, readability, effective use of colour, functional navigation links, and communication of intended meaning.

double-cell diagram
A graphic organiser that is ideally suited for describing and comparing attributes and characteristics of two items, things, people, places, events or ideas.

effectiveness
A measurement of how well something meets its intended purpose. Typical criteria include clarity, accuracy, relevance, ease of use, attractiveness, completeness.

efficiency
Measured in terms of the effort, speed and cost of creating a solution or information product. For example, students explore techniques such as using short-cuts and macros to increase the speed of processing and reduce effort.

e-learning tools
ICT-generated interactive tutorials or other products designed to assist learning; commonly found on CD-ROM, DVD and the World Wide Web.

electronic portfolio
An electronic portfolio (e-portfolio) is a bank of files or a repository of digital evidence selected by students to demonstrate their learning and to monitor their learning progress.

expert system
A computer program that uses a set of predetermined rules for providing answers to questions by drawing on a stored knowledge base developed from the knowledge of experts in a particular field such as medicine or automotive engineering. They simulate how human experts solve problems.

graphic/visual organisers
Frameworks that help students structure their thinking processes (including concept maps, time-sequence patterns, cause-and-effect patterns, flow charts). They are visual frameworks, which help students make connections between existing knowledge and new information, and make visible their thinking processes. Electronic templates can be created by teachers, or students can use available software for generating them.

ICT-controlled models
Tools used to control devices or actions in a pre-determined way; for example, controlling a robot.

ICT presentation conventions
Commonly accepted guidelines for layout and presentation of information.

ICT tools
The range of hardware and software available to perform particular functions. For example, software such as spreadsheets can perform mathematical calculations; a digital camera can capture images.

ICT intellectual property law
Any use of others' works (for example, images, text) must be in accordance with the law and must be acknowledged.

influence diagram
A graphic organiser that enables the visual representation of the relationship between the components of a system, or the elements in a process, that identifies the components/elements that will be affected by particular decisions.

information product
Output created by students using ICT tools, functions and techniques to demonstrate their knowledge or understanding of ideas, concepts and processes from different areas of the curriculum. Typically printed or displayed on-screen; in some cases, output is an action as a result of students using an ICT-controlled model; examples include reports, slide shows, multimedia, cartoons, tables, websites and programs used to control robots.

interaction outliner
A graphic organiser that is used to show the nature of an interaction between individuals or groups.

multimedia resources
Commercially published CD-ROMs, DVDs and websites containing combinations of text, images and sound which allow students to interact with them to control pace, receive feedback, or determine their own path through the program.

operating system
(for example, Windows, Linux, Macintosh) in a computer allows file names to be changed, files to be copied, stored, retrieved, moved, deleted and printed.

planned information products
Products for which the form and layout is designed by students before any data is processed. Typically students would decide how their product would be viewed – printed, on-screen, or as an action – and how the major elements of the product will be displayed. Students then process the data in accordance with their design.

privacy law principles
Any personal data held about a person must not be disclosed to others without the permission of the person.

purposes of information
To entertain, to persuade, to educate, to inform.

structures of information
How parts of information are arranged (for example, detailed or summarised, or presented in blocks of text with hyperlinks to external files).

virtual teams
Those in which people work together via the Internet, meeting and working electronically; can comprise people from intrastate, interstate and overseas.

visualising thinking
The process of using ICT tools and editing techniques to visually code and represent thinking (for example, classifying data by colour coding; using a graphic organiser such as a concept map to discover links between data; using simulation software to model a process). It is a process that allows students to clarify thought, and to identify patterns and form relationships between new and existing knowledge.

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