How **good** is our **school?**

Using ICT in
Learning and Teaching

Curriculum area and subject appendix

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improving Scottish education

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Learning and Teaching

Curriculum area and subject appendix

CURRICULUM AREA   PAGE NUMBER

Art and Design

In art and design, ICT can be an effective tool in learning and teaching when it is used by pupils and /or teachers to:

- develop skills in creating and manipulating scanned, still and animated visual images in photographic and digital formats
- develop skills in expressing and communicating personal thoughts, ideas and feelings in visual formats
- develop and present solutions to design problems
- develop and improve visual and audio presentation skills
- improve thinking and problem-solving skills through the use of ICT in developing ideas and prototypes
- enhance pupils' motivation and independent learning, revision and study skills
- access visual, written and audio information for investigative and research purposes
- provide access to flexible learning approaches relevant to the needs of individual pupils
- develop conceptual understanding of the contemporary and historical significance of art, design and architecture in local, national and international contexts using CD-ROMs and the Internet (for example, to link with galleries, museums, heritage collections, libraries, databases which provide text and visual information)
- develop an understanding of the significance of visual concepts in the construction and creation of art and design objects and artefacts
- enhance awareness of how the visual elements {line, shape, form, colour, tone, pattern and texture} can be employed in the construction of visual objects and artefacts
- communicate to and share visual and other relevant data and information with a wide audience through the use of e-mail, CD-ROMS, software packages for presentations, photography, digital photography and websites
- provide homework, receive feedback and online support from teachers and other relevant sources

Business education subjects

In business education subjects, ICT can be an effective tool in learning and teaching when it is used by pupils and/or teachers to:

- develop specific ICT subject skills
- present text and visual information on the computer screen and electronic blackboard thereby demonstrating visually concepts which might be difficult to explain in words
- enable pupils to demonstrate their knowledge, understanding and skills through ICT-based presentations and displays
- enable pupils to use their skills and acquired knowledge imaginatively to improve the quality and presentation of their investigations and other course work
- enable pupils to communicate their findings accurately and present their results effectively
- enable pupils to use CD-ROMs so that they can revise and learn at a pace which suits their individual needs
- promote the use of distance learning and self-instruction packages
- reinforce key learning points and undertake extension activities
- enable pupils to use resources such as the Internet for enquiry tasks relating to topics such as bus, rail, boat and air timetables, hotel bookings, travel routes and new technologies
- develop pupils' confidence in researching, interpreting and evaluating information
- enable pupils to apply concepts and theories to case studies and problems in real organisations
- enable pupils to use spreadsheets to explore possible scenarios, for example by costing particular systems or services which a firm might use
- make contact with other schools, business organisations and governmental bodies both within and outwith Scotland
- access information about business and management events, for example London Stock Exchange, Wall Street
- engage in enterprise activities, including financial management, databases and correspondence
- access online library catalogues of higher education institutions, international organisations, multi-national companies; governmental bodies
- develop skills in statistical analysis, using statistics and information from Government departments, international organisations such as the European Commission, NATO and the United Nations , non-Governmental organisations and pressure groups
- access a range of views on contemporary issues through ready access to extracts from newspapers and magazines on the Internet or on CD-ROMs
- improve analytical thinking and problem solving through design and refinement of simple models – 'cost benefit analysis' and 'best value scenarios'
- assist in the collation, analysis and presentation of results of investigations through the use of spreadsheets and databases
- set activities in contexts which are topical and motivating through the use of CD-ROMs and websites
- e-mail responses/direct communications between teachers and pupils and suggestions for next steps in pupils' learning

Biology and science

In biology and science, ICT can be an effective tool in learning and teaching when it is used by pupils and/or teachers to:

- enhance the presentation of information through the use of word-processing and ICT-based presentations and displays, for example production of teaching resources, pupils' reports of investigations or delivery of lessons
- extend pupils' knowledge and understanding of local and global biological issues through the use of appropriate Internet sources, for example exploring environmental issues or discussing social, moral and ethical issues in relation to science
- record out-of-school experiences and aspects of the environment using digital cameras, for example following field trips or residential experiences
- develop and assess pupils' understanding of concepts through the use of interactive technology, for example CD-ROMs, electronic multi-media display boards and e-panels
- develop and improve pupils' problem solving skills, particularly those relating to making predictions, analysing and presenting data and drawing conclusions, for example using databases, spreadsheets and graph-drawing software
- encourage pupils to work collaboratively on tasks and investigations, either in class, in the library or at home
- meet pupils' needs through providing challenging tasks and activities for appropriate individuals or groups, for example through Internet research or interactive websites
- support the delivery of courses and programmes using online resources, for example Scholar
- enable scientific issues to be shared widely through effective networking, for example, allowing contact with other schools and groups via websites and e-mail
- support and enhance practical work and class demonstrations through using interfacing equipment to make measurements, for example using a range of sensors, data logging devices, and data processing and analysis facilities
- simulate or illustrate processes and experiments, particularly where they cannot be undertaken conveniently or safely by pupils, for example carrying out dissections, genetics crosses or movement of atoms/molecules
- demonstrate small scale or microscopic processes using video-linked microscopes

Chemistry and science

In chemistry and science, ICT can be an effective tool in learning and teaching when it is used by pupils and/or teachers to:

- interface with pieces of scientific equipment so that measurements can be made and data logged for later use
- simulate/illustrate experiments which are too difficult, dangerous, or time consuming
- simulate natural processes, including those involving atoms/molecules
- demonstrate small-scale or microscopic processes using a video-linked microscope
- develop and assess subject knowledge, understanding and skills through interacting with appropriate learning and teaching materials on CD-ROMs, websites and interactive multi-media display boards
- organise and display collected data using databases, spreadsheets and graph-drawing software
- produce high-quality reports of investigations using word-processing facilities
- give high-quality pupil presentations (for example, using ICT-based presentations and displays)

English, English as an additional language and drama

In English, English as an additional language and drama, ICT can be an effective tool in learning and teaching when it is used by pupils and/or teachers to:

- demonstrate and support well-structured oral presentations, for example through use of ICT-based presentations and displays
- demonstrate the craft of writing and editing through use of interactive multi-media display boards
- encourage well-presented, carefully edited written work for display and for folios
- develop a practical understanding of the importance of audience through use of a range of media for practical purposes with a real readership for example, e-mail, research, ICT-based presentations and displays
- use e-mail for homework and access to support/extension material
- encourage a personal response to reading, for example through use of a discussion board
- support pupils with communication difficulties, for example, through provision of writing frames, dictaphones and voice recognition systems of word-processing
- promote purposeful use of the library for personal reading, reading for information and discursive writing through structured access to data bases, CD-ROMs and the Internet
- provide source material for research purposes
- enable pupils to set language in context through contacts with other English language speaking communities across the world and minority language communities
- allow pupils with English as an additional language to use their first language to learn key concepts
- enable pupils with English as an additional language to gain access to a broad range of language experiences in their mother tongue beyond their family and community groups
- support pupils for whom English is an additional language and those with specific language needs, for example, by providing them with access to electronic dictionaries, customised toolbars and function key programmes
- enhance and enrich textual studies and comparison of different genres, for example, through use of sound and video recordings of texts
- access information about theatrical and literary events and staff development
- exchange information and views through networks and other communications
- improve access to arts performances and festivals and performing groups, for example, in remote locations
- use video/digital cameras to record their own work in drama, professional drama productions and festivals and the work of visiting performers

Geography

In geography, ICT can be an effective tool in learning and teaching when it is used by pupils and/or teachers to:

- develop and improve enquiry skills, particularly those relating to research, analysis and presentation of data
- extend knowledge and understanding of local and global geographical and environmental information and issues through the use of appropriate Internet sources
- improve knowledge of maps and mapping and develop skills in mapping through Internet sources and Geographical Information Systems resources
- generate maps, graphs and charts quickly to free time for other aspects of enquiries and investigations
- analyse data gathered in fieldwork and research using spreadsheets and database software
- enhance the presentation of information through word-processing, ICT-based presentations and displays presentations and digital movies
- enhance classroom delivery of key concepts and geographical data
- provide high quality worksheets, ICT-based presentations and displays and other teaching resources such as maps, charts and diagrams
- encourage direct involvement in learning through use of interactive multi-media display boards
- use digital movies to provide virtual fieldwork exemplars
- work collaboratively on tasks and investigations, either in class, library, other computer suites or at home
- conduct investigations by making contact with other schools and groups via websites and e-mail
- provide more challenging tasks and activities for appropriate individuals or groups, through Internet research or interactive websites
- provide high-quality revision materials such as those found on BBC, Becta and other educational websites

Geology

In geology, ICT can be an effective tool in learning and teaching when it is used by pupils and/or teachers to:

- interface with pieces of scientific equipment so that measurements can be made and data logged for later use
- simulate geological processes and 3-dimensional structures
- show small-scale or microscopic samples/processes using a video-linked microscope
- develop and assess subject knowledge, understanding and skills through interacting with appropriate learning and teaching materials on CD-ROMs, websites and interactive multi-media display boards
- organise and display collected data using databases, spreadsheets and graph-drawing software
- produce high-quality reports of investigations or fieldwork using word-processing facilities
- give high-quality pupil presentations (for example, using ICT-based presentations and displays)

History

In history, ICT can be an effective tool in learning and teaching when it is used by pupils and/or teachers to:

- provide ready access to the huge range of primary and secondary documentary sources of historical evidence available through the Internet, including collections of documents and up-to-date interpretations of historical evidence by historians
- provide ready access to the huge range of primary and secondary visual sources of historical evidence available through the Internet, including historical maps, statistics and other data, photographs and other visual images, film, audio clips
- improve awareness of chronology and historical sequence through the generation or use of timelines, diagrams and other means of reinforcing visual learning
- improve conceptual understanding in history, through simulations or games
- facilitate the preparation of learning and teaching materials of high quality for pupils, including the use of interactive multi-media display boards
- provide ready access to revision materials of high quality from websites
- provide opportunities for improving presentation skills, including the use of word-processing and ICT based presentations and displays presentations, and consequently skills of analysis, debate and discussion
- provide opportunities for the comparison and synthesis of information from a range of sources
- provide opportunities for evaluating the significance, relevance and reliability of primary and secondary sources

Home economics

In home economics, ICT can be an effective tool in learning and teaching when it is used by pupils and/or teachers to:

- enhance design and make activities
- present work to a high standard, including preparing questionnaires (e.g. for market research related to product development), including spreadsheets which can be used for the collation, analysis and presentation of results of investigations
- make audio/visual presentations, for example to present the results of investigations.
- access information for group and individual research using the Internet and CD-ROMs
- simulate processes in food product development by using CD-ROMs.
- enable pupils to work at their own pace according to their ability, with effective use being made of time available
- network with other schools, for example by e-mail and video-conferencing, offering opportunities for peer interaction and support

ICT and computing

In ICT and computing, ICT can be an effective tool in learning and teaching when it is used by pupils and/or teachers to:

- develop specific ICT competencies through hands-on use
- provide teachers with projection devices and multi-media display boards that enable them to demonstrate step-by-step use of key software packages
- enable teachers to set learning tasks and activities in contexts which are topical and motivating (for example, through the Internet)
- use computer simulation to demonstrate concepts which might be difficult to explain in words
- access the computer systems of companies and public bodies to understand how the theory of computing is put into practice
- improve analytical thinking and problem solving through design and refinement of simple models of computer systems and information systems
- enable pupils to use computer simulations interactively to explore particular concepts in computing (such as computer systems and networking)
- enable pupils to improve the quality and presentation of the outcomes of their investigations and other course work
- enable pupils to search for and evaluate the quality and relevance of information on the Internet
- enable pupils to access online learning materials and other materials as part of their development as independent learners
- enable pupils to use ICT resources to work at a pace that suits their needs
- provide an electronic means of exchanging information between teacher and pupils (such as homework, assignments, advice)
- enable pupils to be assessed online, with the advantages of fast feedback to the pupil and better diagnostic information for the teacher
- enable teachers to provide pupils with up-to-date and comprehensive information on their achievement in assessments and course work

Mathematics

ICT can be an effective tool in learning and teaching when it is used to:

- provide pupils with a means to handle data or information effectively for example, through the use of databases, spreadsheets and graphs
- support pupils in presenting and interpreting information in a variety of ways, for example through the use of graph-drawing packages or the use of graphic calculators
- enhance learning and teaching through the use of a graphic calculator viewscreen projected onto an interactive multi-media display boards
- develop pupils' graphicacy skills
- increase pupils' motivation by promoting their active involvement in learning
- enable teachers to demonstrate lessons through the use of ICT based presentations and displays, including the use of interactive multi-media display boards
- encourage teachers to set activities in contexts which are topical and motivating for their pupils through the use of resources found on websites
- support work in shape, position and movement from the early stages through the use of screen and floor turtles
- set pupils challenging problems which require them to think logically, for example by provide ready access through the use of the Internet to a range of problems, ideas and contexts for mathematics
- improve pupils' skills in mental calculation and understanding of numbers through carefully targeted use of software packages designed to help pupils practise their skills.

Modern foreign languages and Gaelic

In modern foreign languages and Gaelic, ICT can be an effective tool in learning and teaching when it is used by pupils and/or teachers to:

- provide a tireless language partner, opportunities to practise languages in different contexts and, where appropriate, receive immediate feedback
- provide access to real contexts and up-to-date information on the target country, often supported by a strong visual element, to allow a rich experience of the language, through, for example, language and cultural websites
- enable pupils to set language in context through contacts with other countries and Gaelic speaking communities
- communicate purposefully with others through the use of email, video conference, webcam and website creation in the foreign language
- present topics in the foreign language through the use of multimedia such as software packages for presentations, sound files and video clips
- word process written work in order to improve quality of output and focus on achieving a better knowledge of grammar and vocabulary
- work at pupils' own pace or provide flexible additional support such as writing-frames
- engage in extended speaking, using digital video in a variety of contexts
- deliver additional support or offer individual distance learning opportunities through programmes such as Scholar

Modern studies and People in Society

In modern studies and People in Society, ICT can be an effective tool in learning and teaching when it is used by pupils and/or teachers to:

- support enquiry tasks, for example, by preparing questionnaires and collating, analysing and presenting results
- develop skills in enquiry through experiencing and discussing the advantages and disadvantages of using CD-ROMs and the Internet as means of enquiry
- consider a range of views on contemporary issues through ready access to extracts from newspapers and magazines, on the Internet and/or on CD-ROMs
- develop skills in statistical analysis, using statistics and information from Government departments, international organisations such as the European Commission, NATO and the United Nations, non-Governmental organisations and pressure groups
- use e-mail as a pupil/pupil and pupil/teacher correspondence network
- communicate findings and present results in an accurate, attractive and clear manner
- network with other schools through e-mail or websites
- process and present statistical data as a basis for developing other skills, thus saving time for more effective teaching
- challenge higher attaining pupils in accessing additional and/or more complex information

Music

In music, ICT can be an effective tool in learning and teaching when it is used by pupils and/or teachers to:

- provide high quality analogue and digital recording facilities for recording music
- aid the creative process by providing ready access to a wide range of sounds and styles
- support the composition process by enabling musical sounds and patterns to be recorded, edited, layered and structured
- provide ready access to a wide range of recorded music, for example midi files, which can be used to support performing, inventing and listening activities
- edit backing tracks, such as midi-files, to meet the specific musical needs of the class or pupil
- support the process of arranging music and printing instrumental and vocal parts for a variety of purposes, including performance
- provide access to study programmes and research opportunities for conceptual understanding, aural training, theoretical awareness, historical and social understanding, and a wide range of other contexts of musical interest
- enable music, musical ideas and issues to be shared widely through effective networking and sharing of best practice
- support the presentation and demonstration of music and musical concepts through high-quality classroom display, for example by using interactive multi-media display boards
- promote the quality of presentation of text and musical extracts in dissertations
- provide remote access to specialist teaching and other resources, for example through videoconferencing

Personal and social development (PSD)

In PSD, ICT can be an effective tool in learning and teaching when it is used by pupils and/or teachers to:

- develop and enhance oral presentations or produce summary notes by use of overhead projector and transparencies
- present materials that will stimulate pupils' interest through use of, for example, interactive multi-media display boards
- research specific areas in preparation for introducing pupils to a range of topics (use of CD-ROMs and the Internet, for example, to research aspects of bereavement counselling)
- make contact with other schools, education authorities in Scotland and abroad using Intranet/Internet
- create and reproduce effective, professional worksheets
- adapt materials so they serve the needs of pupils with different attainment levels, for example, by providing opportunities for research or for contacting other pupils
- communicate with external contributors who will be able to enhance both the school's programme and aspects of learning and teaching
- research topics both independently and collaboratively
- gain access to expertise in areas of personal and social development through the use of videoconferencing and e-mail
- assist pupils to build up an index of useful, topic-related website addresses for their own use and that of others
- develop presentational skills, by working both independently and collaboratively
- to explore and use anti-bullying websites such as **www.kidscape.org.uk**

Physical education

In physical education, ICT can be an effective tool in learning and teaching when it is used by pupils and/or teachers to:

- video record and replay practical performances to provide immediate feedback to pupils on their performance and encourage improvement
- see a new games strategy in action or observe a dance and analyse the choreographic approaches used
- replay televised performance of quality performers in practical spaces (for example, dance studio, gymnasium, games hall) and classroom/lecture room settings as the basis for discussion or for performance-based tasks
- show great performances and thus fire pupils' imaginations (for example, high quality sporting or dancing performances, listening to quality performers talking about their training or a great occasion)
- provide evidence of practical teaching or coaching so that senior pupils can analyse their effectiveness in the teaching or coaching setting (for example, S5/S6 pupils following a community sports leadership award)
- encourage more independent use of video and use more video-based tasks for assessment-assignment purposes
- set homework tasks/assignments which are based on recorded images of performers or clips of performers talking about their approaches to training
- providing evidence for assessment purposes during training, competitions or events which take place outwith class hours
- access the Internet and download information for tasks, projects and assignments or information on, for example, lesson planning, technique practices, dance routines and fitness programmes
- explain concepts more clearly (for example, choreographic techniques, games structures and strategies, approaches to performance improvement)
- use software to compare the performance of a pupil with the 'model' performance of a quality performer for analysis
- enhance fitness training programmes, for example, through the use of pulse monitors as an aid to fitness monitoring, analysis and interpretation of data and the subsequent design and implementation of training programmes

Physics and science

In physics and science, ICT can be an effective tool in learning and teaching when it is used to:

- support and enhance student practical work and class demonstrations using interfacing techniques, including improved measurement techniques using a range of sensors, data logging devices, and data processing and analysis facilities
- simulate physical processes and experiments – particularly where the latter cannot be undertaken conveniently/safely by pupils for example, investigations of properties of radio-active materials
- provide ICT-based presentations and displays presentations, such as summary notes / revision aids for pupils
- present a report on findings of investigations or research task, using word-processing or ICT-based presentations and displays
- 'capture' the motion for example, of collisions or projectiles for subsequent analysis, using digital video technology
- produce high quality printed course materials for pupils using word-processing/desk top publishing
- explore the potential of the Internet as a source of up-to-date, topical reference materials for example, space images, health physics applications; also as an illustration of modern telecommunications
- develop pupils' understanding of physics concepts through the use of inter-active technology for example, CD-ROMs, interactive multi-media display boards
- model physical processes using spreadsheets
- support the delivery of physics courses using online resources

Religious and Moral Education (RME)

In religious and moral education, ICT can be an effective tool in learning and teaching when it is used by pupils and/or teachers to:

- develop and enhance oral presentations or produce summary notes using overhead projector and transparencies.
- present materials that will stimulate pupils' interest through use of interactive multi-media display boards
- research relevant topics
- make contact with colleagues in Scotland and elsewhere
- create and reproduce effective, professional worksheets for pupils (word-processing, use of Internet, cutting and pasting)
- ensure appropriate challenge for pupils through differentiation of materials
- set up e-mail conversations with pupils from other schools, areas and faith communities.
- assist teachers to ensure additional challenge by setting up differentiated activities through, for example, research tasks on the Internet
- communicate with external contributors who will be able to enhance both the school's programme and aspects of learning and teaching in RME
- complement programmes and learning and teaching through efficient means of accessing potential contributors, enabling visits to places of worship
- research topics both independently and collaboratively such as information on aspects of different religions, sacred texts or visual representations of, for example, festivals)
- assist pupils in enhancing both personal and group presentations
- build up an index of useful, topic-related websites for their own use and that of others
- gain Internet access to religious websites and take part in e-debates or discussions

Technology

In technology, ICT can be an effective tool in learning and teaching when it is used by pupils and/or teachers to:
• design artefacts using graphics tools • use simple computer programs to control mechanical/electrical devices • develop and assess subject knowledge, understanding and skills through interacting with appropriate learning and teaching materials on CD-ROMs and websites • organise and display collected data using databases, spreadsheets and graph-drawing software • produce high-quality reports of practical activities using word-processing facilities

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