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GCSE in Information and Communication Technology (Single Award and Short Course)

Teachers' Guide

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1. INTRODUCTION

The WJEC GCSE Information & Communication Technology specification has been modified and updated for delivery from September 2010. The first subject awards will be in Summer 2012. For the first availability of units, see page 2 of the specification. The specification can be delivered and assessed in centres throughout the UK.

The revised subject criteria for GCSE Information & Communication Technology issued by the regulators have necessitated a change in the course structure from the current tiered examination papers and coursework components to non-tiered papers and controlled assignments.

This Teachers' Guide is one of a number of ways in which the WJEC provides assistance to teachers delivering the new specification. Also essential to its introduction are the specimen assessment materials (question papers and marking schemes) and professional development (CPD) conferences.

Other provision which you will find useful are:

- Examiners' reports on each examinations series
- Free access to past question papers via the WJEC secure website
- Easy access to specification and other key documents on main website
- Item level data on outcomes for candidates at question level
- Regular INSET delivered by Chief Examiners
- Additional materials on the National Grid for Learning Wales (NGfL Cymru)
- Easy access to both the Subject Officer and to administrative sections

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1.1 Rationale

A course in Information and Communication Technology offers a unique opportunity in the curriculum for candidates to identify and solve real problems by designing information and communication systems in a wide range of contexts relating to their personal interests. Information and Communication Technology develops candidates' interdisciplinary skills and their capacity for imaginative, innovative thinking, creativity and independence.

The specification encourages the investigation and study of Information and Communication Technology in a variety of contexts. In these contexts the candidates are given opportunities to acquire competence, capability and critical skills through the creation, implementation, use and evaluation of a range of information and communication systems. Candidates from all cultures and both genders can develop their interest in, enjoyment of, and critical reflection about information technology as an integral part of modern society.

This specification has been developed by WJEC to provide the opportunity for candidates to obtain a qualification in:

GCSE (Single Award) Information and Communication Technology
or
GCSE (Short Course) Information and Communication Technology

Information and Communication Technology can be taken as an independent short course and successful candidates will be awarded a GCSE (Short Course) in Information and Communication Technology. The GCSE (Short Course) forms the core of the GCSE specification: it includes half the content of the GCSE (Single Award) and covers the full range of grades. The short course is designed to be delivered in approximately half the time of the single award.

GCSE (Single Award) candidates take two examination papers: for unit 1 and unit 3. They are also required to submit controlled assignments for unit 2 and unit 4.

GCSE (Short Course) candidates take only the unit 1 examination paper and are required to submit a controlled assignment for unit 2.

This specification:

(a)   is intended to be of interest to a wide range of candidates including those intending to study Information and Communication Technology, Applied Information and Communication Technology or Computing at AS or Advanced Level. All units are intended to be accessible to G grade pupils whilst providing some elements that will challenge those working at A*. Some pupils may go on to follow a higher education course or career in Information and Communication Technology or an associated area. Those with other interests and aspirations can also benefit from the many transferable skills inherent in the study of Information and Communication Technology;

(b)   builds upon the knowledge, understanding and skills established by the National Curriculum Key Stage 3;

(c)   promotes progression through the GCSE and provides a suitable foundation for the study of Information and Communication Technology, Applied Information and Communication Technology or a related area of study, at AS or Advanced Level and/or preparation for future employment and the world of work;

(d)   provides opportunities for candidates to gain a broad understanding of the skills, understanding and knowledge inherent in Information and Communication Technology;

(e)   encourages candidates to develop their critical thinking, to see the relationships between systems designer and user, and the role of Information and Communication Technology within the world in which we live;

(f)   provides opportunities to develop candidates' Key/Essential Skills, particularly those in problem solving, use of IT and communication. They will also have opportunities to develop their skills in application of number, working with others and improving own learning and performance;

(g)   assesses the functional elements of ICT;

(h)   is available through the medium of English and Welsh.

1.2   Overview of the specification

The new GCSE specifications of all awarding bodies are based on a revised set of subject criteria drawn up by the regulatory authorities. Awarding bodies were required to make two fundamental changes and both of these relate to the mode of assessment.

Tiered examination papers i.e. Paper 1 Foundation (C-G) and Paper 2 Higher (A*-D) have been replaced by single papers which offer the full range of grades A*-G.

Coursework has been replaced by controlled assessment.

The specification is unitised Units 1 and 2 can be taken as a short course whilst all four units make up the single award.

SUMMARY OF ASSESSMENT

Unit 1: Understanding ICT
Single Award 20%; Short Course 40%
External Assessment: 1½ hours   **80 Marks (40 UMS)**

This examination paper will assess the requirements of the Key Stage 4 Programme of Study for Information and Communication Technology and the functional elements of ICT in a home and school context.

Unit 2: Solving Problems with ICT
Single Award 30%; Short Course 60%
Controlled Assessment: 22½ hours   **80 Marks (60 UMS)**

This controlled assessment consists of a portfolio of work which shows candidates' attainment in obtaining and interpreting different types of information; using, developing and communicating information to meet the purpose of their studies and presenting the results of their work. This assignment will assess the practical aspects of the functional elements of ICT.

Unit 3: ICT in Organisations
Single Award 20%
External Assessment: 1½ hours   **80 Marks (40 UMS)**

This examination paper will assess the 'application' content of ICT in a business and industry context.

Unit 4: Developing Multimedia ICT Solutions
Single Award 30%
Controlled Assessment: 22½ hours   **80 Marks (60 UMS)**

This controlled assessment will give candidates the opportunity to develop a piece of work using multimedia software following a single task brief issued by WJEC.

The Examination Papers

The most obvious benefit of this change to single tier examinations is that centres will no longer have to make what have sometimes proved to be quite difficult decisions regarding the entry of those candidates whose grades are likely to lie in the B-D range.

The examination papers will combine features of the current Foundation and Higher papers. Questions will be structured, most requiring a mixture of short and longer answers. There will be questions based on stimulus material to test candidates' ability to apply knowledge, analyse material and evaluate evidence. Some of the questions will require extended writing and will assess the quality of written communication.

Controlled Tasks

The regulatory authorities have been concerned about coursework for some time and as a result it has been replaced by controlled assessment.

The rationale for controlled assessment includes the need to:

- make assessment more valid and reliable;
- avoid assessments that are too formulaic and predictable;
- support good teaching and learning;
- discourage and detect assessment malpractice;
- allow teachers to confidently authenticate students' work;
- make assessment more manageable for students and teachers.

In summary there are three main aspects or stages to controlled tasks:

- Task Setting
- Task Taking
- Task Marking

For each stage, the regulatory authorities have specified a certain level of control to ensure that the conditions under which the tasks are set, carried out and marked are robust and consistent between centres and awarding bodies. These controls will ensure that the assessment is valid, reliable and authenticated with a high degree of confidence.

Task Setting - Tasks will be set by WJEC.

Task Taking - This involves two elements:

> *Research* – this has **limited control** where some work may be completed without direct supervision.

> *Analysis, implementation and evaluation* – these have a **high level of control** where the candidate must be under the supervision of the teacher at all times.

Task Marking - Tasks will be marked by teachers and moderated by WJEC.

For details on task setting, task taking and task marking, please refer to the specification and the *Instructions for Teachers* issued annually with the assignments.

Subject Content

There are obvious changes to the subject content to reflect developments in information and technology over the last decade, but in the main the existing content has been re-packaged under a largely new set of headings. For the examinations the content has been organised into ICT in home and school contexts for unit 1 and business and industry contexts for unit 3. The unit 2 controlled assessment is mapped to the functional skill and essential skills (Wales) criteria, whilst the unit 4 controlled assessment using multimedia software is entirely new.

Unit 1 Understanding ICT Examination
Data and information Home entertainment Home and personal communication systems Home business Organisations: School, home, environment ICT and learning Staying safe Emerging Technologies
Unit 2 Solving Problems with ICT Controlled Assessment
Organisation of folders and files Communicating Information Modelling Information Handling Email Evaluation
Unit 3 ICT in Organisations Examination
Data, information and knowledge Multimedia industries Networks Social and environmental impact HCI's Organisations Safety in organisations Emerging Technologies
Unit 4 Developing Multimedia ICT Solutions Controlled Assessment
Research Design Template and Navigation Graphical Images Animation or Animated Movie Sound Additional Techniques Evaluation

2. *DELIVERING THE SPECIFICATION*

The examination papers will be available in both January and June, although we have taken the decision not to offer a paper in January 2011 as we feel this will be too early for candidates who only start the course in September 2010 to be adequately prepared. In summer 2011 candidates will be able to sit the unit 1 examination and enter the unit 2 controlled assignment. From January 2012 both the unit 1 and unit 3 examinations will be available at every session. Entries for both controlled assignments can be made in every summer session from 2012.

Units may be re-taken once only (with the better result counting) before aggregation for the subject award. However, at least 40% of the assessment must be taken at the end of the course, to satisfy the requirement for terminal assessment, and the results from that terminal assessment must contribute to the subject award. Therefore, any previous results for the unit(s) that are being used to satisfy the requirement for 40% terminal assessment cannot contribute to the subject award, even if they are better than the results achieved at the end of the course.

Results for a unit have a shelf-life limited only by the shelf-life of the specification. A candidate may retake the whole qualification more than once.

To ensure comparability between sessions individual unit results are reported on a ums scale and these are aggregated for subject awards. Details of these can be found in the tables on page 26 of the specification.

2.1 Pathways through the specification

WJEC acknowledges that whilst a scheme of work is an essential teaching aid it can be presented in many different styles and formats. Indeed a scheme of work is usually the creation of the practitioner and it is devised to meet a preferred teaching style, available resources and the nature of the students following the course. It is expected that teachers will write it and present their scheme of work in totally different ways. It would also be expected that references to the activities and the resources will need to evolve over time, for a scheme of work is a living document that needs constant updating in this dynamic ever-changing subject.

2.2 Examples of approaches

The recommended guided learning hours (glh) for the single award are between 120 and 140 hours. For the short course the glh are between 60 and 70 hours.

It is expected that most candidates will follow this specification as a two year course in years 10 and 11. Some centres have indicated plans to start in year 9, others plan to deliver the short course in one year whilst some colleges will deliver the single award in one year. All these approaches are possible.

Centres will have to decide whether to take advantage of the early assessment opportunities by entering candidates for some units in the first summer of a two year course or in the January sessions. Care must be taken over application of the 40% terminal assessment rule.

Skills assessed in the unit 2 controlled assignment will also be assessed in the unit 1 examination and similarly with units 4 and 3. It would be practical to teach these units in tandem so that candidates develop an understanding of the theory behind the practical application of the skills.

The tasks for the controlled assignments will be released to centres in September each year and these will have a two year shelf life.

In September 2010 the first unit 2 assignment will be released and this could be entered for assessment in summer 2011 and summer 2012. The second unit 2 assignment will be released in September 2011 and this could be entered in summer 2012 and summer 2013.

After the first year, at any one time there will be two 'live' assignments for unit 2.

The first unit 4 assignment will be released in September 2011 and future releases will follow the same pattern as for unit 2.

If candidates re-sit the same controlled assignment they must start again from scratch and are not allowed to just add to a previous attempt.

The duration for each of these assignments is approximately 22½ hours, but these do not have to be contiguous and can be set at any time and in any combination of session lengths at the discretion of the centre. Each centre will have to decide for themselves when the candidates are ready to start the assignments. WJEC recognise that circumstances will vary between centres as to the number of computers available, the demands on these resources from other ICT classes and subject areas, and other considerations including timetabling.

It is advisable that centres record the date and time of the assessments, the name of the supervising teacher, and a log of any incidents which occurred during the course of the assessments. This information will not normally need to be submitted to WJEC but may be required in exceptional circumstances.

Some teachers have indicated that after an initial teaching period they would allocate one hour a week to the controlled assignment, others plan to break the tasks down and run each section at a different time of year, whilst some plan to block a week off the timetable and do it all in one go. Any of these approaches is acceptable. It is up to each individual centre to determine how best to facilitate the assignments in response to their own circumstances.

2.3   *Supervision of the controlled assignments*

The regulations governing the administration of controlled assessments are set out in the JCQ publication, "Instructions for conducting controlled assessments" which can be downloaded from their website at:

http://www.jcq.org.uk/attachments/published/1125/Instructions_for_conducting_controlled_assessments_2009_2010.pdf

Candidates must complete all work, with the exception of research, under informal supervision in the classroom. Although the teacher will not see every keystroke of every candidate, sufficient work must be seen by the teacher to verify it as the candidates' own.

Research may be completed under limited supervision and candidates can carry out this part of the assignment without the teacher and outside the classroom as required. Candidates may carry out research and gather materials such as images, photographs, video footage or audio files without supervision, outside the controlled environment. Teachers should, however, exercise continuing supervision of assignments in order to monitor progress and to prevent plagiarism and to be confident that the work is the candidate's own. This can be facilitated by the teacher discussing work in progress with candidates which not only allows checking authenticity of the work but ensures that work is undertaken in a planned and timely manner and also provides opportunities for formative feedback.

Each candidate should start their controlled assignment with a 'clean' user area on a secure network, a restricted access area of the school's virtual learning environment (VLE) or intranet or use a removable, recordable storage device (e.g. USB data key or CDRW, etc.). They should not have access to their work or this storage area outside the controlled conditions. The work must be kept under secure conditions at all times. Any portable storage device must be kept by the teacher. At the end of each lesson, candidate materials, electronic and paper based, must be collected in, stored securely and handed back at the beginning of the next lesson. The teacher must ensure that **all** materials are securely stored at the end of each lesson.

Centres will need to plan to control access to these user areas, etc, but it would be inappropriate for WJEC to stipulate exactly how this will be organised because of the wide range of different circumstances in centres across Wales and England. Similarly any digital or other research material brought into the classroom must be checked by the teacher before being transferred to the secure storage area. Any manipulation or development of research material must be done under teacher supervision in the controlled environment.

Centres must ensure that the IT equipment used by candidates does not allow them to access any pre-prepared materials and teachers must not provide templates or model answers. Any copied material must be suitably acknowledged.

Candidates must work without intervention or assistance from others but may collaborate in carrying out research activities and the work of the individual may be informed by discussions with others, but candidates must provide an individual response.

Candidates will be asked to collaborate via email or similar technologies with a 'significant friend' who will provide feedback on some of the work they produce. The significant friend may be an end user or teacher but will usually be a fellow student. It may be advisable for teachers to allocate these 'significant friends' to avoid a popular candidate being swamped with requests for feedback.

All the assessment documents necessary for this specification can be downloaded from the WJEC website at www.wjec.co.uk/gcseict.

3. UNIT GUIDES

3.1 Understanding ICT

Content	The Learner can:
<u>Data and Quality of data</u> Data and information	Evaluate data for fitness for purpose, accuracy and bias. Understand: - that data consists of raw facts and figures e.g. readings from sensors, survey facts, etc. - that information is data which has been processed by the computer - that knowledge is derived from information by applying rules to it - the need for good quality data; G.I.G.O. (Garbage In, Garbage Out).
Data validation	Identify: - data validation techniques for single user and online systems such as range checks, format checks, presence checks and check digits. - potential types of errors and understand methods for minimising the risk of errors
<u>Home entertainment</u>	Understand the use, services, input and output devices used with: - interactive TV pay-to-view services, interactive services, e.g. shopping, betting, voting, dating - gaming: online and games consoles - basic digital photography: technology of capturing, storing and simple manipulation of images including cameras, megapixels, flash memory, display devices and photo editing software. - webcam services - social networking: Information needed to create accounts, services available - music and sound including downloading from the Internet and related issues - mobile phones. Describe the advantages and disadvantages of each of these services.
<u>Home and Personal communication systems</u>	Understand how computers can be connected to the Internet: - broadband - satellite - mobile communication - dial up - cable. Understand: - wireless - bluetooth - other emerging connection technologies - geographical Information systems (GIS). Describe the benefits, advantages and disadvantages of these technologies.
<u>Home business</u>	Understand the use of computers when carrying out: - online shopping and searching for products on websites - booking online - verification (passwords and online data entry forms). Describe advantages and disadvantages of online booking and shopping services.

<u>Organisations: School, home, environment</u>	Understand and describe the advantages and disadvantages of: • school registration systems • management information systems in schools • data logging in school activities • weather forecasting systems.
<u>Emerging Technologies</u>	Be aware of current and emerging technologies and their impact on themselves and others in the home, school and environment. Describe the advantages and disadvantages of emerging technologies at home, in school and the environment.
<u>ICT and learning</u> Understanding the desktop environment Learning devices to support disabilities Software to support learning disabilities Online and distance learning services	Understand how to manage the desktop environment including features such as: • adjust window size, mouse settings, icon size, screen resolution, desktop fonts, colour, position, graphics, contrast and volume to meet their own needs • move, copy, delete, rename, files and folders • on-screen help • features of a control panel • print settings • password protection • shortcuts. Understand the features of and the advantages and disadvantages of: • online tutorials e.g. BBC bitesize • online assessment e.g. examinations • Virtual Learning Environments (VLEs). Understand the uses of input devices such as: • braille keyboards • specialist devices such as microphones • touch sensitive data entry devices. Understand the uses of: • voice recognition software • text to voice software • customised desktop environments.
<u>Applications software</u>	Understand and identify suitable sources of information, including files on disks, CD-ROMs, databases, the Internet. Understand the purpose and appropriate use of applications software.

Information handling software	Know when it is appropriate to: • update or delete records • sort information into Descending and Ascending order • search for information using single and multiple criteria. Understand the appropriate use of operators including = , < >, < , >, 'AND', 'OR', 'LIKE'. Have a basic understanding of data type including number, text, date, time, currency, Boolean, lists, picture, sound, video. Identify fields and records in a file. Recognise and understand the purpose of the 'key field'. Search for information using tools such as search engines, keyword searches, etc. Understand: • the outputting of data in report formats • how simple calculated fields are produced • the purpose and suitable application of validation techniques such as 'lists', 'range checks', 'format checks' and 'input masks' for common fields. Understand the benefits of using information handling for: • faster access to data • variety of output formats • data integrity.
Security issues	Understand: • password protection and password protocols • access rights to data • backup procedures.
Email	Understand how to: • create an email • create a standard outgoing signature and message • send the email to one other email address • send a group email • use cc and bcc • use file attachments • forward mail to another email address • create and manage an address book • create and save contacts • organise and name email groups and folders.
Security	Discuss the advantages and disadvantages of using email Understand appropriate measures to prevent misuse e.g. viruses, abusive language.
Spreadsheet software	Understand: • the difference between labels, data and formula • formulas and functions to calculate information such as SUM, AVERAGE or IF • absolute and relative cell referencing • appropriate formatting techniques e.g. borders, currency • cell merging. Understand the benefits of using spreadsheets for: • changing information in a spreadsheet model to make and test predictions (What if investigations) • generating different charts and graphs from suitable data • accurate calculations • auto recalculation.

Data logging and Control	Understand: • the process of data logging • different types of sensor and suitable uses for them • how to write a sequence of instructions to control a screen image or external device appropriately • the use of ICT to control and monitor areas of everyday living such as electronic toys, games, central heating systems, burglar alarms, smart meters, security systems, Discuss the advantages and disadvantages of: • computer control (non feedback)
DTP Software	Understand the purpose and use of the following: • spellchecker • online thesaurus • mailmerge • automatic routines such as: style sheets, headers and footers, pagination and automatic contents production. Recognise, use and where appropriate evaluate techniques such as: • changes in font type, style and size • justification (left, centre, fully justify) • importing different file formats e.g. clipart, csv, txt, rtf, etc. • tabulation • tables • borders • single and double line spacing • manipulation of graphics such as resizing, cropping, rotating and mirror imaging • autoshapes • watermarks.
Web and Presentation Software	Understand the appropriate use of good practice in designing web and slide presentations including: • sequencing instructions • animations • transition • links • consideration of target audience • appropriate use of standard navigation techniques • disability considerations e.g. sound, font style and sizes, pop up comments on images.
Legal and ethical issues	Know and understand the: issues concerning copyright misuse.
Staying Safe Online Data protection issues Health issues	Understand the dangers associated with: • the disclosure of personal data • misuse of images • using inappropriate language. Understand codes of conduct for personal protection Discuss appropriate steps to avoid inappropriate disclosure of personal information. Know : • how to protect data from accidental destruction • how to protect data from deliberate damage caused by viruses and other types of malicious damage • how to protect stored or transmitted data from unauthorised access. State potential health hazards when using computers. Suggest methods for prevention or reducing the risk of potential health hazards.

3.2 ICT in Organisations

<u>Data and Quality of data</u> Data and information	Understand - the potential benefits of encoding data and the reasons for doing it - the improved speed of access to data - the advantages and disadvantages of using Information and Communication Technology for storing data.
Data validation	Define validation and verification. Know the methods used for validation and verification and where they are appropriate. Describe the following: Verification - parity check - double keying - visual check Validation - batch totals - hash totals Understand: - the possible sources of error which could exist - the techniques used to overcome these errors.
<u>Data logging and Control</u>	Understand: - the use of ICT to control and monitor areas of everyday living such as: automatic doors, traffic control systems, car parking systems, greenhouse control systems and robotics, simulation (for example flight or driving) Discuss the advantages and disadvantages of: - computerised data logging - computer control (feedback)
<u>Web and Presentation Software</u>	Describe advantages and disadvantages of data compression techniques for images, movies, sound, pages and slides.

Web Software	Understand browser software:
	• url
	• keyword searches
	• links
	• menus.
	Analyse existing web pages.
	Search for and search on web pages.
	Make comparisons on house style, audience, size and techniques used.
	Use interactive features such as online forms, email, games, quizzes and questionnaires.
Tools and Techniques for creating websites	Understand and use:
	• master pages/templates
	• home page
	• site navigation
	• golden triangle
	• hyperlinks
	• graphical hyperlinks/hotspots/rollover buttons and polygon links
	• bookmarks/ anchors
	• navigation bars
	• leader boards
	• banners
	• web icons e.g. shopping trolley, email
	• html.
	Discuss issues with hosting of websites and factors affecting uploading times.
	Describe advantages and disadvantages of:
	• the use of web pages and the different features used on them
	• RBG colours; decimal and hexadecimal code used for colour.
Presentation software Tools and techniques for creating slide presentations	Understand and use:
	• design templates
	• animation
	• transitions and timings
	• video and sound
	• navigation bookmarks, hyperlinks and hotspots
	• narration and speaker notes
	• printing formats.
	Describe advantages and disadvantages of presentation software.

<u>Multimedia</u> Multimedia components Hardware Memory requirements Software Interactive components	Demonstrate an understanding and awareness of current developments in the multimedia industry and their effects on: • education • entertainment • business • society. Demonstrate an awareness of current and future trends in multimedia. Understand the requirements of multimedia systems in terms of: • screens: size and resolution • input devices: mouse, graphics tablets, touch sensitive input devices, microphone • features of digital still and video cameras, webcams, different megapixels • Midi and other specialist input or output interfaces. Understand and make appropriate use of: • internal memory and backing store • digital photographic editing • movie making • animation • music • sound • keyword searches • quizzes • questionnaire • games • links. Describe advantages and disadvantages of using multimedia software. Discuss differences between techniques for storing text, images, sound and video. Describe advantages and disadvantages of such techniques.
<u>Digital imaging</u> Vector and bit map graphics Tools and techniques for creating and manipulating still images	Understand: • vector and bit map graphical techniques and their implication for memory size and manipulation • pixel dimensions (pixels per inch/cm) and benefits and problems with resizing of images for optimum use • screen resolution and memory requirements for different backgrounds (transparent, white, colour). Describe advantages of vector graphics over bit mapped graphics. Use: • standard tools: zoom, selection, transforming, scaling and sizing, brush settings, distortion, moving, cloning, rotation, layering, toggling between layers • colour effects, colour palettes and gradient tools • imaging effects • transparency effects • composite patterning (repeated patterns). Understand the use, advantages and potential disadvantages of: bmp, jpeg, gif, tiff, eps and other common formats.

<u>Animation</u> Origins of animation Animation processes Uses in commercial and learning environments Tools and techniques for creating animated images	Compare and contrast different animation techniques Understand: - persistence of vision techniques - flip books - stop Motion animation - flash/Key frame animation 3D animation. Understand: - film making and special effects industries - VLEs, educational websites - animations for the web - identification through logos - standard banners for web pages/leader boards. Describe advantages and disadvantages of animation in commercial and educational environments. Plan an animation: folder trees, story boards. Show awareness of audience: mood boarding. Understand: - the impact of variety of frame rates and looping - vector and bit map animation - claymation and pixilation techniques - rotoscoping - tweening and onion skinning - grouping, cloning, backdrops. Understand their use and advantages and potential disadvantages of different formats such as gif, cgm, png, etc.
<u>Sound and music</u> Hardware Software	Understand: - sound storage devices e.g. MP3 players - sound cards - input devices such as microphones and Midi interfaces - speakers - sound conversion analogue to digital and digital to analogue - sequencers (multitrack recording studios) - notators (music composition software) - Sound Wave Editors - downloading music. Discuss potential problems in the capturing and use of sound with respect to copyright. Understand the use, advantages and potential disadvantages of different formats such as wav, wma, mp3, etc.
<u>Networks</u> Types of network Linking LANs and WANs	Appreciate the differences between local (LAN) and wide area (WAN) networks. Understand and describe computer network operation and devices such as: - network topologies including bus, star and ring - Internet / Extranet / Intranet - routers - switches - gateways - bridges - packet switching. Compare the advantages and disadvantages of network systems against standalone computers. Understand and describe: - integrated point of sale (PoS) systems - automatic stock control systems.

Human Computer Interfaces (HCIs)	Understand the functions of an operating system
	Recognise and describe the features and uses of the different types of user interface including:
	• command line
	• GUI (graphical user interface)
	    o WIMP (windows, icons, mouse/menu, pointer)
	    o office assistants, online tutorials
	    o customised desktops
	• voice driven applications
	• menu/dialogue boxes
	• touch sensitive applications e.g. mobile phones, learning aids and PoS systems
	• biometrics e.g. retina, DNA, fingerprints, walking, etc.
	Discuss the advantages and disadvantages of each HCI.

Organisations
 	
Data protection methods
	Demonstrate a knowledge and understanding of a variety of computer applications.
	Know:
	• how data is captured, checked and entered
	• which processing method is used, i.e. batch, real time, real time transaction
	• what the minimum hardware and software requirements are
	• how the information is output
	• what the security implications are.
	Describe:
	• suitable data, file or database structures
	• suitable computer systems including data capture, output and communication devices
	• suitable software tools and techniques used in the processing and presentation of the data
	• suitable verification, validation and security and back-up systems associated with each of the following organisations or applications:
	    o banking
	    o e-commerce systems
	    o payroll
	    o modern mail handling methods
	    o control processes(feedback)
	    o robotics and bionics
	    o Artificial Intelligence (AI) and expert systems.
	Know and understand:
	• physical protection e.g. back ups
	• restricted physical access e.g. biometric scans
	• restricted access to data e.g. hierarchy of passwords and access rights, encryption
	• monitoring e.g. transaction logs.

Social and environmental impact	Reflect critically on the impact of ICT on their own and others' lives, considering the social, economic, political, legal, ethical and moral issues. Understand issues relating to: • employment patterns • retraining • changes in working practices (collaboration) • teleworking • homeworking • videoconferencing • the environmental impact • the impact on rich and poor communities • emerging technologies.

Legal and ethical issues	Know and understand the:
	• provisions of the Data Protection Act (DPA) 1998:
	    ○ rights of the data subject and the holder
	    ○ exemptions from the DPA
	• Computer Misuse Act 1990
	• Electronic Communications Act 2000
	• Regulation of Investigatory Powers Act 2000
	• Health and Safety legislation.
	Identify new crimes created and the implications for computer users.

Emerging Technologies	Be aware of current and emerging technologies in business and commercial contexts. Describe the advantages and disadvantages of emerging technologies in business and commercial contexts.

3.3   Exemplar questions

Example Question

1. Computer systems are networked when they are linked together.

    One type of network is a LAN.
    Write down what LAN stands for:
    ……………………………………………

    Give **one** example of a LAN

    …………………………………………
    …………………………………………
    …………………………………………
    …………………………………………

    These questions are aimed at F-G candidates.

    Another type of network is a WAN.
    Write down what WAN stands for:

    …………………………………………

    Give **one** example of a WAN.
    …………………………………… ……………………………………………
    ……………………………………………
    ……………………………………………

    These questions are aimed at D-E candidates.

    Networks make use of Hubs and Routers. Explain the terms:

    Hub:
    ……………………………………………
    ……………………………………………
    …………………………………… ……………………………………………
    …………………………………… ……………………………………………

    Router:
    …………………………………… ……………………………………………
    …………………………………… ……………………………………………
    …………………………………… ……………………………………………

    These questions are aimed at A°-C candidates.

4.   *CONTROLLED ASSESSMENT*

Notes relating to controlled assessment can be found on pages 28 to 30 of the specification.
http://www.wjec.co.uk/uploads/publications/8336.pdf

and at the following urls:

WJEC Notes on Controlled Assessment
http://www.wjec.co.uk/index.php?nav=111

WJEC Controlled Assessment FAQs
http://www.wjec.co.uk/index.php?nav=121

JCQ "Instructions for conducting controlled assessments"
http://www.jcq.org.uk/attachments/published/1125/Instructions_for_conducting_controlled_assessments_2009_2010.pdf

4.1   *Unit 2 Solving Problems with ICT*

WJEC will set a different assignment each year to be completed using a range of software to demonstrate ability in the practical application of ICT skills including Essential Skills (Wales). The following areas will be assessed:

Organisation of folders and files
    Folders and files with correct names
    Sensible naming and use of subfolders and files
    Version management
    Evidence of at least two different folder operations (copy, move, rename, etc.)
    Backup work on an external device.

Communicating Information
    Creation of a document and a presentation for different purposes
       • At least one draft and final copy of each
       • Review and make comments
       • Final quality production responding to comments
       • Accuracy and plausibility.
    Use appropriate page layout and develop and format data:
       • Use fonts and sizes
       • Use of simple formatting techniques e.g. bold, text alignment, colour, fonts
       • Use word art or borders, autoshapes, simple tables or original templates
       • Simple bullets or numbering.
    Use images, sound or video:
       • Insert, crop or resize and position an image fit for purpose
       • Combine text with information in different forms *from a library* e.g. images, sound, Gif video.
    Develop and format data:
       • e.g. Enhance tables with borders, cell merging, text direction or rotation; rotation or enhanced manipulation of images; customised bullets using *internal* facilities; numbering with subnumbering; Use of formulas in a document e.g. invoices, etc.
       • Use a second different source for data e.g. digital image, sound, original graph, mailmerging, etc.
       • Headers and footers OR Page numbering OR Macros *(play and record macros).*

Modelling

Create and use a spreadsheet model

Accuracy and plausibility

Develop and organise numerical data fit for purpose:

- Currency, %, Decimal places, or grid
- Use formula with single operator
- Simple function e.g. SUM, AVERAGE, MAX, MIN, RAND, etc.
- Relative referencing
- Create a chart with appropriate title legend axis labels and formatting
- 'What if' investigation changing data
- 'What if' investigation changing formula
- Use of Date / time function
- Enhanced layout and format of the spreadsheet / enhanced grids/borders, merged cells, text wrap, headers or footers, forms
- Wider variety of functions or advanced features e.g. If, Multiple if, Lookup functions, goal seek, pivot tables, macros, absolute referencing, multilevel sorts, etc.

Information Handling

Use online information sources:

- Use a url for a purpose
- Use a search engine for different purposes
- Manage and use references to make information easier to find again
- Download, organise and store different types of information.

Use other information sources:

- Printed sources
- People.

Databases:

- Add four extra fields and suitable data
- Accuracy and plausibility
- Obtain information fit for purpose using sort
- Obtain information fit for purpose using simple searches
- Obtain information fit for purpose using double searches (search within a search)
- Import data from a CSV file (or similar)
- Use logical operators and at least one wild card
- Add a validation technique
- Create an on screen data entry form OR test validation technique with erroneous data to produce an error message.

Email:

- Create and Send email
- Open and reply to email
- Check accuracy and plausibility
- Send to a group
- Attach a file to an email
- Open attachment
- Use a contacts list – add, amend and delete entry
- Contribute to blog or forum
- Forward an email
- Adapt style to suit purpose
- Manage groups and folders.

Evaluation

- Evaluation of working practice
- Analysis of research methods and data collected
- Comments on modifications made
- Evaluation of any documents and presentations produced
- Analysis of data and information used in modelling and data handling
- Evaluation of other tools and techniques used
- Review of feedback given and received
- Suggestions for improvement.

4.2   Unit 2 Marking Guidelines

This guidance should be shared with candidates before they start the assignment and can be made available to them on paper and/or electronically during the assignment.

		Max Mark
Organisation of folders and files		
	1 mark for each to MAX of 5 • Store a file(s) • Use of folders • Use of subfolders and their files • Sensible naming of files and folders • Evidence of backup folders on an external device • Demonstrate careful version management • Evidence of at least two different folder operations e.g. copy, move • Organise emails, groups and folders	
Total		**5**
RESEARCH AND DESIGN		
RESEARCH	**1 mark for each to MAX of 6** • use of online information sources • use a url for a purpose • use search engines for different purposes • manage and use references to make it easier to find information again • download, organise and store different types of information • data collection from printed sources • data collection from other people	
Total		**6**
Email		
FURTHER RESEARCH	**1 mark for each to MAX of 6** • open email • save emails efficiently • create and send email • reply to email • send to a group • attach a file to an email • open attachment • use a contacts list - add amend and delete entry • forward an email • adapt style to suit purpose • contribute to blog or forum	
Total		**6**

IMPLEMENTATION		
Communicating Information		
DRAFTS	• Create 2 DRAFT documents i.e. DTP / web or slide type presentation for different purposes	2
Final Documents	• produce the final version of DTP / web or slide type presentation for different purposes	2
Data entry	Accuracy and plausibility and fitness for purpose	2

Basic skills	1 mark for each to MAX of 6
	• use of appropriate page layout and formatting of data e.g.
	    ○ fonts and sizes
	    ○ simple formatting techniques e.g. bold, text alignment, colour fonts
	    ○ word art, borders, autoshapes
	    ○ simple tables or original templates
	    ○ simple bullets or numbering
	• Insert, crop or resize and position an image fit for purpose
	• combine text with information in different forms *from a library* e.g. images, sound, Gif, video
	• on a web page or in a presentation, sequence a set of events e.g. simple animations
		6

Advanced skills	*Additional marks awarded for each one of the following to a MAX of 4 marks* **Develop and format data** • enhance tables with borders, cell merging, text direction or rotation, text to tables • rotation or enhanced manipulation of image • customised bullets using *internal* facilities • numbering with subnumbering • use of formulas in a document e.g. invoices • use a **second** different sources for data e.g. digital images, sound, original graph • mailmerging • headers **or** footers • page numbering on more than one page • macros *(play and record macros)*	4
Total		**16**

Modelling		
Data entry	**Create and use a spreadsheet model** • Data entry • Explanation of formulas and features and functions used	2 2
	Accuracy and plausibility and fitness for purpose	1
Basic skills	**Develop and organise numerical data fit for purpose** **1 mark for each to MAX of 5** • Currency, %, Decimal places, or grid • Use formula with single operator • Simple function e.g. SUM, Average, Max, Min, RAND • Relative referencing • Create a chart • Appropriate title legend axis labels and formatting on the chart **<u>Testing with investigations</u>** • What if investigation changing data • What if investigation changing formula	5 1 1
Advanced skills	**1 mark for each to MAX of 4** <u>Development of the model</u> Enhanced layout and format of the spreadsheet: • enhanced grids/borders/ merged cell / text wrap • headers or footers • forms A wider variety of functions or advanced features, e.g. • IF, LOOKUP and COUNT functions • absolute referencing • sorts • goal seek • pivot tables • macros, e.g. navigation • testing (more what if investigations)	4
Total		**16**

Information Handling		
Basic skills	**Basic skills** • Importing data from CSV file • adding key field • adding fields with suitable fieldnames *(1mark 2 fields, 2 marks 4 fields)* • adding suitable data types • variety of data types *(At least two other than text)* • adding suitable data to complete the file • editing a record *as required or state a reason* • deleting a record *as required or state a reason*	7
	Produce lists • obtaining information fit for purpose using sort • obtaining information fit for purpose using simple search • obtain information fit for purpose using a double searches (search within a search) • add a validation technique • testing that validation works	5
Advanced skills	A range of more advanced skills, e.g. • create an on screen data entry form • use logical operators and at least one wild card • sort on multiple fields • use of clearly explained logical operators • use of a calculation • use a report • command buttons or macros • VB enhancements	4
Total		**16**
Evaluation		
	<u>**Formative process**</u> **Review and redrafting of <u>each</u> document** • Make comments with criticisms and suggestions for improvements	4
	• Comments from others	2
	• Final quality production responding to comments	2
	<u>**Summative process**</u> • analysis of data and information used in modelling and data handling • evaluation of final documents /presentation or web pages and review feedback given and received • evaluation of other tools and techniques used • suggestions for improvements • analysis of research methods and data collected • evaluation of working practice	7
Total		**15**
Max mark		**80**

4.3   Unit 4 Developing Multimedia ICT Solutions

WJEC will set a different assignment each year to be completed using multimedia software. The following areas will be assessed:
Research Analysis of existing contrasting websites or presentations Analysis of multimedia features used on existing websites or presentations
Design Identify a multimedia project Design web pages or a presentation
Template and Navigation Create navigation paths for 6 web pages or slides Edit an existing template/slide style design Select and use a navigation bar or tool
Graphical Images Create two images; optimise and save them in appropriate format for use in the web pages or presentation
Animation or Animated Movie Storyboard an animation or animated movie Create an animation or animated movie
Sound Create and manipulate sound or music
Additional Techniques Web/presentation effects Animation effects Movie effects Sound effects Interactive elements Enhancement with original code
Evaluation Evaluation of working practice Description of the suitability and effectiveness of the features analysed Evaluation of tools and techniques used Review of feedback given and received Comments on modifications made Suggestions for improvement Evaluation of effectiveness of final solution Consideration of output to the web Consideration of download times and file size Justification of choice of image, sound and animation optimisation

4.4 Unit 4 Marking Guidelines

Controlled Task			Max Mark
Organisation of folders and files			
		• Store a files using of folders, subfolders and their files	1
		• Sensible naming of files and folders	1
		• Evidence of backup folders on an external device	1
		• Demonstrate careful version management	1
		• Sources log	1
Research and Design			
RESEARCH	Analysis of existing contrasting websites or presentation.	Candidates must study 2 different web sites and/ or presentations:	
		• Describe the purpose of each	2
		• Describe the House style of each	2
		• Describe the target audience of each	2
		Compare and contrast the design and layouts used in each. e.g. navigation. Template design, hyperlinks or hotspots, anchors or bookmarks, rollover buttons pop up comments mood colours, no of pages, interactive features, etc.	4
	Analysis of multimedia features used on existing websites and/or presentations	Candidates will collect evidence of examples of multimedia features used on these websites and/or existing presentations and complete the sources log. **1 mark for 2 different features identified e.g.** • Banners and/or animations • Web icons • Digital images • Animations • Movies • Sound They should describe the type and size of the features.	2

		Research individual presentation or web page	
RESEARCH	Design a presentation or web page template	• Purpose of their web page or presentation identification of a solution to the multimedia task	1
		• Explanation of how or why their solution is fit for purpose and audience	1
		• Consideration of design of master page style *1 mark basic layout*	1
		1 mark adding navigation features to be used e.g. navigation bars, rollover buttons, hyperlinks, bookmarks etc,	1
		• Collection and design of mood colours/moodboard	1
SOUND	Create and manipulate sound or music	Use sound or music or narration	1
		Edit sound, music or narration to produce an original sound file for use on website or presentation.	2
ADDITIONAL TECHNIQUES		**Additional marks will be awarded for the use of:** **Web/presentation effects:** Rollover buttons **Web/presentation effects:** Add special effects to objects e.g. Shadow. Raised/ outer glow. **Web/presentation effects:** Make some use of drop down boxes or expanding collapsing menus of at least two choices **Web/presentation effects:** hyperlinks in the form or text or graphics to external files **Animation effects:** More complex animation of at least 6 frames or techniques or a mixture of both **Animation effects:** Use of background or overlay frames **Animation effects:** Looping or repeating techniques **Movie effects:** Title or credits **Movie effects:** Video or transition effects **Sound effects:** Envelopes, echo etc **Sound effects:** Looping or repeating **Sound effects:** Overlay tracks **Sound effects:** Podcasting **Interactive element(s)** from a library **Enhancements with original code** e.g. html, vb, etc. *Other additional techniques may be acceptable upon application to the WJEC.*	9

Evaluation			
EVALUATE	Evaluation	**Evaluation may be iterative and/or summative.** The controlled assignment may specify what should be evaluated but candidates could include the following: • evaluation of working practice • description of the suitability and effectiveness of the features analysed • evaluation of tools and techniques used • justification of choice of image, movies, sound and animation optimisation. • consideration of download times and file size • review of feedback given and received • comments on modifications made • suggestions for improvement • consideration of output to the web • evaluation of effectiveness of final solution.	**14**
		TOTAL	**80**

5.   RESOURCES

The following list is an indication of books and other resources which teachers and students may find useful in teaching and studying a course based on this specification. It is not intended to be a list of prescribed texts, nor is it intended to be an exhaustive list of all available resources. New resources are becoming available all the time, and in such a fast changing subject new resources are constantly being published.

Some of the websites listed may be considered unsuitable for use by students for a number of reasons. Sites such as YouTube, for example, may contain content which would hinder rather than enhance learning. Teachers are advised to select and download useful material, such as software tutorials beforehand and use them on their intranet or vle.

For other enquiries or information, visit:

www.wjec.co.uk

5.1   Textbooks for the specification as a whole

WJEC ICT for GCSE – Hodder
By Peter Vickers & Ian Paget
ISBN 9781444109580   Available June 2010
Free online student resources available with book

Essential GCSE ICT for WJEC – Folens
By Stephen Doyle
ISBN 9781850085416   Available March 2010
also available
Teachers Guide and CDROM   ISBN 978-1-85008-542-3
Test and Assessment Tool (licences for small, medium and large schools)

5.3   Software resources for the specification

There are no specified software resources for this specification although it is assumed that for most of the work candidates will have access to standard office applications using Microsoft Office or Open Office software. For the multimedia unit 4 controlled assignments there is no need to purchase expensive software licenses. Many free or relatively inexpensive products are available and the list below (in no particular order) shows some which have been recommended by teachers.

Stop Motion Pro	*Gif Animator*	*Moviemaker*
Photoshop Elements	*Flash*	*3D Textmaker*
Fireworks	*I Can Animate*	*Zu3D*
TrueTube	*Scratch*	*FrameThief (Mac)*
Serif DrawPlus, etc		*Dreamweaver*

5.3   National Grid for Learning – Cymru

A particular source of resources and support for teachers of WJEC GCSE ICT has been created on the National Grid for Learning Cymru by teachers of ICT.

http://www.ngfl-cymru.org.uk/vtc-landingpage-ict.htm

Teachers will find a wide range of supporting materials including:

http://www.ngfl-cymru.org.uk/vtc_-_ks4_-_ict_-_wjec_ict_course-_download
This resource was written for the current legacy specification but contains much useful content for the new specification.

http://www.ngfl-cymru.org.uk/vtc/ngfl/2007-08/ict/1-create-simple-gif-imslrn/Page_01.htm
A tutorial on creating a simple animated gif using Photoshop CS and Paint Shop Pro

http://www.ngfl-cymru.org.uk/vtc/ngfl/2007-08/ict/2-tweening-shapes-flash-2004-imslrn/Page_01.htm
Tutorial on tweening shapes using Macromedia Flash MX

http://www.ngfl-cymru.org.uk/vtc/ngfl/200708/ict/coveringthebasics_imslrn/page_01.htm
Tutorial covering the basics in Dreamweaver

http://www.ngfl-cymru.org.uk/vtc/ngfl/2007-08/ict/how-to-do-it-guide-no7-question-sets.doc
Tutorial using Moodle to create a question set

http://www.ngfl-cymru.org.uk/vtc/ngfl/2007-08/ict/understanding-virtual-reality-imslrn/page_04.htm
Tutorial on different types of virtual reality

http://www.ngfl-cymru.org.uk/vtc/ngfl/ict/cynnal_ict1/
This resource although prepared for the AS specification has useful multimedia teaching resources for the GCSE specification including ICT in the home, Booking systems, online banking, online ticketing, internet shopping, school administration systems and e-commerce.

Much of this material is intended to be downloaded so that it can be edited by teachers to suit the needs of their own candidates and centres.

The list of websites is comprehensive and the links are checked regularly to ensure that they are still live and of use to teachers. Please contact NGfL Cymru if you become aware of new and useful sites.

Please keep returning to this site as new materials become available. It is hoped that teachers will be willing to contribute their own work and ideas to this site for the benefit of colleagues in other centres.

5.4   General websites

Some useful website addresses are listed below. These addresses are current at the time of writing. However, it must be recognised that new sites are being launched on the Internet on a regular basis and that older sites may change address or disappear.

The WJEC website offers recent information on courses and CPD.
www.wjec.co.uk

http://www.tes.co.uk/resources
http://www.teach-ict.com/gcse/gcse_topics.html
http://www.theteacher99.btinternet.co.uk/theteacher/default.htm
http://www.fatmax.org/index.html
http://www.bbc.co.uk/schools/gcsebitesize/ict/

http://en.wikipedia.org/wiki
This source is variously described as both the biggest on-line encyclopaedia and the one with the greatest amount of inaccurate content. It should be used with care (this in itself could be used in teaching about suitability of sources of information).

Data, information and knowledge
http://www.teach-ict.com/gcse/theory/datainfo/student/shome_datainfo.htm

School registration systems and MIS in schools
http://www.capitaes.co.uk/SIMS/Downloads/demos.asp
http://www.ngfl-cymru.org.uk/vtc/ngfl/ict/cynnal_ict1/
http://schoolforge.org.uk/index.php/Management_Information_and_Administration_Systems
http://www.theteacher99.btinternet.co.uk/theteacher/gcse/newgcse/module9/task12.htm

Weather forecasting systems
http://en.wikipedia.org/wiki/Weather_forecasting#Data_collection
http://www.sciencedaily.com/releases/2006/08/060825132313.htm
http://www.metoffice.gov.uk/
http://www.metoffice.gov.uk/education/teachers/

Banking
http://www.teach-ict.com/gcse/theory/banking/student/shome_banking.htm

ATM simulation
http://www.moneymatterstome.co.uk/Images/Workshops/ATM/ATM.swf

e-commerce systems
http://www.ngfl-cymru.org.uk/vtc/ngfl/ict/cynnal_ict1/
http://www.microsoft.com/casestudies/Case_Study_Detail.aspx?casestudyid=4000004999
http://www.microsoft.com/casestudies/Case_Study_Detail.aspx?casestudyid=4000000949
http://www.teach-ict.com/gcse/theory/ecommerce/student/shome_ecommerce.htm

payroll
http://www.thepayrollsite.co.uk/
http://www.theteacher99.btinternet.co.uk/theteacher/gcse/newgcse/module9/task2.htm
http://www.teach-ict.com/gcse/theory/payroll/student/shome_payroll.htm

modern mail handling methods
http://www.excellencegateway.org.uk/media/KSSP/mailhandling.pdf
http://www.btbmf.co.uk/index.html?kw=mailing%20services&fl=340618&ci=910789824&network=s
http://track.royalmail.com/portal/rm/track;jsessionid=VUJNIRVAUSXKQFB2IGIVGAQ;jsessionid=VUJNIRVAUSXKQFB2IGIVGAQ?catId=22700601&emt=emt&track=track&default=default&imageRootPath=&loc=en_GB&keyname=track_home&gear=track

Control processes
http://www.theteacher99.btinternet.co.uk/theteacher/gcse/newgcse/module9/task1.htm
http://www.theteacher99.btinternet.co.uk/theteacher/gcse/newgcse/module9/task9.htm
http://www.teach-ict.com/gcse/software/control/students/shome_control.htm

Robots and bionics
http://www.theteacher99.btinternet.co.uk/theteacher/gcse/newgcse/module9/task5.htm
http://www.teach-ict.com/gcse/software/robotics/students/shome_robotics.htm

AI and Expert Systems
http://www.nhsdirect.nhs.uk/sat/InitialAssessment/SAT.aspx?t=initial&p=nhsd
http://en.wikipedia.org/wiki/Expert_systems_for_mortgages
A good example of an expert system used by many people is the Microsoft Windows operating system troubleshooting software located in the "help" section in the taskbar menu.

ICT and Learning
http://www.teachernet.gov.uk/wholeschool/ictis/
http://www.teachers.tv/video/169
http://www.teach-ict.com/gcse/theory/education/student/shome_education.htm

Bluetooth
http://www.comm-spec.com/how-bluetooth-works.php
http://www.altiusdirectory.com/Computers/bluetooth-wireless-technology.html
http://www.pantherproducts.co.uk/Articles/Communication/Bluetooth.shtml

Social networking
http://www.guardian.co.uk/media/socialnetworking
http://www.getsafeonline.org/nqcontent.cfm?a_id=1459
http://www.digizen.org/socialnetworking/what.aspx

Webcams
http://www.bbc.co.uk/england/webcams/
http://www.bbc.co.uk/wales/inpictures/webcams.shtml

Staying safe – ICT
http://www.teach-ict.com/ks3/internet_safety/staying_safe/stayingsafe4.htm
http://www.heles.plymouth.sch.uk/ict/KS3/Year07/StaySafeOnline/Resources/PersonalData.doc
http://lukemorton.co.uk/securityhelp/

Emerging Technologies
http://news.bbc.co.uk/1/hi/programmes/click_online/default.stm
http://www.cesweb.org/news/coverage.asp
http://www.eetimes.com/showArticle.jhtml?articleID=221900117
http://www.technologyreview.com/

GIS – This topic is also in the Geography GCSE criteria so the Geography department may have some useful resources.
http://www.ordnancesurvey.co.uk/mapzone
http://www.esriuk.com/schools

Multimedia Industry
http://www.multimediator.com/
http://www.stupidvideos4u.com/tag/multimedia-industries/

http://www.w3schools.com/default.asp
Free web building tutorials

http://www.youtube.com
Lots of animation and effect tutorials available on YouTube for programs such as Flash, Photoshop and 3D animation software. It is a good idea to select these yourself and download suitable content for pupils to watch off-line.

http://www.truetube.co.uk
http://www.truetube.com/watch_popup?v=eA1CFm3U8jY
This site is a free educational resource training students to develop short multimedia films or animations and offering the opportunity to publish them.

http://www.kidzdom.com/tutorials/
http://www.3rddimension.ie/
http://www.idleworm.com/how/index.shtml

http://toonyphotos.com/download.htm
Free rotoscoping software

http://animation.about.com/od/flashanimationtutorials/Flash_Animation_Tutorials_StepbyStep_Lessons.htm
http://www.zwinky.com/dl/jump.jhtml?jump=fb1&partner=ZJxdm399&sub_id=111
http://persistenceofvision.blogspot.com/
http://www.3dtextmaker.com
http://www.teachanimation.org
http://www.pixar.com
http://www.animationfactory.com
http://www.animationmagazine.net
http://www.kudlian.net/products/icananimate
http://www.zu3d.com
http://www.creaza.com
http://www.clayanimation.com
http://www.flickr.com/groups/clones/
http://www.digitalmediaminute.com/howto/clones/

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