Information and communication technology

Guidance for Key Stages 2 and 3

Yr Adran Plant, Addysg, Dysgu Gydol Oes a Sgiliau
Department for Children, Education, Lifelong Learning and Skills

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

Information and communication technology

Guidance for Key Stages 2 and 3

Audience Teachers at Key Stages 2 and 3; local authorities; regional consortia; tutors in initial teacher training; and others with an interest in continuing professional development.

Overview These materials provide key messages for planning learning and teaching in information and communication technology. They include profiles of learners' work to exemplify the standards set out in the level descriptions and illustrate how to use level descriptions to make best-fit judgements at the end of Key Stage 3.

Action required To review learning plans and activities at Key Stages 2 and 3, and to prepare to make judgements at the end of Key Stage 3.

Further information Enquiries about this document should be directed to:
Curriculum Division
The Education Directorate
Welsh Assembly Government
Cathays Park
Cardiff
CF10 3NQ
e-mail: curriculumdivision@wales.gsi.gov.uk

Additional copies This document can be accessed from the Learning Wales website at gov.wales/learning

Related documents *Information and communication technology in the National Curriculum for Wales; Skills framework for 3 to 19-year-olds in Wales; Making the most of learning: Implementing the revised curriculum; Ensuring consistency in teacher assessment: Guidance for Key Stages 2 and 3* (Welsh Assembly Government, 2008)

This guidance is also available in Welsh.

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Contents

Introduction

The programmes of study set out the opportunities that learners should be given at each key stage and provide the basis from which you, as a teacher, can plan learning and teaching. They are divided into two sections, Skills and Range. The Skills section lists the skills to be developed in a subject and the Range section comprises the opportunities and contexts through which these skills should be developed and consolidated.

Ongoing formative assessment – assessment **for** learning – lies at the heart of good teaching. Through the assessments that you make in the course of your teaching, you will build up an extensive knowledge of your learners' strengths, as well as the areas that need further development, and you will use this knowledge to help you plan for the next steps in their learning. Learners will also gain understanding of specific learning goals and the associated success criteria so that, supported by you, they can develop their capacity for self-assessment and peer assessment. In this way, they can establish their current position, set and move towards targets, and discover if and when the targets have been reached. Individual targets are linked to improving the quality of a learner's work, as highlighted through formative feedback, and are therefore linked to success criteria for specific tasks. Level descriptions do not make effective targets as these describe attainment across the breadth of the programme of study at the end of a key stage.

Level descriptions can help to inform your planning, teaching and assessment at Key Stages 2 and 3 by indicating expectations at particular levels and progression in the subject. Evidence from assessment for learning will indicate where more time is needed to consolidate learning and when learners are ready to move on. You may wish to keep some evidence so that you can discuss a learner's work and progress with them and/or with colleagues or parents/guardians. However, there is no statutory requirement to keep unnecessarily complex records or detailed evidence on every learner.

The essential function of level descriptions is to help you make rounded summative judgements at the end of Key Stage 3 about a learner's overall performance. Level descriptions are designed neither to be used to 'level' individual pieces of work nor for the production of half-termly or termly data. It is only by the end of the key stage that you will have built up sufficient knowledge about a learner's performance across a range of work, and in a variety of contexts, to enable you to make a judgement in relation to the level descriptions.

It may be that some learners will be more advanced in some aspects of the work than in others, and that no one level description provides an exact fit. That is to be expected, and the range of individual learners' work included in these materials illustrates the making of best-fit judgements under those circumstances. Many schools/departments have found it helpful to develop their own learner profiles to support moderation of end of key stage judgements. These profiles also help to maintain a common understanding of standards when they are reviewed annually and refreshed when necessary.

When making judgements at the end of Key Stage 3, you should decide which level description **best fits** a learner's performance. The aim is for a rounded judgement that:

- is based on your knowledge of how the learner performs across a range of contexts
- takes into account different strengths and areas for development in that learner's performance
- is checked against adjacent level descriptions to ensure that the level judged to be the most appropriate is the closest overall match to the learner's performance in the attainment target.

National curriculum outcomes have been written for learners working below Level 1. These are non-statutory and guidance on their use is planned.

Using these materials

This booklet is divided into four sections.

Section 1 highlights key messages for learning and teaching in information and communication technology.

Section 2 highlights expectations and progression in information and communication technology.

Section 3 contains a series of Key Stage 2 learner profiles. These are designed to show the characteristics of the level descriptions.

Section 4 contains a series of Key Stage 3 learner profiles. These are designed to show the use of the level descriptions in coming to judgements about a learner's overall performance at the end of the key stage.

This booklet is for reference when you wish to:

- review your learning plans and activities
- consider the standards set out in the revised information and communication technology Order
- work with other teachers to reach a shared understanding of the level descriptions
- prepare to make judgements at the end of the key stage
- develop your own learner profiles
- support transition from Key Stage 2 to Key Stage 3.

For ease of reference, the level descriptions are included in a leaflet with this booklet.

A CD-ROM is also included with this booklet. It contains a PDF version of *Information and communication technology in the National Curriculum for Wales*, *Skills framework for 3 to 19-year-olds in Wales* and this guidance.

This guidance is part of a series of materials that will help teachers at Key Stages 2 and 3 to implement the revised curriculum and its associated assessment arrangements. The series includes:

- *Making the most of learning: Implementing the revised curriculum* – overview guidance on implementing the new curriculum
- *Skills framework for 3 to 19-year-olds in Wales* – which includes guidance about progression in skills
- *Ensuring consistency in teacher assessment: Guidance for Key Stages 2 and 3*
- *A curriculum for all learners: Guidance to support teachers of learners with additional learning needs*
- specific guidance for all national curriculum subjects, personal and social education, careers and the world of work, and religious education.

Section 1

Key messages for learning and teaching in information and communication technology

The focus of this section is to help you plan for the teaching of the revised programmes of study so it is relevant and motivating for each learner. The revised curriculum is learner-centred and skills-focused.

You should plan to provide opportunities for learners to develop their skills through a breadth of contexts, using a range of ICT applications, working independently and in groups. The Range section in each programme of study should be used as a starting point, but you are free to build upon the activities and examples listed to take into account the needs and interests of individual learners and developments in technology through the lifetime of the information and communication technology Order. You should use the Skills and Range sections of the programme of study as a flexible framework from which it is possible to select contexts and develop activities that will be relevant and motivating for your learners.

Developing a Skills focus

Learners should have opportunities to develop, practise and apply the skills identified in the ICT programmes of study: Find and analyse information, and Create and communicate information. These clearly link with the two ICT strands in the *Skills framework for 3 to 19-year-olds in Wales*: Finding and developing information and ideas, and Creating and presenting information and ideas. Learners' progress should be evident through a developing sense of purpose for their work, increasing competence and sophistication in their use of ICT applications, and greater independence, both in selecting and using resources.

Safe and appropriate use of ICT should be embedded throughout all activities. Current and emerging technologies should be covered so that learners gain an understanding of the importance of safe, responsible and legal use of ICT at all times, minimising risks to data, themselves and others. The learner should progress from working safely with support and supervision to working safely, responsibly and independently, thus ensuring their safety when using digital communications both within and outside of the school environment.

Schemes of work should allow relevant and realistic experiences through which learners are able to develop skills for life.

Useful questions to guide your planning

- Does this sequence of activities progress skills?
- Which skills from the ICT programme of study does this lesson develop?
- What is the purpose of this activity? Does it introduce a new skill, consolidate a skill or apply and extend a skill?

A scheme of work is more likely to support the development of a range of skills if it offers opportunities for learners to:

- work practically, taking a hands on approach, using personal experience and a pro-active investigation
- work in a variety of settings in groups and individually
- use thinking skills to think critically and creatively about their ICT
- use a variety of communication skills.

For all learners, schools should choose material that will:

- provide a meaningful, relevant and motivating curriculum
- meet the specific needs of learners and further their all-round development.

Implementing the Range

The contexts selected for a scheme of work should cover, as a minimum, those listed under the Range in the relevant programme of study. This will ensure balance and breadth for learners at each key stage. In designing the scheme of work, the focus should be on the learner and, in selecting various contexts, it may be helpful to ask the question 'How relevant is this context to learners in this school/class?' The Range is designed to offer flexibility for you to choose topics and approaches that will be relevant for all learners. The contexts may be covered separately or combined. They do not necessarily require equal amounts of study time. They may be used as a flexible framework within which to explore other relevant ICT topics or issues of interest to the learners.

Information and communication technology and skills across the curriculum

A non-statutory *Skills framework for 3 to 19-year-olds in Wales* has been developed in order to provide guidance about continuity and progression in thinking, communication, ICT and number for learners from 3 to 19.

At Key Stages 2 and 3, learners should be given opportunities to build on skills they have started to acquire and develop during the Foundation Phase. Learners should continue to acquire, develop, practise, apply and refine these skills through group and individual tasks in a variety of contexts across the curriculum. Progress can be seen in terms of the refinement of these skills and by their application to tasks that move from: concrete to abstract; simple to complex; personal to the 'big picture'; familiar to unfamiliar; and supported to independent and interdependent.

The skills framework may be used alongside the ICT Order and other subject Orders to help the process of curriculum planning.

Icons have been used in the ICT Order to signal explicit requirements for the development of skills and learning across the curriculum. However, in planning a scheme of work relevant to learners, you should identify other opportunities to enrich skills and learning development.

The starting point for planning can focus on the Skills section of the ICT Order (or ICT within the skills framework) to identify which skills are to be the focus, then turn to the Range section of the ICT Order (and other subject Orders) to identify and map the subject contexts that are most appropriate for their development.

Alternatively, planning can follow a thematic or topic approach where the Range section of the ICT Order is the starting point. This could be considered in combination with the Range sections of other Orders to find combinations of subjects that might cover relevant and complimentary content and develop common skills. The learner profiles in Section 3 illustrate how the theme of food and fitness can be used as a context for a range of ICT activities.

One of the overall aims of the revised curriculum is to reduce prescription. Whichever of the suggested starting points is chosen, there are opportunities for different approaches where the timescale and timetable can be flexible.

Developing thinking 

Learners develop their thinking across the curriculum through the processes of **planning**, **developing** and **reflecting**.

In ICT, learners plan their activities identifying appropriate software and hardware. They consider the needs of the audience and they create and develop their presentations accordingly. They use ICT to explore and solve problems in a range of contexts and reflect on the strengths and weaknesses of their solutions.

The following tables show how Scott's Key Stage 2 profile and aspects of Branwen's and Bethan's Key Stage 3 profiles illustrate the development of some of the skills described in Section 1 of the skills framework.

Scott **Activity 1 – Ski wax advertisement**

Skill		Evidence
Plan	Activating prior skills, knowledge and understanding	Scott has shown some evidence of identifying and making links with prior skills and knowledge related to this context, suggesting he could take the picture from a website or clip art.
	Determining success criteria	He is aware that he has criteria to meet to make the advertisement a success.
Develop	Entrepreneurial thinking	Scott has generated an imaginative idea and is beginning to experiment with the ideas of others, using the screen next to him as a stimulus for his own work.
Reflect	Reviewing the process/ method	Scott has begun to informally evaluate the results of his work against the success criteria. He has been able to describe amendments that he has made, such as changing font size.

Scott **Activity 2 – A healthy sandwich**

Skill		Evidence
Plan	Determining the process/method and strategy Determining success criteria	Scott has been able to plan what he was going to do after discussion and support from the teacher and his partner. Scott is aware that he will have succeeded if he manages to get the correct number of calories in the sandwich.
Develop	Thinking about cause and effect	Scott was able to describe the simple links between cause and effect in the context of the total number of calories changing when he puts different fillings in the sandwich.
Reflect	Evaluate own learning and thinking	Scott was able to describe what he found out about spreadsheets and what didn't work in the second level.

Scott **Activity 3 – Safer Routes to School**

Skill		Evidence
Plan	Gathering information	Scott was able to suggest where to find information for the database (related to this context) and undertook the data collection at home with the help of his parents.
Develop	Valuing errors and unexpected outcomes	Scott has been able to briefly describe errors that he has encountered regarding the adding of information into non-menu fields, though he has not really understood their significance.
Reflect	Reviewing outcomes and success criteria	Scott has been able to begin to evaluate his work against the success criteria identified.

Branwen **Activity 1 – Teen newspaper front page**

Skill		Evidence
Plan	Activating prior skills, knowledge and understanding	Branwen has identified gaps and begun to build on existing skills, knowledge and understanding. By studying suitable examples she identified the existing and new skills required to create her newspaper such as linking text frames and creating drop capitals.
	Determining success criteria	Branwen has determined success criteria and provided some justification for choice. Working in a group she set realistic criteria for success and realised the need for professional appearance and style, for example, no large white spaces, refined layout.
Develop	Generating and developing ideas	Branwen has developed and begun to combine a variety of imaginative ideas, possibilities and alternatives, including those of others. The teacher held short reviewing sessions throughout the developmental work so that learners could peer assess the work in progress. Structured questions were asked to highlight good and weak designs, what worked well, how different effects were created, etc. This allowed learners to refine their ideas, take into consideration the class and teacher's comments, keeping in mind the success criteria.
Reflect	Reviewing the process/method	Branwen was able to comment on the success of the process she adopted to produce her newspaper. She also evaluated the final outcome against the success criteria and identified the skills used as being appropriate.

Bethan **Activity 1 – Promoting local tourist attractions**

	Skill	Evidence
Plan	Activating prior skills, knowledge and understanding	Bethan has built on existing skills, knowledge and understanding. She already had a good grounding in using the presentation software from her earlier work. These skills were then applied and added to in the context of this activity, for example, creating and repeating text boxes to achieve a consistent style. New skills included locking the actions of the mouse to allow navigation only through hyperlinks and hotspots.
	Determining the process/method and strategy	Bethan has carefully planned her work, including the need for thorough research, slide design/layout and finding/authoring attraction descriptions. Bethan also suggested a range of options as to where and how to find relevant information and ideas. She looked at different leaflets that were professionally produced for each attraction and considered how consistent they were with their website design. She also searched for and evaluated publications and websites that collectively looked at and promoted a range of attractions.
	Determining success criteria	In a group discussion, Bethan was able to identify realistic success criteria, i.e. consistent style and colour scheme, ease of use for many users, a suitable balance between text and images, appropriate use of space and layout.

Develop	Forming opinions and making decisions	Bethan has considered the views of others and used these to inform her decisions as the work progressed. Peer assessment sessions were used to discuss the learners' presentations as they developed. When Bethan was developing the layout, content and presentation, the teacher's and other learners' opinions were taken into consideration.
	Monitoring progress	Bethan regularly checked progress, and made revisions to the process/method, where necessary. Her work developed in accordance with her success criteria. Bethan regularly took into consideration factors such as having too much textual information in certain slides or inappropriately sized images and adapted accordingly. Bethan successfully edited and manipulated the information so that each tourist attraction included similar details for the user.
Reflect	Reviewing the process/method	Bethan was able to comment on the success of the process she adopted to produce her presentation. She also evaluated the final outcome against the success criteria and identified the skills used as being appropriate.
	Linking and lateral thinking	Bethan linked her learning to dissimilar but familiar situations within and outside school. She noted how easy it would be to use this presentation in other situations (the design could be used by other organisations to promote attractions in other areas of Wales). Bethan acknowledged that attraction details and relevant images would need to be replaced.

Bethan **Activity 2 – Room painting calculator**

Skill		Evidence
Plan	Activating prior skills, knowledge and understanding	Bethan has built on existing skills, knowledge and understanding. She discussed with her teacher the skills she was confident with and the new skills she required to create her model of a cost calculator.
	Determining the process/method and strategy	Bethan planned the layout of the model and decided what column headings she would use. Further to this she planned the functionality of the model deciding on suitable formulas.
Develop	Thinking logically and seeking patterns	Bethan was able to explain the patterns and relationships in the model, for example, that the areas of windows and doors would need to be subtracted from the total wall area of each room, and that the total cost of the job would involve adding up the costs for all rooms.
	Monitoring progress	Bethan regularly checked progress, and amended her early work so that the calculation could fit on one page. Having tested the form, she realised the benefits of incorporating a macro to clear the form with one click instead of having to manually delete or overwrite the data.
Reflect	Reviewing outcomes and success criteria	Bethan was able to reflect on the suitability of her solution. She evaluated her model against her success criteria, deciding that it was successful. She recognised the value of including a macro to clear the form, as well as the benefits of adopting a layout where all the relevant cells fit on one page.

Developing communication

Learners develop their communication skills across the curriculum through the skills of **oracy**, **reading**, **writing** and **wider communication**.

In ICT, learners communicate and present information in a variety of ways, including text, graphs, pictures and sound, to support their activities in a range of contexts. They read information from a wide range of ICT and non-ICT sources and discuss their work with their peers, teachers and others. They use ICT to interpret and analyse information and communicate their findings in ways suitable for their intended audience and purpose.

The following tables show how aspects of Siôn's Key Stage 2 profile and Branwen's Key Stage 3 profile illustrate the development of some of the skills described in Section 2 of the skills framework.

Siôn — **Activity 1 – '5 a day' presentation**

Skill		Evidence
Reading	Responding to what has been read	Siôn read about healthy eating as part of his research for his presentation. He was able to confirm his understanding by talking about the benefits of different fruits and vegetables, and by using this information to decide on the content of his presentation.
Writing	Organising ideas and information	Although the amount of text in his presentation is relatively small, Siôn has demonstrated a clear ability to plan, organise and present ideas and information.
	Writing accurately	Siôn has chosen an appropriate form, sequence and layout of text and pictures to suit the intended audience and purpose.
Wider communication	Communicating information	Siôn's final presentation effectively represents information in many forms including pictures, text and sound.

Siôn	Activity 2 – Sending an e-mail	
Skill		**Evidence**
Writing	Organising ideas and information	Siôn has shown evidence of his ability to plan, organise and present ideas and information, both in the e-mail message about the juice shop and in his contribution to the two posters advertising the shop.
	Writing accurately	Siôn has produced a short but clear e-mail message about the juice shop, using appropriate vocabulary for the audience and purpose. He used the spell check facility in the software before sending the message.
Wider communication	Communicating information	Each poster advertising the juice shop integrates words and pictures into an effective presentation.

Branwen	Activity 1 – Teen newspaper front page	
Skill		**Evidence**
Reading	Locating, selecting and using information using reading strategies	Branwen looked at a number of websites to find up-to-date information on the world of music and entertainment, noting both the story and how it was presented.
Writing	Organising ideas and information	Branwen has produced a successful front page, reflecting her ability to plan, organise and present ideas and information. The presentation is of a high standard, and appropriate to the publication and the intended audience.
	Writing accurately	Branwen has selected a relevant topic and used appropriate vocabulary for the audience and purpose. She used the spell check facility in the DTP software and carefully proof-read the final page.
Wider communication	Communicating ideas and emotions	The newspaper front page is appropriately written for Branwen's target audience, communicating the information in a manner that should attract and engage the reader.

Developing ICT 

Learners develop their ICT skills across the curriculum by **finding**, **developing**, **creating and presenting information and ideas** and by using a wide range of equipment and software.

Learners use ICT individually and collaboratively, depending on the nature and context of the task in hand.

Reference to the development of ICT skills is included here for completeness as these skills feature within Section 3 of the skills framework. Examples from learners' profiles are not tabulated here, however, as the development of ICT skills is obviously fundamental in each of the profiles presented in this guidance.

Developing number 

Learners develop their number skills across the curriculum by **using mathematical information**, **calculating**, **and interpreting and presenting findings**.

In ICT, learners use mathematical information and data presented numerically and graphically in data-handling software. They use number to collect and enter data for interpretation in spreadsheets and simulations and present their findings as graphs and charts, checking accuracy before processing.

The following tables show how aspects of Erin's Key Stage 2 profile and Branwen's and Bethan's Key Stage 3 profiles illustrate the development of some of the skills described in Section 4 of the skills framework.

Erin	Activity 2 – Modelling distances	
Skill		**Evidence**
Use mathematical information	Gathering information	Erin has gathered data on the distances covered by learners and input this into the spreadsheet.
Calculate	Using a variety of methods	Erin has used a variety of methods of calculation, including mental calculation (when collecting the information and using a worksheet) and a calculator (spreadsheet), to find the total distances covered.
Interpret and present findings	Comparing data	Erin has recorded and presented data in simple lists within the spreadsheet. She has compared the distances covered by individual learners and totals for the group (by day/week/month).

Branwen	Activity 2 – Analysing pupils' marks	
Skill		**Evidence**
Use mathematical information	Using numbers	All of Branwen's work in the analysis of pupils' marks involves the use of numbers, including percentages to describe and compare proportions of full marks achieved by pupils.
Calculate	Using a variety of methods	Branwen has used a variety of methods of calculation, including mental calculation (to predict which subjects pupils are doing best in) and a calculator (spreadsheet), to generate percentages across the three subjects.
Interpret and present findings	Comparing data	Branwen has recorded, interpreted and presented data in simple lists within the spreadsheet. She has used these lists to compare the sets of data for each subject (predicting best performance).

Bethan **Activity 2 – Room painting calculator**

Skill		Evidence
Use mathematical information	Measuring	To test her model with realistic data, Bethan estimated the dimensions of the walls, windows/doors in several rooms, using appropriate units for length (m) and the correct units for area (m^2).
Calculate	Using a variety of methods	Bethan checked the accuracy of her results using mental estimation of the area of the walls in a room.
Interpret and present findings	Talking about and explaining work	Bethan used correct mathematical language in discussions with her teacher and other learners. Her spreadsheet includes appropriate units (m and m^2) and symbols (£ and %).

Information and communication technology and learning across the curriculum

At Key Stages 2 and 3, learners should be given opportunities to build on the experiences gained during the Foundation Phase, and to promote their knowledge and understanding of Wales, their personal and social development and well-being, and their awareness of the world of work.

Curriculum Cymreig

At Key Stages 2 and 3, learners should be given opportunities to develop and apply their knowledge and understanding of the cultural, economic, environmental, historical and linguistic characteristics of Wales.

ICT contributes to the Curriculum Cymreig by offering learners opportunities to find and analyse information about the rich characteristics of Wales and communicate their findings in a variety of ways.

As an example, Bethan's Key Stage 3 profile includes a presentation to promote local tourist attractions on the Isle of Anglesey (Activity 1). This presentation provides photographic and written information about six very different attractions on the island that celebrate its history and natural features, as well as facilities reflecting modern interests. To provide an appropriate summary of each attraction Bethan has investigated each in some detail, improving her own understanding of the environment and businesses on Anglesey. The outcome is a professional presentation that accurately and effectively communicates the nature and characteristics of these attractions.

Personal and social education

Learners should be given opportunities to promote their health and emotional well-being and moral and spiritual development; to become active citizens and promote sustainable development and global citizenship; and to prepare for lifelong learning.

ICT contributes to learners' personal and social education by providing opportunities to work in contexts that allow learners to make decisions based on the values that underpin society, helping them become active and informed global citizens. They begin to identify and question bias in sources of information and become increasingly aware of the social, ethical and moral effects of ICT in the wider world.

Learners should gain an understanding of the importance of adopting safe and legal practices when using digital communications, along with an appreciation of the need to show respect towards others.

Links between selected learners' profiles and the *Personal and social education framework for 7 to 19-year-olds in Wales* are summarised in the table below. Schools could develop these in ways appropriate to their own delivery of PSE.

Learner	Activity	ICT topic	PSE learning outcome
Scott (KS2)	2	A healthy sandwich	Features and benefits of a healthy lifestyle (food and fitness)
	3	Safer Routes to School	The importance of personal safety
Erin (KS2)	1	A certificate for covering 26 miles	Take increasing responsibility for keeping healthy
	2	Modelling distances	Take increasing responsibility for keeping healthy
	3	Healthy eating (database)	Features and benefits of a healthy lifestyle (food and fitness)
Siôn (KS2)	1	'5 a day' presentation	Features and benefits of a healthy lifestyle (food and fitness)
	2	Sending an e-mail	The importance of personal safety (e-safety) and roles of elected representatives (school council)
	3	Modelling distances	Take increasing responsibility for keeping healthy
	4	Searching a database	Valuing diversity
Branwen (KS3)	1	Teen newspaper front page	Identify and assess bias and reliability (messages from the media)
	3	Searching for suspects (database)	(i) The criminal justice system (ii) Right and wrong actions
Bethan (KS3)	1	Promoting local tourist attractions	Topical local issues

Health, safety and child protection

A central feature of the revised ICT Order is the requirement that learners are taught how to use ICT comfortably, safely, legally and responsibly and to consider the hazards and risks in their activities. Learners should be presented with a balanced view of the positive aspects of communication technologies, along with the potential hazards and risks posed. Whilst being made aware of the potential dangers, it is clearly important that learners realise that ICT has the power to transform lives for the better. The aim should be to develop learners' understanding of the issues so that they move from using the technology safely under supervision to becoming safe, autonomous users of ICT. It is important to remember that although schools may have technologies in place to restrict access to inappropriate material, learners have access to increasingly sophisticated handheld devices, as well as computers at home, so safe, independent use is the underlying goal.

Whilst safe use of the internet remains one of the main objectives, the school's responsibilities with respect to 'e-safety' are much broader than this if learners are to enjoy a lifetime as competent and confident users of existing and emerging technologies. At appropriate times you should aim to integrate into your scheme of work discussions on issues as diverse as: excessive use of the internet (particularly from home); correct use of ICT equipment (display equipment, cable management, posture, breaks); carrying equipment; use and security of mobile devices.

Challenges such as preventing cyberbullying (using ICT to deliberately upset someone else) may be dealt with through schools' existing anti-bullying policies. However, opportunities for discussions around the responsible use of technology within ICT, PSE or the context of other subjects, can help learners deal confidently with problems that may arise within or outside of school.

Careers and the world of work 

Learners should be given opportunities to develop their awareness of careers and the world of work and how their studies contribute to their readiness for a working life.

ICT contributes to learners' awareness of careers and the world of work by providing opportunities for them to engage purposefully with the technologies that are increasingly used in the workplace, develop essential skills for employment and consider the economic effects of ICT in the wider world.

The activities shown in many of the learners' profiles involve the use of industry standard applications. Whilst there is no requirement to use any particular software or platform, experience of using desktop publishing, presentation, modelling and data-handling software should develop transferable skills which are of use in a broad range of careers or business situations.

ICT and learning in other subjects

In a well-planned scheme of work, integrating the use of ICT in other subjects in a relevant and realistic way offers opportunities to both enhance the learners' work in the subject concerned and develop their experience and skills in ICT.

The table overleaf illustrates some links with other subjects that are evident in the learners' profiles shown in Sections 3 and 4 of this guidance. These could be developed to varying degrees by teachers wishing to integrate learning in ICT with any of the subjects listed.

Learner	Activity	Title	Subject Order	Link
Scott (KS2)	1	Ski wax advertisement	English	Writing for a particular purpose, e.g. to persuade
			Welsh	Write in a variety of forms, e.g. advertisements
			Science	Properties of materials/friction
	2	A healthy sandwich (modelling)	Mathematics	Counting whole numbers
	3	Safer Routes to School	Geography	Observe and ask questions about geographical issues
Siôn (KS2)	1	'5 a day' presentation	Science	The need for a variety of foods for good health
	2	Sending an e-mail	English	Writing for a particular purpose/audience
			Welsh	Write in a variety of forms, e.g. electronic texts
	3	Modelling distances	Mathematics	(i) Calculating the mean (ii) Metric equivalents of imperial units
			Physical education	Plan daily physical activity
Thomas (KS3)	1	Cuban missile crisis (presentation)	History	How some twentieth century individuals and events have shaped our world today
Branwen (KS3)	1	Teen newspaper front page	English	Writing for a real or imagined audience
	2	Analysing pupils' marks	Mathematics	Calculating (i) percentages (ii) the mean
Bethan (KS3)	1	Promoting local tourist attractions	Geography	Use imagery and ICT to interpret and present locational information
			History	Investigate historical issues (on a local scale)
	2	Room painting calculator	Mathematics	(i) Solving mathematical problems (ii) Find areas of common shapes
	3	Tour operator database	Geography	People as consumers: the impacts on and changes in economic activity

Learners' profiles within guidance materials produced for other national curriculum subjects illustrate the effective use of ICT within the context of these subjects. The following tables list some of the subjects and learners' profiles where this can be seen.

Key Stage 2

Subject	Learner	Application of ICT
Art and design	Siân	Scans drawn images to produce a repetitive pattern
Design and technology	Reece	Researches types of bridge using the internet, before designing and making his own model bridge
English	Bethan	Drafts ideas for a poem and uses DTP and clip art to enhance final publication of work
English	Bethan	Uses ICT resources for both information retrieval and for presentation of her ideas for a leaflet advertising Milford Haven Museum
English	Hari	Researches information about the Sea Empress disaster on the internet and word processes a recount of events
English	Siôn, Shannon, Sophie (DVD)	Use PowerPoint to present a short talk to their peers on a subject they have researched on the internet
Music	Morgan, Bethan, Jac (DVD)	Use a digital voice recorder to record their voices and other sound sources then use SonarLite LE sampling software to change these sounds
Science	David	Researches shadow puppets on the internet in order to make his own
Science	Amy	Word processes on pre-drawn tables her ideas about posters
Science	Tom	Uses a spreadsheet designed by the teacher to manipulate variables in order to plan a successful mission to Mars
Science	Tom	Researches an image of the Sun and the Earth on the internet to check its authenticity
Welsh (Welsh only)	Leigh	Finds information from a variety of sources for a defined purpose – presents information about Japan
Welsh (Welsh only)	Lisa	Selects and combines suitable information for an oral presentation on the Titanic
Welsh second language	Freya	PowerPoint presentation and information leaflet – creating a range of presentations combining a variety of information and media

Key Stage 3

Subject	Learner	Application of ICT
Art and design	Aled	Uses a graphics program as part of a multimedia project
Art and design	June	Selects and uses a graphics program to distort an image because of its appropriateness to the task
Design and technology	Emma	Uses CAD to develop her ideas, before making a photo frame using a laser cutter
English	Carys	Compares two websites connected with Shakespeare and analyses the appeal of each for a prospective audience
English	Annie, Sam, Carys	Use word processing to produce final versions of their responses to tasks for both reading and writing
Modern foreign languages	Zoe, Steff, Laura, Luke	Create and use a PowerPoint presentation to support oracy
Modern foreign languages	Jordan, Josephine, Penny, Hazel, Alex, Huw	Use a range of ICT applications to draft and produce texts including images and clip art to enhance the final version
Music	Rhys, Tomas (DVD)	Use Cubasis to compose music for moving image
Music	Abby (DVD)	Uses Sibelius 3 to compose music to accompany an animation
Physical education	Ella, Leanne, Tom	Use a camcorder to record, analyse and develop performance in dance, gymnastics and athletic activities
Science	Siân	Researches the vertebrate groups on the internet in order to compare their main features – word processes, and copies and pastes clip art images into her table
Science	Siân	Researches fossil fuels and biomass on the internet so that she can produce a leaflet for the governors suggesting the type of fuel the school should use
Science	Amy	Researches insulin on the internet to produce a presentation to the class – makes a PowerPoint presentation and includes a sound clip
Science	Ben	Produces a PowerPoint presentation to the class about Joseph Priestley's experiment
Science	Mia	Researches newspaper articles to write a report on the factors involved in climate change

Subject	Learner	Application of ICT
Welsh (Welsh only)	Helen	Finds relevant information efficiently from a variety of sources for a defined purpose – creates a newspaper article on football for the blind
Welsh (Welsh only)	Jac	Creates and communicates information in the form of text – writes a poem about 9/11
Welsh second language	Ethan	Poster and personal information – plans tasks, including consideration of purpose/audience and appropriate resources
Welsh second language	Laura	Report and letter – creates and communicates information in the form of text
Welsh second language	Emily	PowerPoint presentation, newspaper article and poem – finds relevant information efficiently from a variety of sources for a defined purpose and uses a range of ICT hardware and software to present the information appropriately

Section 2

Expectations and progression in information and communication technology

Level descriptions in information and communication technology focus on pupils' capabilities with respect to: researching, planning, evaluating, communicating information, data handling, modelling, managing their workspace, using electronic communication, awareness of issues surrounding the use of ICT in the wider world, health and safety, and understanding ICT systems. The level descriptions are not related to a particular phase or key stage but describe the types and range of performance that pupils working at a particular level should characteristically demonstrate.

Progression in any of the above aspects may be mapped with reference to the appropriate parts of the level descriptions. For example, in the context of health and safety pupils progress from safe use of the internet/related technologies with support at Level 1, to independently at Level 7 and beyond. In the context of planning they move from beginning to organise their tasks at Level 3 to planning independently for a specific purpose and refining in the light of development at Level 8 and beyond.

In the following table, progression from Level 1 to Exceptional Performance in the central activities of using ICT to communicate, handle data and model is shown. The table illustrates progression expected of pupils in the fundamental use of ICT applications. However, it is important to remember when using the level descriptions at Key Stage 2 or making judgements at the end of Key Stage 3 that progression in these aspects of ICT activity needs to be considered in the context of the other skills of researching, planning, evaluating, etc.

Progression in ICT

Level	Communicating	Data handling	Modelling
1	Pupils use ICT to move objects on screen for a defined purpose and use words and pictures to communicate ideas.	Pupils explore, with support, different types of information held on ICT systems.	
2	Pupils consider, create and communicate information and ideas in different forms using text, images, pictures and sound.	Pupils enter information into a record with some assistance.	Pupils explore the effects of making changes in models or simulations.
3	Pupils use ICT to create, organise, amend and present information and ideas. They send and receive information electronically, with support.	Pupils use ICT to search, sort and/or graph data to follow simple lines of enquiry.	Pupils understand how changing one variable affects another in models or simulations.
4	Pupils combine a variety of information and media when creating and developing their ideas, with a sense of purpose and audience. They send and receive information electronically.	Pupils begin to check the validity of data. They add and amend records in databases.	Pupils use ICT to explore patterns and relationships. They make simple predictions about how changing one variable affects another in models or simulations.
5	Pupils combine a variety of information and media when creating, refining and developing their own ideas and information. Their presentations are fit for purpose and meet the needs of their intended audience. They use ICT to send and receive files electronically.	Pupils create their own databases and search or sort on more than one field to follow particular lines of enquiry.	Pupils create their own models or simulations and investigate the effect of changing data.

Level	Communicating	Data handling	Modelling
6	Pupils use ICT to create and refine their work using information from a range of sources, recognising the need for different styles for different audiences.	Pupils use databases to follow complex lines of enquiry and draw conclusions.	Pupils use models or simulations of increasing complexity, vary the rules within them and test hypotheses.
7	Pupils refine their choice of selected information to match the needs of a specific purpose or audience.	Pupils design a database making appropriate choices within a data-handling application, using its specialised functions.	Pupils design computer models and procedures, with variables, to meet specific needs.
8	Pupils create presentations for others to meet specific requirements.	Pupils design and implement ICT systems for others to use.	
Exceptional Performance	Pupils design, implement and document systems for others to use, predicting some of the consequences that could arise in use.		

Progression in information and communication technology is characterised by refinement of ICT skills and their application to tasks that move from: simple to complex; concrete to abstract; and familiar to unfamiliar. Pupils progress from needing close supervision and support to independent and interdependent working. There is also a developing sense of purpose and audience for the work and increasing competence and sophistication in the creative use of ICT software.

In practice, progression may not necessarily be regular or linear; pupils might regress in some aspects of their work, they might reach a plateau for a while or they might progress significantly in one or more aspects. They will have strengths and areas for development and, for example, partial success in a more complex task has to be judged against a very successful outcome in a less challenging task. The familiarity of the context, the complexity of the task and the degree of individual responsibility (or support needed) all have to be considered. It should be remembered that support can come from a variety of sources including the pupil's teacher, peers or the software itself.

As far as health, safety and child protection is concerned, progression is not just about a reduction in support or supervision, but development of awareness and understanding to ensure pupils remain safe whenever and wherever they use ICT.

Although it can be useful to separate the different aspects of the level descriptions in order to see how attainment is characterised as learners progress though the levels, effective learning and teaching in information and communication technology bring together all of these aspects. When judgements are made about a pupil's performance at the end of Key Stage 3, it is important to consider a particular level description as a whole as each pupil's work is likely to demonstrate characteristics of more than one level.

It is worth reiterating here that level descriptions are neither designed for day to day use with pupils nor for the production, for example, of half-termly or termly data. A single piece of work should not be levelled. It cannot provide the range of information needed to make a best-fit judgement although it may demonstrate characteristics of a particular level. Each activity shown in the profiles in Sections 3 and 4 of this guidance should be viewed in this manner, i.e. considered as demonstrating characteristics of, for example, Level 5 rather than being a Level 5 piece of work.

For ongoing, formative assessment – assessment for learning – it is necessary to focus on the characteristics of a pupil's achievement and on details of ways to move forward rather than on the national curriculum levels. This will involve pupils gaining understanding of specific learning goals and the associated success criteria so that, supported by you, they can develop their capacity for self and peer assessment. In this way, they can establish their current position, set and move towards targets and discover if and when the targets have been reached. The profiles include details of the anticipated learning outcomes for each activity, along with 'Where next?' suggestions.

Progression from Foundation Phase to Key Stage 2

In the Foundation Phase, ICT should be holistic and integral to all Areas of Learning. Children's ICT skills, knowledge and understanding should be developed through a range of experiences that involve them finding and developing information and ideas, and creating and presenting information and ideas. Children's progression in ICT capability should be observed with an understanding of child development and the stages children move through.

The Foundation Phase Outcomes incorporate the current Baseline Assessment Scales and Descriptions and the national curriculum level descriptions. There are six outcomes per Area of Learning and for information purposes the following outcomes broadly cross-reference to the current national curriculum level descriptions:

- Foundation Phase Outcome 4 links with National Curriculum Level 1
- Foundation Phase Outcome 5 links with National Curriculum Level 2
- Foundation Phase Outcome 6 links with National Curriculum Level 3.

As learners move into Key Stage 2, it is important to build on the learning and teaching that has taken place in the Foundation Phase.

Progression from Key Stage 2 to Key Stage 3

As noted previously, at key transition points, it is important to build on the learning and teaching that has gone before when planning the next steps in information and communication technology. The teaching of information and communication technology in Year 7 might reflect the approach being taken in partner primary schools so that teachers and learners can build on progress made in Key Stage 2 right from the start of Year 7.

Providing Year 7 teachers with relevant information on individual learners' prior achievements, strengths and areas for development, sharing schemes of work and developing projects that span Year 6 and Year 7 can improve transition and ensure that Year 7 teachers have realistic expectations for each learner.

Year 7 teachers benefit from a thorough understanding of what learners already know and what ICT skills they already have when they join the secondary school. There will be variations between individual learners, and indeed partner primary schools, but relevant knowledge about their learners is necessary for Year 7 teachers to develop appropriate schemes of work. These should provide learners with opportunities to utilise their existing skills, knowledge and understanding, avoiding unnecessary repetition of work and the demotivation and underachievement to which this can lead.

Section 3

Using the level descriptions in Key Stage 2

There is no requirement to make end of key stage judgements in information and communication technology at Key Stage 2. However, knowledge of the characteristics of the level descriptions will help you to recognise learners' strengths, as well as areas for improvement, and to plan for progression.

You may find the following points useful when considering the profiles in this section.

- The learner profiles are not presented as a model for how you should collect evidence about your learners. Decisions about collecting evidence, and about its purpose and use, are matters for teachers working within an agreed school policy.
- The commentaries on the pieces of work have been written to indicate particular qualities of the work and make links to characteristics of the level descriptions. They are not intended as an example of a report to parents/guardians.
- The materials in each learner profile can only represent a small part of the information and experiences that make up a teacher's knowledge of each learner. They do not reflect the extent of the knowledge of each learner that you will have built up over time across a range of different contexts. You will use this knowledge to recognise learners' strengths and areas for development, and to plan for progression.
- Some of your learners may need to use a range of alternative forms of communication to show what they know, what they understand and what they can do.

This section includes profiles for three learners. For each learner a description is provided that outlines the context of the activities, a summary of the ICT skills shown and possibilities for further development. Where appropriate, outlines of conversations between the learner and his/her teacher, or the learner and his/her peers, are provided to build upon the evidence available in the work itself. Whilst the context of the activity and records of conversations add to the evidence presented in each profile, it is important to remember that images of the learners' work generally show only the final outcomes. Researching, planning and developmental work, some of which may be ephemeral in nature, should all be considered when recognising learners' strengths and planning for progression.

The learner profiles shown in this section illustrate activities that have been completed on PCs using a range of software applications. Clearly, it is the nature of the activity that is important not the hardware and software used. There is no suggestion that these platforms or applications are the most appropriate ways of delivering the revised programmes of study for ICT.

Scott | Characteristics of Levels 2 and 3

Scott is a 10-year-old learner in Key Stage 2.

His teacher knows much more about Scott's performance than can be included here. However, this profile has been selected to illustrate characteristic features of Scott's work across a range of activities. Each example is accompanied by a brief commentary to provide a context and indicate particular qualities in the work.

Scott's profile shows some characteristics of Levels 2 and 3, but mainly characteristics of Level 2.

In the commentaries accompanying each of the following activities, consideration is given to the progression Scott could make to improve his performance in information and communication technology.

Activity 1 | Ski wax advertisement
Software: DTP

Context

The class were investigating advertisements as part of their English/Welsh curriculum. The teacher linked some science work on friction with the English studies by looking at advertisements for ski wax. Examples of advertisements for ski wax from internet sources were studied closely with the focus on the language used to promote the product.

Pupils were given the task of working individually to produce their own advertisement for a ski wax of their own creation. They had a brief to make the advertisement as eye-catching as possible so that their brand would be chosen above others.

The learning outcomes were to:

- create an advertisement for a ski wax product
- combine text and graphics within the document
- use internet-based examples as a source of evidence and stimulus.

This activity develops the following skills taken from the Key Stage 2 Programme of Study.

Find and analyse information
find information from a variety of sources for a defined purpose

Create and communicate information
create and communicate information in the form of text, images and sound, using a range of ICT hardware and software

Scott showed an awareness of the use of the internet as a medium to buy and sell products stating that some members of his family buy goods from internet sites and have them delivered to their homes. Scott remembered that his teacher said you have to be careful about what information you give over the internet and he mentioned that one or two members of his family do not like paying for things this way. This is characteristic of Level 2: pupils *are aware of the use of ICT in the outside world*.

Teacher:
How are you going to make your advert stand out?

Scott:
I'm going to put a picture in there (points to screen).

Teacher:
What's the picture going to be of?

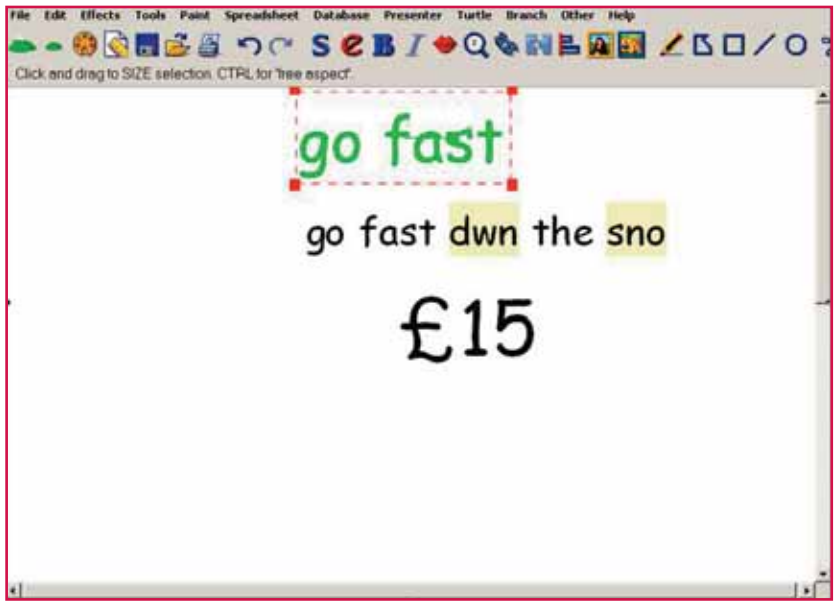
Scott:
I don't know yet.

Teacher:
Do you know where you're going to get the image from?

Scott:
No, don't know. I can get pictures on here somewhere.

Scott's work

Scott started by working on the text in his advertisement.



Teacher:
Where would be the best place to put your piece of clip art?

Scott:
I don't know. I want everyone to be able to see it but I don't know where would be best.

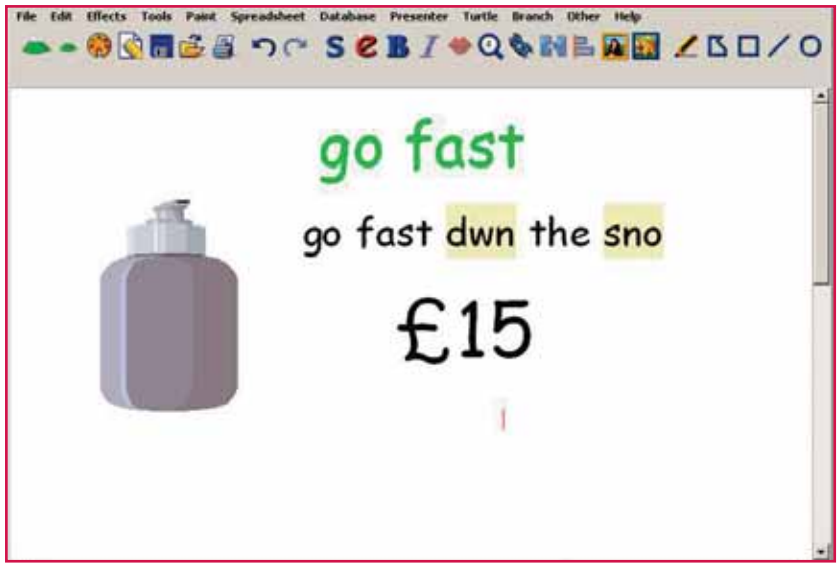
Teacher:
You've made the price really stand out. Do you think the picture is as important as the price?

Scott:
Yes. It lets people know what they are buying. I think I'll put it next to the price.

Scott has taken information from a text source on the internet (the website had been bookmarked by his teacher) which he has used in his own advertisement. This is characteristic of Level 2: pupils *find information from a given source using it to answer simple questions*. Scott has identified that he must have a clear layout that will be eye-catching during questioning from the teacher, as recorded here, but required guidance and advice on how this could be achieved within the package.

This suggests that Scott has considered what needs to go into the advert, which is characteristic of Level 2, but that he has not planned what the image is going to be, where he is going to get it from or where it is going to be positioned on the screen.

Scott added an image from clip art to complete his advertisement. His teacher helped him correct the two typing errors later.



Finally, in his Welsh lesson, Scott produced a Welsh version of the poster by translating the text with the help of his teacher.

The text that Scott has included shows that he is able to change font size and colour to make certain text stand out to the audience, though he required some help from a friend to do this. He showed awareness that by changing the font style it would make the text stand out (after being reminded about this by seeing work on the screen used by another pupil).

Scott has combined text and images within the document using a piece of clip art that he selected from the package clip art bank, and dragged and dropped into his document. The image was not resized however, and he needed some help from the teacher in deciding where to place the image in the document.

Scott required some help to save the file to his particular work folder, which again is characteristic of Level 2: pupils *store and retrieve work with some assistance*, and he needed to be reminded to change the name of the file to be saved.

Overall, the advertisement demonstrates mainly characteristics of Level 2: pupils *consider, create and communicate information and ideas in different forms using text, images, pictures and sound.*

Where next?

In order to make progress, Scott needs an opportunity to show more consideration and planning/organising of his work. He is aware of the need to make outcomes such as advertisements 'eye-catching'; he now needs an opportunity to use higher order skills within this particular package to make them so. With more experience, he should become confident enough to save work independently into his folder.

Activity 2 | A healthy sandwich
Software: Spreadsheet

Context

As part of their work on the topic of healthy eating, pupils used an internet-based modelling activity to develop a sandwich according to set criteria.

The class were shown the online activity by their teacher who demonstrated how to navigate through the application using the simple one-click technique required. They listened to the demonstration given both by the teacher and the 'voice' within the package that explains what is required at each stage.

After the task was explained the class worked through the first exercise together, with the teacher following their instructions to complete the task. They were then put into mixed ability pairings to explore the package in 'Explore' mode before going on to the 'Task' aspect of the package.

The learning outcomes were to:

- use a spreadsheet with given values and information
- use ICT to explore and solve problems in the context of healthy eating.

This activity develops the following skills taken from the Key Stage 2 Programme of Study.

Find and analyse information
find information from a variety of sources for a defined purpose
produce and use models and/or simulations to ask and answer questions

Scott's work

Within the mixed ability pairing, Scott was able to click his mouse button on the bread and fillings to create a sandwich with no set criteria.

When Scott and his partner were asked why they had chosen to put in the fillings, they remarked that it was because they liked to eat them but further questioning suggests they did take into account the calories in each.

Teacher:
How did you know what fillings to use?

Scott:
I used the numbers by the food.

Teacher:
What do those numbers tell you?

Scott:
How many calories are in it.

Teacher:
What did you do with those numbers to get the answer?

Scott:
I added them up.

Teacher:
Did you use the spreadsheet to add them up?

Scott:
No, I added them up in my head.

Teacher:
What would you do if you couldn't add them up in your head?

Scott:
I don't know.

Teacher:
Could the spreadsheet help you?

Scott:
I can't remember what it's called but I think it could.

Teacher:
Well try clicking on some of the fillings and look what happens in that cell there (B5).

Scott:
The number is changing.

Teacher:
Why do you think the number is changing?

Scott:
The computer is adding the numbers up for me.

Scott has shown that he can explore the effects of making changes in the model by controlling the application, which is characteristic of Level 2. He was able to click the mouse button onto the variables and could see that the picture of the bread or filling appeared on the screen along with the details in the spreadsheet cells.

Scott was able to clear the screen and look for help using the buttons available to him.

Scott was able to enter information into a spreadsheet with the support provided by this specialist software. When undertaking the next level in the application, Scott became confused and was not able to enter the information manually into the spreadsheet.

The modelling activity demonstrates mainly characteristics of Level 2: pupils *explore the effects of making changes in models or simulations*.

Where next?

In order to make progress, Scott needs an opportunity to develop a better understanding of how changing one variable affects others in a spreadsheet. With more experience, he should be able to use the software more confidently and demonstrate an awareness of what is actually happening within the cells of the application.

Activity 3 | Safer Routes to School
Software: Data handling

Context

As part of the Safer Routes to School Programme, pupils have to enter their own information into a database constructed by the Safer Routes to School Co-ordinator. Pupils were given a prepared data capture sheet for homework, to be completed with the help of their parents then returned to school ready for entry into the database.

The class have used the database package before in ICT lessons and other subject areas. The teacher showed them the location of the file that was saved in an easily accessible area of the network. The teacher explained that they were to enter the information they had completed into the single database on one computer. The teacher reminded them that, for the purpose of this activity, any number that they were going to use would be entered into the database as a digit so that the computer would recognise it was a number.

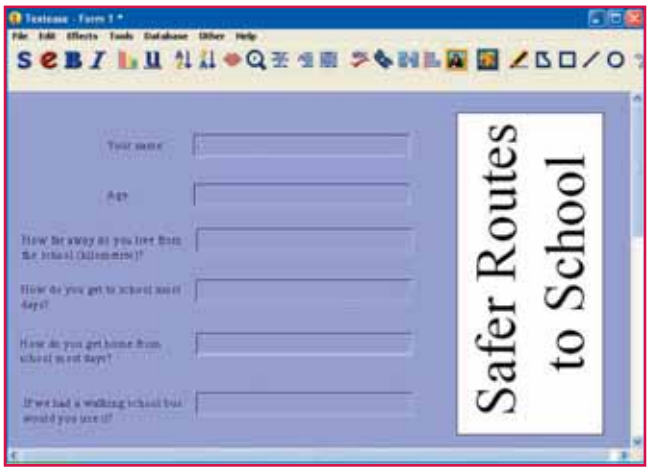
The use of the menu system was explained, along with the reasons for its use such as to minimise spelling mistakes or inserted spaces. Pupils were then directed towards another activity which the teacher had prepared related to Safer Routes to School, after which they started to take turns to enter the information individually. This was under the supervision of the class teacher whilst the others worked at the computers on an alternative activity.

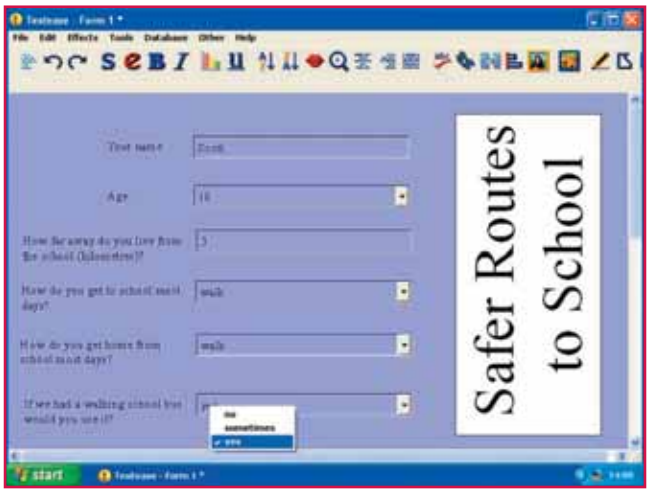
The learning outcomes were to:

- enter gathered information into a database record
- use ICT to explore and solve problems in the context of geography/PSE.

This activity develops the following skills taken from the Key Stage 2 Programme of Study.

Find and analyse information
produce and use databases to ask and answer questions
find information from a variety of sources for a defined purpose





Teacher:
What would happen if you put in either the number '3' or the word 'three' in there?

Scott:
Nothing, it means the same thing.

Teacher:
How do you know?

Scott:
I'm not sure, but I think it's the same.

Scott's work

Scott has used this package only once before and so he was still getting to grips with the software. He was the first to enter the data into his record.

Scott was able to navigate the network with the help of the teacher to the file held on the file server. He was able to open the database independently by double-clicking on the 'File' icon within the folder which opened up the saved template. This is characteristic of Level 3: pupils *store and retrieve work independently*.

The data capture sheet that Scott had completed as homework was then used to enter information into the database.

Scott found it confusing entering the information into the non-menu fields and started to type the word 'three' rather than the digit '3' into the third field. The teacher had to point this out to Scott who didn't understand the difference that it would make when searching the database.

Scott was able to use the menu system within the database independently but experienced difficulties when entering the information into the fields that did not have menu options.

In all, Scott received help and assistance from both the teacher in the questioning and also from the menu option which made it far simpler for him to enter his data onto the record. The teacher tidied up the record so that there would be no inaccuracies in the database and added the record to the database.

Teacher:
You don't find it as easy to enter the information into the fields that don't have a menu do you?

Scott:
I like the menu ones. You just have to click in the box and the menu comes up for you to choose from.

Teacher:
It does make it easier for us. What if you haven't got a menu to use though?

Scott:
I've got to type the words in.

Teacher:
Or numbers if that's what it needs.

Scott:
Yes, numbers too.

Scott has shown that he can navigate the network to simple, immediate locations with assistance and that he can open files independently. He has shown that he is able to select options from a menu within a record but finds it difficult to enter information accurately into a non-menu field. He now has a partial understanding of the need to have fields with the same types of values within them.

Although Scott has demonstrated that he can open files independently (which is characteristic of Level 3), the data-handling activity demonstrates mainly characteristics of Level 2: pupils *store and retrieve work with some assistance* and *enter information into a record with some assistance.*

Where next?

In order to make progress, Scott needs to be able to extract the information from the data capture sheet independently and demonstrate the ability to search the database to find answers to set questions. Having learned how to open files on the network, the next step for Scott is to be able to save his work independently.

Summary

Scott's profile shows some characteristics of Level 2 and Level 3 but mainly the characteristics of Level 2.

Aspects of Scott's work in ICT which are not explicitly evident in these three activities support this view, because he is able to use ICT safely with some help (*…use the internet/related technologies safely, with support…*which is characteristic of Levels 1, 2 and 3) and can recognise and name a mouse, keyboard, monitor and printer (*…recognise the different parts of a computer system…* which is characteristic of Levels 1 and 2).

Erin | Characteristics of Levels 4 and 5

Erin is a 10-year-old learner in Key Stage 2.

Her teacher knows much more about Erin's performance than can be included here. However, this profile has been selected to illustrate characteristic features of Erin's work across a range of activities. Each example is accompanied by a brief commentary to provide a context and indicate particular qualities in the work.

Erin's profile shows some characteristics of Levels 4 and 5, but mainly characteristics of Level 4.

In the commentaries accompanying each of the following activities, consideration is given to the progression Erin could make to improve her performance in information and communication technology.

Activity 1 | A certificate for covering 26 miles
Software: DTP

Context

Erin's school takes part in the Healthy Schools and Eco-Schools Projects.

One of the school's aims is to give pupils the opportunity to engage in frequent and regular physical activity beneficial to their health, fitness and well-being. Clwb Dal i Fynd (Keep Going Club) encourages pupils of all physical abilities to walk, jog or run around a marked track on the school yard.

Erin's class decided to design certificates for pupils once they have achieved 10km and 41.8km (roughly equivalent to a 26 mile marathon).

The teacher introduced the topic on the interactive white board to highlight good practice and present new skills, then led the class through the following activities:

- analysing other certificates on the interactive white board and looking at their format
- determining success criteria for the task
- introducing new skills such as using picture frames and text
- layering information such as text and pictures.

The learning outcomes were to:

- combine a variety of information and media as pupils create, refine and develop their own ideas and information within the certificate
- produce a certificate that will suit the purpose and meet the needs of their audience.

This activity develops the following skills taken from the Key Stage 2 Programme of Study.

Find and analyse information
find information from a variety of sources for a defined purpose

Create and communicate information
create and communicate information in the form of text, images and sound, using a range of ICT hardware and software create a range of presentations combining a variety of information and media

Erin's work

Erin extended her use of desktop publishing. She has already used different layouts in 2Create and Paw-Print, however for this task she used Publisher.

When planning the work, Erin suggested how she would find relevant information and ideas. She has planned the process to be used, stating that she would:

- look at other certificates including an existing one for 10km (shown here)
- design the certificate carefully and focus on the layout
- decide on the location of pictures and text, and the font size(s) to be used
- research information on the internet.

Teacher:
How did you plan from the beginning?

Erin:
I looked at ready-made templates of 10km and 20km running certificates we had in the school. I then looked on the internet for ideas.

Teacher:
What was the most important thing to you when designing the certificate?

Erin:
The appearance – I wanted to put a picture in the background and make the font big enough.

Teacher:
Do you think that the format of the certificate is important?

Erin:
Yes, because the child wants to show it to everybody in school and at home.

Teacher:
Did you give the pictures and font size a lot of thought?

Erin:
Yes, it's important that the word 'marathon' stands out.

This is characteristic of Level 4: pupils *broadly plan their tasks and combine a variety of information and media when creating and developing their ideas*.

When developing her ideas, Erin realised that she needed to follow her plan but make some amendments where necessary. She also used her prior knowledge effectively to develop and begin to combine a variety of imaginative ideas.

Erin made a number of changes to her design as she developed it. She sometimes asked her friends' opinions but she made the changes herself, requiring very little support throughout the task. Her final certificate is shown here.

Questioning by her teacher shows that Erin understands some of the factors that make such a certificate fit for purpose.

Teacher:
Do you think the certificate looks OK?

Erin:
Yes, I think everybody will like it.

Teacher:
How would you have improved it?

Erin:
Maybe I would have typed instead of writing the child's name and made the pictures bigger.

Teacher:
Was the certificate easy to create?

Erin:
Fairly, there was a lot of research and planning to do before starting the work.

Teacher:
Do you think you have succeeded?

Erin:
Yes, I'm quite happy.

Erin is also able to reflect on the process and final product.

Erin has planned the task for a purpose and audience. She has effectively combined text and images when creating this certificate. Erin found, placed and resized clip art herself, and she amended font size, position and colour until she was happy with the final effect.

The certificate is one presentation that is effectively for one audience. There are, however, some characteristics of Level 5 evident in this work as Erin has demonstrated she can *combine a variety of information and media when creating, refining and developing her own ideas and information*, and her final product is *fit for purpose and meets the needs of her intended audience.*

Where next?

In order to make progress, Erin needs further opportunities to apply the above skills in different contexts for different audiences. This should allow her to demonstrate an awareness of the need for different styles for different audiences. With more experience she should begin to plan her tasks in more detail for specific purposes and audiences. Erin could be encouraged to use ICT to create and refine her work more than she has been able to in the certificate task, using information from a broader range of sources.

Activity 2 | Modelling distances
Software: Spreadsheet

Context

As part of their work on healthy living Erin's teacher identified the ICT aspects that can contribute to the practical nature of this work. Through Clwb Dal i Fynd pupils plan daily physical activity and using a spreadsheet they record and evaluate their personal progress on a daily or weekly basis.

The learning outcomes were to:

- explore patterns and relationships in a spreadsheet
- make simple predictions about how changing one thing affects another in a spreadsheet.

This activity develops the following skills taken from the Key Stage 2 Programme of Study.

Find and analyse information
produce and use models and/or simulations to ask and answer questions
investigate the effect of changing variables in models and/or simulations to ask and answer 'what if…?' type questions

Teacher:
How long did it take you to calculate the total of every member of the class and the weekly total using a pencil and paper?

Erin:
Too much time!

Teacher:
Can you think of a quicker way of doing this?

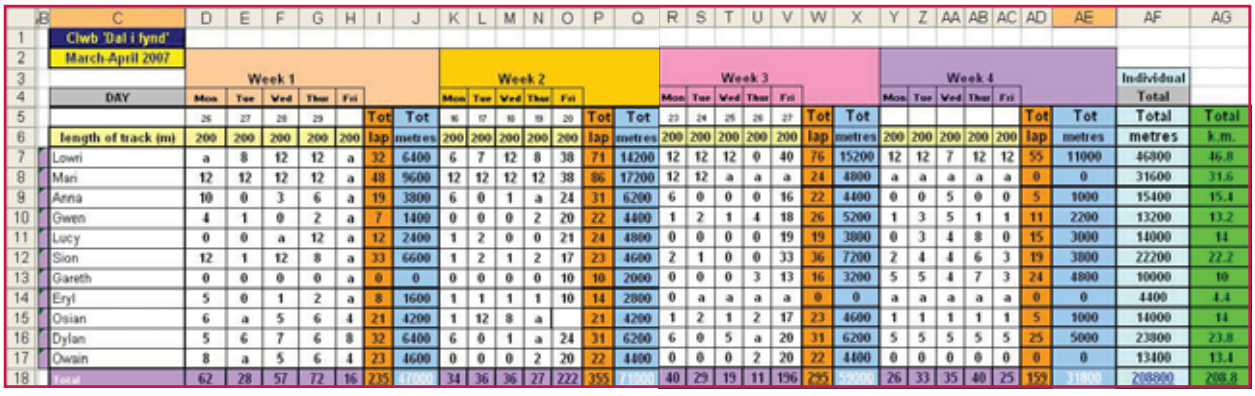
Erin:
Using a calculator.

Erin's work

Erin has some experience of modelling using spreadsheets. She has also previously had experience of using a pencil and paper recording method and a calculator to input data into a simple spreadsheet. Erin is beginning to realise that every cell has a unique reference with a letter for every column and a number for every row. She also realises that this reference can be used to link cells in a table.

Erin has looked at the hidden formula in the 'Clwb Dal i Fynd' file provided by the teacher and predicted changes, and identified patterns and relationships. This is characteristic of Level 4: pupils *use ICT to explore patterns and relationships*. She could explain that the formula 'made things happen automatically'.

Erin's printouts show that she has entered the data into the spreadsheet for the week and calculated totals for individual pupils and for days and weeks. Although the model produces the conversion, she understands the relationship between metres and km.



	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG
1	Clwb 'Dal i fynd'																														
2	March-April 2007																														
3		Week 1							Week 2							Week 3							Week 4							Individual	
4	DAY	Mon	Tue	Wed	Thur	Fri			Mon	Tue	Wed	Thur	Fri			Mon	Tue	Wed	Thur	Fri			Mon	Tue	Wed	Thur	Fri			Total	
5		26	27	28	29		Tot	Tot	16	17	18	19	20	Tot	Tot	23	24	25	26	27	Tot	Tot						Tot	Tot	Total	Total
6	length of track (m)	200	200	200	200	200	lap	metres	200	200	200	200	200	lap	metres	200	200	200	200	200	lap	metres	200	200	200	200	200	lap	metres	metres	k.m.
7	Lowri	a	8	12	12	a	32	6400	6	7	12	8	38	71	14200	12	12	12	0	40	76	15200	12	12	7	12	12	55	11000	46800	46.8
8	Mari	12	12	12	12	a	48	9600	12	12	12	12	38	86	17200	12	12	a	a	a	24	4800	a	a	a	a	a	0	0	31600	31.6
9	Anna	10	0	3	6	a	19	3800	6	0	1	a	24	31	6200	6	0	0	0	16	22	4400	0	0	5	0	0	5	1000	15400	15.4
10	Gwen	4	1	0	2	a	7	1400	0	0	0	2	20	22	4400	1	2	1	4	18	26	5200	1	3	5	1	1	11	2200	13200	13.2
11	Lucy	0	0	a	12	a	12	2400	1	2	0	0	21	24	4800	0	0	0	0	19	19	3800	0	3	4	8	0	15	3000	14000	14
12	Sion	12	1	12	8	a	33	6600	1	2	1	2	17	23	4600	2	1	0	0	33	36	7200	2	4	4	6	3	19	3800	22200	22.2
13	Gareth	0	0	0	0	a	0	0	0	0	0	0	10	10	2000	0	0	0	3	13	16	3200	5	5	4	7	3	24	4800	10000	10
14	Eryl	5	0	1	2	a	8	1600	1	1	1	1	10	14	2800	0	a	a	a	a	0	0	a	a	a	a	a	0	0	4400	4.4
15	Osian	6	a	5	6	4	21	4200	1	12	8	a		21	4200	1	2	1	2	17	23	4600	1	1	1	1	1	5	1000	14000	14
16	Dylan	5	6	7	6	8	32	6400	6	0	1	a	24	31	6200	6	0	5	a	20	31	6200	5	5	5	5	5	25	5000	23800	23.8
17	Owain	8	a	5	6	4	23	4600	0	0	0	2	20	22	4400	0	0	0	2	20	22	4400	0	0	0	0	0	0	0	13400	13.4
18	Total	62	28	57	72	16	235	47000	34	36	36	27	222	355	71000	40	29	19	11	196	295	59000	26	33	35	40	25	159	31800	208800	208.8

Teacher:
Why is it important to enter and check the figures correctly?

Erin:
If one number is wrong then the number at the end would also be wrong.

Teacher:
What would have happened if Mari had made a mistake when typing a number, for example, 40 instead of 4?

Erin:
The total would be wrong.

Teacher:
Could the error be corrected?

Erin:
Yes, by changing the number to 4 and the result would be correct.

In planning the work, Erin suggested how she would find relevant information and ideas. She planned the process to be used, stating that she would:

- record regularly with a clipboard on the yard
- enter the information into the spreadsheet regularly
- check that the information is correct.

While using a pencil and paper, Erin had the opportunity to do mental and written calculations by completing a worksheet, and consequently she was able to discuss the advantages of using a calculator then a spreadsheet to carry out the task.

Teacher:
Was the spreadsheet easy to use?

Erin:
Yes, I could see all the figures on the screen, the calculator doesn't do that.

Teacher:
So are there any advantages of using a spreadsheet rather than a calculator?

Erin:
Yes. Everything changes automatically when I change one thing. It adds up the column automatically.

Erin's printouts show that she has completed the spreadsheet for the week. She has entered the data correctly and has checked the figures carefully. She realises the importance of having accurate data.

She also realises the advantages of using a spreadsheet.

In this task Erin has used a template supplied by the teacher, opened a ready-made spreadsheet for 'Clwb Dal i Fynd' and input data on a daily basis. Erin has checked the accuracy of the data before saving the file independently. This (and the conversation on the previous page) shows characteristics of Level 4: pupils *recognise that poor quality information and data yields unreliable results*.

Where next?

In order to make progress, Erin needs to move on from using templates and have opportunities to create her own models or simulations and investigate the effect of changing data. As well as developing her understanding of models/simulations, a carefully structured task can give Erin a chance to plan in more detail for a particular purpose.

Activity 3 | Healthy eating
Software: Data handling

Context

One of the main aims of the Healthy Schools Project is to look carefully at what pupils eat from day to day. In this activity the class develop a questionnaire in order to find out whether or not pupils follow the recommendation to eat five portions of fruit or vegetables each day, then enter data into the Information Workshop database created by the teacher and interpret the information.

The teacher introduced the activity, reminding the class what a database is and how it can be used to organise data and search for specific information. The teacher explained they would be creating a database to include information about the eating habits of the class, and whether or not pupils follow the five a day recommendation. The class were asked to think of some questions they should include on a questionnaire to ensure that they gathered the necessary data. Erin and her classmates then started collecting data in their groups.

The learning outcomes were to:

- create questionnaires to gather data
- enter information into a data file
- classify and search in order to retrieve relevant information
- demonstrate understanding of data-handling concepts
- compare the use of a database with other methods of collecting and handling information.

This activity develops the following skills taken from the Key Stage 2 Programme of Study.

Find and analyse information
discuss the purpose of their tasks, the intended audiences and the resources needed
find information from a variety of sources for a defined purpose
produce and use databases to ask and answer questions

Teacher:
What types of questions are important when planning your questionnaire?

Erin:
Questions about healthy foods.

Teacher:
How do you know which foods are healthy and which aren't?

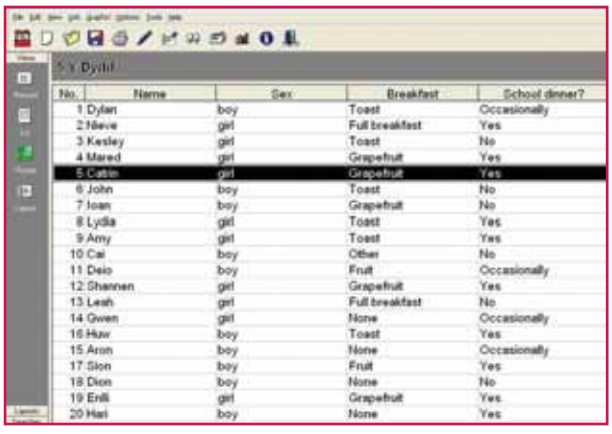
Erin:
Well...I suppose I could look on the internet... type 'healthy foods' into a search engine.

Erin's work

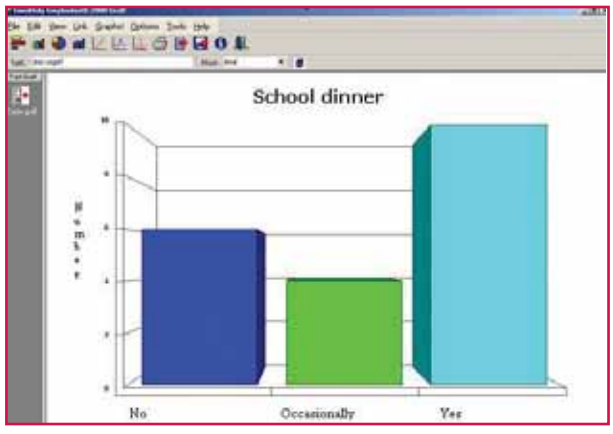
Erin has some experience of using the Information Workshop application while in Year 5. She has also worked on a mathematical and scientific investigation involving the Green School Project on pupils' means of transport to school.

Erin was involved in planning the questionnaire and collecting the data. She understood the need for careful questions in order to gather relevant information, and to allow useful sorting, searching and graphing later on. Although Erin wasn't the group leader, she played a prominent part in planning the questionnaire. Erin's responses to her teacher's questions suggest she recognises what the focus of the questions should be and how to carry out relevant research.

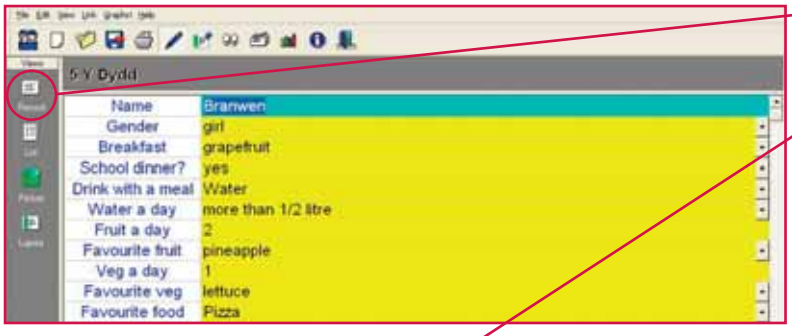
The teacher created a database with 20 records from the information collected by this group. After locating and opening the ready-made file, Erin used simple enquiries to produce a wide variety of tables and graphs and held discussions with classmates whilst trying to interpret these. For example, when comparing pupils' favourite foods and how many pupils have school dinners, they asked questions such as 'What's the least favourite food?', 'Why do six pupils in the class choose to bring a packed lunch rather than have school dinners?'



No.	Name	Sex	Breakfast	School dinner?
1	Dylan	boy	Toast	Occasionally
2	Nieve	girl	Full breakfast	Yes
3	Kesley	girl	Toast	No
4	Mared	girl	Grapefruit	Yes
5	Catrin	girl	Grapefruit	Yes
6	John	boy	Toast	No
7	Ioan	boy	Grapefruit	No
8	Lydia	girl	Toast	Yes
9	Amy	girl	Toast	Yes
10	Cai	boy	Other	No
11	Deio	boy	Fruit	Occasionally
12	Shannen	girl	Grapefruit	Yes
13	Leah	girl	Full breakfast	No
14	Gwen	girl	None	Occasionally
16	Huw	boy	Toast	Yes
15	Aron	boy	None	Occasionally
17	Sion	boy	Fruit	Yes
18	Dion	boy	None	No
19	Enlli	girl	Grapefruit	Yes
20	Hari	boy	None	Yes



Erin was able to search through the data file and then compare data for different categories. She was able to present the information with a variety of graphs and tables.



Erin sorted the information by looking at 'Record' and 'List'.

Erin managed to adapt and add to the database which had 20 records. However, she added Branwen's record (21) before the first rather than at the end.

No.	Name	Sex	Breakfast	School dinner?
21	Branwen	girl	grapefruit	Yes
1	Dylan	boy	Toast	Occasionally
2	Nieve	girl	Full breakfast	Yes
3	Kesley	girl	Toast	No
4	Mared	girl	grapefruit	Yes
5	Catrin	girl	grapefruit	Yes

Erin's friend, Siôn: If all these computers were down today, it wouldn't really matter because we've got all the information here on paper.

Erin: Yes ... but it would take us ages to look for the information.

Erin's friend, Siôn: That's what people used to do!

Erin: Yes ... but look how fast I can look up how many like potatoes.

When asked, Erin could compare the use of a paper and pencil method with a number of different applications she had used on the computer. She could discuss the advantages and disadvantages of using a database compared to traditional methods of finding information.

Erin has opened and used the '5 a day' database supplied by the teacher and she has adapted and added to the records in the database. This is characteristic of Level 4: pupils *add and amend records in databases*. Erin has shown that she can create and interpret graphs in order to answer questions.

Where next?

In order to make progress, Erin needs an opportunity to create her own database, and to search or sort on more than one field to follow particular lines of enquiry. She could, for example, build upon the '5 a day' database by including data from the previous (modelling) activity, such as total distance covered each month. Erin could then search for pupils with the most healthy lifestyles, for example those who eat five a day *and* cover a distance of 'x' km per month around the running track.

Summary

Erin's profile shows some characteristics of Level 4 and Level 5 but mainly the characteristics of Level 4.

Aspects of Erin's work in ICT that are not explicitly evident in these three activities support this view. In class discussions about the safe use of ICT, Erin showed that she understood computers can be affected by viruses. She regularly sends e-mail messages to others in her class and carefully follows the school's rules about acceptable use of e-mail and the internet. This is characteristic of Level 4: pupils *send and receive information electronically … they use the internet/related technologies safely in accordance with given guidelines.* Erin is able to open and save files independently, using a sensible structure and appropriate names; this is another characteristic of Level 4: pupils *manage their workspace effectively*.

Siôn | Characteristics of Levels 5 and 6

Siôn is a 10-year-old learner in Key Stage 2.

His teacher knows much more about Siôn's performance than can be included here. However, this profile has been selected to illustrate characteristic features of Siôn's work across a range of activities. Each example is accompanied by a brief commentary to provide a context and indicate particular qualities in the work.

Siôn's profile shows some characteristics of Levels 5 and 6, but mainly characteristics of Level 5.

In the commentaries accompanying each of the following activities, consideration is given to the progression Siôn could make to improve his performance in information and communication technology.

Activity 1 | '5 a day' presentation
Software: Presentation

Context

Siôn's school takes part in the Healthy Schools and Eco-Schools Projects.

One of the school's aims is to raise awareness of healthy living and eating. Pupils have been studying the positive and negative effects that advertisements, particularly food advertisements, have on children. They have looked at how these advertisements are presented, the timing, what appeals to an audience as well as the persuasive language used. They also produced a questionnaire about food advertisements.

Pupils then created a multimedia presentation on Photo Story 3 to try to persuade their audience to eat healthily by eating five portions of fruit/vegetables a day.

The learning outcomes were to:

- use a multimedia application to sort, refine and present information
- combine images, sound and text
- create pages that offer variety
- present information that meets the needs of the audience.

This activity develops the following skills taken from the Key Stage 2 Programme of Study.

Find and analyse information
discuss the purpose of their tasks, the intended audiences and the resources needed
find information from a variety of sources for a defined purpose

Create and communicate information
create and communicate information in the form of text, images and sound, using a range of ICT hardware and software
create a range of presentations combining a variety of information and media

Siôn's work

Siôn is very confident with ICT. He has experience of using a different multimedia application to the one he used in this activity. Siôn's task was to prepare a presentation noting the importance of healthy eating, and particularly of trying to eat five portions of fruit or vegetables a day. He targeted his presentation at Year 5 and Year 6. Siôn decided to spend time on the internet to research the benefits of different fruits and vegetables before creating his presentation. He followed the school's guidelines on acceptable use of the internet and saved the information he found in his workspace.

Evidence of Siôn's work on this activity is shown here.

- Creating pages
- Importing pictures and adjusting frames

- Timing and zoom in/out
- Adding/amending text

- Recording sound

- Importing background music
- Editing

Siôn has undertaken effective and detailed planning for this task, requiring very little support from his teacher. This is characteristic of Level 6: pupils *plan their tasks in detail for specific purposes and audiences*. Siôn has produced a successful presentation of around one and a half minutes that achieves what he set out to do. The evidence shows he has created 11 'pictures' in his filmstrip and he has imported relevant images into his presentation. He added simple text to reinforce the message and recorded voice messages that play at the appropriate stages during the presentation. After testing the presentation, Siôn decided on between 6 and 10 seconds timing for each picture and how the picture would be animated on screen, for example the focus point of zooming in/zooming out. Finally he imported background music. This demonstrates characteristics of Level 5: pupils *combine a variety of information and media when creating, refining and developing their own ideas and information*.

Where next?

In order to make progress, Siôn needs an opportunity to develop a presentation for a different audience and to use ICT to refine his work drawing on information from a range of sources, recognising the need for different styles for different audiences.

Activity 2 | Sending an e-mail
Software: E-mail/messaging

Context

As noted in Activity 1, Siôn's school takes part in the Healthy Schools and Eco-Schools Projects.

One of the school's aims is to raise awareness of healthy living and eating. In this context, the school council was responsible for establishing and running a fruit juice shop in the school at break time.

The first step was to find out whether or not there was a demand for a juice shop by producing a questionnaire for the school's pupils, including a question about their favourite juice. An investigation using the internet was then carried out, looking at the ingredients, e.g. sugar content, of different kinds of fruit juices. As the class would be using the internet, the teacher took the opportunity to remind them at the start of the activity of the school's rules for using the internet, and held a short discussion on the safe and legal use of the internet outside of the school environment.

The school council decided to contact parents by e-mail to note their intentions and to design posters to place around the school advertising the juice shop. Sending an e-mail rather than a letter to parents reflected the school's Green School Scheme. It was also decided to send a poster as an attachment to the e-mail.

The learning outcomes were to:

- send and receive messages
- load, keep and print messages
- send e-mails to a selected group using an address book
- attach a file to an e-mail
- use the tools available to communicate information effectively
- show awareness of a specific audience.

This activity develops the following skill taken from the Key Stage 2 Programme of Study.

Create and communicate information
share and exchange information safely through electronic means

This activity also provides opportunities to gain an understanding of the importance of adopting safe practices when using ICT as highlighted in the Key Stage 2 Programme of Study.

Health, safety and child protection
Pupils should be taught how to use ICT comfortably, safely and responsibly, and to consider the hazards and risks in their activities. They should be able to follow instructions to minimise risks to themselves and others.

The teacher introduced the topic on the interactive white board and explained how to:

- add to the names in the address book and use these to write messages and send copies
- send attached files
- show good practice, e.g. add new folders as necessary
- work offline to write e-mails as messages don't have to be sent immediately.

As a class, pupils compared the advantages and disadvantages of ICT compared with other methods of communication, discussing its use in the wider world with confidence. The teacher broadened the discussion on the use of e-mail to include issues such as what might happen when large attachments are sent or if the recipient does not have the software used to create the attachment. The risk of receiving a virus was discussed along with the dangers of disclosing personal details in e-mails or on social networking sites and chat rooms.

Teacher:
Why have you decided not to send a Publisher poster to the families?

Siôn:
Because I've found out that that most of them haven't got Publisher on their computers at home.

Teacher:
How do you know this?

Siôn:
I've asked about 12 friends.

Siôn's work

Siôn has a computer at home and is a confident ICT user. He is experienced in sending e-mails in school and from his home computer. He sent the message about the juice shop and an attachment to a selected group of families who had already agreed to be part of the Green School Initiative to save paper. He used the address book to do this and kept a copy of the message for his teacher. Siôn is a member of the school council and he worked with other members of the council to design a poster to advertise the juice shop. They decided that the poster should be created on two different programs – Word and Publisher.

Having written his e-mail message to parents, Siôn showed it to his fellow council members. His informal enquiries with some friends led him to send the poster as a Word file as it became clear that most families had Word but only some had Publisher on their home computer.

This is firm evidence that Siôn has thought about the needs of his audience before sending the message.

The two versions of the poster are shown here. Siôn helped develop the posters and they provide further evidence of his communication skills using ICT.

Teacher:
When sending an e-mail is distance a problem?

Siôn:
No, an e-mail can be sent anywhere in the world very quickly.

Teacher:
Why is it important to keep an address book?

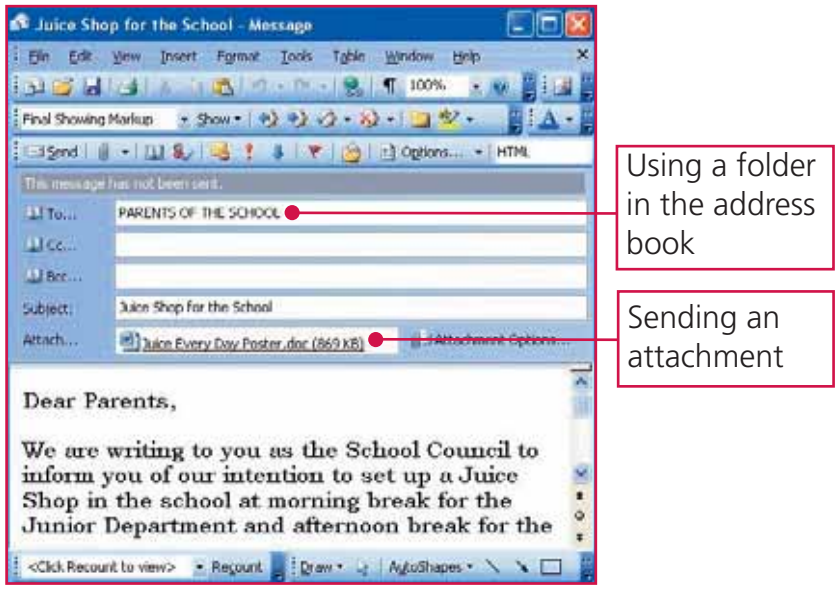
Siôn:
It is much easier to find an e-mail address when it is kept there.

Teacher:
In your opinion, what is the advantage of having a distribution list?

Siôn:
It makes it easier having one folder for the families' e-mail addresses so you don't have to send a separate e-mail to everyone. It saves time.

Siôn's contribution to the posters demonstrates characteristics of Level 5: pupils *combine a variety of information and media when creating, refining and developing their own ideas and information*.

Part of Siôn's e-mail message is shown here. He followed the school's acceptable use policy in producing and distributing this message.



Siôn played an active part in planning the process of setting up the juice shop – organising the research into favourite juices, investigating the ingredients of fruit juices and helping to produce the posters. When questioned by his teacher, Siôn demonstrated a good understanding of the benefits of using e-mail.

This evidence confirms that Siôn has experimented confidently with his own and others' ideas. He formed a considered opinion and made informed decisions. He followed the planned process/method, making some amendments where necessary.

Siôn:
Do you think the e-mail has been of any use?

Erin:
A lot of pupils say that they are looking forward to the shop opening.

Siôn:
What did your parents say about having messages from school by e-mail?

Erin:
Mum really likes the poster and is glad that she'll never lose letters again!

Teacher:
What was the most useful piece of research you did?

Siôn:
I'm glad I asked who had Publisher at home.

Teacher:
What will you do when sending attachments to parents in the future?

Siôn:
Every file will be in Word.

Siôn discussed the activity with other members of the school council, particularly the effectiveness of the e-mail and the outcomes.

The response to the initiative was positive and the juice shop is supported by about 75% of the school's pupils. Siôn started to evaluate the success of his communication, describing what he had learned and recognising the methods that worked best.

Siôn attached the file and sent the message independently and confidently. This is characteristic of Level 5: pupils *use ICT to send and receive files electronically.* He could also identify the advantages of this method of communication.

Siôn has formed *opinions about issues raised by the use of ICT*: a characteristic of Level 5. In separate class discusssions, Siôn has shown a good knowledge of *the dangers associated with misuse of the internet/related technologies*: a characteristic of Level 6.

Where next?

Siôn was more confident using Word than Publisher when working on the posters. He says he'd like to use Publisher for his next piece of work. In terms of e-mail, having discussed how helpful it would be to know that parents have opened his message, Siôn's teacher could help him set up a 'read receipt'. Siôn could then send a message to a small group of parents to see how this works.

Activity 3 | Modelling distances
Software: Spreadsheet

Context

As part of their work on healthy living the teacher has identified the ICT aspects that can contribute to the practical nature of this work. Through Clwb Dal i Fynd pupils plan daily physical activity and using the spreadsheet they record and evaluate their personal progress on a daily or weekly basis.

The learning outcomes were to:

- explore patterns and relationships in a spreadsheet
- make predictions about how changing one variable affects another.

This activity develops the following skills taken from the Key Stage 2 Programme of Study.

Find and analyse information
produce and use models and/or simulations to ask and answer questions investigate the effect of changing variables in models and/or simulations to ask and answer 'what if…?' type questions

Siôn's work

Siôn knows that each cell has a reference with a letter for every column and a number for every row, which gives the cell a unique reference. He knows that this reference can be used to link cells in a table. He understands that the hidden formula in the 'Clwb Dal i Fynd' file provided by the teacher carries out a calculation.

Siôn's printouts show that he has completed the spreadsheet for the week and month. For the weekly spreadsheet, he entered the data correctly and checked the figures carefully. Siôn understands the need for accuracy and the effect inaccurate data would have on calculations including that data.

Teacher:
Was it easy creating the new spreadsheet?

Siôn:
Yes, and I could see all the figures on the screen. You can only see one number at a time with a calculator.

Teacher:
So what are the advantages of using a spreadsheet rather than a calculator?

Siôn:
Everything changes automatically when I change one thing.

Teacher:
What do we call one of these on the spreadsheet? (points to a cell)

Siôn:
Cell.

Teacher:
What does the sum formula do in the sum column?

Siôn:
It adds up all the numbers in the column.

Teacher:
Can you do anything with this?

Siôn:
You can copy the formula into the other cells.

Siôn decided that it would be useful having the total for the year and suggested creating a new spreadsheet. He also suggested that seeing the total in miles would give some pupils a better idea of the distance involved, and with some support he created a formula to convert kilometres into miles.

Siôn realised that there was no need to retype everything for the year total spreadsheet so he modified the original spreadsheet by keeping the 'Name' column and deleting the data for each week. Siôn created his own spreadsheet for the school year using the totals for each term from the previous spreadsheet in the new spreadsheet.

He completed the spreadsheet and then improved the presentation by merging and formatting cells and typing new headings, 'Autumn Term, Spring Term, Summer Term'. This evidence shows that he is able to use the software effectively and is becoming aware of an audience.

Siôn managed to create a formula for the total km of every pupil, an average km for every term/year (for the group) and a conversion from kilometres to miles, as shown in the spreadsheet on the next page. Although Siôn started by using the same spreadsheet as Erin (see previous profile), his work demonstrated characteristics of a higher level as he created his own spreadsheet and formulas as shown on the next page. This is characteristic of Level 5: pupils *create their own models or simulations and investigate the effect of changing data*.

	C	D	E	F	G	H
1	Clwb 'Dal i fynd'					
2	Total for year					
3						
4		Autumn Term	Spring Term	Summer Term	Total km	Total miles
5		Total km				
6	length of track (m)	200.00	200.00	200.00		
7	Lowri	42.00	44.00	45.00	131.00	81.88
8	Mari	31.00	33.00	35.00	99.00	61.88
9	Anna	33.00	35.00	35.00	103.00	64.38
10	Gwen	20.00	22.00	18.00	60.00	37.50
11	Lucy	14.00	20.00	24.00	58.00	36.25
12	Sion	25.00	27.00	28.00	80.00	50.00
13	Gareth	15.00	23.00	25.00	63.00	39.38
14	Eryl	23.00	30.00	30.00	83.00	51.88
15	Osian	22.00	25.00	28.00	75.00	46.88
16	Dylan	17.00	20.00	23.00	60.00	37.50
17	Owain	20.00	22.00	26.00	68.00	42.50
18	Total	262.00	301.00	317.00	880.00	550.00
19						
20	Average	23.82	27.36	28.82	80.00	50.00
21						

Siôn:
I have managed to run 80km during the year. I'd like to know how many miles that is.

Teacher:
You could work out the sum in a special way to tell you the total miles.

Siôn:
How would I do that?

Teacher:
1km is the equivalent of 5/8 of a mile – we would have to divide the total by 8 and multiply by 5.

Siôn:
I could do that on paper and a calculator.

Teacher:
Good idea – do you think that we could create a formula in the spreadsheet though?

Siôn:
What about doing it on paper and then trying to create the formula?

Teacher:
Excellent, Siôn.

Siôn created a formula, for example, the sum of the term in cell D18 (262.00km) divided by the number of pupils in the class (11) to get an average of 23.82km.

Siôn saw that he had run 25km during the autumn term, which is higher than the class average. In class discussions it was clear that, though familiar with the metric system, most pupils still referred to large distances in miles.

Term	Siôn's distance (in km)
Autumn Term	25
Spring Term	27
Summer Term	28
Total	**80**

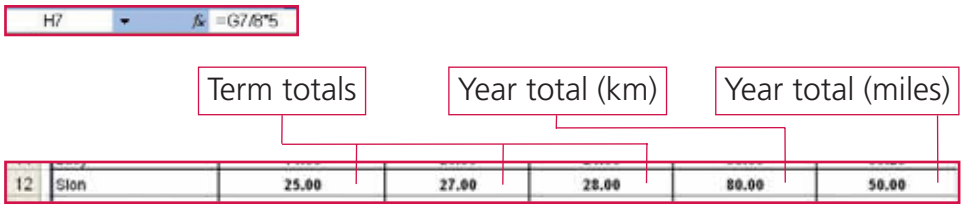
Teacher:
You need to divide the total by 8 and then multiply by 5.

80 ÷ 8 =10

10 x 5 =50

80 x 5 ÷ 8=50

So 80km = 50 miles – next step – put the formula in the spreadsheet.



Siôn approached the task in a logical way and produced a successful spreadsheet model. He is confident using ICT and understands how the spreadsheet works. He shows interest in how the spreadsheet works automatically and how it can easily be changed for use in another context.

Where next?

In order to make progress, Siôn needs an opportunity to develop more complex models, vary the rules within them and test hypotheses.

Activity 4 | Searching a database
Software: Data handling

Context

Siôn's teacher visually and interactively introduced the concepts of searching, sorting, graphing and creating a database using a unit on the NGfL Cymru website (www.ngfl-cymru.org.uk). Groups of pupils then set about creating and handling a database, and practicing the skills of sorting and searching for relevant information.

The aim of the 'Searching' presentation is to introduce the concept of searching information as well as collecting and displaying information as records. The 'Searching two fields' resource builds on what is presented in the 'Searching one field' resource. This time, two specific features are chosen. The examples show how to search for everybody with green eyes *OR* red hair, and then everybody with green eyes *AND* red hair. The aim of the 'Graphing' resource is to introduce the type of graphs/charts that can be created with data-handling software, whilst the aim of the 'Creating' resource is to introduce how to create a database.

Once the teacher had presented the above resources, some groups of pupils handled ready-made databases whilst others created their own. Siôn was amongst those who created their own database using Information Workshop.

The learning outcomes were to:

- create questionnaires to collect data
- create their own database
- do a search on more than one field to follow a particular line of enquiry
- show understanding of data-handling concepts.

This activity develops the following skills taken from the Key Stage 2 Programme of Study.

Find and analyse information
discuss the purpose of their tasks, the intended audiences and the resources needed
find information from a variety of sources for a defined purpose
produce and use databases to ask and answer questions

Siôn's work

Siôn can use data-handling software confidently and he supports others in the class with this work.

Earlier in Key Stage 2, Siôn had entered information into a ready-made data file. He was able to follow simple lines of enquiry and produce a range of graphs and tables in order to analyse and present his conclusions. He could also discuss the use of a pencil and paper method in comparison with undertaking work on a computer. This year, he has adapted the '5 a day' data file prepared by the teacher by adding fields. Now Siôn is ready to create a database after following the NGfL Cymru data resources.

After Siôn worked through the animation, which shows how a database can be created from scratch, he created his own database.

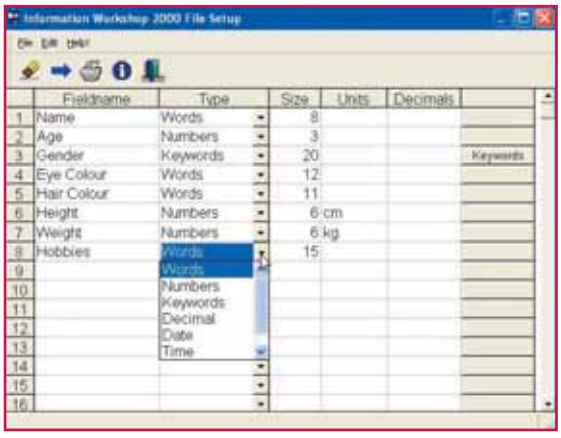
Extracts from the animation are shown here.

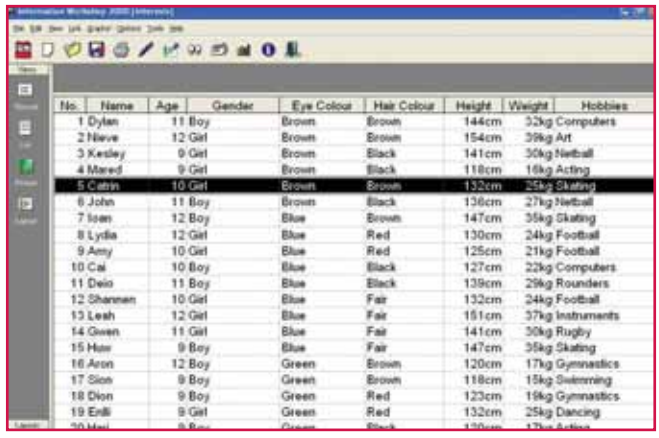
Siôn read the text and created fields within a computer simulation. He then entered the relevant data for the first record on the interactive task.

After completing this unit, Siôn understood how to create a database and how to choose suitable fields for collecting data.

Siôn chose suitable fields to collect data on his classmates. This was done independently straight after he completed the NGfL Cymru activity as noted.

Siôn created a database with 20 records and eight fields: Name, Age, Gender, Eye Colour, Hair Colour, Height, Weight, Hobbies.

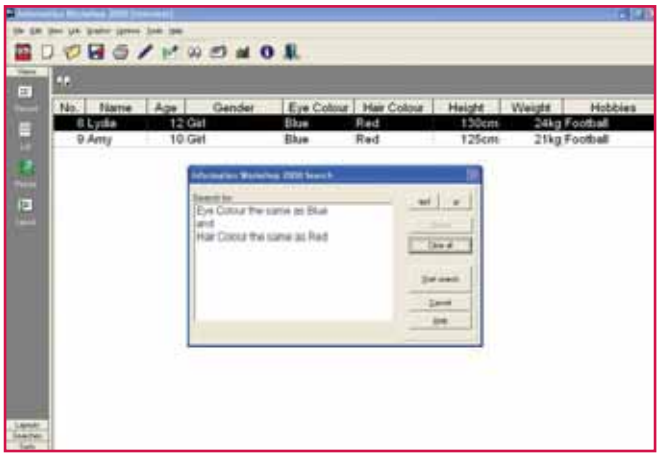




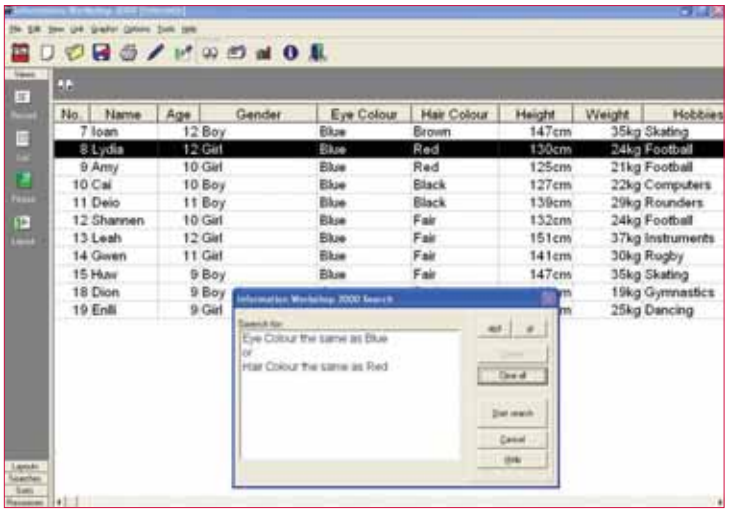
He understood the need for careful questioning whilst sorting, searching and graphing, in order to make sense of the information.

Siôn was able to search for information on different individuals in the classroom and compare their height and weight. He carried out a similar investigation in order to find out the interests of boys and girls.

When searching more than one field, Siôn identified the difference between the *OR* and *AND* statements when searching for children with blue eyes and/or red hair.



He was set the task of searching for children with blue eyes *AND* red hair to begin, then children with blue eyes *OR* red hair.



Siôn carried out these searches and created a suitable graph from his results. This is characteristic of Level 5: pupils *create their own databases and search or sort on more than one field to follow particular lines of enquiry.*

Siôn was able to respond to his teacher's questions about why *AND* and *OR* searches gave different results. This evidence confirms that Siôn is able to use his knowledge to explain the links between cause and effect and to give reasons for his predictions. When the teacher asked Siôn to search for children with blue eyes and red hair in the classroom (i.e. without a computer), he did this successfully. However, he was fully aware of the advantages of a database for more complex searches and was able to discuss the advantages and disadvantages of using ICT rather than other methods.

Teacher:
How do you get 11 records when searching for children with blue eyes *OR* red hair, and only two when using *AND*?

Siôn:
There aren't as many children with blue eyes *AND* red hair as with one or the other.

Where next?

Siôn should now attempt to use a database to prove or disprove hypotheses in an investigation that calls for complex searches. An example would be to investigate to see if there is a link between pupils' interests and their weight.

Summary

Siôn's profile shows some characteristics of Level 5 and Level 6 but mainly the characteristics of Level 5.

Aspects of Siôn's work in ICT that are not explicitly evident in these four activities support this view. For example, in class discussions Siôn shows that he recognises some of the *implications of using networks* in comparison with stand alone computers, which is a characteristic of Level 5.

Section 4

Making judgements at the end of Key Stage 3

This section shows how level descriptions can be used when making judgements about which level best describes a learner's overall performance at the end of the key stage.

You may find the following points useful when considering the profiles in this section.

- The learner profiles are not presented as a model for how you should collect evidence about your learners. Although you will want to be able to explain why you have awarded a particular level to a learner at the end of the key stage, there is no requirement for judgements to be explained in this way or supported by detailed collections of evidence on each learner. Decisions about collecting evidence, and about its purpose and use, are matters for teachers working within an agreed school policy.
- The commentaries on the pieces of work have been written to explain the judgement made about a learner's performance. They are not intended as an example of a report to parents/guardians.
- The materials in each learner profile can only represent a small part of the information and experiences that make up a teacher's knowledge of each learner. They do not reflect the extent of the knowledge of each learner that you will have built up over time across a range of different contexts. You will use this knowledge to make a rounded judgement about the level that best fits each learner's performance.
- You will arrive at judgements by taking into account strengths and weaknesses in performance across a range of contexts and over a period of time. Opportunities will need to be provided for learners to demonstrate attainment in all aspects of the level descriptions.
- Some of your learners may need to use a range of alternative forms of communication to show what they know, what they understand and what they can do.

This section includes profiles for three learners. For each learner a description is provided that outlines the context of the activities, a summary of the ICT skills shown and possibilities for further development. Where appropriate, outlines of conversations between the learner and his/her teacher, or the learner and his/her peers, are provided to build upon the evidence available in the work itself. While the context of the activity and records of conversations add to the evidence presented in each profile, it is important to remember that images of the learners' work generally show only the final outcomes. Researching, planning and developmental work, some of which may be ephemeral in nature, should all be considered when making a judgement about the level that best fits each learner's performance.

The learner profiles shown in this section illustrate activities that have been completed on PCs using a range of software applications. Clearly, it is the nature of the activity that is important not the hardware and software used. There is no suggestion that these platforms or applications are the most appropriate ways of delivering the revised programmes of study for ICT.

Thomas | Level 5

Thomas is a 14-year-old learner in Key Stage 3.

His teacher knows much more about Thomas' performance than can be included here. However, this profile has been selected to illustrate characteristic features of Thomas' work across a range of activities. Each example is accompanied by a brief commentary to provide a context and indicate particular qualities in the work.

Thomas' teacher judges that his performance in information and communication technology is best described as Level 5.

In the commentaries accompanying each of the following activities, consideration is given to the progression Thomas could make to improve his performance in information and communication technology.

Activity 1 | Cuban missile crisis
Software: Presentation

Context

In their history lessons, the class were investigating the background to the Cuban missile crisis in the early 1960s. They were required to produce a brief presentation on the main issues. Some wrote a short newspaper report, others designed and produced a poster. Thomas designed a multimedia presentation that could be used in future history lessons to introduce this topic.

Thomas had previously used multimedia software to create simple presentations. This brief allowed him to build on these skills in order to produce a more professional presentation for a specific audience.

Pupils used the internet in their research for this activity. The teacher reminded the class at the start of the activity of the school's rules for using the internet, and held a short discussion on the safe and legal use of the internet outside of the school environment.

The learning outcomes were to:

- combine text and graphics within the presentation
- create slides that offer variety
- use animation and sound to make the presentation interesting
- present information that meets the needs of the audience.

This activity develops the following skills taken from the Key Stage 3 Programme of Study.

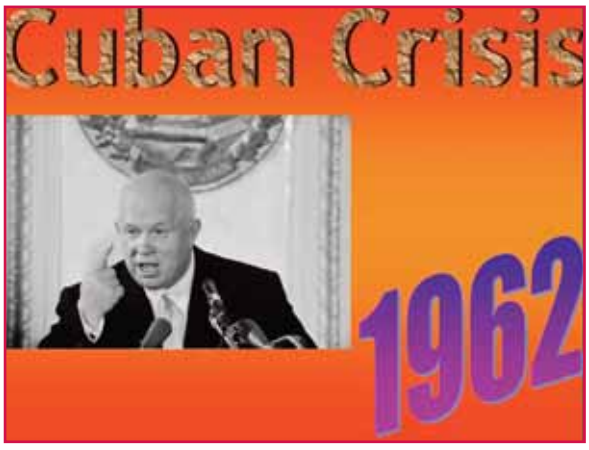
Find and analyse information
plan tasks, including consideration of purpose/audience and appropriate resources
find relevant information efficiently from a variety of sources for a defined purpose
select relevant information and make informed judgements about sources of information

Create and communicate information
create and communicate information in the form of text, images and sound, using a range of ICT hardware and software
create and develop a range of presentations, combining a variety of information and media, for specific purposes and audiences

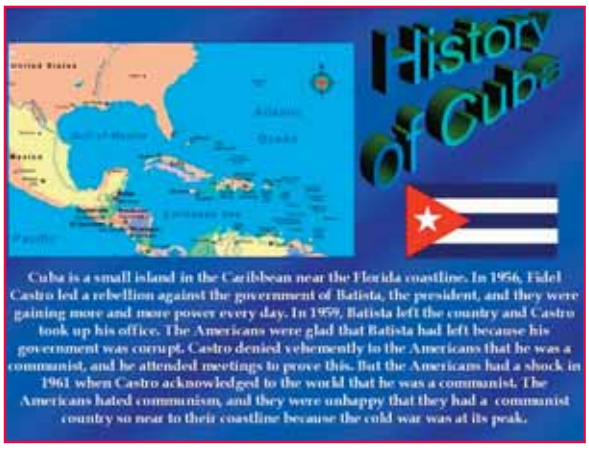
Thomas' work

Thomas designed and created a presentation using PowerPoint. He researched the topic using the internet, checking the historical facts and obtaining suitable images, whilst following the school's guidelines on acceptable use of the internet. Thomas saved the information he found in his workspace.

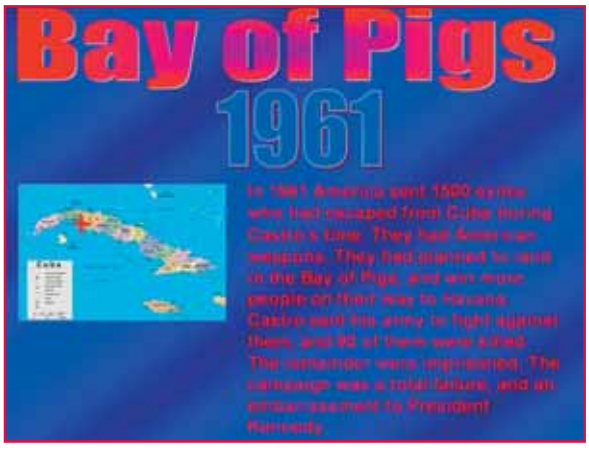
The final presentation is effective and provides a useful summary of the events surrounding the Cuban missile crisis in the early 1960s. Thomas has used a range of features within PowerPoint in an effort to make the presentation interesting for his audience. In most cases the separate animations (bulleted on the following pages) are timed to occur between one and three seconds after each other. The first slide moves to the next after 15 seconds, using 'random transition'. All other slides (except the last) move to the next after 30 seconds, again using 'random transition'.



- WordArt 'Cuban Crisis' flies from the top and music starts.
- WordArt '1962' files from the left side.
- Pictures of Kennedy, Castro and Khrushchev go across the screen from right to left (crawl).
- After the pictures pass there is an explosion from the centre of the page. The explosion (created with AutoShapes) covers the whole screen; the explosion takes place with 'zoom out from screen centre'.

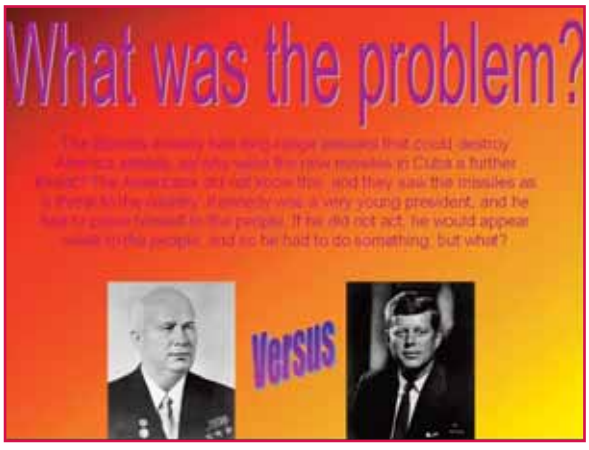


- WordArt 'History of Cuba' flies from the bottom left corner of the page with a 'whoosh' sound.
- The flag of Cuba flies from the right side with the sound 'breaking glass'.
- The map makes a swivel and there are gun sounds.
- A text box appears with 'dissolve'.

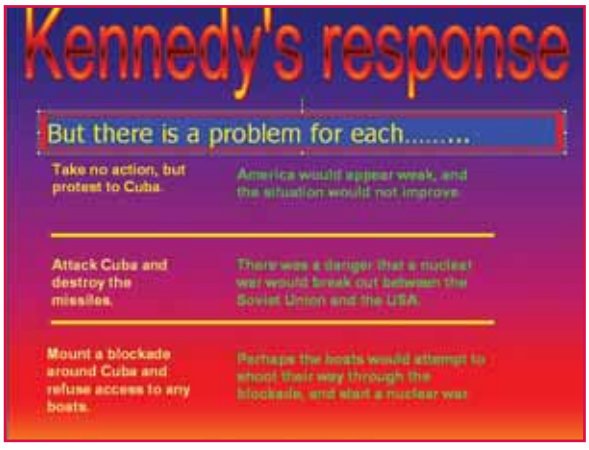


- WordArt 'Bay of Pigs' flies from the top and 'suspense' sound comes on.
- WordArt '1961' flies from the bottom with a 'whoosh' sound.
- The map appears with 'zoom out' and with 'chimes' sound. Immediately a star (AutoShapes) appears.
- The text flies from the right.

- An aeroplane flies from the left to the right (crawl).
- WordArt 'A discovery' flies from the top with a 'gunshot' sound.
- The text flies from the bottom with 'whoosh' sound.
- The air picture appears with 'stretch from bottom'; immediately the text and arrow (grouped) fly from the side.

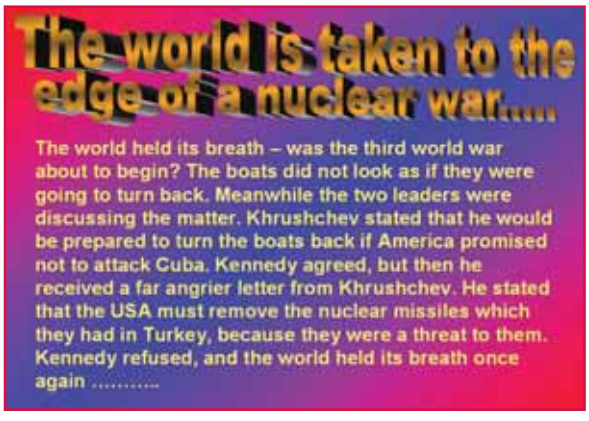


- WordArt 'What was the problem?' flies from the top with 'suspense' sound.
- The text flies from the bottom with 'glide' sound.
- A picture of Khrushchev flies from the left with 'whoosh' sound.
- The WordArt 'Versus' flies from the top with 'drumroll' sound.
- A picture of Kennedy flies from the left with 'whoosh' sound.

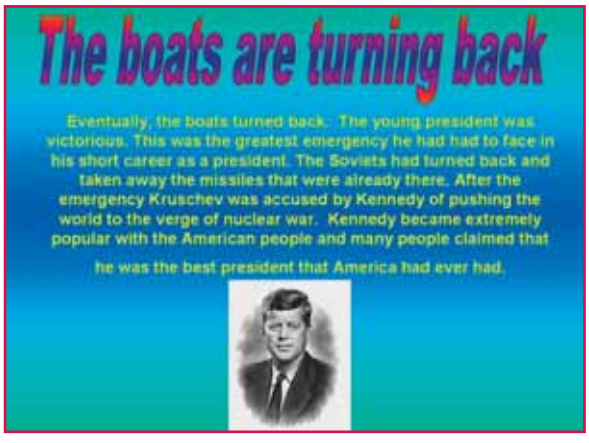


- WordArt 'Kennedy's response' flies from the top with 'ricochet' sound.
- 'These were the choices that Kennedy had' flies from the right with 'clapping' sound.
- Group 1 (yellow lines) flies from the bottom left corner. The yellow captions fly from the right every second with 'typewriter' sound.
- The text box 'But there is a problem for each' flies from the right, with 'explosion' sound and covers the original text.
- The green captions fly from the right (at one second intervals) with 'gunshot' sound.

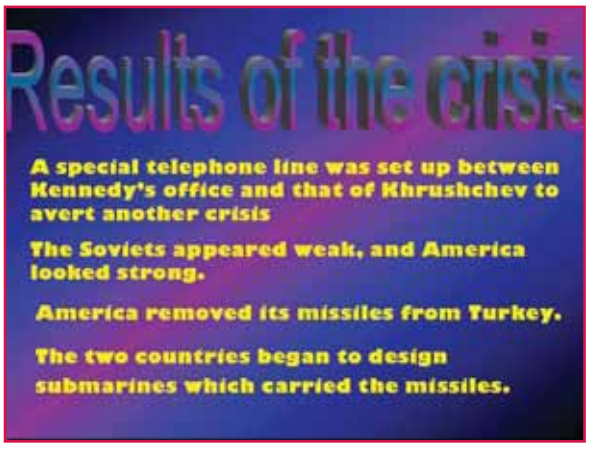
- WordArt 'The situation' and the map are already present.
- Text 'This is where the missiles were' flies from the left with 'gunshot' sound.
- The pictures of the missiles appear in Cuba. The text 'Here are their distances' flies from the right, with 'gunshot' sound, covering the original text.
- The red circles and text appear.
- The text 'This is the American force blockade' flies from the right, with the 'gunshot' sound, covering the '…distances' text.
- The blue freeform line around Cuba appears.
- Finally, the text 'Here are the Soviet ships' flies from the right, with 'gunshot' sound, covering the '…blockade' text.



- WordArt appears – 'dissolve' with 'explosion' sound'.
- The yellow text flies from the right side with 'whoosh' sound.



- WordArt 'The boats are turning back' appears from the top with a 'whoosh' sound.
- The main text appears with the sound 'applause'.
- The picture of Kennedy appears, 'stretch from bottom' with a 'clapping' sound.



- WordArt appears from the top with the sound 'explosion'.
- The yellow headings appear from the right every one second with the sound 'typewriter'.
- The presentation finishes after 20 seconds.

Where next?

In order to make progress, Thomas could evaluate his presentation by asking pupils (the intended audience) for their views, and his history and ICT teachers for theirs. Thomas could use this feedback to improve the presentation, possibly aiming for a more consistent style throughout all slides whilst retaining the interest of pupils. He could also consider navigation through the presentation for pupils who read at different speeds.

Activity 2 | Sending an e-mail

Software: E-mail/messaging

Context

Thomas' year group has completed a number of different presentations on a range of important events in history. Thomas' teacher suggested that pupils could share their presentations as a useful way of reinforcing their class-based activities. Each pupil was to invite up to six others to look at their presentation then feedback on its strengths and weaknesses.

Thomas decided to write a message to six friends, telling them that his presentation is saved on the school network, and asking them to look at it and answer a few questions. Thomas decided to send a short questionnaire, in Word format, as an attachment to the e-mail. He intended to analyse the responses and save them in his workspace for future reference.

The learning outcomes were to:

- send and receive messages
- load, keep and print messages
- send e-mails to a selected group using an address book
- attach a file to an e-mail
- use the tools available to communicate information effectively
- show awareness of a specific audience.

This activity develops the following skill taken from the Key Stage 3 Programme of Study.

Create and communicate information
share and exchange information safely through electronic means

This activity also provides opportunities to gain an understanding of the importance of adopting safe practices when e-mailing/messaging as highlighted in the Key Stage 3 Programme of Study.

Health, safety and child protection
Pupils should be taught how to use ICT comfortably, safely and responsibly, and to consider the hazards and risks in their activities. They should be able to follow instructions to minimise risks to themselves and others and understand that disclosing personal details can put themselves and others at risk.

The teacher reminded the group how to:

- add to the names in the address book, and use these to write messages and send copies
- send attached files
- show good practice, e.g. add new folders as necessary.

As a class, pupils compared the advantages and disadvantages of ICT compared with other methods of communication. Although they were sending messages within school, they discussed its use in the wider world and the specific advantages of electronic communications across large distances. The teacher broadened the discussion on the

Teacher:
Why have you included some images from your presentation in your questionnaire?

Thomas:
I want to make it look more colourful so that people will fill it in.

Teacher:
How else could these images be helpful?

Thomas:
I could use one to ask a question.

Teacher:
Can you give me an example?

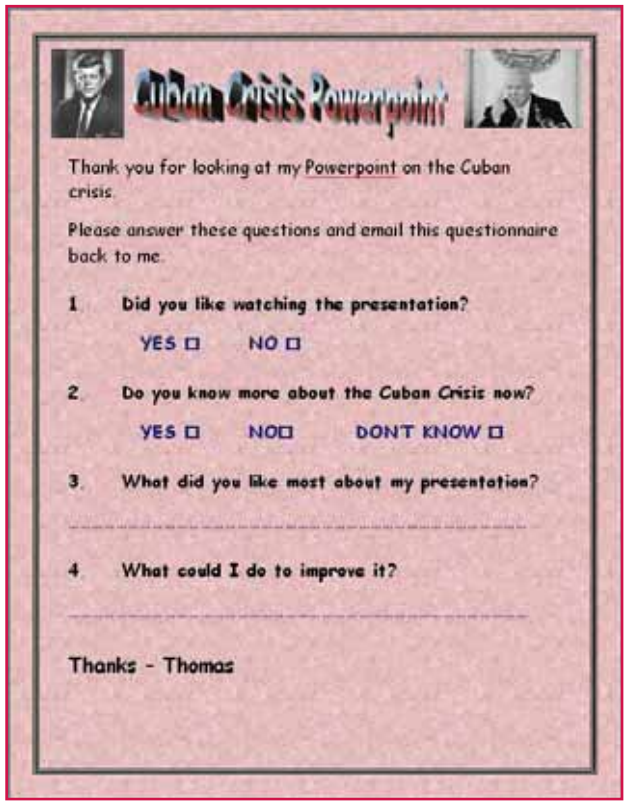
Thomas:
I could have the slide showing the American blockade and the Soviet ships and ask 'Does this help you understand how the blockade worked?'

use of e-mail to include issues such as what might happen when large attachments are sent, or if the recipient does not have the software used to create the attachment. The risk of receiving a virus was discussed along with the dangers of disclosing personal details in e-mails or on social networking sites and chat rooms.

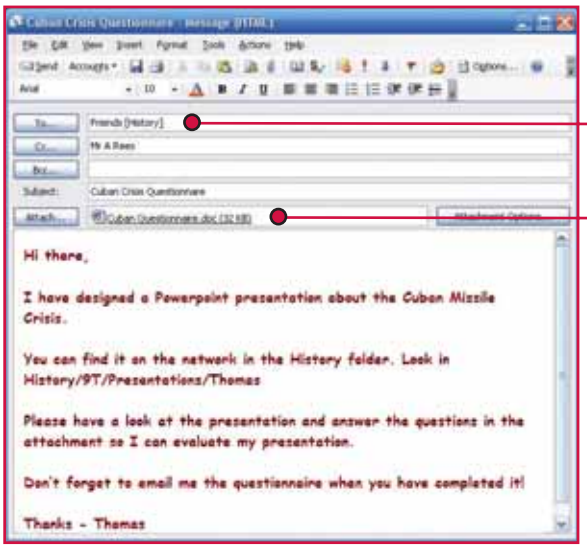
Thomas' work

Thomas has experience of sending e-mails in school and from his home computer. He sent the message about his presentation to six friends in his history class. He used the address book to do this and sent a copy of the message to his teacher.

Thomas designed a short questionnaire about his presentation, adding some images from the presentation to make it interesting.



Part of Thomas' e-mail message is shown here. He followed the school's acceptable use policy in producing and distributing this message.



Using a folder in the address book

Sending an attachment

Teacher:
Could you attach your presentation to the e-mail?

Thomas:
Yes – it is the same as adding the questionnaire.

Teacher:
You attach it in the same way, but is there anything you'd need to think about if you were sending it to people at home?

Thomas:
I'd have to make sure they have PowerPoint to open it.

Teacher:
Anything else?

Thomas:
You need to check the size because some PowerPoint files are very big.

Questioning by his teacher revealed that Thomas has a good understanding of some of the issues surrounding sending attachments with e-mails.

Thomas attached his questionnaire and sent the message independently and confidently. He could also identify the advantages of this method of communication.

Thomas' work shows good planning and he has formed an opinion about issues raised by the use of ICT and is aware of the dangers associated with misuse of the internet/ associated technologies.

Where next?

Thomas could use the feedback from his questionnaire to evaluate the success of his presentation, and use this information when developing future presentations. In terms of e-mail, having discussed how helpful it would be to know that recipients have opened his message, Thomas' teacher could help him set up a 'read receipt'. Thomas could then send a message to a small group of friends to see how this works.

Activity 3 | Mobile phone tariffs
Software: Spreadsheet

Context

Thomas' teacher selected the theme of mobile phone tariffs as a relevant and motivating context for some modelling work. Many of the pupils in Thomas' class use mobile phones on a daily basis for speaking and texting. Some also use their phones to browse the web.

The teacher introduced the work by discussing how it was important to select the correct phone contract, bearing in mind the type and extent of use. A discussion was held on the benefits of 'pay as you go' and 'pay monthly' options and a quick survey around the class revealed pupils used a mixture of different providers and contracts.

The teacher explained that as a starting point they would be looking at the costs of various contracts for making phone calls. Pupils were given the opportunity to develop this work by considering other variables such as texting later. The teacher also explained the use of absolute cell referencing, and how this applied to cell B3 in the phone tariff spreadsheet.

The learning outcomes were to:

- explore patterns and relationships in a spreadsheet
- make predictions about how changing one variable affects another
- use absolute and relative cell referencing.

This activity develops the following skills taken from the Key Stage 3 Programme of Study.

Find and analyse information
produce and use models and/or simulations to analyse data and test hypotheses investigate more complex patterns and relationships in models and/or simulations

Thomas' work

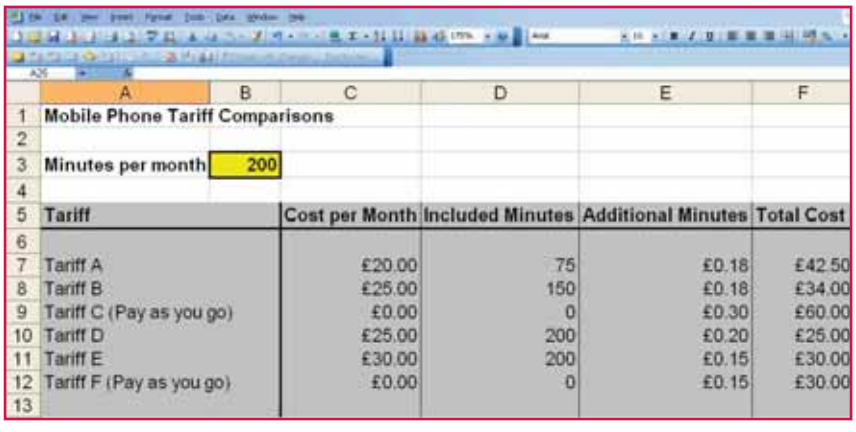
Thomas knows that each cell has a reference with a letter for every column and a number for every row, which gives the cell a unique reference. He knows that this reference can be used to link cells in a table.

The teacher provided a spreadsheet with details of tariffs which were available at the time with well-known providers, to add realism and relevance to the activity. It has been necessary to replace the providers' names with the letters A to G in this guidance.

Thomas opened the phone tariff spreadsheet provided by the teacher. This included details of six tariffs with the total cost of 200 minutes calculated for the first tariff, using the formula =(($B$3-D7)*E7)+C7 where B3 contains the number of minutes, D7 the number of free minutes, E7 the cost of additional minutes and C7 the cost per month.

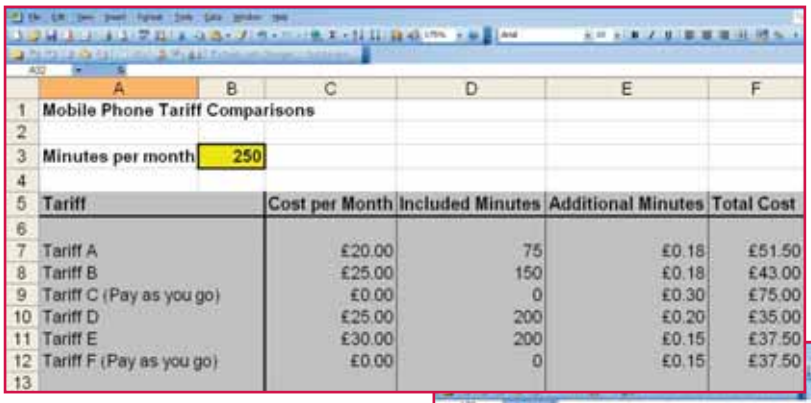
Thomas worked his way through the following task.

> Siân uses her mobile phone to make about 200 minutes of calls each month. Alison makes about 250 minutes of calls while Robert makes about 300 minutes of calls.
>
> Use the spreadsheet model to decide which would be the cheapest tariff for each of these people.



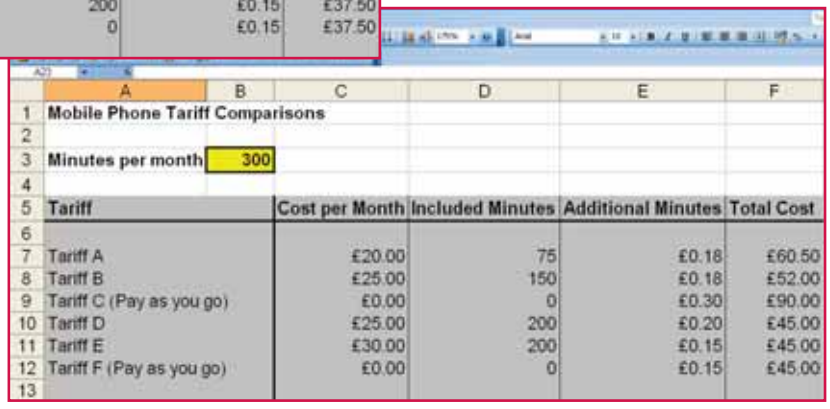
	A	B	C	D	E	F
1	Mobile Phone Tariff Comparisons					
2						
3	Minutes per month	200				
4						
5	Tariff		Cost per Month	Included Minutes	Additional Minutes	Total Cost
6						
7	Tariff A		£20.00	75	£0.18	£42.50
8	Tariff B		£25.00	150	£0.18	£34.00
9	Tariff C (Pay as you go)		£0.00	0	£0.30	£60.00
10	Tariff D		£25.00	200	£0.20	£25.00
11	Tariff E		£30.00	200	£0.15	£30.00
12	Tariff F (Pay as you go)		£0.00	0	£0.15	£30.00
13						

Thomas copied the formula for calculating the total cost into the relevant cells and printed the results for 200, 250 and 300 minutes. He used this information to correctly identify the cheapest tariffs for each level of usage.



	A	B	C	D	E	F
1	Mobile Phone Tariff Comparisons					
2						
3	Minutes per month	250				
4						
5	Tariff		Cost per Month	Included Minutes	Additional Minutes	Total Cost
6						
7	Tariff A		£20.00	75	£0.18	£51.50
8	Tariff B		£25.00	150	£0.18	£43.00
9	Tariff C (Pay as you go)		£0.00	0	£0.30	£75.00
10	Tariff D		£25.00	200	£0.20	£35.00
11	Tariff E		£30.00	200	£0.15	£37.50
12	Tariff F (Pay as you go)		£0.00	0	£0.15	£37.50
13						

Questioning by his teacher revealed that Thomas has a good understanding of what the results show and, using his experience as a mobile phone user, of what other factors affect choice.



	A	B	C	D	E	F
1	Mobile Phone Tariff Comparisons					
2						
3	Minutes per month	300				
4						
5	Tariff		Cost per Month	Included Minutes	Additional Minutes	Total Cost
6						
7	Tariff A		£20.00	75	£0.18	£60.50
8	Tariff B		£25.00	150	£0.18	£52.00
9	Tariff C (Pay as you go)		£0.00	0	£0.30	£90.00
10	Tariff D		£25.00	200	£0.20	£45.00
11	Tariff E		£30.00	200	£0.15	£45.00
12	Tariff F (Pay as you go)		£0.00	0	£0.15	£45.00
13						

Teacher:
Looking at these models, Tariff C seems an expensive option – why do you think that is the case?

Thomas:
Because the cost of calls is the most expensive and even 200 minutes a month is a lot of calls.

Teacher:
So who might that tariff suit the best?

Thomas:
Someone who only uses their phone for emergencies.

Teacher:
Robert seems to have a choice of three tariffs as they all cost the same for 300 minutes per month. How do youthink he could decide which to select?

Thomas:
He could see what phones come with each one and pick the one he likes the best.

Thomas then worked on an additional task given by his teacher.

There are lots of other tariffs available. Look at the following details about a tariff that is quite different to the ones in your model so far.

This tariff (G) costs £75 per month and includes 3000 free minutes. If you go beyond this, extra minutes cost 20 pence each.

Modify your model to try to find out how much Siân would pay each month if she selects this tariff.

Teacher:
That looks like a good deal – does it mean Siân gets nearly £500 a month off the phone company?

Thomas:
No!

Teacher:
What has happened then?

Thomas:
Something is wrong with the formula.

Teacher:
Did you copy it correctly?

Thomas:
(After checking) Yes.

Teacher:
Describe to me what the first part of the formula does – B3 minus D15.

Thomas:
It takes the free minutes away from the minutes used.

Teacher:
What would that be in this case?

Thomas:
3000 away from 200.

Teacher:
Do you think that is where the problem is?

Thomas:
Yes – it is too much.

Teacher:
So the model doesn't work in all cases. Can you think of a rule to describe when it does work?

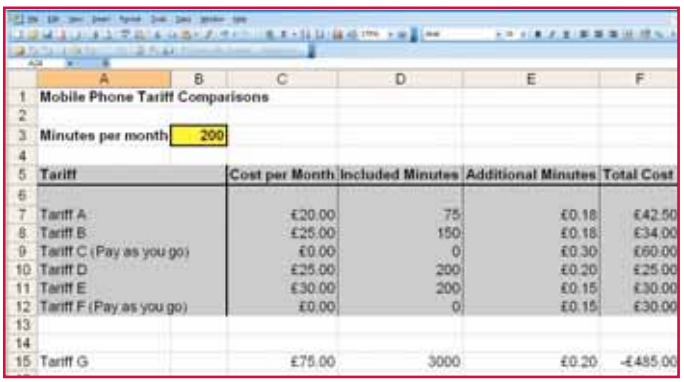
Thomas:
If the minutes used is more than the free minutes.

Teacher:
Yes – actually it would work if the minutes per month was equal to the free minutes too.

Thomas:
OK.

Thomas was able to correctly enter the information about the additional tariff into his spreadsheet. He copied the 'Total Cost' formula correctly but initially forgot to enter the value of 200 into cell B3 (he had last saved the model with a value of 300 in here). He quickly corrected this and realised that the answer was still wrong.

Thomas approached the task in a logical way and produced a successful spreadsheet model. He is confident using ICT and understands how the spreadsheet works. He shows interest in how the spreadsheet works automatically and how it can easily be changed to incorporate additional data.

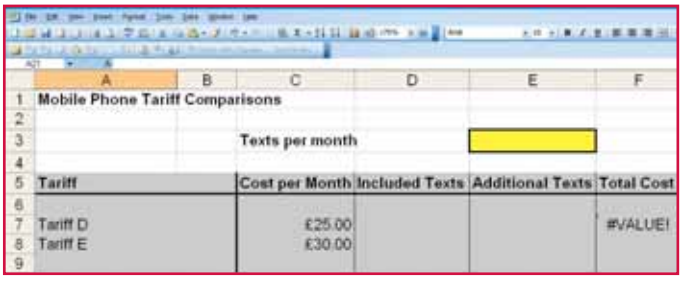


	A	B	C	D	E	F
1	Mobile Phone Tariff Comparisons					
2						
3	Minutes per month	200				
4						
5	Tariff		Cost per Month	Included Minutes	Additional Minutes	Total Cost
6						
7	Tariff A		£20.00	75	£0.18	£42.50
8	Tariff B		£25.00	150	£0.18	£34.00
9	Tariff C (Pay as you go)		£0.00	0	£0.30	£60.00
10	Tariff D		£25.00	200	£0.20	£25.00
11	Tariff E		£30.00	200	£0.15	£30.00
12	Tariff F (Pay as you go)		£0.00	0	£0.15	£30.00
13						
14						
15	Tariff G		£75.00	3000	£0.20	-£485.00

Where next?

As the next step, the teacher has prepared the following task.

> Load up the spreadsheet template called 'Costs of texts'. This has a similar format to the first template, but we will develop this to work out the costs including texting for the two tariffs shown.



	A	B	C	D	E	F
1	Mobile Phone Tariff Comparisons					
2						
3			Texts per month			
4						
5	Tariff		Cost per Month	Included Texts	Additional Texts	Total Cost
6						
7	Tariff D		£25.00			#VALUE!
8	Tariff E		£30.00			
9						

If you check back to your earlier work you'll see that both tariffs give 200 free minutes of phone calls. To simplify things, we'll assume that we are working this out for Siân and that she uses exactly 200 minutes of calls each month. That means we can concentrate on the costs of texting without worrying about what happens if she makes more or less minutes of calls.

Details of the tariffs are as follows:

- Tariff D includes 400 free texts each month; additional texts cost 12p each.
- Tariff E includes 300 free texts per month; additional texts cost 10p each.

Which will be the cheapest tariff for Siân if she sends about 450 texts per month?

Hint – at the moment cell E7 contains the formula =(($B$3-D7)*E7)+C7
This was used to calculate the costs of calls when the number of minutes was entered into cell B3. You'll need to modify the formula now that the number of texts will be entered into cell E3.

Activity 4 | Music database
Software: Data handling

Context

To introduce the activity, Thomas' teacher reminded the class of the concepts of creating, searching and sorting a database. In particular he explained how searches could be made on one field or on two (or more) fields and how, when searching on two fields *AND* or *OR* operators can help us find particular information.

Once the teacher had completed the introduction, some groups of pupils handled ready-made databases whilst others created their own. Thomas was amongst those who created their own database using Access. He decided to develop a database of part of his music collection so that he could search for particular artists.

The learning outcomes were to:

- create their own database
- do a search on more than one field to follow a particular line of enquiry
- show understanding of data-handling concepts.

This activity develops the following skills taken from the Key Stage 3 Programme of Study.

Find and analyse information
select relevant information and make informed judgments about sources of information
produce and use databases to analyse data and follow particular lines of enquiry

Thomas' work

Thomas created a database with 15 records and five fields: Artist, Album, Favourite Track, Label, Rating (1–3).

To collect the data he printed a table in Word with five columns and 20 rows. He took this home, entered the details of part of his CD collection and brought the completed table back to school to enter the data into his database.

Artist	Album	Favourite Track	Label	My Rating
Outkast	Outkast - Speakerboxxx	Hey Ya!	Arista	2
Snow Patrol	CD Single	Chasing Cars	Fiction	2
Snow Patrol	CD Single	Run	Polydor	2
Amy Winehouse	Back To Black	Back To Black	Universal Records	1
Erasure	Erasure - Pop!	Blue Savannah	Mute Records	3
Bon Jovi	Music Of The Millennium (Various)	Livin' On A Prayer	Universal Music TV	3
Amy Winehouse	CD Single	Rehab	Island	1
Scissor Sisters	CD Single	I Don't Feel Like Dancin'	Polydor	2
Kylie Minogue	CD Single	Wow	Parlophone	2
Prince	Prince - The Very Best Of	Let's Go Crazy	Warner Bros	3
Talk Talk	More Greatest Hits Of 80's (Various)	It's My Life	Disky	3
Kate Bush	Kate Bush - The Whole Story	Running Up That Hill	EMI	2
Queen	Queen - Greatest Hits	We Are The Champions	Parlophone	1
James Blunt	CD Single	You're Beautiful	Atlantic	2
David Bowie	David Bowie - Best Of Bowie	Ashes To Ashes	EMI	1

Teacher:
Your database seems to be almost finished Thomas. Has it been easy to enter all the data?

Thomas:
Some bits were quick because I know how to spell most of theartists. I've had to be really careful with the labels though.

Teacher:
Would it matter if you spelled 'Parlophone' in two different ways?

Thomas:
Yes, I might only find one when I was searching for it.

Thomas created his database with only a little help from his teacher to set up the five fields. He entered his data and spent some time checking the spelling because of the nature of the text and the unusual spellings in some cases. He understood that any spelling errors would cause problems when he came to search the database for specific information.

Thomas successfully carried out a number of sorts and searches on his database. Examples are shown here.

Sort alphabetically by Artist

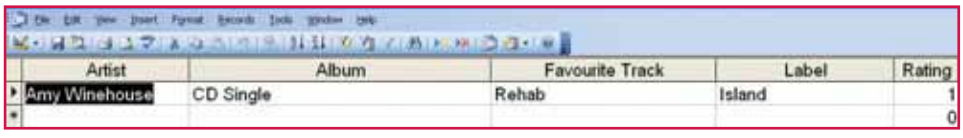
CD Collection : Table

Artist	Album	Favourite Track	Label	Rating
Amy Winehouse	CD Single	Rehab	Island	1
Amy Winehouse	Back To Black	Back To Black	Universal Records	1
Bon Jovi	Music Of The Millennium (Various)	Livin' On A Prayer	Universal Music TV	3
David Bowie	David Bowie - Best Of Bowie	Ashes To Ashes	EMI	1
Erasure	Erasure - Pop!	Blue Savannah	Mute Records	3
James Blunt	CD Single	You're Beautiful	Atlantic	2
Kate Bush	Kate Bush - The Whole Story	Running Up That Hill	EMI	2
Kylie Minogue	CD Single	Wow	Parlophone	2
Outkast	Outkast - Speakerboxxx	Hey Ya!	Arista	2
Prince	Prince - The Very Best Of	Let's Go Crazy	Warner Bros	3
Queen	Queen - Greatest Hits	We Are The Champions	Parlophone	1
Scissor Sisters	CD Single	I Don't Feel Like Dancin'	Polydor	2
Snow Patrol	CD Single	Run	Polydor	2
Snow Patrol	CD Single	Chasing Cars	Fiction	2
Talk Talk	More Greatest Hits Of 80's (Various)	It's My Life	Disky	3
				0

Search for CD Single

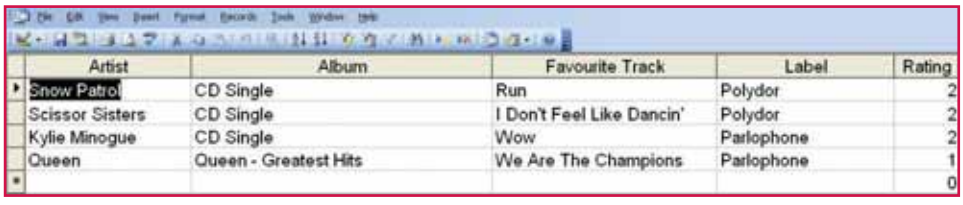
Artist	Album	Favourite Track	Label	Rating
Snow Patrol	CD Single	Chasing Cars	Fiction	2
Snow Patrol	CD Single	Run	Polydor	2
Amy Winehouse	CD Single	Rehab	Island	1
Scissor Sisters	CD Single	I Don't Feel Like Dancin'	Polydor	2
Kylie Minogue	CD Single	Wow	Parlophone	2
James Blunt	CD Single	You're Beautiful	Atlantic	2
				0

Search for CD Single *AND* a Rating of 1



Artist	Album	Favourite Track	Label	Rating
Amy Winehouse	CD Single	Rehab	Island	1
				0

Search for Polydor *OR* Parlophone Labels



Artist	Album	Favourite Track	Label	Rating
Snow Patrol	CD Single	Run	Polydor	2
Scissor Sisters	CD Single	I Don't Feel Like Dancin'	Polydor	2
Kylie Minogue	CD Single	Wow	Parlophone	2
Queen	Queen - Greatest Hits	We Are The Champions	Parlophone	1
				0

Thomas was able to carry out the searches and sorts independently. When searching more than one field, he understood the difference between the *OR* and *AND* statements and devised realistic searches to develop these skills.

Where next?

As the next step, Thomas could add some more of his CD collection to the database and carry out further complex searches. He could, for example, search the database to prove or disprove a hypothesis such as 'CD singles tend to have high ratings because the decision to purchase is based on liking the one song'. Thomas could also think about other reasons for which he might search a music database and consider whether additional fields such as genre would be useful to have.

Summary and overall judgement

Levels 5 and 6 were considered and Level 5 was judged to be the best fit. This judgement was made because although Thomas' broader understanding of the issues concerning the use of ICT and the internet demonstrate characteristics of Level 6, his presentation, communication, modelling and data-handling work show mainly characteristics of Level 5.

The Cuban missile crisis presentation demonstrates mainly characteristics of Level 5. Thomas has incorporated text with a range of font sizes, colours and types, animation, transition effects and sound into his presentation. This demonstrates characteristics of Level 5: pupils *combine a variety of information and media when creating, refining and developing their own ideas and information.* The presentation is effective and pitched at about the right level for the intended audience, another characteristic of Level 5: pupils' *presentations are fit for purpose and meet the needs of their intended audience.*

In his e-mail activity, Thomas' questionnaire demonstrates characteristics of Level 5: pupils *combine a variety of information and media when creating, refining and developing their own ideas and information.* His e-mail message also demonstrates characteristics of Level 5 as he used *ICT to send and receive files electronically* and there is clear evidence that he *planned his task for purpose and audience.*

Thomas' modelling work shows mainly characteristics of Level 5. He started with a template provided by the teacher but had to amend a formula and add data: evidence that he can create his *own models or simulations and investigate the effect of changing data.* In discussions with his teacher, it was clear that Thomas understood the factors that might influence a user's choice of mobile phone tariff and, with prompting, he was able to identify the limitations of his model.

Thomas' database activity demonstrates a great deal of independent work. He collected the relevant data from his CD collection at home and entered this into a database he created in school. Thomas successfully carried out a number of sorts and searches, including searches involving the *AND* and *OR* operators. This is characteristic of Level 5: pupils *create their own databases and search or sort on more than one field to follow particular lines of enquiry.*

Aspects of Thomas' work in ICT that are not explicitly evident in these three activities show some characteristics of Level 6. For example, in class discussions Thomas shows that he has *opinions about issues raised by the use of ICT* and that he has a good understanding of *the dangers associated with the misuse of the internet*, which are both characteristics of Level 6.

Branwen | Level 6

Branwen is a 14-year-old learner in Key Stage 3.

Her teacher knows much more about Branwen's performance than can be included here. However, this profile has been selected to illustrate characteristic features of Branwen's work across a range of activities. Each example is accompanied by a brief commentary to provide a context and indicate particular qualities in the work.

Branwen's teacher judges that her performance in information and communication technology is best described as Level 6.

In the commentaries accompanying each of the following activities, consideration is given to the progression Branwen could make to improve her performance in information and communication technology.

Activity 1 | Teen newspaper front page

Software: DTP

Context

The class investigated newspapers from the point of view of purpose, and the use of ICT in their design and production.

The teacher introduced the activity by discussing the following using the interactive whiteboard:

- newspaper purpose – targeted audiences
- existing front pages (electronic versions from www.newseum.org/todaysfrontpages) using interactive whiteboard tools to show good practice and page setup, i.e. frames, text flow, different text sizes
- identification of realistic success criteria for the front page
- layout styles, font styles/sizes and their effectiveness.

Pupils were given the task of designing a newspaper front page, with the type of newspaper and content left to their own choice. Each pupil was given 20 minutes to browse through examples on the Newseum website and download two or three front pages of their choice. These were then used as stimulus for their work.

The learning outcomes were to develop new skills and review/practice previously developed skills as follows:

- new software skills
  - create equally sized text frames, copy and paste, group, resize
  - linking text frames
  - drop caps
- previous skills reviewed
  - layering
  - right, centre and left tabs.

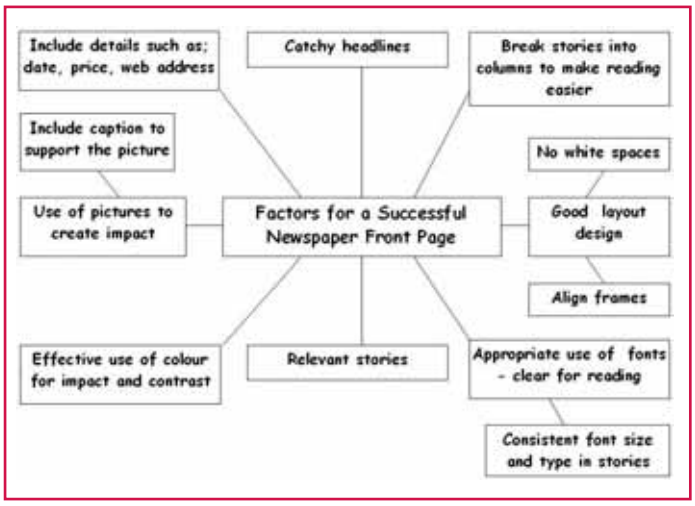
This activity develops the following skills taken from the Key Stage 3 Programme of Study.

Find and analyse information
find relevant information efficiently from a variety of sources for a defined purpose select relevant information and make informed judgements about sources of information

Create and communicate information
create and communicate information in the form of text, images and sound, using a range of ICT hardware and software

Branwen's work

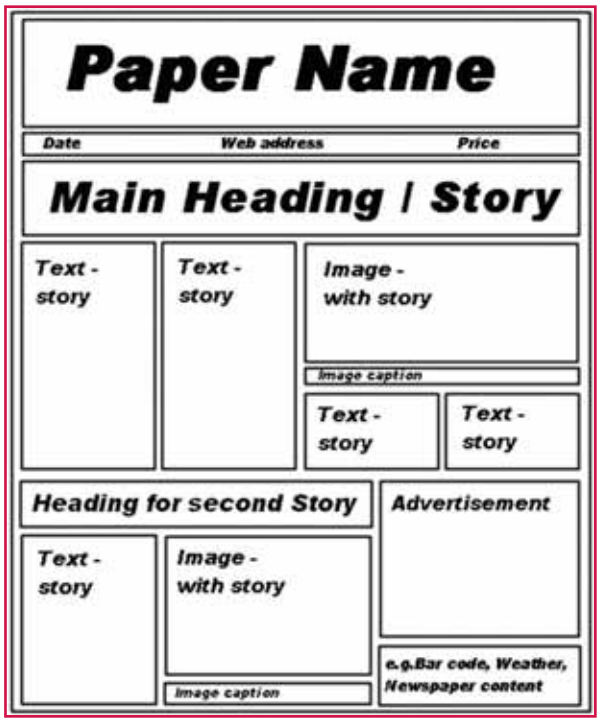
Branwen decided to produce a front page for a teen lifestyle newspaper. She decided that it would contain information and articles about themes such as celebrities, music, entertainment and sport. Branwen researched similar articles on a range of websites and used the Newseum website to look for designs that would match her targeted audience.



Possible design for front page

Branwen has planned the activity well, initially considering the important factors in page design, then moving on to some hand-drawn plans to help develop this layout.

She has built on her existing skills, knowledge and experience in desktop publishing and developed new skills such as linking text frames and creating drop capitals to achieve the desired outcome.



Branwen did not use a template to create this front page; it was planned mainly by looking at existing examples and being aware of the required content. Branwen adhered strongly to the good practice that was pointed out by the teacher at the beginning of the task.

Branwen has thought about the layout and the alignment/positioning of items on the page and her font selection/size is appropriate. An appreciation of audience is clearly evident and effective use has been made of various designs found on the newspaper examples that Branwen downloaded from the internet. Refinements were made to ensure that the final printout appeared as professional as possible.

Branwen followed the school's guidelines on use of the internet whilst researching existing front pages and finding suitable images for her front page.

Teacher:
If you needed to create a new front page for next week's edition what steps would you take?

Branwen:
Find out what stories were making the news.

Teacher:
How will your existing newspaper help you?

Branwen:
I don't think that I would start from scratch because all the headings and layouts have already been created. I would have to change information such as the date and also think of new headings, find relevant images and stories.

Teacher:
How do you think daily newspapers manage this?

Branwen:
Probably quite similar to this – they probably have some sort of template where all they change are the headings, stories and images.

Teacher:
Do you think that the stories and images fit into the same size boxes?

Branwen:
No, they probably have to play about with the layout to get everything to fit in nicely.

The finished front page

Branwen produced a number of drafts of her front page, refining her layout as the content developed. As her main story grew in size, Branwen decided to abandon plans to have a second story on the front page, and noted that this would be placed on page 2. Judged against the criteria for this task, Branwen's finished front page is successful.


The Daily News

Monday 5 March 2007 www.dailynews.co.uk 75p

Who's playing at the Millennium Stadium?

Win A Holiday in The Sun!!!

Page 16 Page 22

CHURCH TURNS TO POP

Charlotte Church said she has returned to her "belter" voice for her first pop single, eschewing the classical tunes which made her famous.

The 19-year-old's new single entitled Crazy Chick, was played on Radio 1 ahead of its release next month.

"It's the big strong belter voice, which is how I sang before I sang classical," she told the BBC. Wales-based bookmakers Jack Brown are offering odds of 5-2 on the record going straight to No. 1 in the charts.

Cardiff-based Church told Radio 1: "The record's quite poppy but it's got a bit of Motown influence, which I think is pretty cool. "I'm singing my little heart out on it."

She said her "belter" voice was the one she used before she started singing classical numbers at age eight. "So I've always been able to sing like that, so it was a pretty natural transition for me, really."

BBC entertainment reporter Briggy Smale said she was surprised by Church's delivery of the number.

She said: "People are going to be very surprised to find that it's her because of the voice because there is no hint of what she was before in it.

"She's got the strength in the voice. She clearly has got a far better voice than most of the current female pop singers.

"It's definitely better than the dance track a few years ago when she was still singing in her opera style.

Free Beauty Bible For This Coming Summer!

LIVERPOOL 1 - 0 CHELSEA

BACK PAGE

In responding to questions from her teacher, it is also clear that Branwen appreciates how, having developed a successful layout, ICT software could help speed up the production of subsequent editions of the teen newspaper.

Where next?

Branwen has created a professional front page that appears appropriate for her target audience. Through creating a sports back page, she would add a greater range to the content and provide opportunities to consider alternative layouts, still with the audience in mind. Alternatively she could consider a different type of publication for a different audience or develop a teen lifestyle website.

Activity 2 | Analysing pupils' marks
Software: Spreadsheet

Context

The aim of the task was to see how spreadsheets are used practically in school to store and analyse information that is collected on pupils.

The teacher introduced the task by holding a class discussion to see if the pupils knew how and where spreadsheets were used in school. As a result of their familiarity with computerised registration, many of them gave this as their response; others mentioned that some teachers used spreadsheets for their class registers, and to store pupils' marks for examinations and coursework.

The class were then shown a spreadsheet that was used by a Head of Year in a fictitious school to examine pupils' progress in three subjects; this was shown on the interactive whiteboard so that it could be developed during the discussion.

The initial spreadsheet contained the data but no formulas. The pupils first looked at the way the spreadsheet was formatted. Following a discussion, the % columns were formatted to 'percentage' with 0 decimal places.

	A	B	C	D	E	F	G
1	EXAMINATION RESULTS FOR FORM 9W						
2							
3		Mathematics	%	English	%	Welsh	%
4	Total Marks	60		80		120	
5							
6	Name						
7	Gemma Butler	47		65		110	
8	Judith Davies	32		54		108	
9	Karen Evans	45		69		98	
10	Michelle Frost	12		33		56	
11	Katie Grace	23		27		49	
12	Rachel Jones	56		69		57	
13	Sarah Jones	51		72		98	
14	Catherine Llewellyn	34		45		74	
15	Emma Reed	17		29		50	
16	Hayley Williams	34		30		24	

	A	B	C	C
1	EXAMINATION RESULTS FOR FORM 9W			
2				
3		Mathematics	%	%
4	Total Marks	60		
5				
6	Name			
7	Gemma Butler	47	78%	=(B7/B4)
8	Judith Davies	2	#DIV/0!	=(B8/B5)
9	Karen Evans	45	#DIV/0!	=(B9/B6)
10	Michelle Frost	12	26%	=(B10/B7)
11	Katie Grace	23	72%	=(B11/B8)
12	Rachel Jones	56	124%	=(B12/B9)
13	Sarah Jones	51	425%	=(B13/B10)
14	Catherine Llewellyn	34	148%	=(B14/B11)
15	Emma Reed	17	30%	=(B15/B12)
16	Hayley Williams	34	67%	=(B16/B13)

The pupils then considered the formula to calculate Gemma Butler's percentage in Mathematics. The initial formula suggested by Branwen was = (B7/B4). This was used to show that it produced errors when copied for the other pupils as it meant some pupils' marks were being divided by a blank cell and others were being divided by someone else's mark rather than the total. The teacher explained that to make the formula work it always had to be divided by B4.

	A	B	C
1	EXAMINATION RESULTS FOR FORM 9W		
2			
3		Mathematics	%
4	Total Marks	60	
5			
6	Name		
7	Gemma Butler	47	78%
8	Judith Davies	32	53%
9	Karen Evans	45	75%
10	Michelle Frost	12	20%
11	Katie Grace	23	38%
12	Rachel Jones	56	93%
13	Sarah Jones	51	85%
14	Catherine Llewellyn	34	57%
15	Emma Reed	17	28%
16	Hayley Williams	34	57%

	A	B	C
1	EXAMINATION RESUL		
2			
3		Mathematics	%
4	Total Marks	60	
5			
6	Name		
7	Gemma Butler	47	=(B7/$B$4)
8	Judith Davies	32	=(B8/$B$4)
9	Karen Evans	45	=(B9/$B$4)
10	Michelle Frost	12	=(B10/$B$4)
11	Katie Grace	23	=(B11/$B$4)
12	Rachel Jones	56	=(B12/$B$4)
13	Sarah Jones	51	=(B13/$B$4)
14	Catherine Llewellyn	34	=(B14/$B$4)
15	Emma Reed	17	=(B15/$B$4)
16	Hayley Williams	34	=(B16/$B$4)

The class discussed how to make the formula work. Branwen suggested they use 60 instead of B4, but the teacher explained that if the spreadsheet was used in the future then the formula would have to be changed every time. The teacher then explained about absolute referencing. The initial formula was changed to = (B7/$B$4) and the teacher demonstrated how this now worked, showing the pupils the way the formula had been copied as well.

Branwen has previously created her own models or simulations and has investigated the effect of changing data. She has used Excel and has been able to create simple formulas. She can explain how formulas are constructed.

For this activity she collected data to produce a marks spreadsheet for a fictitious group of Year 9 pupils. Her task was to set up a spreadsheet model for two subjects then amend it to include a third.

The learning outcomes were to:

- develop and use a spreadsheet including formulas with relative and absolute referencing
- vary the rules within the spreadsheet
- use the spreadsheet to test hypotheses.

This activity develops the following skills taken from the Key Stage 3 Programme of Study.

Find and analyse information
produce and use models and/or simulations to analyse data and test hypotheses investigate more complex patterns and relationships in models and/or simulations

	A	B	C	D	E	F
1	Own Marks					
2		I.C.T	%	Art	%	Average %
3	Total Marks	80		50		
4						
5	Name					
6	Michelle Hitchens	32	40%	45	90%	65%
7	Becky Coughlin	78	98%	13	26%	62%
8	Lucy Desmond	54	68%	46	92%	80%
9	Christie Watkins	23	29%	34	68%	48%
10	Natasha Vaughan	11	14%	32	64%	39%
11	Lucie Phillips	54	68%	32	64%	66%
12	Matthew Pearce	23	29%	19	38%	33%
13	James Munday	73	91%	12	24%	58%
14	Jago Mapp	23	29%	45	90%	59%

Branwen's work

Branwen initially set up her spreadsheet for ICT and Art. She created a formula to calculate the Average % by adding together the % for ICT and Art and dividing by 2, for example, = (C7+E7)/2. She then added the results for History into her spreadsheet and changed her formula for Average % to include History: =(C7+E7+G7)/3.

	A	B	C	D	E	F	G	H
1	Own Marks							
2		I.C.T	%	Art	%	History	%	Average %
3	Total Marks	80		50		60		
4								
5	Name							
6	Michelle Hitchens	32	40%	45	90%	37	62%	64%
7	Becky Coughlin	78	98%	13	26%	46	77%	62%
8	Lucy Desmond	54	68%	46	92%	35	58%	80%
9	Christie Watkins	23	29%	34	68%	27	45%	48%
10	Natasha Vaughan	11	14%	32	64%	23	38%	39%
11	Lucie Phillips	54	68%	32	64%	12	20%	66%
12	Matthew Pearce	23	29%	19	38%	40	67%	33%
13	James Munday	73	91%	12	24%	37	62%	58%
14	Jago Mapp	23	29%	45	90%	36	60%	59%

Branwen understands the significance of the data in her spreadsheet and is able to make predictions.

	A	B	C	D	E	F	G	H
1	Own Marks							
2		I.C.T	%	Art	%	History	%	Average %
3	Total Marks	80		50		60		
4								
5	Name							
6	Michelle Hitchens	32	40%	45	90%	37	62%	64%
7	Becky Coughlin	78	98%	13	26%	46	77%	62%
8	Lucy Desmond	54	68%	46	92%	35	58%	80%
9	Christie Watkins	23	29%	34	68%	27	45%	48%
10	Natasha Vaughan	11	14%	32	64%	23	38%	39%
11	Lucie Phillips	54	68%	32	64%	12	20%	66%
12	Matthew Pearce	23	29%	19	38%	40	67%	33%
13	James Munday	73	91%	12	24%			
14	Jago Mapp	23	29%	45	90%			
15	Steph Havey	19	24%	49	98%			
16	Jemma Cox	54	68%	36	72%			
17	Megan Aston	23	29%	25	50%			
18	Bethan Jackson	78	98%	47	94%			
19	Justine Card	73	91%	28	56%			
20	Megan Davies	65	81%	23	46%			
21								
22	Prediction : Pupils are doing best in Art							

Having worked out the average for each pupil (row), Branwen realised she needed to work out the average for specific columns to find the figure for each subject. These printouts show her prediction and the formulas she used to test this.

	A	B	C	D	E	F	G	H
1	Own Marks							
2		I.C.T	%	Art	%	History	%	Averag
3	Total Marks	80		50		60		
4								
5	Name							
6	Michelle Hitchens	32	=(B6/B$3)	45	=(D6/D$3)	37	=F6/F$3	=(C6+E6+G6)/3
7	Becky Coughlin	78	=(B7/B$3)	13	=(D7/D$3)	46	=F7/F$3	=(C7+E7)/2
8	Lucy Desmond	54	=(B8/B$3)	46	=(D8/D$3)	35	=F8/F$3	=(C8+E8)/2
9	Christie Watkins	23	=(B9/B$3)	34	=(D9/D$3)	27	=F9/F$3	=(C9+E9)/2
10	Natasha Vaughan	11	=(B10/B$3)	32	=(D10/D$3)	23	=F10/F$3	=(C10+E10)/2
11	Lucie Phillips	54	=(B11/B$3)	32	=(D11/D$3)	12	=F11/F$3	=(C11+E11)/2
12	Matthew Pearce	23	=(B12/B$3)	19	=(D12/D$3)	40	=F12/F$3	=(C12+E12)/2
13	James Munday	73	=(B13/B$3)	12	=(D13/D$3)	37	=F13/F$3	=(C13+E13)/2
14	Jago Mapp	23	=(B14/B$3)	45	=(D14/D$3)	36	=F14/F$3	=(C14+E14)/2
15	Steph Havey	19	=(B15/B$3)	49	=(D15/D$3)	21	=F15/F$3	=(C15+E15)/2
16	Jemma Cox	54	=(B16/B$3)	36	=(D16/D$3)	31	=F16/F$3	=(C16+E16)/2
17	Megan Aston	23	=(B17/B$3)	25	=(D17/D$3)	38	=F17/F$3	=(C17+E17)/2
18	Bethan Jackson	78	=(B18/B$3)	47	=(D18/D$3)	43	=F18/F$3	=(C18+E18)/2
19	Justine Card	73	=(B19/B$3)	28	=(D19/D$3)	40	=F19/F$3	=(C19+E19)/2
20	Megan Davies	65	=(B20/B$3)	23	=(D20/D$3)	30	=F20/F$3	=(C20+E20)/2
21								
22		Average	=AVERAGE(C6:C20)		=AVERAGE(E6:E20)		=AVERAGE(G6:G20)	=AVERAGE(H6:H20)
23								
24	Prediction : Correct							

Teacher:
Which of the subjects do you think the pupils are producing the best results in?

Branwen:
Art.

Teacher:
Why do you think this?

Branwen:
Lots of the pupils are getting high marks out of 50.

Teacher:
What could you do to test your prediction?

Branwen:
I could work out the average for each subject and see if Art is the highest.

Teacher:
What way could you have checked there were no errors in your data?

Branwen:
I could have tested to make sure no one had more than the total mark for each subject.

Teacher:
Did you check at all?

Branwen:
Only when I collected the data.

Branwen used the class exercise as the basis for her own spreadsheet, constructing formulas and using relative and absolute referencing for the calculation of the percentage for each subject. Her printouts show evidence that she understands how to construct formulas that use relative and absolute referencing and how to format her spreadsheet to show percentages. She was able to add columns for History and to alter the formula for Average % to include History.

When asked to make a prediction on the subject the pupils were doing best in Branwen decided correctly on Art and tested her prediction by adding an average formula for each subject.

Branwen was asked how she could have made sure there were no errors within her spreadsheet.

Branwen is now beginning to think along the lines of adding validation to her spreadsheet.

Where next?

In order to make progress, Branwen could further develop her spreadsheet in a number of different ways, for example:

- adding an IF statement to consider if a pupil's mark is 'good' or 'satisfactory'
- using conditional formatting to show when pupils get over a certain percentage
- using 'Validation' to test if the data for ICT is between 0 and 80, Art is between 0 and 50 and History is between 0 and 60
- adding a tutor group and using a filter to show the results of the pupils in two groups. Branwen could then use this further to see if there is any difference between the results of the pupils in the two different groups.

Activity 3 | Searching for suspects
Software: Data handling

Context

The aim of the task was to allow pupils to carry out realistic queries on a database – the database being sufficiently large to demonstrate that it is much quicker to search for data using data-handling software than doing so manually. The fictitious database uses the theme of criminals, both to motivate pupils and give an indication of how large systems such as the PNC (Police National Computer) can be used to search through vast amounts of data.

The database is set up with the following fields: Forename, Surname, Location, Car (colour), Hair, Date of birth, Car (registration), Offence (type), Known as (up to two aliases), Height, Weight. The key field is ID (number).

Criminals : Table

ID	FORENAME	SURNAME	LOCATION	CAR	HAIR	DOB	CAR_REG	KA1	OFFENCE_TY	KA2	KA3	height	weight
1	Shahron	Van Rooij	Aberdeen	red	Black	28/02/1957	M830TTT	Martin Backler	F	Elaine Casler	Kamin Campbe	161	88
2	Christopher	Aberson	Leeds	red	Brown	09/07/1956	A107AJD	Heleen Coetzee	D	Terry Guthridge	Ulric Gorbett	178	74
3	Di	Adams	Cardiff	blue	Brown	19/09/1972	M141CUF	Efren Bucholtz	F	Harry Davis	Judy Dassaski	166	80
4	James	Adams	London	blue	Black	19/12/1964	A124BKE	Rob Branch	T	Vaughn Cooper	Derek Coller	183	78
5	Robert	Adams	Newport	silver	Brown	24/10/1958	M158DMG	Tom Brush	F	Chris Daunhaus	Angela Cusson	154	81
6	Scott	Adamski	Sheffield	BLACK	Black	12/03/1953	M175ENH	Janice Burkitt	D	Alexandre Drell	Renu Dickinsor	165	73
7	anthony	Adendorf	Ipswich	red	Blonde	13/09/1960	M192FOI	Roxanne Burna	A	Larry Diemer	Nidhi Dempsey	173	86
8	Debbie	Adler	Doncaster	green	Grey	07/02/1965	N209GPJ	Bonnie Burto	F	Jean Derco	Melani DeGreni	152	76
9	Debora	Adolt	Liverpool	red	Bald	05/12/1976	N226HOK	Jerold DeHart	T	David Halpin	Ed Greer	174	72
10	Karen	Ahmad	Glasgow	red	Brown	04/04/1966	N243IRL	Paula Christoph	M,S	Elsa Glassman	Cliff Gance	169	75
11	Arshad	Aldeed	Aberdeen	silver	Black	16/02/1972	P260JSD	Lynne Chapmar	S	Isidro Grau	Leslie Gleim	181	77
12	Steve	Alessi	Cardiff	black	Brown	24/01/1954	B294LUF	Ruth Burkett	F	Omer Deliatiogl	Cindy Davis	178	78
13	Maquita	Alexander	Newport	white	Brown	02/12/1948	B311NVG	Jeanne Buckley	T	Lynne Davis	Seujan Daunha	164	72
14	Cathy	Alfano	Sheffield	red	Black	12/09/1977	B328OWH	Michael Campi	S	Rita Ellsworth	Linda Delles	178	92
15	Jim	Allen	Ipswich	red	White	11/12/1974	C345PXI	Brian Butz	F	Jackie Dobrovol	Peles Diemer	169	72
16	Melissa	Alperin	Doncaster	brown	Brown	19/09/1968	C362QYJ	Aldo Caputo	D	Stephen diFilpi	Brett Derco	165	76
17	Faramarz	Amiri	Leeds	red	Black	07/05/1967	M379RZK	Sandy Cole	T	Rhonda Hannib	Anne Guthridge	151	83
18	Alan	Amory	London	blue	Brown	16/04/1950	M396SAL	Allan Briggs	M,S	Amy Corrigan	Jim Cooper	158	81
19	Rogelio	Anasagasti	Cardiff	blue	Brown	04/12/1970	M413TBY	Rob Campbell	S	Robert Devadas	John Delialioglu	168	73
20	Roy	Anasagasti	Newport	silver	Black	22/03/1973	N430UUZ	Linda Burkey	M,S	Peter de Lisle	Keeley Davis	160	65
21	Imad	Anayah	Sheffield	BLACK	Blonde	31/07/1967	N447VKA	Jennifer Celano	A	Matt Ensenberg	Regina Ellewort	173	90
22	Gary	ANDERSON	Ipswich	red	Grey	22/05/1973	N464WLB	Raf Canters	M,S	Betsy Drulard	John Dobrowoln	152	89
23	Thomas	Andre	Doncaster	green	Bald	09/01/1959	R401XMJ	John Chatta	A,B,T,	Mike Dobson	Blythe diFilipo	165	66
24	Andreas M	Andreou	Liverpool	red	Brown	02/12/1957	R498YNK	Patrick Dills	S	Megan Hargrea	Merle Halpin	175	91
25	Deacon AE	Andrew	Glasgow	red	Black	20/09/1953	A515ZOL	Patsy Clarke	F	Tom Gram	Charles Glassn	171	90
26	Sandy	Andrews	Glasgow	yellow	Brown	29/01/1972	G549BQN	Tami Clinnin	A	Joseph Gregg	Patrick Gram	158	60
27	Sharon	Andrews	Aberdeen	silver	Blonde	20/05/1948	A532APM	Peter Chuah	F	Glen Gummess	Sara Grau	178	86
28	Charoula	Angeli	Aberdeen	black	Brown	17/02/1963	G686CRO	Marilyn Clarke	M,S	Marty Hamman	Jennifer Gumm	187	88
29	Anne	Archambault	Doncaster	white	Black	08/10/1981	H583DSP	Bill Chia	S	Jacques du_Pl	Tamra Dobson	177	65
30	Allen	Armstrong	Glasgow	red	Brown	03/04/1952	H617FUR	Chris Connor	F	Alan Gregory	S Gregg	179	72
31	Deborah	Armstrong	Liverpool	red	White	09/03/1957	H600ETQ	Terry Dolling	T	Ian Hart	Charles Hargre	182	69
32	Toni	Aronovitz	Aberdeen	brown	Black	22/03/1958	H634GVS	Teresa Cook	A	Mary Hamshle	Rob Hammann	174	77

The teacher introduced the task using the interactive whiteboard, showing how much data is held in the 'Criminals' database by quickly scrolling through the 1300 records. The teacher demonstrated how swiftly simple searches such as 'lives in Cardiff' could be completed. In a class discussion about the PNC system, Branwen mentioned she had seen television programmes where the police had carried out roadside checks on drivers and vehicles.

The teacher reminded the class that databases can contain many types of data, and the group discussed the most appropriate data type for each of the fields in the 'Criminals' database. The teacher reminded the group of the use of logical operators in complex searches and then demonstrated how to search for values greater than, equal to and less than, and also demonstrated the use of wildcards. As a group, the class suggested appropriate queries for a number of quick-fire scenarios posed by the teacher.

Branwen has previously produced and used databases to follow straightforward lines of enquiry. This activity involves designing queries for a range of given scenarios, requiring careful thought about the information they are seeking.

The learning outcomes were to:

- appreciate that very large databases can be searched quickly using data-handling software
- design appropriate (complex) searches for a range of scenarios
- understand that the quality of results is dependent upon using suitable search criteria.

This activity develops the following skills taken from the Key Stage 3 Programme of Study.

Find and analyse information
select relevant information and make informed judgements about sources of information produce and use databases to analyse data and follow particular lines of enquiry

To get used to searching the database, pupils were given some time to search using simple criteria of their choice, such as 'suspects who own a green car', or 'suspects who are less than 1.7m tall'. Branwen then worked through a range of scenarios, developing appropriate search criteria by considering the information given in each case. Four examples are shown over the page.

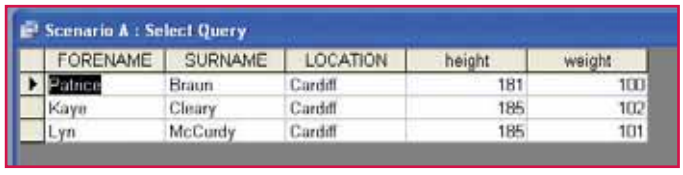
Branwen's work

Scenario A

A man has taken a bus full of passengers hostage in Cardiff. He told the driver to stop near the Millennium Stadium where he ran off into the crowd and has not been seen since. Witnesses say the man was at least 100kg in weight and at least 1.8m tall. Find a list of possible suspects.

Branwen decided to use the following query to find a list of suspects that generated three suspects as shown below.

Field:	FORENAME	SURNAME	LOCATION	height	weight
Table:	Criminals	Criminals	Criminals	Criminals	Criminals
Sort:					
Show:	☑	☑	☑	☑	☑
Criteria:			"cardiff"	>=180	>=100
or:					



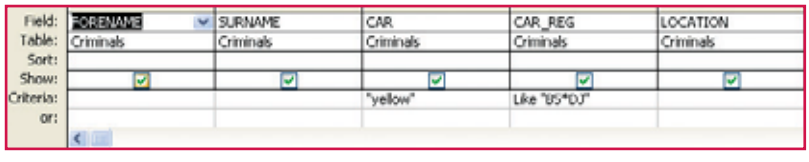
Scenario A : Select Query

FORENAME	SURNAME	LOCATION	height	weight
Patrick	Braun	Cardiff	181	100
Kaye	Cleary	Cardiff	185	102
Lyn	McCurdy	Cardiff	185	101

Scenario B

We have a partial registration number for a yellow car that went through a red light in Glasgow and narrowly missed an ambulance. The number we have is B5***DJ. Find out who owns a car that fits this description.

Branwen decided to use the following query to find a list of possible owners and found one suspect as shown below.



Field:	FORENAME	SURNAME	CAR	CAR_REG	LOCATION
Table:	Criminals	Criminals	Criminals	Criminals	Criminals
Sort:					
Show:	☑	☑	☑	☑	☑
Criteria:			"yellow"	Like "B5*DJ"	
or:					

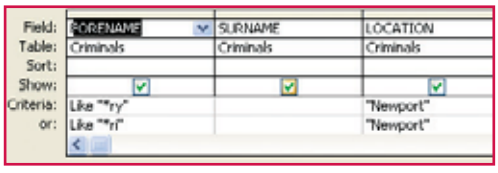
Scenario B : Select Query

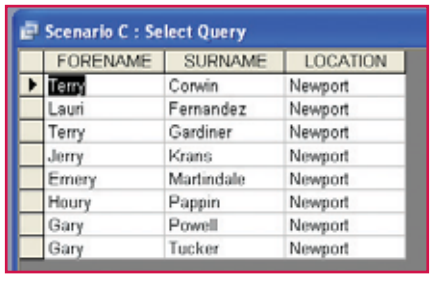
FORENAME	SURNAME	CAR	CAR_REG	LOCATION
Michael	Matzko	yellow	B562SDJ	Glasgow

Scenario C

Two men have mugged an elderly woman in Newport. She thinks that one of the men's names sounded like Harry but she does not have good hearing and may have misheard. Find a list of likely offenders.

Branwen decided to use the following query to find a list of likely offenders, which generated eight suspects as shown below.

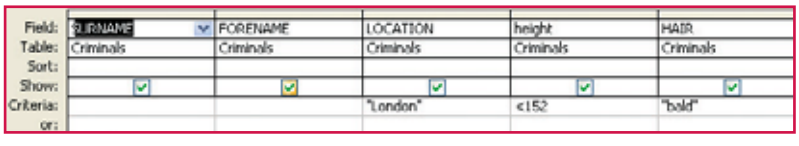




Scenario D

Someone in London is burgling houses by crawling through very small openings. We have done some experiments and found that those people who are shorter than 152cm would be able to climb through. The only description we have of this person is that he has a bald head. Find a list of likely offenders.

Branwen decided to use the following query to find a list of likely offenders, which found one suspect as shown below.



Where next?

Before undertaking this activity, Branwen had created a small database and searched it on more than one field. She has now experienced searching a large database where some thought was necessary to establish appropriate search criteria and is in a position to evaluate the 'Criminals' database. She could do this from the perspective of how helpful the information she has found might be in helping police find the offenders in each of the four scenarios shown on the previous pages. She could also consider what other information (fields) it would be useful to include in the 'Criminals' database.

Summary and overall judgement

Levels 6 and 7 were considered and Level 6 was judged to be the best fit. This judgement was made because although Branwen's understanding of the legal, moral and safety issues of using communications technologies clearly demonstrate characteristics of Level 7, her work in communicating information, modelling and data handling demonstrates mainly characteristics of Level 6.

The teen newspaper front page demonstrates mainly characteristics of Level 6. Branwen carried out appropriate research and planning, which is a characteristic of Level 6: pupils *plan their tasks in detail for specific purposes and audiences* and she developed a professional looking page that would seem to be attractive to teenagers: pupils' *presentations are fit for purpose and meet the needs of their intended audience* (another characteristic of Level 6). The quality of this work provides a sound platform to produce further work at a higher level.

In the analysis of pupils' marks, again the predominant characteristics are of Level 6. Branwen demonstrated a good understanding of the use of absolute and relative referencing and she created formulas and amended them as more data was added to her model. She made predictions about which subject pupils achieved the best in, and tested her prediction by adding an average formula for each subject. These are characteristics of Level 6: pupils *use models or simulations of increasing complexity, vary the rules within them and test hypotheses*.

Branwen's work with the 'Criminals' database shows that she was able to analyse information provided in a range of scenarios and develop appropriate queries. Once again this demonstrates characteristics of Level 6: pupils *use databases to follow complex lines of enquiry and draw conclusions.*

Aspects of Branwen's work in ICT that are not explicitly evident in these three activities show some characteristics of Level 7. She uses the internet in a confident and mature way both within school and at home. She is very aware of the benefits and potential dangers of using communication technologies and she uses these safely without supervision. This is a characteristic of Level 7: pupils *use the internet/related technologies safely and independently*. Branwen downloads music on her home computer. She does this legally and admits that she spends a significant proportion of her pocket money paying for this music. In class discussions she has spoken against illegally downloading music or software, suggesting this is not fair on the people who have written the material. This is also characteristic of Level 7: pupils *have informed opinions of legal and other issues raised by the use of ICT in the wider world.*

Bethan | Level 7

Bethan is a 14-year-old learner in Key Stage 3.

Her teacher knows much more about Bethan's performance than can be included here. However, this profile has been selected to illustrate characteristic features of Bethan's work across a range of activities. Each example is accompanied by a brief commentary to provide a context and indicate particular qualities in the work.

Bethan's teacher judges that her performance in information and communication technology is best described as Level 7.

In the commentaries accompanying each of the following activities, consideration is given to the progression Bethan could make to improve her performance in information and communication technology.

Activity 1 | Promoting local tourist attractions
Software: Presentation

Context

Pupils were required to design a multimedia presentation to promote local tourist attractions on Anglesey. The presentation could be used in tourist information centres to provide an overview of each attraction.

Bethan had previously used multimedia software to create presentations. This activity allowed her to build on these skills in order to produce a professional presentation for a specific audience.

The learning outcomes were to:

- produce a fully interactive presentation/information system that meets the specific needs of the end users
- combine text and graphics within the presentation
- evaluate and make judgements about existing uses of ICT in publications/websites/presentations and use the findings to support pupils' own work.

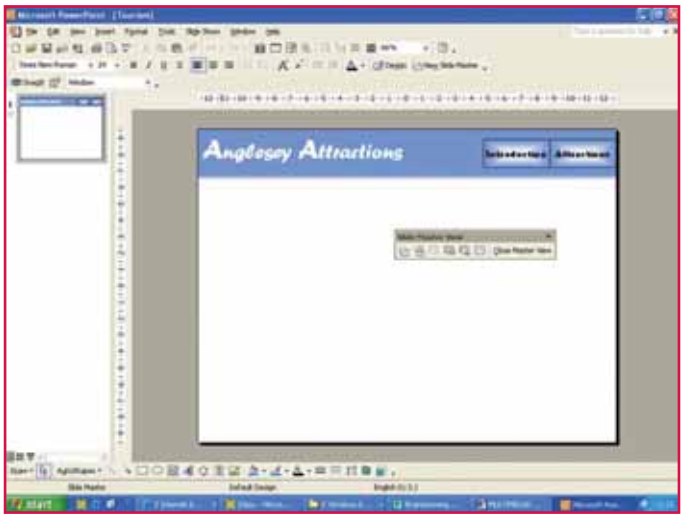
This activity develops the following skills taken from the Key Stage 3 Programme of Study.

Find and analyse information
plan tasks, including consideration of purpose/audience and appropriate resources
find relevant information efficiently from a variety of sources for a defined purpose
select relevant information and make informed judgements about sources of information

Create and communicate information
create and communicate information in the form of text, images and sound, using a range of ICT hardware and software
create and develop a range of presentations, combining a variety of information and media, for specific purposes and audiences

The class were introduced to the task by discussing and investigating the following points:

- designing and creating a master slide
- locking mouse clicks in presentation mode to create a more interactive resource and allow users to navigate more effectively
- analysing websites of similar attractions to evaluate their effectiveness.



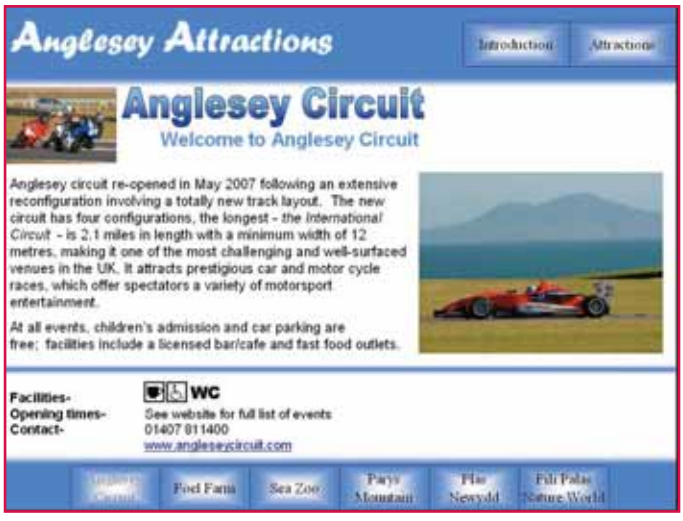
Bethan's work

Whilst designing and creating the presentation Bethan showed a good appreciation of the skills required for the task, i.e. knowing when it is appropriate to use custom animations, adhering to a consistent style, etc. Bethan also displayed an understanding of using ICT as a tool to develop and produce the work quickly – copying and pasting, using the Format Painter and creating the master slide.

Evidence of Bethan's work on this activity is shown here.

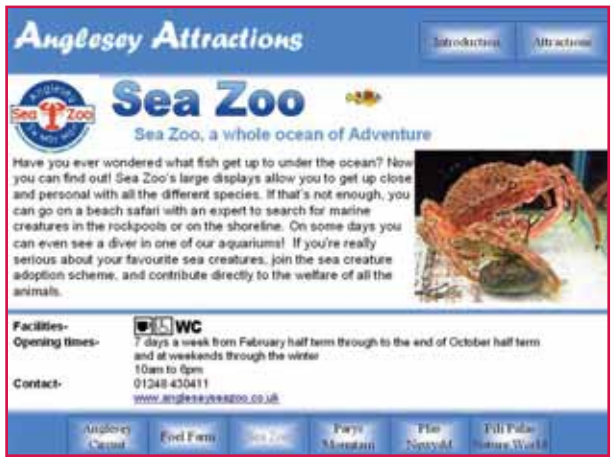
- Bethan has adopted a consistent style across all slides.
- The main body of text is animated – comes in from the left.
- The user can navigate through the presentation using either the 'Attractions' button or the 'Introduction' button (to return to the 'Introduction' slide).

- Header is animated – comes in from the right on each slide.
- Attractions are individually animated – right-hand series comes in from the right, left-hand series comes in from the left.
- The user can navigate to the appropriate slide by clicking on the attraction.

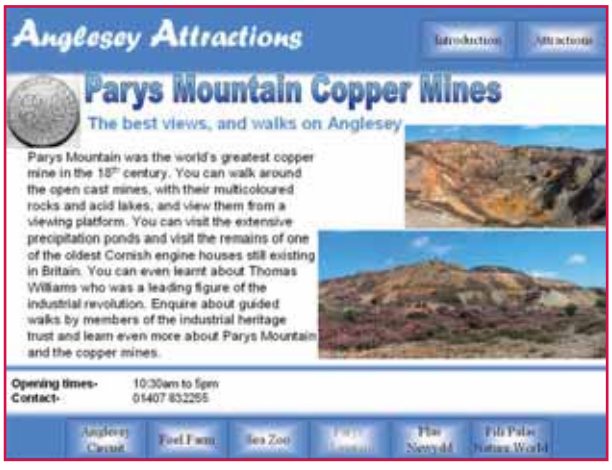


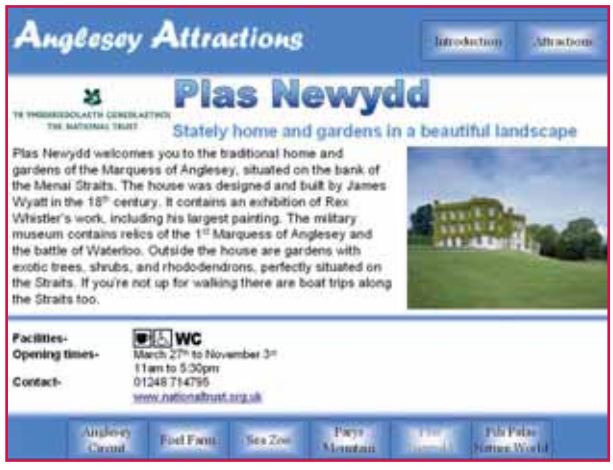
- Transition between slides is consistent throughout.
- The 'Attractions' button (top right) links back to the 'Attractions' slide.
- The user can navigate to specific attractions using the links at the bottom of the slide.
- Link to website functions correctly on all slides.

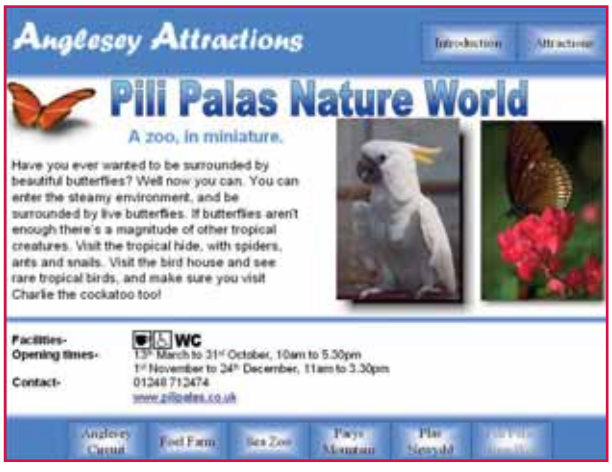
- Links function as previously described.



- Fish is animated – swims left to right.







Bethan planned her work well and carried out wide-ranging and appropriate research, including looking at the features and layout of professionally produced leaflets and websites. She followed the school's guidelines on use of the internet whilst carrying out research for this activity.

Bethan established realistic success criteria and considered the views of others when developing and evaluating the presentation.

The final product is of a professional standard and makes good use of features within the presentation software. The information on each attraction is relevant, the balance between text and images is appropriate, and the layout is attractive and consistent throughout the slideshow.

The presentation has been developed and refined to such a degree that it could be used in a real-life situation. The consistent design and style creates an impact, and navigating the slides is intuitive to the user. Clicking on the hyperlinks and hot spots are the only way of progressing through the presentation which keeps the user 'on track' whilst browsing the information.

Evaluation
I'm very pleased with my final presentation mainly due to the fact that I have managed to make it look very professional. This was achieved by using a consistent layout in each of the attraction slides. I have tested the presentation and I'm confident that it could be used by most visitors in a tourist information centre without any problems. Most of the information came from the attractions' websites although further information and images were found by using a search engine. I had to edit and rewrite some of the attraction descriptions in order to make all of them consistent and fit the allocated space on the slide.

Where next?

This is a very successful presentation, judged against the information it provides, the ease by which it can be used, and the ICT skills Bethan has demonstrated in its design and production. Developments and further experiences could include recording sound and/or video to further enhance the information provided on each attraction. There are also opportunities to edit and enhance the digital images through photo editing or graphics packages. Using graphics, sound and video editing software would enrich Bethan's ICT skills and enhance what is already a very good presentation.

Activity 2 | Room painting calculator
Software: Spreadsheet

Context

Pupils were required to design a working model to calculate the cost of painting a room. The teacher introduced the activity by guiding pupils to consider the requirements of the system, including how best to work out the area of a room.

In a class discussion pupils decided on the factors to consider in their model: cost of paint, coverage of paint, possibility of windows and doors. The success criteria for the model were identified as: able to calculate costs accurately for a variety of rooms, take into account windows and doors, have a clear layout and be straightforward to use, and print on one page for convenience.

Bethan has previously created her own models or simulations and has investigated the effect of changing variables and data. She has used Excel and has been able to create formulas with relative and absolute referencing and she can explain how formulas are constructed.

The learning outcomes were to:

- develop and use a spreadsheet including complex features
- vary the rules within the spreadsheet
- use the spreadsheet to test hypotheses.

This activity develops the following skills taken from the Key Stage 3 Programme of Study.

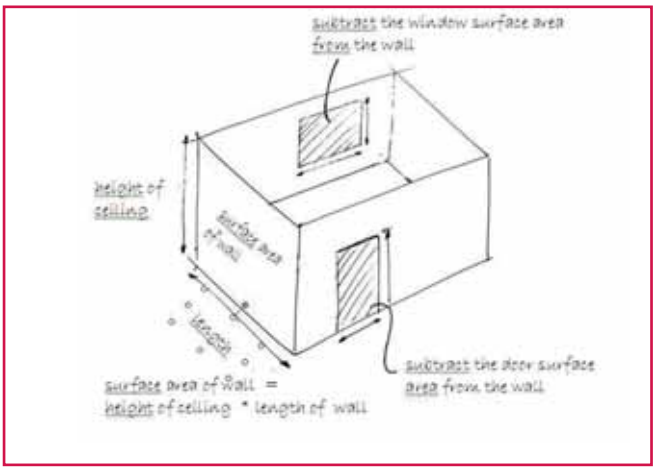
Find and analyse information
produce and use models and/or simulations to analyse data and test hypotheses
investigate more complex patterns and relationships in models and/or simulations

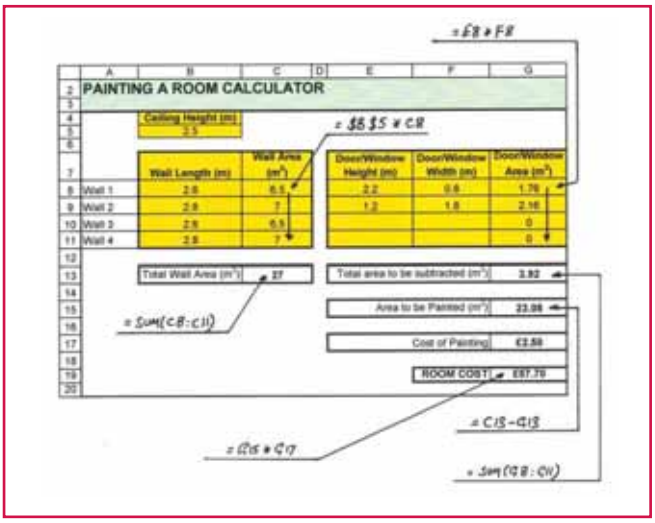
ICT skills being developed or reinforced include: spreadsheet design (layout and formatting), use of simple mathematical functions, formula construction, absolute referencing, use of IF statement to increase functionality of model, creation of macro function for user-friendly interface, and suitable testing of the model.

Bethan's work

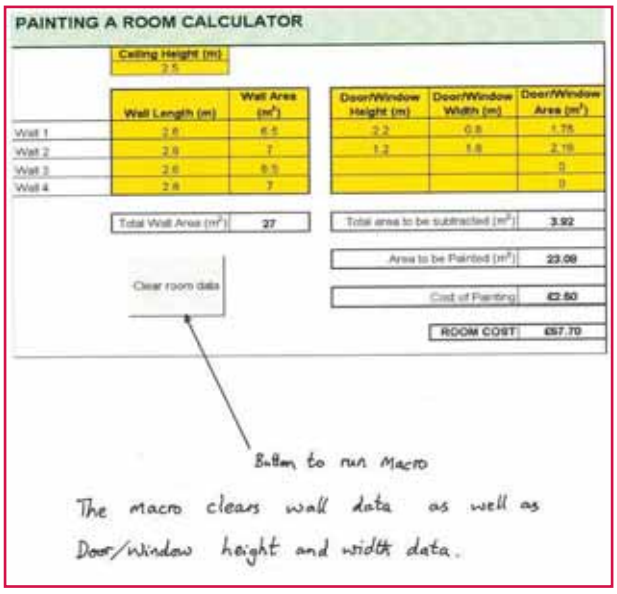
Design and create model

Following class work and individual research, Bethan started to develop a solution for the task. She:





- established the need to identify the number of walls in a room, also the length of these walls, as well as ceiling height of the room
- sketched a plan of the room that included the position of the door and windows, deciding that it would be appropriate to subtract the area of the windows and door from the area of the walls
- decided the cost of painting would be calculated on a per m^2 basis
- established a possible need to cost more than one room
- went on to construct the model using an appropriate layout using suitable column headings and formatting
- tested the completed model with realistic data
- annotated a printout with formulas and explanations, as shown to the left.

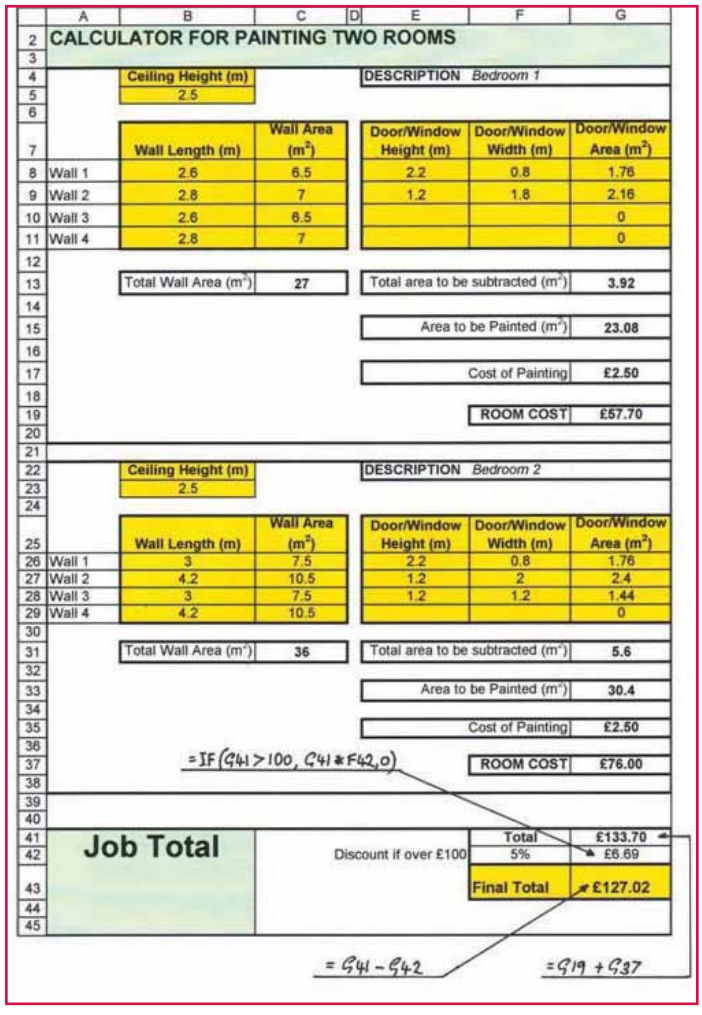


Develop the model's functionality

(with the ability to clear data for a room, reflecting good practice used on interactive calculators)

Following the teacher's introduction to the use of macros, Bethan:

- designed a successful macro to clear data as shown in the screenshot on the left
- developed the task further to calculate the cost of painting an additional room (copy and paste room model)
- developed an additional section to calculate the job total



- developed an IF statement to work out a discount
- did further testing to evaluate her model by changing: room dimensions, ceiling height, cost (per m^2), level of discount; she also tested the macro
- tested the model would print on one page as shown in the screenshot on the left (note: print settings were changed to row and column headings to support the functionality of the formulas).

The screenshot to the left also shows the development of the spreadsheet to include a second room, calculation of the job total and a discount. (The printout does not show the position of the macro buttons.) Bethan's response to her teacher's questions show that she had a good understanding of the factors to consider when undertaking this development.

Teacher:
What if you have an L-shaped room?

Bethan:
I would add more walls.

Teacher:
How would a professional painter/ decorator use this kind of calculator?

Bethan:
Help with costing a job for a customer. They would probably print out a quote to give the customer.

Teacher:
How would you calculate the cost of another room?

Bethan:
I could copy and paste the relevant cells of Room 1 then add totals to find the total cost.

Teacher:
What do you need to be careful of if you do this?

Bethan:
Some cells use absolute referencing – I'd have to make sure cell references are changed in the formulas.

Bethan identified the skills she was confident with and what new skills she required to create her model of a cost calculator. She planned the layout of the model and decided on what column headings she would use. Further to this she planned the functionality of the model deciding on suitable formulas. Bethan corrected errors in layout as the model developed – formulas that didn't work initially were corrected.

Bethan was able to reflect on the suitability of her solution. She evaluated her model against her success criteria. She decided that the model was successful, and amended her layout so that all the cells fitted on one page. She improved the functionality of the model by creating a macro to clear the form. She added a discount feature using an IF statement. In a discussion with a small group of classmates, it was clear that Bethan realises the advantages to a painter and decorator of using a dedicated calculator such as this, as opposed to using traditional manual methods.

Where next?

In order to make progress, Bethan could further develop her spreadsheet in a number of ways:

- creating a drop-down menu that gives the user a choice of different types of paints/paint costs
- developing a header and footer for a particular painter and decorator
- using suitable validation techniques.

Bethan could enhance her model into a professional quoting tool, and develop her researching and investigation skills, by searching paint manufacturers' websites to find a method of working out the amount of paint required to paint a room.

Activity 3 | Tour operator database
Software: Data handling

Context

Pupils were required to develop a database that could be used by a tour operator. The teacher introduced the activity by guiding pupils to consider the requirements of the system. The class decided that for a successful outcome they would need to:

- consider the information that they would need to collect if they worked as a booking clerk within a tour company
- create a data capture form for the tour company office staff to collect all the relevant data
- create a database to hold the information and test it by sorting and querying the database
- think about how data could be exported in a useful way for the company.

Bethan has previously used a number of databases to follow complex lines of enquiry, but the teacher has provided the database and/or structure. This activity gives Bethan an opportunity to develop her ICT skills by designing her own database for a realistic situation.

The learning outcomes were to:

- research information relevant to the situation
- design an appropriate data capture form that is easy to complete and read
- design an appropriate database that could be used by a tour operator to keep records of customers, bookings and destinations
- export data into reports and mail merged documents
- objectively evaluate their solution.

This activity develops the following skills taken from the Key Stage 3 Programme of Study.

Find and analyse information
select relevant information and make informed judgments about sources of information
produce and use databases to analyse data and follow particular lines of enquiry

Teacher:
What does the system have to do?

Bethan:
It must allow employees to add information as customers ring to book a trip and allow employees to search for specific information.

Teacher:
How else might it be used?

Bethan:
To produce documents that can be presented to both customers and company officials.

Teacher:
What sort of documents?

Bethan:
It could be a report or a mail merged letter.

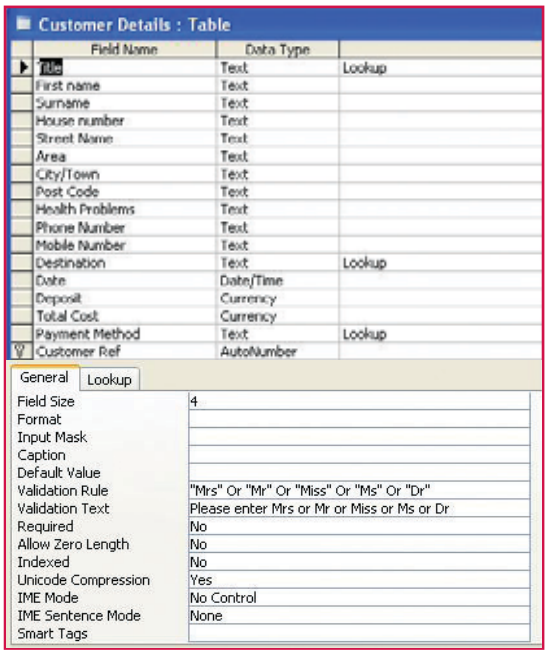
Bethan's work

In discussions with her teacher, Bethan showed a good understanding of the main requirements of the database.

Data capture

After some research on the internet and talking with her classmates, Bethan started work on designing a data capture form. She realised the importance of standardising data collection, particularly as the tour company has more than one employee.

Bethan initially designed a portrait form but amended this to a landscape layout as she felt this made it easier to see the whole form on the computer screen without scrolling.



Data structure

Bethan showed a very good understanding of setting up the data structure for her database. She considered field size noting, for example, that 'Miss' would be the longest title she would be using, so a field size of four was appropriate, as well as field name, format and type. She included a Lookup list for title and simple validation rules where appropriate. Bethan set the customer number field as the primary key.

Data input

Bethan used the form wizard in Access to produce the data input form, matching the style and layout to the data capture form that was produced in Word.

Sorts

Bethan sorted her data on 'Surname' and 'Date', both ascending and descending. The alpha sorts are shown here.

Alpha Sort Z-A

The reportbelow shows the records in my database sorted into Alphabetical order from Z to A. I have completed this so as to make it easier to find names beginning with letters close to the end of the alphabet. These are located at the top of the table.

Surname	Title	First name	Destination	Date	Customer Ref
Williams	Mrs	Gemma	Dan yr Ogof Caves	17-Feb-07	20
Turner	Mrs	Aimee-mae	Tenby	13-Mar-07	1
Thomas	Miss	Kimberly	Tenby	09-Feb-07	13
Teesdale	Mr	Jack	The Millennium Stadium Cardiff	15-Feb-07	5
Rogers	Mrs	Sophie	Cardiff Castle	07-Mar-07	12
Muhat	Mrs	Caitlin	Tenby	14-Feb-07	6
Morgan	Mrs	Ria	Caernarfon Castle	14-Feb-07	10
Mayumbu	Mr	Olivier	Cardiff Harbour	01-Mar-07	9
King	Mr	Joe	Big Pit	21-Mar-07	19
Jones	Ms	Kayleigh	Big Pit	01-Mar-07	4
Holmes	Mr	Adam	Tenby	19-Feb-07	17
Herlihy	Mr	Steven	Cardiff Castle	14-Feb-07	18
Green	Mrs	Teresea	Caldey Island	25-Mar-07	7
Glover	Mr	Ben	Big Pit	14-Feb-07	16
Gemma	Mr	Tomas	The Millennium Stadium Cardiff	20-Mar-07	15
Farley	Mr	Jordan	Cardiff	13-Feb-07	8
Edwards	Miss	Emma	Tenby	03-Feb-07	11
Clarke	Mr	Joshua	Dan yr Ogof Caves	14-Feb-07	14
Chapman	Miss	Hannah	Dan yr Ogof Caves	02-Feb-07	3
Bevan	Ms	Emma	Cardiff Castle	27-Mar-07	2

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Alpha Sort A-Z

The report below shows the records in my database sorted into Alphabetical order from A to Z. I have completed this so as to make it easier to find names beginning with A as these are located at the top of the table.

Surname	Title	First name	Destination	Date	Customer Ref
Bevan	Ms	Emma	Cardiff Castle	27-Mar-07	2
Chapman	Miss	Hannah	Dan yr Ogof Caves	02-Feb-07	3
Clarke	Mr	Joshua	Dan yr Ogof Caves	14-Feb-07	14
Edwards	Miss	Emma	Tenby	03-Feb-07	11
Farley	Mr	Jordan	Cardiff	13-Feb-07	8
Gemma	Mr	Tomas	The Millennium Stadium Cardiff	20-Mar-07	15
Glover	Mr	Ben	Big Pit	14-Feb-07	16
Green	Mrs	Teresea	Caldey Island	25-Mar-07	7
Herlihy	Mr	Steven	Cardiff Castle	14-Feb-07	18
Holmes	Mr	Adam	Tenby	19-Feb-07	17
Jones	Ms	Kayleigh	Big Pit	01-Mar-07	4
King	Mr	Joe	Big Pit	21-Mar-07	19
Mayumbu	Mr	Olivier	Cardiff Harbour	01-Mar-07	9
Morgan	Mrs	Ria	Caernarfon Castle	14-Feb-07	10
Muhat	Mrs	Caitlin	Tenby	14-Feb-07	6
Rogers	Mrs	Sophie	Cardiff Castle	07-Mar-07	12
Teesdale	Mr	Jack	The Millennium Stadium Cardiff	15-Feb-07	5
Thomas	Miss	Kimberly	Tenby	09-Feb-07	13
Turner	Mrs	Aimee-mae	Tenby	13-Mar-07	1
Williams	Mrs	Gemma	Dan yr Ogof Caves	17-Feb-07	20

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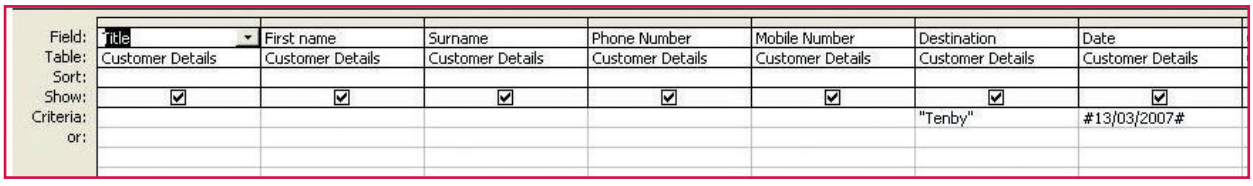
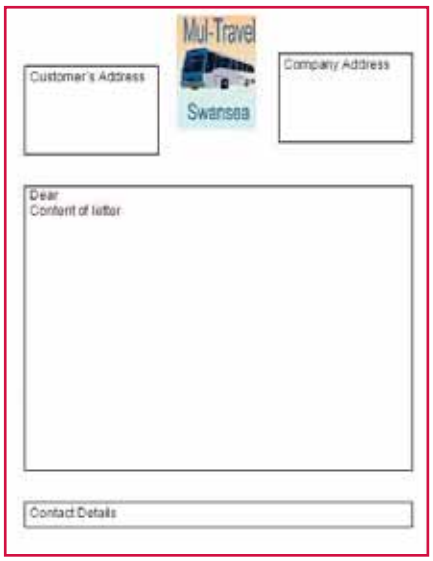
Queries

Bethan successfully carried out a simple query (customers who travelled to Tenby) and a complex query (customers who travelled to Tenby on the 13th of March 2007).

The design view of the complex query is shown here.



Field:	Title	First name	Surname	Phone Number	Mobile Number	Destination	Date
Table:	Customer Details	Customer Details	Customer Details	Customer Details	Customer Details	Customer Details	Customer Details
Sort:							
Show:	☑	☑	☑	☑	☑	☑	☑
Criteria:						"Tenby"	#13/03/2007#
or:							



Export data

Bethan had already produced simple reports based on her queries and sorts so for the final part of the activity she decided to write a letter about new tours that could be mail merged and posted to customers.

Bethan produced a plan for the letter, the letter itself and a mail merged template as shown here.

Bethan required only a small amount of support from her teacher to reach this stage. When she was happy with the letter, she carried out a mail merge and printed out a few as evidence of its success.

Mul-Travel
Swansea

«Title» «First_name» «Surname»
«House_number» «Street_Name»
«Area»
«CityTown»
«Post_Code»

M & S Travel
26 Station Rd
Bynea
Llanelli
SA14 5GF

Ref:Mill_14/01/07_123

Dear «Title» «Surname»

This letter is written to confirm your booking for 3 people to travel to «Destination» on «Date». We would like to take this opportunity to thank you for your custom and express our desire in making this day stress free and comfortable.

Enclosed with this letter you will find three tickets, you will need to bring these with you on your travel date. Unfortunately we cannot allow any person to travel who does not have a valid ticket.

In order to ensure that you have time to spare we ask that you arrive 30 minutes prior to the departure time shown at the bottom of your ticket. This will allow the driver time to stow any baggage safely within the baggage compartment of the coach.

Please check the information listed below. If any errors are present, please contact us using the contact reference shown at the top of this letter and the contact details shown at the bottom of this letter. May we all again thank you for your custom and wish you a pleasant journey.

Destination: «Destination»
Date of Travel: «Date»
Number in party: 3

Yours Faithfully
Mr M Mulhall

Email: booking_m&stravel@btinternet.com
Tel: 01554 453432
Web: www.mul-travel.co.uk

Mul-Travel
Swansea

Mrs Aimee-mae Turner
32 Ynysymond
Allwen
Pontadawe
SA8 5GD

M & S Travel
26 Station Rd
Bynea
Llanelli
SA14 5GF

Ref:Mill_14/01/07_123

Dear Mrs Turner

This letter is written to confirm your booking for 3 people to travel to Tenby on 13 March 2007. We would like to take this opportunity to thank you for your custom and express our desire in making this day stress free and comfortable.

Enclosed with this letter you will find three tickets, you will need to bring these with you on your travel date. Unfortunately we cannot allow any person to travel who does not have a valid ticket.

In order to ensure that you have time to spare we ask that you arrive 30 minutes prior to the departure time shown at the bottom of your ticket. This will allow the driver time to stow any baggage safely within the baggage compartment of the coach.

Please check the information listed below. If any errors are present, please contact us using the contact reference shown at the top of this letter and the contact details shown at the bottom of this letter. May we all again thank you for your custom and wish you a pleasant journey.

Destination: Tenby
Date of Travel: 13 March 2007
Number in party: 3

Yours Faithfully
Mr M Mulhall

Email: booking_m&stravel@btinternet.com
Tel: 01554 453432
Web: www.mul-travel.co.uk

Mul-Travel
Swansea

M & S Travel
26 Station Rd
Bynea
Llanelli
SA14 5GF

Ref:Mill_14/01/07_123

Ms Emma Bevan
39 Wern Terrace
Port Tennant
Swansea
SA1 8JH

Dear Ms Bevan

This letter is written to confirm your booking for 3 people to travel to Cardiff Castle on 27 March 2007. We would like to take this opportunity to thank you for your custom and express our desire in making this day stress free and comfortable.

Enclosed with this letter you will find three tickets, you will need to bring these with you on your travel date. Unfortunately we cannot allow any person to travel who does not have a valid ticket.

In order to ensure that you have time to spare we ask that you arrive 30 minutes prior to the departure time shown at the bottom of your ticket this will allow the driver time to stow any baggage safely within the baggage compartment of the coach.

Please check the information listed below. If any errors are present; please contact us using the contact reference shown at the top of this letter and the contact details shown at the bottom of this letter. May we all again thank you for your custom and wish you a pleasant journey.

Destination: Cardiff Castle
Date of Travel: 27 March 2007
Number in party: 3

Yours Faithfully
Mr M Mulhall

Email: booking_m&stravel@btinternet.com
Tel: 01554 453432
Web: www.mul-travel.co.uk

Mul-Travel
Swansea

M & S Travel
26 Station Rd
Bynea
Llanelli
SA14 5GF

Ref:Mill_14/01/07_123

Miss Hannah Chapman
155 Port Tennant Road
Port Tennant
Swansea
SA1 7JH

Dear Miss Chapman

This letter is written to confirm your booking for 3 people to travel to Dan yr Ogof Caves on 02 February 2007. We would like to take this opportunity to thank you for your custom and express our desire in making this day stress free and comfortable.

Enclosed with this letter you will find three tickets, you will need to bring these with you on your travel date. Unfortunately we cannot allow any person to travel who does not have a valid ticket.

In order to ensure that you have time to spare we ask that you arrive 30 minutes prior to the departure time shown at the bottom of your ticket. This will allow the driver time to stow any baggage safely within the baggage compartment of the coach.

Please check the information listed below. If any errors are present; please contact us using the contact reference shown at the top of this letter and the contact details shown at the bottom of this letter. May we all again thank you for your custom and wish you a pleasant journey.

Destination: Dan yr Ogof Caves
Date of Travel: 02 February 2007
Number in party: 3

Yours Faithfully
Mr M Mulhall

Email: booking_m&stravel@btinternet.com
Tel: 01554 453432
Web: www.mul-travel.co.uk

Evaluation

I feel that I have succeeded in my aims for this database. My initial data structure required reworking as I did not spend enough time planning, but the modified version works. I made a number of spelling errors entering the data, which I did not notice until I tried some searches and sorts. I corrected these and tried again to prove they worked. The data capture and data input forms are easy to use, and they give all the information needed. I'm glad I used a landscape layout as this made it easier. I am pleased with the mail merged letters. They look good and are quick to produce. An improvement would be to have the reference number and number of tickets come up automatically. At the moment I have to type those in myself.

Where next?

Bethan has been able to use her database to successfully carry out a limited number of sorts and queries. She could further test the database by undertaking a range of other complex queries then discuss with other pupils whether the basic design is likely to enable a tour company to easily find all the information it is likely to need. She could evaluate ease of use by having other pupils use the database then incorporate their feedback into a more detailed objective evaluation.

Summary and overall judgement

Levels 7 and 8 were considered and Level 7 was judged to be the best fit. This judgement was made because although Bethan's tourist attractions presentation demonstrates characteristics of Level 8, her modelling work on the room painting calculator and her tour operator database show mainly characteristics of Level 7.

The tourist attractions presentation demonstrates characteristics of Level 8. Bethan has produced a professional presentation, using the help facilities in the software, but requiring very little support from her teacher. Her research was relevant and thorough, and the finished presentation reflects a great deal of development and refinement. She has included relevant information on each attraction and presented it in an effective and appropriate manner. These are characteristics of Level 8: pupils *plan independently for a specific purpose and refine in the light of development…they create presentations for others to meet specific requirements*.

The room painting calculator demonstrates mainly characteristics of Level 7. Bethan planned her work independently and was able to develop her model to meet the need of the intended users. Following the teacher's introduction to the use of macros, Bethan was able to design one to clear the data in her model. This is characteristic of Level 7: pupils *plan independently for different purposes…they design computer models and procedures, with variables, to meet specific needs*.

The tour operator database demonstrates mainly characteristics of Level 7. Following the teacher's introduction to the task, and the class discussions, Bethan was able to design a database that met the main requirements of the intended user. She refined her work as it progressed until she was happy with the final version. This is characteristic of Level 7: pupils *design a database making appropriate choices within a data-handling application, using its specialised functions*.

Aspects of Bethan's work in ICT that are not explicitly evident in these three activities show mainly characteristics of Level 7. She uses the internet in a confident and mature way both within school and at home. She is very aware of the benefits and potential dangers of using communication technologies and she uses these safely without supervision. This is a characteristic of Level 7: pupils *use the internet/related technologies safely and independently*.

Acknowledgements

The Department for Children, Education, Lifelong Learning and Skills (DCELLS) would like to thank the many teachers, schools, local authorities and other organisations who have helped in the development of this guidance.

Special thanks are given to the Guidance Group, Gethin Elis Thomas, Carole Evans, Gwenno Jones, Peter Lewis, Gwyndaf Owen, Timothy Richards and Marcus Walker, who gave up valuable time to assist us in the development of this guidance. Particular thanks are due to Osian Hughes and Haf Jones from Cynnal for both their work in the Guidance Group and their invaluable assistance in the development of this guidance.

DCELLS would also like to thank those pupils and parents/guardians who agreed to allow examples of work to be reproduced in this guidance.

In particular, DCELLS is grateful to the following schools for providing help and materials:

Cefn Hengoed Community School, Swansea
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St. Cyres Comprehensive School, Penarth
West Monmouth School, Pontypool
Ysgol Bro Lleu, Caernarfon
Ysgol Llanfairpwll, Ynys Môn
Ysgol Syr Thomas Jones, Amlwch
Ysgol y Creuddyn, Llandudno.

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