



*Rhagoriaeth i bawb – Excellence for all*

Arolygiaeth Ei Mawrhydi dros Addysg  
a Hyfforddiant yng Nghymru

Her Majesty's Inspectorate  
for Education and Training in Wales

# The impact of ICT on pupils' learning in primary schools

July 2013



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Publication Section

Estyn

Anchor Court

Keen Road

Cardiff

CF24 5JW or by email to [publications@estyn.gsi.gov.uk](mailto:publications@estyn.gsi.gov.uk)

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## Introduction

This report is produced in response to a request for advice from the Welsh Government in the Minister's annual remit letter to Estyn for 2012-2013. It builds upon two previous reports: 'Review of information and communications technology (ICT) provision in schools and its impact on raising standards' (Estyn, 2003), and 'An evaluation of the impact of the better schools fund provision for ICT in schools' (Estyn, 2007).

This is the first of two reports on ICT. It focuses on ICT in primary schools. The second report will be about ICT in secondary schools.

The report evaluates standards in the National Curriculum subject of 'information and communication technology' (ICT) and considers the impact of ICT as a key skill on pupils' learning across the curriculum in primary schools in Wales. In particular, the report considers the impact of ICT on developing literacy and numeracy skills and on closing the poverty gap. The report contains case studies of good practice in the use of ICT. The evidence base for the report is given in Appendix 1.

The report is intended for the Welsh Government, local authority and consortia personnel, headteachers and teachers. Others with an interest in the use of ICT in education will find it useful.

## Background

This report looks at the subject of ICT and the use of ICT skills across the curriculum. Although pupils often gain initial ICT skills in ICT lessons, in order to be fully competent and proficient, pupils must practise and apply these skills in other subjects and contexts.

### Curriculum guidance

There are two key guidance documents about ICT: 'Information and communication technology in the National Curriculum for Wales Order' (Welsh Government, 2008) relates to ICT as a subject, and 'Non-statutory Skills Framework for 3 to 19-year-olds in Wales' (Welsh Government, 2008) relates to the use of ICT skills across the curriculum.

The National Curriculum subject orders for ICT identify two areas of skills that pupils should be given opportunities to experience: 'Find and analyse information' and 'Create and communicate information'. In addition, 'pupils should be taught how to use ICT comfortably, safely and responsibly'.

The 'Non-statutory Skills Framework for 3 to 19-year-olds in Wales' provides guidance on developing continuity and progression across the curriculum and between key stages in the skills of thinking, communication, ICT and number. The

aim of the framework is to help teachers improve pupils' ICT skills across subjects, where applicable. The ICT section of the Skills Framework has two strands. These are: 'finding and developing information and ideas' and 'creating and presenting information and ideas'. These closely reflect the two strands of the National Curriculum subject orders for ICT. A summary of the main requirements for ICT in the National Curriculum and in the Skills Framework is in Appendix 3.

In addition to these two key documents, National Curriculum subject orders for subjects other than ICT identify further opportunities to use ICT, where appropriate. Often these opportunities require specific ICT skills, such as using logo and control boxes in the National Curriculum subject orders for design and technology.

### **Recent developments and initiatives**

The ICT Self-review framework<sup>1</sup> (SRF) and ICT Mark were introduced in 2007-2008 in Wales to assist schools in identifying, improving and benchmarking the use of ICT in learning, teaching and management of schools. The ICT Mark is an integral part of the SRF and provides recognition of a school reaching a level of maturity in their use of ICT. Currently, 516 schools in Wales (around a third) have registered to use the SRF and 353 have been awarded the ICT Mark.

The One Wales Laptops (OWLs) pilot was launched by the Welsh Government in 2010. This initiative provides laptops for up to 1,200 children aged 10 to 11, from selected schools in Communities First and Flying Start areas. Its purpose was to explore the educational benefits of providing access to laptops for pupils from deprived areas. Information from this initiative was used in identifying good practice schools for this survey.

The Welsh Government set out its vision for ICT in a statement on the 'Establishment of a Review of Digital Classroom Teaching Task and Finish Group' in September 2011. The subsequent Task and Finish Group produced a report<sup>2</sup> and the Minister announced his response<sup>3</sup> in June 2012, which included:

- creating a new National Digital Learning Council to provide expert guidance on the use of digital technology in teaching and learning in Wales;
- launching a new bilingual learning platform for Wales, called Hwb<sup>4</sup>, for learners and teachers to share resources, knowledge and experience;

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<sup>1</sup> The **Self-review framework**, now run by the National Association of Advisors for Computers in Education (NAACE), is an online tool to assist schools in identifying, improving and benchmarking the use of ICT in learning, teaching and management of schools. Schools evaluate their progress against a 5-level scale for aspects of development grouped under six major elements. Since its introduction, over 19,500 schools have used it to review and plan their use of technology.

<sup>2</sup> 'Find it, make it, use it, share it: learning in digital Wales', published in March 2012

<sup>3</sup> The Welsh Government's response to the recommendations in the Digital Classroom Teaching Task and Finish Group's report can be found in the Minister's written statement which was published on 22 June 2012.

<sup>4</sup> Hwb is the all Wales Learning Platform provided by Welsh Government aimed at supporting national action in the following areas:

- encouraging, supporting and preparing teachers to operate in a digital environment and to share their digital practice; and
- establishing and developing a system and a national collection for creating, storing and sharing digital resources.

- creating a National Digital Collection, which will include a repository for curriculum and good practice resources for learners and teachers to upload, share and use;
- encouraging the use of iTunes U to showcase the best educational resources and activities in Wales;
- establishing Digital Leaders, drawn from the best digital technology practitioners in Wales;
- providing professional development to support the teaching of computer science, particularly new products such as the Raspberry Pi<sup>5</sup> and Dot Net Gadgeteer<sup>6</sup>, designed to encourage young people into future studies and careers in computer science; and
- sponsoring an annual National Digital Event to raise the profile of digital technology in education and of Welsh achievements in this field.

This response is based on the Welsh Government's desire to see Wales becoming a world leader in digital learning. To this end, the Minister established an ICT Review Group to recommend a new curriculum for ICT, and the First Minister announced in January 2013 that all schools will have access to faster broadband connections<sup>7</sup> as a result of £39m investment.

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<sup>5</sup> The Raspberry Pi is a low-cost credit-card sized computer that plugs into a TV and a keyboard. It can be used for many of the things that a desktop PC does, such as spreadsheets, word-processing and games. It also plays high-definition video. The Raspberry Pi was developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools.

<sup>6</sup> Microsoft .NET Gadgeteer is a toolkit for building small electronic devices. It allows hobbyists, educators and developers to build and refine prototype electronic devices quickly and easily.

<sup>7</sup> This will mean a minimum speed of 100Mbps (megabits per second) for secondary schools and 10Mbps for primary and special schools by 2014.

## Main findings

### Standards

- 1 Standards in ICT are good or excellent in around half of the primary schools visited for this survey. Standards in ICT are better in the Foundation Phase, relative to age, than in key stage 2. Where standards are not good pupils generally do not develop the full range of ICT skills that they should in key stage 2. Over half of the schools do not use ICT well enough to stretch more able and talented pupils.
- 2 Pupils' skills in using ICT for presenting information are good in most primary schools and nearly all pupils use ICT well to research information in different subjects. However, pupils in key stage 2 do not generally develop their data-handling or modelling skills well enough. This hinders the development of their thinking and problem-solving skills, and their application of higher-order number skills.
- 3 The areas that are weak within ICT as a subject are also weak in the use of ICT skills in other subjects. Pupils do not apply ICT skills learned in ICT subject sessions well enough in other subjects and not all schools teach pupils these skills in the first instance.
- 4 The impact of ICT on standards in literacy is good or better in the majority of schools. In these schools, boys who are reluctant readers and writers are motivated by ICT to improve their literacy skills. In a few schools, pupils' oracy, presentation, research and writing skills, as well as their collaborative and thinking skills, improve significantly through working on video-filming, editing and animation.
- 5 The majority of schools use ICT to support numeracy interventions and a minority do so well and can show a link between the use of ICT and an improvement in standards.

### Teaching and learning

- 6 In nearly all the primary schools, ICT has a positive impact on teaching and learning, mainly by motivating and engaging pupils. With a few exceptions, practitioners (teachers and support staff) make good use of ICT to engage and enthuse pupils.
- 7 The quality of teaching in ICT is better in the Foundation Phase than in key stage 2. Generally, practitioners in the Foundation Phase are competent enough in ICT to support pupils appropriately. Practitioners are generally less competent in delivering the full range of the ICT programme of study in key stage 2.
- 8 Most schools have a current scheme of work for ICT that sets out progression and continuity in all aspects of the subject. However, the implementation of these schemes of work is adequate or worse in over half the schools surveyed. Neither do schools use the Skills Framework well for planning progression in pupils' ICT skills.
- 9 The assessment and tracking of pupils' skills in ICT are only adequate or unsatisfactory in the majority of schools visited. As a result, many pupils are not making enough progress in using ICT. Only in just over a half of the schools do teachers assess pupils' work against the National Curriculum levels at the end of key stage 2 and a few have yet to develop any assessment procedures at all in ICT.

- 10 Primary and secondary schools do not always share a common understanding of standards in ICT. For example, in response to Estyn's questionnaire survey, 60% of primary schools in our survey said that pupils' skills in the use of spreadsheets are good or better compared with none of the secondary schools.

### **Leadership and management**

- 11 Around half of the primary schools visited are successful in raising standards in and through the use of ICT. The leaders in these schools have a clear vision and a determination to improve staff capacity, planning and provision for ICT. They ensure that all staff have the competence and confidence to use ICT well. In around a half of schools, however, leaders have not ensured that professional development in ICT enables practitioners to meet the ICT learning needs of pupils.
- 12 A third of the schools visited do not have an ICT plan that prioritises key developments, such as the introduction of portable technologies (tablet computers and mobile phones). Often schools do not consider planning for new technologies a priority because they do not feature clearly in National Curriculum orders or guidance.
- 13 Many leaders do not evaluate the effectiveness of their ICT plans with enough rigour to judge the impact on pupils' ICT or literacy and numeracy skills. In particular, too few leaders in schools make a baseline assessment of pupils' ICT skills before implementing a project or initiative to measure its impact.
- 14 There are too few educational Welsh-medium applications for portable technologies. Few leaders of Welsh-medium schools take the option to change the interface language of key computer software into Welsh. These issues can give pupils the impression that Welsh is not relevant in ICT.
- 15 Local authorities provide nearly all schools with an internet connection. Around a half of the schools surveyed say that the poor quality of the connection hinders their ICT work. This is mainly due to slow connections, which make internet searches for a whole class difficult. The level of filtering and blocking of internet sites by local authorities also hinders classwork unnecessarily in the majority of schools.
- 16 Local authorities provide only limited advice on ICT to schools. Local authority ICT advisory teams are very small and most schools are unsure about ICT support arrangements under the new regional consortia school improvement services.

## Recommendations

### **Schools should:**

- R1 develop the full range of pupils' ICT skills at key stage 2 especially in data-handling, modelling and numeracy;
- R2 assess and track pupils' ICT subject knowledge and skills rigorously;
- R3 plan the introduction of portable technologies;
- R4 implement and evaluate a development plan to improve standards in ICT; and
- R5 train teachers so that they are competent to deliver the full range of the IT programme of study in key stage 2

### **Local authorities and regional consortia should:**

- R6 support schools to improve standards and in all elements of ICT at key stage 2;
- R7 help secondary schools to plan to meet the needs of pupils who were regular users of tablets in primary schools and find themselves in secondary schools where the use of tablets is less frequent;
- R8 assist primary and secondary schools to gain a common understanding of standards in ICT;
- R9 disseminate good practice in ICT in schools;
- R10 support schools' safeguarding arrangements while maximising their access to a range of online digital technologies and services; and
- R11 explain to schools the levels of ICT support that they can expect from the new regional consortia.

### **The Welsh Government should:**

- R12 review the National Curriculum orders and non-statutory Skills framework for ICT to make sure that they remain relevant in light of new technologies;
- R13 support the development of Welsh-medium educational applications for portable devices; and
- R14 provide adequate broadband connectivity for all schools in Wales.

## Standards

### Standards in ICT

- 17 Since ICT is not a core subject, teachers are not required to assess every pupil in it formally at the end of key stage 2. Neither is ICT assessed at the end of the Foundation Phase. There is no official national data on standards of attainment in ICT in primary schools although a minority of schools do undertake informal assessments.
- 18 Standards of achievement in ICT are good or excellent in around half of the primary schools visited for this survey. In the majority of the schools where standards are good or excellent, ICT is contributing well to improving standards in literacy and numeracy.
- 19 Standards of achievement in ICT in the current cycle of inspection are higher in the Foundation Phase than at the end of key stage 2. The personal ICT skills needed by practitioners are less demanding in the Foundation Phase than in key stage 2. Many teachers and staff in the Foundation Phase are competent enough in ICT to help pupils achieve good standards. Practitioners are generally less competent in delivering the full range of the ICT programme of study at key stage 2.
- 20 Where ICT standards were judged adequate or unsatisfactory, a number of shortcomings were evident. In particular, pupils lacked:
  - competence in creating, using and interrogating databases;
  - understanding of elements of modelling, especially the use of spreadsheets, other than to create graphs;
  - enough experience in sending and receiving emails; and
  - the confidence to use control technology and logo in design and technology, and monitoring (data logging) in science.
- 21 Higher standards are often evident in schools that use portable technologies, such as tablet computers and mobile phones, well. However, even in these schools, there is often an over-emphasis on using ready made presentation packages to convey information with little differentiated provision between the year groups in key stage 2.
- 22 Overall, while standards and pupil competence in 'creating and presenting or communicating information and ideas' are good in many schools, they are lower in 'finding and developing or analysing information and ideas'. Pupils' ability to use a learning platform<sup>8</sup> is underdeveloped in around half of the schools visited.
- 23 Twelve local authorities, 152 primary schools and 14 secondary schools completed questionnaires for this survey. They were asked questions about pupil competency in using ICT skills. Primary schools based their responses on end of key stage 2 assessment, while the secondary schools used assessments of the work of Year 7

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<sup>8</sup> Learning platforms offer safe and secure web access to teaching, learning and management resources for the whole education community.

pupils on transfer. While these sources of evidence broadly identify similar patterns of strengths and weakness, there are significant differences in the judgements of primary and secondary schools. Generally, primary school judgements are more generous than secondary, with local authorities falling in between. For example, 60% of primary schools say that pupils' skills in the use of spreadsheets are good or better, compared with 0% of secondary schools and 20% of local authorities.

- 24 Most schools and local authorities agree that pupils display good ICT skills in 'online searching', 'presentation packages' and 'word processing'. However, judgements are different for 'graphs', 'database', 'spreadsheets', 'graphics' and the 'safe use of the internet'. These discrepancies highlight a significant lack of common understanding of standards in ICT between the primary and secondary schools.

### **The impact of ICT on standards in other areas**

- 25 A few schools use measurable outcomes (such as pupil reading ages) to evaluate the impact of ICT in raising standards. Ysgol Golwg y Cwm (case study 5) is an example of a school that does this well. These schools use baseline assessments of writing or reading before using ICT and then measuring its impact. Too many schools use anecdotal evidence rather than such measurable outcomes to evaluate the impact of ICT. Only a third of schools involved in the One Wales Laptops initiative used measurable evidence in their evaluation of the impact upon standards of the initiative.
- 26 Areas that are weak within ICT as a subject are also weak in the use of ICT skills in other subjects. Pupils do not apply ICT skills learned in ICT subject sessions well enough in other subjects and not all schools teach pupils these skills in the first instance.

### **Literacy**

- 27 Many schools use ICT to support literacy interventions and the impact ICT has on standards in literacy is good or better in the majority of schools. Almost all pupils enjoy using new technologies. ICT is used well to motivate boys who are reluctant readers and writers and have difficulty in keeping on task.
- 28 Penybont primary school is an example of a school that uses ICT well to raise standards in literacy.

### **Case study 1 – Enhancing literacy through the use of ICT**

#### **Context**

Penybont Primary School is located in Bridgend town centre and provides education for 337 pupils. Entitlement to free school meals is currently 28.3%, which is higher than the national average of 20.6%.

#### **Action**

The school decided to use ICT to develop the teaching and learning of literacy.

While studying World War 2, Year 5 and 6 classes used Michael Morpurgo's 'Friend or Foe' as a stimulus for work in English. The children focused on the main characters' evacuation to Devon. Pupils worked collaboratively in small groups to create scripts based on this aspect of the story. They then performed their script and filmed the work using Flip<sup>9</sup> cameras. Pupils uploaded the videos and edited the clips. Completed films were premiered to the class for evaluation.

### **Impact**

Observations made by teachers as part of assessment procedures noted that the tasks had successfully engaged and motivated all pupils. The tasks also catered well for all abilities and developed literacy skills. Pupils developed the skill of script-writing for a specific audience. Pupils' collaborative, creative and thinking skills developed well through working in small groups. Their oral and communication skills improved through rehearsing, refining and finally performing their scripts in front of a camera. Pupils used ICT skills to draft and edit scripts. They developed further ICT communication skills through the process of filming, editing and presenting their videos. Pupils' abilities to self-assess and peer-assess developed well.

The use of ICT has had a positive impact on standards in English at the end of key stage 2. The school's performance in the end-of-key-stage 2 teacher assessments shows high levels of achievement in English for both boys and girls. Performance is higher than that in the family of schools and the Wales average in oracy, reading and writing. Standards in writing are especially high. Their percentage of pupils achieving the higher levels is the highest within their family and this is significantly above what is expected. Their results also place the school in the top 25% of similar schools based on free-school-meals benchmarks.

- 29 Too few schools support their judgements on standards in ICT or the impact of ICT in raising standards in other subjects with robust evidence. Only a very few schools, often those that were originally part of the OWLs project<sup>10</sup>, can show a significant increase in reading ages as a result of using ICT. These schools understand the importance of establishing a baseline to enable progress to be evaluated, and are well placed to measure the impact ICT has made and to evaluate the benefits of their investment in additional ICT resources. A few schools, at the end of the project, compared the final individual pupils' outcomes with the targets they predicted at the outset of the project.
- 30 Schools that use ICT well to raise standards in literacy generally use an appropriate range of hardware, software and websites to enhance provision. For example, oracy skills are developed well when pupils prepare and publish podcasts. An increasing number of schools run their own radio service, which is broadcast throughout the school. Schools also support the development of pupils' reading skills, for example by encouraging pupils to search the internet for relevant information. However, too many pupils copy and paste information without enough regard to its accuracy, often because they use material that is not suitable for their reading levels. The most effective schools ensure that the websites used are matched to pupils' reading ages.

<sup>9</sup> A commonly used digital video camera in schools

<sup>10</sup> Please refer to Appendix 2.

- 31 Just under a half of the schools that made questionnaire returns have started using portable tablet computers<sup>11</sup> in the classroom. Potentially, tablets can have a significant impact on standards as they can be used anywhere and are not limited to an ICT suite or a fixed location in the classroom. Teaching and learning can therefore move with the pupil and take place anywhere either in the classroom or outside. This flexibility broadens the options available for teachers and enhances provision for learners.
- 32 Some commercial companies have produced software applications ('apps')<sup>12</sup> for tablet computers that link to books they publish. Some schools make good use of these apps to engage reluctant readers, and use the tracking elements in the apps to measure progress in individual pupils' reading ability. Impact is evident through an improvement in reading scores over time.
- 33 A few schools allow pupils to take tablets home and this has strengthened home-school links. This is the experience of Ysgol Llanrug in Gwynedd.

### **Case Study 2 – Promoting home-school links through the use of ICT**

#### **Context**

Ysgol Llanrug is a primary school for 244 pupils, located five miles from Caernarfon. Most pupils come from the village and the surrounding Welsh-speaking area of Snowdonia. Entitlement to free school meals is currently 5.3%, which is lower than the national average.

The slow speed of internet connectivity has made teaching and learning using ICT extremely difficult and frustrating. It has also hindered the development of home-school links using ICT

#### **Action**

The school established the following vision for the development of ICT within the school and the rural community it serves:

- for everyone in the area to enjoy the benefits of digital technologies for education, work and leisure;
- to develop robust ICT skills for children and adults of all ages in the area;
- to see a thriving local economy that is driven by research and development in technology;
- to develop a creative vibrancy in the local community by using 'technology' as a new creative medium; and
- to locate greater scope for mobile services and fast wireless connectivity throughout the area.

The vision was to make Dyffryn Peris and Llanrug truly digital. To realise the vision, the school had to ensure that everyone could access digital and information technologies, and gain the skills to make the most of them.

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<sup>11</sup> A tablet PC is a wireless, portable personal computer with a touch screen interface. The tablet is generally smaller than a notebook computer but larger than a smartphone.

<sup>12</sup> 'Apps' is an abbreviation for 'applications'. It is another name for computer programs that run on mobile devices, such as tablets or smartphones.

The approach was to develop a business plan with local partners to create a structure satellite 'broadband' speed to the village. This was done as their telecommunications provider is unable to upgrade the substation in the village until 2015.

The school has been registered as a regional training centre for Apple for the last 10 years. It therefore already had the experience and expertise to deliver specialist ICT training for pupils, staff and parents on the use of new technologies, such as tablets.

Parents were given an option to join this innovative project through a purchase of tablets through the school. By subscribing over two years, each family could purchase tablets and receive training. This was seen as key to developing home-school links and involving parents in the education of their children.

### **Impact**

The service is now in place and the local community can choose to subscribe to a range of internet packages. At first, 70 homes subscribed to the project, giving a boost to the school's focus on 'lifelong learning' and enriching the school's home-school connections. By now, around 92% of school families are part of the project.

On joining the project parents received four two-hour sessions of free training. This helped them develop skills alongside their children and staff and fostered a very close link with homes.

By using 'Dropbox'<sup>13</sup>, the school made training materials available to parents. Pupils also benefited from using this as they could easily access their work at home, at school or anywhere that allowed wireless access to the internet.

The terms 'blog', 'wiki' and 'digital stories' are now used by pupils and parents regularly. The community is also well aware that Welsh has a part to play in the new technology, although few apps are available in Welsh at present.

- 34 A few schools make very good use of video filming and editing and animation to improve pupils' oracy, presentation, research and writing skills as well as collaborative working and developing thinking skills. The availability of apps on tablets to film and edit on the same device makes this skill easier to develop. A few schools make good use of a 'green screen' technology to produce videos. This provides an stimulus to captivate, motivate and engage learners. For example, using this technology gives pupils at St Julian's Primary School a purpose for writing and has a positive impact on the quality and length of writing.

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<sup>13</sup> **Dropbox** is a free service that users can use to create a special folder on each of their computers, tablets or mobile phones, which are synchronised so that it appears to be the same folder regardless of which device is used.

### **Case study 3 – Using ICT to stimulate and support learners to achieve standards and take pride in their work**

#### **Context**

St Julian's Primary School in Newport provides education for pupils aged between three and 11 years and currently has 576 pupils on roll taught by 23 teachers and 24 support staff. Entitlement to free school meals is 22.7%, which is above the national average.

#### **Action**

The school identified areas where they could use ICT to stimulate and support learners to raise standards in all areas of the curriculum. One innovative area that they have found stimulating for learners is the use a 'green screen' to create videos or photographs.

#### **What does a 'green screen' do?**

A green screen is a green backdrop, which is placed behind someone while they are filmed. When the video is then imported into a video editing package, the green backdrop can be replaced by another scene or photograph, giving the impression that the person being filmed is in that particular scene or photo. Although fabric green screens can be costly to buy, green display backing paper is cheaper and just as effective.

#### **How does it work?**

- find a video clip to use as a background;
- a pupil/teacher is filmed in front of the 'green screen';
- the video is then imported into a video editing program;
- the recorded video is then placed on top of the original clip; and
- the computer identifies the green and makes it transparent, allowing the original clip to be seen in the background.

#### **How has the school used the green screen?**

Staff are always looking for opportunities to raise standards in pupils' writing, in particular to stimulate boys to improve their writing. During their World War II theme, a Year 6 class read 'Goodnight Mr Tom'. After reading a chapter of the book, pupils were asked to write a diary entry as of a child who had been evacuated from the city.

Prior to the lesson, the teacher had found a video clip of children being evacuated at a railway station and played this to the class. The children were then shown the clip again, this time with their teacher dressed up as an evacuee in the foreground of the video, recounting his first day as an evacuee. The teacher then explained to the class that, after writing their diary account, they were going to have the opportunity to read it aloud, standing in front of a green screen, whilst their partner filmed them.

In follow-up ICT sessions, they edited the video and placed themselves in the scene at the railway station, giving the impression that they were actually standing on the station reading their diary entry. Click [here to](#) view the video.



**Before**



**After \***

\* Source: Geoff Charles Photographic Collection – National Library of Wales

Since the pilot lesson, more staff have had training in using the green screen and have used it in many areas across the curriculum. There have been science lessons where children have been filmed talking about planets in outer space, and geography lessons where children have talked about Africa as if they were there.

### **Impact**

The school regularly use the green screen to produce videos for the start of their themes, with teachers dressed up and placed in a video clip relating to the theme.

As soon as pupils saw the video of their teacher dressed up at the railway station in the pilot lesson, they were captivated. When they went back to their tasks to start writing their own diary entries, they were enthusiastic and excited at the prospect of being able to place themselves in the video clip, reading their diary entry. This had a positive impact on their ability to focus on the task and on the quality of their writing.

Pupils who often take time to settle down to start writing wrote extended pieces of work. Their level of engagement was high and they did not allow themselves to become distracted. Nearly all the pupils wanted to make sure they had finished their writing in order to read their diary in front of the green screen. The activity gave pupils a purpose for writing and had a positive impact on the quality of writing. Teachers say that this is the case every time that the green screen is used.

The school has sustained the novelty of using the green screen. Whatever the task or activity, it provides an instant stimulus to motivate and engage learners in the task.

- 35 Another example of using emerging technologies allows pupils to create 'Quick Response' (QR) codes. QR codes are scannable images similar to a barcode. By scanning a QR code using a mobile device, such as a tablet or mobile phone, information linked to the QR code can be accessed. This can be text, links to web-based materials, bookmarks and email addresses. The few schools that use QR codes capture pupils' attention well and make lessons more interactive. They use

QR codes in a variety of ways, from creating interactive displays based on a theme to conducting treasure hunts inside or outside the classroom. A very few schools have now also started using Aurasma to take this technology a step further to bring displays even more alive than with QR codes. This is exemplified in the case study below from Casllwchwr Primary School.

#### **Case study 4 – Investigating how QR codes are used within the classroom**

##### **Context**

Casllwchwr Primary School is situated in the village of Lower Lluchwr, between Swansea and Llanelli. There are 229 pupils on roll. Approximately 17.4% of learners are entitled to free school, which is below the national average.

##### **Action**



The school has often been innovative in its use of technology and teachers have researched and implemented the use of apps well to enhance pupils' learning experiences and raise standards. They became aware of 'QR' codes and immediately saw their educational uses. They believed that QR codes could be used as an interesting method to engage pupils and make lesson material far more interactive.

The school began introducing QR codes in 2010. Now they appear all around the school linking to the school blog, to information blogs for parents regarding school clubs and also to newsletters and noticeboards.

The school uses QR codes alongside pieces of work in corridors and classrooms. Pupils use apps to generate a QR code, which is then placed under pieces of work. When scanned with a portable device, displays 'come alive' with children podcasting or starring in a movie explaining choices or work content.

Both key stages in the school use QR codes to promote different areas of the curriculum. In the Foundation Phase, children use QR codes made by staff. The teachers prepare 'phonic hunts' where the children scan the QR code and are asked to find letters; this promotes word building and blending of phonemes.

In key stage 2, QR codes are used in a variety of different ways. They are used for numeracy hunts and to promote questioning skills. Pupils work in pairs to create questions about the class novel and then create QR codes which link to their text. These questions lead on from one another and provide pupils with choices of answers and enhance motivation to answer questions whether inferential or literal. QR codes have also been created to link to an audio file of children's poetry and music so that they can be shared and heard by a larger audience. QR codes are used to describe vocabulary on displays for the children, such as the journey of a river. They are also used for Welsh lessons, where they link to podcasts modelling the pronunciation of words.

Successful activities in geography and history have included going on a trail with the children around the locality. Then Year 5 and Year 6 pupils create QR codes linking

to text or a website with the created podcast or movie. The QR codes can be placed on important landmarks, ready for the younger classes to use. When they scan the QR codes, they are taken to different information.

The school is now at a point where it is bringing displays alive even further by using the Aurasma app. A photograph of the piece of learning on the display board is taken; children may describe how they created a piece of work or present information via a dance or song, and once a mobile device is held to the selected piece of work the children's filming appears on it. To develop the use of Aurasma, teachers invited two previous headteachers to the school and asked them to select 10 old photographs from the school museum to show old landmarks and pictures of Loughor. Pupils recorded a film of each headteacher explaining the picture and informing the viewer of the history and story behind it. Pupils then Aurasma-ed the picture and made it public. With the free Aurasma app on each iPod, any visitor to the school can open the app and hover over the picture, and the films about the history of their locality appear.

Interactivity of displays enhances learning environments for all pupils. With the use of Google Drive<sup>14</sup>, the ability to link to spreadsheets for numeracy across the curriculum is another aspect of QR codes, which the school is exploiting well.

### **Impact**

Staff have noticed an increase in the engagement by all pupils. Their thinking skills are promoted as they are continually seek questions or ways in which to summarise work to link to QR codes. Their research skills and reading skills develop as they search for relevant information.

### **Numeracy**

- 36 About two-thirds of schools use ICT to support numeracy interventions and a minority do so well. However, nearly a third of schools do not make use of ICT to support pupils' numeracy skills.
- 37 In a minority of schools, carefully selected software and websites support the development of pupils' numeracy skills well. By using ICT in purposeful activities, pupils in these schools build upon and enhance their numeracy skills. The most effective schools ensure that the sites, software and apps used match or extend the abilities of their pupils. Too many schools do not match ICT activities to pupils' numeracy capabilities. As a result, pupils use websites or software packages to reinforce elements of numeracy with little understanding of why the answers are correct or incorrect.
- 38 Around half the schools visited use ICT very well to develop pupils' understanding of data handling and the impact of changing variables in models or simulations. These

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<sup>14</sup> **Google Drive** is a free service that allows the storage of files including documents, photos, videos and Google Docs online, and access to them anywhere via an internet connection.

schools often build on simple logo<sup>15</sup> work in the Foundation Phase well by offering more challenging work at key stage 2. This equips pupils to apply their thinking and problem solving skills. It also fosters logical thought and the application of high-order number skills and extends more able and talented pupils. These are skills that can be built on later to develop programming skills and prepare pupils for the world of work.

### **Cross-curricular use of ICT**

- 39 In almost all primary schools, pupils use ICT to research information. Pupils usually present this information well using presentation packages, posters or electronic leaflets. However, not all schools plan for progression in presentation skills. For example, there is often little variation in what pupils can do in different year groups across key stage 2.
- 40 The very few schools that are innovative make very good use of video work to inform and convey information to a variety of audiences. In these schools, pupils' work may typically be available online for parents to view. This also helps to engage parents so that they will encourage their children's development further.
- 41 Overall, too few pupils use the potential of spreadsheets, logo, monitoring or data-handling especially in mathematics, science and design technology. These pupils therefore have limited ICT skills because lessons focus too much on communication or creating and presenting information and ideas.

### **Using ICT to reduce the "poverty gap"<sup>16</sup>**

- 42 Schools involved in the OWLs project have used Welsh Government funding to purchase hardware and software including apps for tablets to enhance the provision of technology for pupils who may not have connectivity at home. The very few schools that have allowed pupils to take tablets home have seen an improvement in the quality of homework and in the engagement of parents in the development of their children's skills. Ysgol Golwg y Cwm in Ystradgynlais was involved in the OWLs project and specifically targeted disadvantaged pupils.

### **Case study 5 – Improving reading through the use of ICT**

#### **Context**

Ysgol Golwg y Cwm in Ystradgynlais has 130 pupils, and is located in a Communities First area with a high level of deprivation. The school was part of the All-Wales Laptop Project and selected pupils were given individual laptops.

#### **Action**

Individual pupils used the laptops every day across all curriculum subjects. In addition, pupils used the laptops for specific programs, particularly those to improve

<sup>15</sup> Logo is a simple computer programming language which can be used to control a screen or floor turtle.

<sup>16</sup> Closing the poverty gap relates to closing the gap in attainment between pupils living in low income households and those that do not.

of numeracy and literacy. The school had a specific focus on improving pupils' reading scores and a range of programs and websites were used to support this goal. Teachers assessed pupils to find their reading scores at the beginning of the year and then re-assessed them at the end of the year.

### **Impact**

All pupils improved in their test results. Boys and pupils with literacy difficulties within the class have benefited greatly from the use of the laptops as they were engaged and interested in a wider range of subjects, and this improved their overall attainment levels substantially. Data was compared from the same tests in June 2010 and June 2011.

### **Reading ages – boys in Year 6**

100% of boys have progressed by > +2 years  
50% of boys have progressed by > +3 years  
20% of boys have progressed by > +4 years

### **Reading ages – girls in Year 6**

100% of girls have progressed by > +1 year  
42% of girls have progressed by > +2 years  
25% of girls have progressed by > + 3 years  
18% of girls have progressed by > + 4 years

The laptops also increased learner engagement substantially in Year 6. When questioned, pupils said that they enjoyed the more independent learning opportunities that the laptops allowed. Through the use of laptops, pupils can transfer skills across the curriculum subjects and from school to home. Pupils were excited to share new experiences and skills with family members and siblings. Confidence and self-esteem in their own learning abilities have grown, as shown by feedback from pupils in Year 6:

**“The laptops helped me build my confidence because when you play games on there they don't tell you ‘Oh you had it wrong’ they tell you ‘Better luck next time!’ I think the laptops are more interesting than books because, if you're learning about sounds – you can't hear the sound in a book. It helps if you have trouble spelling because you can use the spell check.”**

**“I can go home and show my parents what I've done My father used Microsoft Excel to do his invoices for work, when he was doing them I showed him something that I had learned in school and he had learned something new. So I think the laptops have helped me a lot with my school work and projects.”**

Increased use of ICT has allowed the pupils to develop more lateral thinking and has given many more opportunities to use their thinking skills, assessment for learning

and problem-solving skills. Pupils are now more willing to speak about different topics, ideas and activities inside and outside school. Pupils confidently prepare presentations independently to present in front of fellow pupils and visitors. They also take more ownership of their learning. For instance, they use spreadsheets to analyse their weekly spelling and tables results.

Pupils have benefited from using the skills they have gained in school at home to research and find information for their termly projects on topics such as recycling. This has helped the pupils to engage and be motivated to work independently at home, and 100% of pupils have completed termly projects this year.

Pupils also had more opportunities to develop their reading and researching skills and especially benefited from using [www.thinkuknow.co.uk](http://www.thinkuknow.co.uk). This is an internet-safe website that they also use at home and share the information with their parents.

- 43 A few schools ensure that pupils who do not have access to computers at home have dedicated times to access them at school. Too few schools offer after-school clubs that are specifically targeted for these pupils.
- 44 A few schools make good use of attitudinal surveys to produce evidence of the impact of using ICT with pupils in disadvantaged areas. These provide a useful measure of a pupil's attitudes towards themselves as learners and their attitudes towards school. Others, as in literacy and numeracy, make good use of comparisons between predicted and actual levels of attainment at the end of a key stage or levels of achievement between key stages.
- 45 The few schools that have monitored the attendance of pupils in disadvantaged areas have noticed an improvement in attendance rates following targeted use of ICT in the OWLs project. They have also noticed an improvement in standards of behaviour as pupils generally respond well to the trust placed in them to return the tablets after taking them home

### **Pupil engagement**

- 46 In most schools, ICT impacts positively on pupil engagement and it often improves pupils' motivation and self-esteem. The few schools that use attitudinal surveys<sup>17</sup> to measure this have a development profile for each pupil which shows an improvement in several measures of emotional engagement.
- 47 Nearly all pupils observed during the survey were on task, enthusiastic and positive about their work. Most could talk confidently and knowledgeably about their use of ICT. In the better schools, pupils knew how to improve their ICT skills.
- 48 Schools that successfully engage pupils with ICT allow pupils greater independence in planning, designing and evaluating tasks. As a result they have high expectations of themselves and their standard of work.

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<sup>17</sup> Attitudinal surveys, such as the Pupil Attitudes to Self and School (P.A.S.S.) Rating Scale, can be used in a range of educational environments to help understand pupil motivation and learner attitudes.

- 49 Schools that have invested in tablets and prepared well for their introduction by training staff and securing purposeful apps have noticed a significant improvement in pupil engagement. Pupils sustain this level of engagement even after the initial rush of excitement. Pupils develop their self-esteem and pride in their work when the whole class admires their work on the interactive whiteboard or large monitors. They speak with pride while explaining how they researched, wrote, filmed and edited their films. In the few sector-leading schools, pupils are becoming excellent ambassadors for portable technologies and are very confident, not only in explaining what they do to fellow pupils, but also to pupils and staff from other schools.

## **Teaching and learning**

- 50 Generally, the quality of teaching in ICT is better in the Foundation Phase than in key stage 2. This is mainly because the ICT skills required by Foundation Phase practitioners are less demanding than those needed at the end of key stage 2. As a result, teachers and staff in the Foundation Phase are more confident and competent in delivering the provision at the appropriate level.
- 51 In nearly all schools, the use of ICT helps to motivate and engage pupils. The way schools teach and use ICT varies a lot. The factors that affect reading include: the number of computers available; the physical constraints of school buildings; and the vision of senior managers. For example, more primary schools now teach ICT in ICT suites partly because more ICT suites are now available. Not all schools choose to have suites and prefer to deploy computers in the classroom. Other schools have a portable trolley with a number of laptops that staff or pupils move from room to room. These laptops often connect to the internet wirelessly. Within the past two years, the number of schools using tablets and other mobile technologies has increased.

## **Using ICT to support more able and talented pupils**

- 52 Over a half of schools do not use ICT well enough to challenge more able and talented pupils. This is a significant omission considering the potential of ICT to engage and extend these pupils. The under-developed areas in ICT are those that would help stretch the more able and talented pupils. Creating and interrogating databases, using spreadsheets to model real-life situations and looking at the effects of changing variables along with data logging and logo are ideal to meet the needs of more able pupils.
- 53 The schools that meet the needs of more able and talented pupils well make use of the full set of ICT skills. Often the creative elements of ICT such as animation and video-editing are used well in providing suitable challenge for more able and talented pupils. The case study below shows how Penybont Primary School builds on early logo skills using programmable toys in the Foundation Phase.

## **Case study 6 – Using ICT to enhance the provision for more able and talented pupils**

### **Context**

Penybont Primary School is located in Bridgend town centre and provides education for 337 pupils. Entitlement to free school meals is currently at 28.3%, which is higher than the national average.

### **Action**

The school organised an ICT club to challenge more able children by using a range of technologies and software.

During a lunchtime club, pupils are provided with an opportunity to develop programming and game-creation skills using Lego Mindstorms<sup>18</sup> and Microsoft Kodu<sup>19</sup>. 'Icon-based' languages allow students to design, program and test their own games. Through the elements of logic and problem-solving involved in such programming, pupils learn about cause and effect, co-operation, logic and creativity, in addition to programming itself.

The club promotes independence, interdependence and self-motivation through the use of learning groups of pupils who co-operate with each other. Pupils' experiences and interests are harnessed as they use their knowledge, understanding and experience of computer games from home. Assessment for learning practices, including peer-assessment, are an integral part of the teaching and learning.

### **Impact**

Pupils have developed enhanced programming skills and an understanding of programming in a real-life context. They have gained a greater understanding of associated programming language. This underpins their developing problem-solving skills when accessing relevant programs.

More able and talented children within this group are much more confident due to their achievements in ICT. This has been evident in many areas of the curriculum, particularly when problem-solving and group-work activities are involved.

## **Assessment**

- 54 There is no requirement to publish the outcomes of assessment against the National Curriculum for ICT as it is not a core subject. Also, there is no requirement to assess pupils' ICT skills formally against the non-statutory Skills framework. Even so,

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<sup>18</sup> Lego Mindstorms are a series of kits containing software and hardware to enable pupils to create small, customizable and programmable robots. These kits include a programmable unit to control the system, modular sensors and motors, along with LEGO parts from the Technics line for pupils to use to create their robots.

<sup>19</sup> Kodu is a creative construction tool that supports contemporary teaching and higher-order Web 2.0 learning, emphasising links to creative programming and critical thinking.

assessment and recording of pupils' ICT skills are established procedures in a minority of schools visited. These schools make good use of assessment information to inform planning and meet the needs of individual pupils. Where assessment of ICT is good, schools:

- adhere to clearly agreed procedures and make effective use of co-ordinators to assist staff in the process;
- track pupil progress (many using commercial packages) and use the information to inform planning;
- have comprehensive portfolios or e-portfolios containing annotated examples of current pupil work for all the ICT skills; and
- use these portfolios as a basis for levelling pupils' work.

- 55 The best schools involve pupils in the assessment process through self-evaluation and set pupils targets for ICT at least every term. As a result, pupils are clear about what they need to do to improve. A few schools make effective use of electronic assessment and tracking systems. These systems alert teachers where pupils are having difficulties in ICT so that they can offer appropriate support and intervention.
- 56 Assessment of ICT is adequate or worse in the majority of the schools visited and few have developed assessment procedures. Less than half of schools assess standards in ICT as a subject at the end of the year. Just over a half assess pupils' work at the end of key stage 2. This hampers effective transition to secondary schools and can lead to secondary schools providing inappropriate work for Year 7 pupils, after transition from primary education.
- 57 Just over a half of schools do not standardise levelling within the school and only a very few moderate ICT with external partners. Most schools do not use the ACCAC Optional Assessment materials to aid their assessment or as a benchmark. Only a minority of schools have ICT portfolio of pupils' work.
- 58 Tracking pupils' progress in ICT skills is one of the weakest areas of provision. Generally, teachers do not know how well pupils can use and apply their ICT skills across the curriculum and therefore do not plan appropriately challenging work for them at the next stage. Consequently, many pupils are not making sufficient progress in developing their ICT skills. This especially affects the more able and talented pupils, who are not set challenging tasks because their previously high levels of achievement have not been recorded or recognised.

#### **Planning for ICT as a subject**

- 59 Most schools have a current scheme of work for ICT and many have adopted the schemes produced by their local authority. These schemes of work generally set out activities that would provide progression and continuity in all aspects of ICT, including handling information and modelling. More confident and innovative schools have either produced their own scheme of work or have modified the local authority's scheme to reflect the school's provision and expectations. Most base their scheme of work on the relevant subject document 'Information and communication technology in the National Curriculum for Wales' Order 2008. A few schools base their planning on the Qualifications and Curriculum Authority document from England without understanding where this differs from the NC Subject Orders in Wales.

- 60 While the quality of planning for the subject is good in most schools, its implementation is adequate or worse in over half the schools visited. As a result, key areas of the ICT curriculum are not delivered and this has a negative impact on pupils' standards.

### **Planning for ICT as a cross-curricular skill**

- 61 Schools do not use the Skills framework well enough to plan how pupils should make progress in ICT. Few schools monitor with sufficient rigour how well practitioners deliver all aspects of ICT skills by scrutinising plans or pupils' work. As a result, pupils do not develop all the necessary ICT skills.
- 62 A minority of schools in our survey do not plan the use of ICT in other subjects. In these schools, pupils do not have enough opportunities to apply their ICT skills in a range of contexts. As there is no clear mapping of skills, these schools often do not provide pupils with all the ICT skills needed for transition to secondary schools.
- 63 In a few local authorities, schools use 'skill ladders' well to plan continuity and progression in ICT. These documents provide helpful guidance to schools to plan enough opportunities for pupils to practise and use their ICT skills. A growing number of schools purchase commercial schemes that identify and plan the use of ICT across subjects. A key factor for both these approaches is the need for all teachers to implement plans fully.
- 64 The best schools have well-embedded plans for ICT as a subject and as a key skill. These schools successfully provide rich learning experience for all pupils. In these schools, provision matches the needs of individuals and groups. Teachers implement plans effectively and ensure the successful development of pupils' ICT skills in each area of learning and National Curriculum subject. One such school is Ysgol Gynradd Cae Top in Gwynedd.

### **Case Study 7 – The use of classroom management software to monitor provision and raise ICT standards across the school**

#### **Context**

Ysgol Gynradd Cae Top provides education for some 240 pupils in Upper Bangor in Gwynedd. At present, 12.8% are entitled to free school meals, which is below the national average.

#### **Action**

An essential aspect during the design stage of their new school building was to ensure the effective use of ICT (hardware and software) across the school. An ICT studio is located on the first floor with 30 computers. Four computers are located in each practical area and there is an allocation of tablets that are shared. Classroom management software<sup>20</sup> was purchased to monitor the effective use of ICT.

<sup>20</sup> Classroom management software such as Smart Sync used by Ysgol Cae Top allows a teacher to view student screens on the teacher's computer desktop. This enables the teacher to monitor pupil activities and provide guidance and support throughout the lesson. With this software teachers can interact with their students as a group or individually to keep them engaged and focused.

## Impact

The classroom management software has had a significant impact on the effectiveness of the ICT studio provision. Teachers and pupils can share their desktop with everyone in the room, for example to demonstrate a concept, to open a programme, or to assess work, and the transfer of work between the pupil and teacher is easy, quick and effective. This assists the teacher in delivering skill-based activities that ensure pupils stay focused on learning.

Pupils are organised into small groups and teachers guide their collaboration, while still maintaining whole-class instruction. Teachers are able to give students an assignment to work on individually, and then organise them into groups so that they can team up and develop a consensus by sharing screens. The teacher can take control of a pupil's computer remotely to guide him/her through a task or problem, and pupils can send the teacher private (one to one) or public (whole class) questions regarding specific tasks.

The power of technology for teaching and learning across the curriculum is a particular focus across the whole school. As a recognition of this, Ysgol Cae Top has received the "Naace – ICT Mark Accreditation for demonstrating commitment to continual improvement through ICT", and has recently been invited to be a Naace – ICT Mark Champion School. This honour has the added responsibility for sharing excellent practice with others.

The impact on learners has been evident, with the pupils demonstrating improved confidence and improved ICT skills across a variety of areas of learning, from the Reception class through to Year 6. The impact on staff ICT skills development is also evident, with senior leaders using the classroom management software to offer continuing professional development opportunities across the workforce.

- 65 However, in too many schools, planning for ICT skills development does not ensure the progressively-increasing complexity of activities needed or secure enough challenge within tasks.

## Leadership and management

- 66 Schools that are successful in raising standards in and through the use of ICT are effective because senior management have a clear vision and determination. They engage staff, pupil, governors, parents and the community in their vision. In these schools, the leaders drive initiatives purposefully, and provide a clear rationale and funding for resources. There is high-quality training for all staff. These schools have well-developed ICT improvement plans that prioritise the work and have arrangements to monitor it regularly. In these schools, teachers are encouraged to keep up-to-date with developments in ICT and implement innovative approaches.
- 67 One school that has a very clear vision for the use of ICT to raise standards is Ysgol Casllwchwr.

### **Case study 8 – School leaders with a clear vision on how effective use of mobile devices can enhance the curriculum and show positive results in the end of key stage 2 data**

#### **Context**

Casllwchwr Primary School is situated in the village of Lower Llwhchwr, between Swansea and Llanelli. There are 229 pupils on roll. Approximately 17.4% of learners are entitled to a free school meal.

#### **Action**

Prior to their 2010 inspection, the senior management team analysed literacy data for July 2009. They noticed that there was a 24 percentage points difference between boys and girls at level 4+ attainment. Girls were outperforming the boys significantly. The staff brainstormed actions to target the issue. Initially they embarked on a book project with the help of a local author who was also a governor at the school. The project involved weekly visits where the children researched famous Welsh sporting celebrities and interviewed them. As a result, the class published their own book, entitled 'Believing Is Achieving'.

Staff looked at the possibility of introducing mobile technology to inspire pupils to raise standards. The school borrowed one Macbook and an iPad. Activities such as creating book reviews using the Pages application along with filmed footage using Photobooth allowed pupils to create work using apps that could be accessed by others in the school library. They also displayed written poetry in this format.

Eventually, when they had acquired enough equipment and had 30 iPads, 18 iPods and two iMacs, they were able to explore other applications. They then used apps to create 'word collages' while practising summarising. Pupils used a presentational application to increase their confidence in making oral presentations. Children planned well and wrote scripts, which they performed using appropriate apps.

By 2011-2012, staff understood fully how to use ICT applications to enhance literacy by making learning interesting. Providing children with opportunities to plan work

using applications also gave them more visual opportunities to record work. The teachers began introducing screen casting<sup>21</sup> apps through the school. These were then embedded on the school blogging website. This improved home-school links, allowing strategies taught in school to be reinforced and accessed at home.

### **Impact**

As a result of the initial project, the data for that year showed an improvement of 25 percentage points in the proportion of boys attaining level 4. The proportion of girls also increased from 38% attaining at level 5 to 57%. The school evaluated what they had done to achieve this as the average class sizes were similar and the classes had cohorts similar to those of previous years. They concluded that what they had done was inspire, engage and enthuse pupils by making learning more exciting.

As a result of using mobile technologies in 2011, high levels of engagement were evident. Pupils became more decisive when considering the layout of work they had researched and how to present it. This was evident in their end of key stage data when the boys increased performance by 16 percentage points at level 5.

In 2011-2012, as a result of using creative applications in a planned context that helped children to practise spelling and grammar, the school closed the gender gap to 0% at level 5 in English.

Tablets are allowing the school to deliver teaching and learning in a way that would have been inconceivable just two years ago. Pupils enjoy one-to-one provision whereby each pupil has their own iPad in key stage 2 and there are banks of iPads in the Foundation Phase that lend themselves to enhancing tasks.

- 68 Effective school leaders help staff to improve their competence in ICT.. ICT standards, and their impact on other subjects, are usually good or better in schools where staff have the skills and confidence needed to deliver all elements of ICT to the levels expected in their class. Successful leaders ensure that all staff have relevant, up-to-date continuous professional development and ICT systems that work well.
- 69 One school that has focused on developing the confidence and competence of teachers in ICT is St Julian's Primary School in Newport

### **Case study 9 – Developing the confidence and competence of teachers in ICT**

#### **Context**

St Julian's Primary School provides education for pupils aged between three and 11 years and currently has 576 pupils on roll. Entitlement to free school meals is 22.7%.

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<sup>21</sup> A screencast is a digital video recording that captures actions made on a computer desktop. Screencasts often contain voice-over narration and are useful for demonstrating how to use specific software applications or websites.

## **Action**

Following a rigorous self-evaluation of ICT in 2010, the school prioritised spending in excess of £60k for new equipment and a further £5k on training. The training focused on improving teacher competence. The school identified areas of ICT that staff felt less confident in delivering, namely modelling and simulation, as it was felt that staff did not fully understand what was required to facilitate such activities. The school leaders developed a detailed training programme to address these gaps.

The decision to have an ICT suite was part of the school's corporate vision. All classes in key stage 2 are timetabled to use the suite twice a week. During these sessions, teachers introduce and develop ICT skills and new techniques. If staff or individual staff members are not confident with the new software, team teaching by members of the support group will occur, thus training staff and pupils at the same time. Planning ensures that these newly acquired skills, when relevant, are implemented across the curriculum and less-confident staff are monitored and observed by the support group who offer further training and suggest areas for improvement.

The school is organised into three phases with senior managers each leading a phase:

Phase 1: Nursery, Reception and Year 1

Phase 2: Years 2, 3 and 4

Phase 3: Years 5 and 6

Phase meetings identify staff training needs, contribute to the school's self-evaluation and support the preparation of the school improvement plan.

A comprehensive ICT Action Plan has been produced that highlights strengths and weaknesses. It focuses on areas for development within the ICT skills framework and this includes training requirements as well as resources. The school has ensured that all teaching staff have ready access at school to computers running up-to-date software.

There are established strategies to enable and encourage the use of email and learning platforms by staff for transferring documents and teaching materials between home and school. This has made it easier to prepare activities to meet the needs of the ICT skills ladder introduced by the local authority.

The school's INSET programme ensures that all teaching and non-teaching staff have training and focused support in order to use ICT equipment as part of their professional development. This has resulted in staff becoming more confident and competent through the sharing of good practice

## **Impact**

The school offers valuable support for teaching and non-teaching staff. The way in which the school responded to the initial training needs has ensured that, within three

years, every member of staff has become confident and competent enough to deliver all ICT skills in every aspect of the curriculum. As a result of increased teacher confidence and competence in using and delivering ICT skills, the school has observed a significant improvement in the confidence and skill levels of pupils across the school, and this has been evident in many areas of the curriculum.

- 70 Nearly all school surveyed have a member of staff who is the ICT subject leader or co-ordinator and many schools also have someone with the responsibility for the use of ICT across the curriculum. In most cases, the same member of staff takes on both responsibilities.
- 71 In the best practice, the ICT co-ordinator works alongside other subject leaders and helps them to plan and develop the use of ICT in their subject areas. Together they identify where to use ICT appropriately in National Curriculum subjects. These opportunities are in addition to developing ICT skills within the ICT subject and the Skills framework. Often these require more specialised ICT skills such as using logo, data loggers and control boxes. Staff in the very few schools that utilise these skills benefit from the guidance and support secured by leaders.
- 72 The more effective co-ordinators have produced clear policies to secure a consistent approach to ICT across the school. They make sure that all staff adhere to the scheme of work and the cross-curricular planning for ICT through rigorous monitoring. They set in place effective assessment and tracking procedures and ensure that this is used well to inform planning. They also arrange for the creation of portfolios to exemplify standards and aid in levelling pupils' work.
- 73 Successful leaders monitor and evaluate the standards of ICT in their schools. This is often done through lesson observations, scrutiny of pupils' work, talking with learners, formative and summative assessment and analysing pupil tracking information. Through using these methods, leaders identify early where the strengths and weaknesses are in standards and provision. Leaders address these issues successfully through a school improvement plan, which includes quantifiable targets. This in turn ensures complete coverage of ICT skills at the appropriate levels for all pupils and leads to improved standards in ICT.
- 74 Generally, leaders do not evaluate the effectiveness of their ICT provision or judge the impact on pupils' ICT skills with enough rigour. Very few measure the impact of ICT initiatives. Other leaders decide to follow a trend in ICT and make purchases without understanding why, because they have not undertaken enough research or planning. In one example, a school had purchased a number of tablets for classroom use and only after their delivery did they contact another school in order to find out what could be done with them.
- 75 Innovative leaders take an active part in professional networks and make every effort to keep abreast of emerging technologies, through visiting local and national conferences. They review the potential impact of any new development on teaching and learning before deciding on the way forward.

- 76 Over half of the schools surveyed use freely available open-source software. This has the potential of saving schools a significant amount of money. However, too many schools remain reluctant to use an open-source application suite whose main use is for word processing, spreadsheets, presentations, graphics, and databases. This is mainly because staff and pupils feel more comfortable with more familiar and expensive packages
- 77 Very few leaders in Welsh-medium or bilingual schools take a strategic decision to change the interfaces of key software in MS Windows or Linux to appear in Welsh. One headteacher who did change the interface faced difficulties in getting support from the local authority and reverted to the English interface. Currently, Apple does not offer any of its software or interfaces in Welsh. This can give pupils the impression that the use of Welsh is not relevant within ICT or technology.
- 78 A third of schools that responded to the Estyn questionnaire do not have an ICT development plan. In the past, all schools were required to have an ICT development plan under the Grants for Education Support and Training (GEST) and Better Schools Fund (BSF). A minority of schools have not included ICT in their school development plan for the last three years. This is not good practice, especially when they have continued to spend money on ICT over the same period.

### Spending on ICT over the last three years in primary schools

<b>How much was spent over the last three years on hardware?</b>		
	<b>Responses</b>	
	<b>Number</b>	<b>%</b>
Under £1,000	14	9%
Over £1,000 but below £5k	57	38%
Between £5 and £25k	59	39%
Over £25k	21	14%
Total number of responses	151	
<b>How much was spent over the last three years on software?</b>		
	<b>Responses</b>	
	<b>Number</b>	<b>%</b>
Under £1,000	82	54%
Over £1,000 but below £5k	58	38%
Between £5 and £25k	11	7%
Over £25k	0	0%
Total number of responses	151	

**How much was spent over the last three years on training?**

	Responses	
	Number	%
Under £1,000	99	66%
Over £1,000 but below £5k	47	31%
Between £5 and £25k	4	3%
Over £25k	0	0%
Total number of responses	150	

- 79 If expenditure is not noted in development plans, the monitoring of the expenditure by governing bodies, as part of school self-evaluation more generally, is constrained.
- 80 Schools surveyed show that a significant amount is to be spent on ICT in their schools over the next three years.

**Proposed expenditure on ICT over the next three years in primary schools**

**How much do you plan to spend over the next three years on hardware?**

	Responses	
	Number	%
Under £1,000	23	17%
Over £1,000 but below £5k	67	49%
Between £5 and £25k	48	35%
Over £25k	0	0%
Total number of responses	138	

**How much do you plan to spend over the next three years on software?**

	Responses	
	Number	%
Under £1,000	84	56%
Over £1,000 but below £5k	55	37%
Between £5 and £25k	9	6%
Over £25k	1	1%
Total number of responses	149	

**How much do you plan to spend over the next three years on training?**

	Responses	
	Number	%
Under £1,000	94	63%
Over £1,000 but below £5k	50	33%
Between £5 and £25k	5	3%
Over £25k	1	1%
Total number of responses	150	

- 81 The figures above show that schools generally spend proportionately less on training than on hardware and software for ICT. This probably contributes significantly to the lack of confidence and competence in using certain software.
- 82 At present around half the schools in our questionnaire survey use tablets. Of those that do not use tablets, many are considering doing so. The number of tablets that schools purchase varies significantly:

**How many tablets do you have at school?**

	Responses	
	Number	%
None	63	43%
1	10	7%
3 or fewer	8	5%
6 or fewer	18	12%
10 or fewer	13	9%
15 or fewer	4	3%
20 or fewer	9	6%
30 or fewer	4	3%
30+	17	12%
Total number of responses	146	

- 83 The most popular tablets generally cost around £250 each. The best schools also buy the apps needed to utilise tablets fully in the learning environment. Purchasing 30 tablets entails an initial expenditure of around £7,500. Additionally, schools need to budget for training for staff on their use. One school in our survey purchased tablets without ensuring that the school had wireless connectivity. Without connectivity the school could not put the tablets to best use.

**Identified challenges for school leaders in using ICT**

**Support**

- 84 The majority of schools are satisfied with the ICT curriculum and technical support they received in the past from their local authority. However, the support that most schools receive from their local authorities is diminishing. ICT advisory teams are now far smaller than at any time in the past 10 years and most schools are unsure or do not know what will happen to ICT support under the new regional consortium arrangements.

**Connectivity**

- 85 Local authorities provide nearly all schools with their internet connection. Around a half of the schools in our questionnaire survey state that the poor quality of the connection hinders their ICT work. This is mainly due to slow connectivity, which makes even simple internet searches for a whole class difficult. Connectivity speeds across Wales vary widely and as a result there is inequality in provision. The slowest

connectivity rates reported in our survey are 56 kbs and 320kbs, while the fastest rate is 24Mbps. Many schools have connection rates between 2 and 10Mbps. Urban areas are usually very well catered for, but rural areas suffer the most from poor connectivity.

- 86 In January 2013, the Welsh Government pledged £39m to improve broadband connectivity to schools as a direct response to hearing about schools' experiences of coping with variable broadband speeds. This will mean a minimum speed of 100Mbps (megabits per second) for secondary schools and 10Mbps for primary and special schools. This has the potential of transforming learning and teaching in the schools of Wales and school leaders need to plan for this expansion.

### **Filtering**

- 87 All schools recognise the importance of teaching pupils to use the internet safely and responsibly as stipulated in the ICT 'National Curriculum for Wales Order'. However, the level of filtering and blocking of internet sites by local authorities at present is a serious constraint on the range of work that can be done in class in the majority of schools. The inability to access content rich websites such as iTunesU and You Tube denies teachers the ability to share relevant information to pupils which could help to enthuse and engage them. The filtering of web-conferencing facilities (such as Skype) also seems to be common and this hinders:

- the development of pupils' oracy and listening skills;
- the ability to work with partner schools across the world in Comenius and other E-twinning projects;
- the sharing of good practice between schools in professional learning communities; and
- the ability to communicate with teacher training institutes to support students on teaching practice.

### **Technical challenges**

- 88 There will probably be a significant increase in the use of tablets in schools in the future as more schools either purchase them or allow pupils to bring their own. As a result, there will be an increase in the number of wireless devices that need an IP address<sup>22</sup> in order to link to the computer network. A very few schools are already on the limit of the range of IP addresses allocated to them by their local authority or other internet providers. As more and more schools order equipment requiring an IP address, it is clear that extending the range of IPs available to schools will be an issue that needs careful planning.

### **Effective transition to secondary schools**

- 89 Headteachers of schools where pupils make frequent use of tablets face a challenge to prepare these pupils for transition to secondary schools. While pupils have been

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<sup>22</sup>An IP address is an exclusive number all devices (computers, tablets, printers, routers etc.) use ,which identifies and allows them the ability to communicate with each other on a computer network. It is the 'address' of a device while online. Without an IP address, servers would not be able to deliver content to the device, because they would not be able to locate it.

used to working in an environment where the availability of tablets is the norm, on transition to secondary schools this may not be the case. Furthermore, while their teachers in the primary school will have been used to providing ample opportunities for them to use tablets in all areas of the curriculum, this may not be the case in the secondary school they transfer to. This could have a negative effect on pupils' educational development

### **Primary school leaders' perception of the importance of ICT**

- 90 The Welsh Government has a clear vision for ICT in schools and has spent £200 million on ICT initiatives for schools since 1998. However, primary leaders say that other developments have undermined their perception of the importance of ICT in schools, because ICT across the curriculum is still only part of the non-statutory Skills Framework, while literacy and numeracy now have statutory frameworks. In addition to this they believe that, because ICT has not been a core subject, and that it does not feature prominently in the Foundation Phase, its importance is further diminished.

## Appendix 1: Evidence base

The findings and recommendations in this report draw on visits to 19 primary schools identified for their good practice through their involvement in the ICT Self-review, OWLs project or recommendation from the ADEW ICT group. This sample includes schools of different sizes in a range of geographical locations with different socio-economic and linguistic contexts. In these visits team members:

- observed lessons and withdrawal groups;
- met groups of pupils;
- scrutinised planning and assessment documents;
- looked at monitoring arrangements and
- held discussions with teachers and senior managers.

Additional evidence was drawn from:

- online questionnaires completed by 152 primary schools, 14 secondary schools and 12 local authorities;
- inspection reports on primary schools from the 2004-2010 inspection cycle;
- a sample of recent inspection reports along with an analysis of all inspections undertaken by the ICT lead within Estyn since the start of the new cycle to the end of the summer term 2012; and
- an analysis of previous research and evaluation reports.

The schools visited as part of this remit were:

- Always Primary School, Newport
- Ashgrove Special School, Vale of Glamorgan
- Casllwchwr Primary School, Swansea
- Croeserw, Neath Port Talbot
- Malpas CinW, Newport
- Mount Stewart Primary, Cardiff
- Penybont Primary School, Bridgend
- Sandfields Primary School, Neath Port Talbot
- St Julian's, Newport
- Tredegarville C.W Primary School, Cardiff
- Ysgol Babanod Glan Gele, Conwy
- Ysgol Bryn Pennant, Flint
- Ysgol Cae Top, Gwynedd
- Ysgol Golwg y Cwm, Powys
- Ysgol Gynradd Llanrug, Gwynedd
- Ysgol Heulfan, Wrexham
- Ysgol Llanfawr, Anglesey
- Ysgol Tan y Marian, Conwy
- Ysgol y Graig, Anglesey

## **Appendix 2: A summary of national initiatives and policy development**

### **The One Wales Laptops (Owls) initiative**

The Welsh Government launched the One Wales laptop pilot in 2010 providing laptops for up to 1,200 children aged 10 to 11, from selected schools in Communities First and Flying Start areas. The cost of the project over two years was £700,000. Its purpose was to explore the educational benefits of providing access to laptops for pupils from deprived areas.

The pilot comprised a network of local projects across Wales with a strong focus on learning as well as supporting digital inclusion. Digital inclusion was a focus as research had shown that pupils are more likely to be digitally excluded if they live in more deprived areas. Schools were expected to have arrangements for ensuring that the children receiving laptops were those most likely to benefit.

The project's proposals offered innovative ways of using laptops to encourage pupils to engage in learning in order to help them improve their literacy, numeracy and ICT skills.

### **The 'Establishment of a Review of Digital Classroom Teaching Task and Finish Group'**

The Welsh Government shared its vision where all Welsh schools are able to deliver digitally in the written statement on the 'Establishment of a Review of Digital Classroom Teaching Task and Finish Group', 22 September 2011. This is intrinsically linked to a clear focus on improved performance as stated by the Minister for Education and Skills in his speech 'Teaching Makes a Difference' February 2011.

In a written statement when setting up the 'Review of Digital Classroom Teaching Task and Finish Group' in September 2011, the Minister for Education and Skills emphasised<sup>23</sup> that information and communication technology is a valuable tool, which can enable people to learn effectively.

As a response<sup>24</sup> to the report<sup>25</sup> by the Task and Finish Group the Minister announced:

- the creation of a new National Digital Learning Council to provide expert guidance on the use of digital technology in teaching and learning in Wales;
- the launch of a new bilingual learning platform for Wales, provisionally called Hwb, which will provide a platform for learners and teachers to share resources, knowledge and experience across the whole of Wales;

<sup>23</sup>Written Statement by the Welsh Government "Establishment of a Review of Digital Classroom Teaching Task and Finish Group", 22 September 2011 by Leighton Andrews, Minister for Education and Skills

<sup>24</sup>The Welsh Government's response to the recommendations in the Digital Classroom Teaching Task and Finish Group's report can be found in the Minister's written statement, which was published on 22 June 2012.

<sup>25</sup>'Find it, make it, use it, share it: learning in digital Wales', published in March 2012

- the creation of a National Digital Collection, which will include a repository for thousands of curriculum and good practice resources for teachers and learners to upload, share and use;
- encouraging the use of iTunes U to showcase the best educational resources and activities in Wales;
- the establishment of Digital Leaders, who will be drawn from the best practitioners using digital technology in Wales;
- additional professional development for teachers and other education staff to support the teaching of computer science and IT, building on the new enthusiasm around the development of products such as the Raspberry Pi and Dot Net Gadgeteer to encourage young people into future studies and careers in computing; and
- the sponsorship of an annual National Digital Event to raise the profile of digital technology in education and of Welsh achievements in this field; and stated:

**“I want Wales to be a world leader in digital learning. I believe the actions I’ve set out today show how we can achieve that goal.”**

### **ICT subject review**

On 1 October 2012, the Minister announced a review of assessment and the National Curriculum in Wales. The review aims to streamline and simplify assessment arrangements and consider the National Curriculum core and other foundation subjects at each stage, to ensure that expectations of content and skills developments are suitably robust.

On 19 November 2012, the Minister for Education and Skills, Leighton Andrews AM, chaired a seminar to consider the future of ICT and computer science in schools in Wales. As a result of the seminar the Minister established a steering group<sup>26</sup> to consider the findings from the seminar. These findings include the following.

- The existing ICT curriculum in Wales is not fit for purpose.
- Digital literacy is the start not the end-point. Learners need to be taught to create as well as to consume.
- ‘ICT’ in schools needs to be re-branded, re-engineered and made relevant to now and to the future.
- Important skills include creative problem-solving, communication, collaboration, co-operation and commercial awareness. These should be reflected in the curriculum.

### **Faster broadband connectivity for all schools**

In January 2013, First Minister Carwyn Jones announced that all schools will have access to faster broadband connections as a result of £39m from the Welsh Government. This will mean a minimum speed of 100Mbps (megabits per second) for secondary schools and 10Mbps for primary and special schools by 2014. In doing so the First Minister stated:

**“We want Wales to be a world leader in digital learning, therefore we need to be able to offer our schools fast, consistent and reliable broadband services.”**

<sup>26</sup> ICT Review Group

## The development of Hwb

Hwb is the all-Wales learning platform provided by Welsh Government aimed at supporting national action in the following areas:

- encouraging, supporting and preparing teachers to operate in a digital environment and to share their digital practice; and
- establishing and developing a system and a national collection for creating, storing and sharing digital resources.

Hwb will host a national collection of digital resources to support learning and teaching for learners aged three to 19 in Wales, which will be known as the National Digital Repository. The collection will be accessed through multiple channels and will include:

- resources created or commissioned by the Welsh Government and/or its agents;
- resources licensed or bought by the Welsh Government;
- resources made available by 'trusted sources'; and
- resources created by teachers and learners.

In addition it will offer:

- consistent treatment of the Intellectual Property Rights for all resources provided to Hwb, with the presumption that Creative Commons Attribution licenses will be applied; and
- new approaches to the use of social networking sites in schools (to be supported with guidance).

Through Hwb, each school in Wales will have the opportunity to have an individual learning platform, tailored to their own school's needs. This additional functionality is referred to as Hwb+.

Hwb + will offer the following functionality:

- an external public website;
- Office 365;
- virtual classrooms;
- blogs / wikis;
- forums;
- podcasting;
- lesson plans and tools; and
- learner and teacher spaces

The beta version of Hwb was launched on 12 December 2012. Hwb will be available to all schools in Wales from that date.

Hwb+ (the part of Hwb that requires user authenticated access) will be made available to a representative sample of schools to trial in the first instance. This will ensure that Hwb+ is fit-for-purpose before its roll out to all schools in Wales from February 2013.

## An overview of the history behind the definition of ICT

Estyn's report<sup>27</sup> 'in 2003 defined ICT as "the range of tools and techniques (telecommunications, networking, hardware and software) that supports teaching and learning". In this previous report information technology (IT) referred to the National Curriculum subject that deals with the knowledge, understanding and skills that pupils need in order to make effective use of ICT in contexts across the school curriculum.

In the curriculum review that led to the 2008 National Curriculum, the subject information technology (IT) was renamed information and communication technology (ICT). Thus, both the subject and the key skill confusingly shared the same title. This was not the case for English/Welsh and literacy or mathematics and numeracy.

The Schools ICT Strategy Working Group in its report<sup>28</sup> to the Welsh Government in March 2008 attempted to define ICT capability as follows:

**"The ICT capability involves demonstrating skills in the processes of gathering, searching, exploring, analysing, presenting, communicating and sharing information, underpinned by an understanding of key concepts related to the nature of information and of technology. It includes a set of technical competences together with a confidence in learning to use new tools; a disposition to solve problems and enhance results with ICT in unfamiliar contexts; a knowledge of the potential and limitations of familiar tools; an awareness of the opportunities and dangers inherent in the use of ICT; and a willingness to reflect on the use of ICT in the world beyond one's immediate experience."**

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<sup>27</sup> 'A review of information and communication technology provision in schools and its impact on raising standards'

<sup>28</sup> Transforming Schools with ICT

## **Appendix 3: A summary of key ICT documents**

### **National Curriculum for Wales Order Programme of Study for ICT**

There are two areas under skills that pupils should be given opportunities to experience. These are: 'Find and analyse information'; and 'Create and communicate information'.

Under 'Find and analyse information', pupils should be given opportunities to:

- discuss the purpose of their tasks, the intended audiences and the resources needed;
- find information from a variety of sources for a defined purpose;
- select suitable information and make simple judgements about sources of information;
- produce and use databases to ask and answer questions, e.g. search, sort and graph;
- produce and use models and/or simulations to ask and answer questions, e.g. using a spreadsheet to calculate and graph sales in a shop; and
- investigate the effect of changing variables in models and/or simulations to ask and answer 'what if...?' type questions.

Under 'Create and communicate information', pupils should be given opportunities to:

- 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, e.g. a poster combining text and graphics, or a multimedia presentation; and
- share and exchange information safely through electronic means, e.g. the use of e-mail, or virtual learning environments.

In addition, under '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, e.g. the importance of not disclosing personal details to strangers. They should be able to follow instructions to minimise risk to themselves and others.

### **The non-statutory Skills Framework for 3 to 19-year-olds in Wales**

The non-statutory Skills Framework for 3 to 19-year-olds in Wales (the Welsh Assembly Government, January 2008) is the basis upon which Estyn inspects the Essential Skill of ICT in schools. This framework sets out six stages of progression in ICT. The six stages of progression in ICT capability are set out in a six-column continuum in the Skills Framework for 3 to 19-year-olds in Wales document. These columns are not titled but cover broad expectations from the beginning of the Foundation Phase to post-16.

**Developing ICT across the primary curriculum based on the Skills Framework for 3 to 19-year-olds in Wales (WAG January 2008)**

<b>Strand</b>	<b>Beginning of Foundation Phase</b>	<b>End of Foundation Phase</b>	<b>End of key stage 2</b>
<b>Finding and developing information and ideas</b>	Become aware that information exists in a variety of forms.	Begin to find different sources of information with support.	Find suitable information from given sources using simple searches, to support a range of activities.
		Begin to develop information and ideas, combining text and images.	Develop/model information and ideas by processing data from given sources to support their activities in a range of subjects, and begin to ask questions about bias of information sources.
<b>Creating and presenting information and ideas</b>	Become aware that ICT can be used to communicate ideas.	Use given ICT resources to help create, present and safely share their ideas, including text/word-banks, images.	Create and present their ideas for a given purpose by combining different forms of information, including text, images, sound, with some sense of audience.
			Safely share information with others, including the use of e-mail; virtual learning environments (VLEs).

Learners' progression in developing ICT is described as you read across the columns from left to right. Progression is cumulative; skills identified in each stage of progression will have been demonstrated – at least at a simple level – by learners before they move to the next stage.

Progression 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.

Learners progress from needing support to more independent working. They move from listening and interacting with others in a general way to a situation where they choose to work with others as a deliberate strategy for reaching understanding. In these ways they become both independent and interdependent learners.

## Glossary/references

<b>ADEW</b>	Association of Directors of Education in Wales
<b>Aurasma</b>	A free augmented reality platform for mobile technologies. Its image recognition technology uses a smartphone's or tablet's camera to recognise real world images and then overlay rich media on top of them in the form of animations, videos, 3D models, and more.
<b>Blog</b>	Originally from the word 'weblog' or a 'web log'. In its simplest form it is an online journal or diary.
<b>Bookmarks</b>	Website addresses that you can save in your browser, in order to get back to them easily
<b>Comenius</b>	School partnerships, usually funded by the British Council, between a school in the UK and at least two other schools in European countries
<b>eTwinning</b>	A scheme enabling schools from the 28 European Countries to collaborate on a range of curriculum projects using ICT
<b>Forum</b>	An internet forum is a discussion area on a website. Here members can post discussions and read and respond to posts by other forum members. A forum can be focused on nearly any subject and a sense of an online community, or virtual community, tends to develop among forum members.
<b>Green screen</b>	A green backdrop, which is placed behind someone whilst they are being filmed. When the video is imported onto a computer, the green backdrop can be replaced by another scene or photograph, giving the impression that the person being filmed is in that particular scene or photo.
<b>Higher-order reading skills</b>	The specific reading skills of location, reorganisation, inference, evaluation and appreciation of texts. 'Guidance on the teaching of higher-order reading skills' (Welsh Government, 2010) provides training activities for teachers focusing on the use of these across the curriculum.
<b>ICT</b>	Information and communication technology
<b>Kbps</b>	Kilobits per second is a measure of data transfer speed.

<b>Learning Platform</b>	An integrated collection of online tools and services for teachers, learners, governors, parents/carers and other stakeholders to support and enhance educational delivery and management
<b>Mbps</b>	Megabits per second is a measure of data transfer speed.
<b>Office 365</b>	This provides access to familiar Microsoft Office tools, email, conferencing, and IT services from virtually anywhere.
<b>OWLs</b>	One Wales Laptops initiative
<b>Podcast</b>	The term derives from 'broadcast' and 'pod' from the success of the iPod, as podcasts are often listened to on portable media players. Simply, a podcast is a digital media file that is downloaded directly from the internet. The media files are downloaded onto a computer and then downloaded onto a digital media device like an iPod or other MP3 player. Podcasting lets you automatically receive the latest episode of your chosen radio programme as soon as it is available or access older programmes.
<b>Portable technologies</b>	A generic term for using tablets, mobile phones etc. in schools
<b>QR Codes</b>	Simple, scannable images that are a form of barcode. By scanning a QR code using a mobile device, such as a tablet or mobile phone, a variety of information can be accessed. This can be text, links to web-based materials, bookmarks and email addresses.
<b>Virtual classroom</b>	Pupils attend a virtual classroom by connecting to the Internet rather than traveling to a physical classroom.
<b>Wiki</b>	A website that allows its users to add, modify, or delete through a web browser
<b>Wireless device</b>	Any kind of communications equipment that does not require a physical wire for relaying information to or from another device

## Explanation of words and phrases used to describe our evaluations

nearly all	with very few exceptions
most	90% or more
many	70% or more
a majority	over 60%
half or around a half	close to 50%
a minority	below 40%
few	below 20%
very few	less than 10%

## The remit author and survey team

Maldwyn E Pryse HMI	Remit author
Dyfrig Ellis AI	Team member
Anwen Griffiths AI	Team member