April 14, 2011

1. INTRODUCTION

1.1 The Association for Information Technology in Teacher Education (ITTE - www.itte.org.uk) is a professional subject association which focuses on supporting and representing the views of those involved in training and providing resources for pre-service and in-service teachers of ICT and IT. ITTE was formed in 1986 and has been working with a range of national and international organisations and bodies such as BECTA, the TDA and the various government Departments for Education to inform, develop and maintain the quality of ICT and IT provision in teacher education and hence the quality of ICT teaching in schools. (See Hammond 2009)

2. RECOMMENDATION

2.1 As a professional subject association with a membership which has accumulated considerable experience and expertise in the educational applications of ICT, we would strongly urge the national curriculum review panel to consider making ICT a core subject. We offer the following rationale in support of this recommendation.

3. RATIONALE

3.1 Across the world, ICT has been identified as a critical factor in supporting, enhancing and transforming educational, commercial and financial practices. UNESCO, for example, has been promoting developmental projects in ICT since 2004 (see UNESCO, 2011a, 2011b). The European Commission included 'digital competence' and digital literacy as a key target for its eInclusion programme (see European Commission, 2008). Internationally, across the developed and in developing economies, the importance of ICT in education has been recognised (eg EURYDICE, 2009). We consider that any diminution of the profile of ICT within the English educational system would be detrimental, not only to the quality of learning and teaching, but also with regard to the future standing of the country in the global economy.

3.2 UK schools have for many years gained an international reputation for being at the forefront of innovative uses for ICT in learning and teaching (see European Commission, 2006). Recent investment in equipment and resources has helped ensure that schools are well placed to provide pupils with ongoing high quality access to ICT based experiences in preparation for the evolving workplace. There is a risk that, unless ICT is identified as a core subject, then its use within many schools will become fragmented (see OFSTED 2008, 2009; BCS, 2010) and our recognised international lead in this area will be sacrificed.

3.3 Evidence shows that initially in primary schools, pupil's attainment and the quality of teaching in Science significantly improved when it became a core subject of the national curriculum (see Tymms, Bolden & Merrell, 2008). At present, the quality of teaching in ICT is variable across schools (see OFSTED, 2009). A contributory factor has been a lack of clarity and precision in past and existing curriculum documentation for ICT. This revision of the National Curriculum provides a timely opportunity to produce a programme of study which is carefully structured to identify key concepts and skills. This will only be achieved if the teaching of ICT is guided by statutory documentation.

3.4 There is considerable evidence showing the benefits for learning in supporting the development of children's digital literacy (see Newhouse, 2002; UNESCO, 2005; Balanskat, Blamire and Kefala, 2006; STEPS, 2007; Rose, 2009, Underwood, 2009, OFSTED, 2009). Just as literacy and numeracy are fundamental to learning across other subjects, in the 21st century digital literacy underpins most forms of human communication and the retrieval, manipulation and presentation of the majority of information. It also broadens and deepens opportunities for collaborative learning and provides meaningful contexts for problem solving - all of which are core skills for learning and effectiveness in world of work. Without the guidance from a clearly defined programme of study, the knowledge, skills and understanding required by children and teachers to develop digital literacy will lack cohesion.

3.5 In recent years, considerable energy and financial investment has been made in developing the e-maturity of schools (See BESA, 2009; BECTA, 2008). It has been estimated that £5bn has been spent on ICT provision in schools since 1997 (BECTA, 2010). In addition to material provision, significant attention has been given to raising children's, teachers' and parents' awareness of issues relating to e-safety. A clearly defined Programme of Study for ICT/Digital Literacy would ensure that this important groundwork is consolidated, given due prominence and further developed to take account of new opportunities and threats posed by the next generation of web based technologies (eg Web 3.0, cloud computing, 4G).

3.6 Our contention is that a carefully structured Programme of Study for ICT/Digital Literacy would provide a clear agenda for the progressive and cohesive development of ICT capability through the identification of key concepts and skills to be developed through purposeful subject related contexts. It would also set the agenda for teachers' Initial Training and their Continuing Professional Development, and ensure a minimum entitlement for pupils. Furthermore, clearly defined expectations at each Key Stage would focus teachers' assessments and thus inform future planning to improve progression within and across Key Stages; aspects which have been repeatedly identified by OFSTED (2001, 2008, 2009) as causing concern. We believe that without a Programme of Study, existing deficiencies in ICT learning and teaching would escalate.

3.7 Whilst there have been recent large scale and high profile investigations in into the teaching of literacy (Rose, 2006), numeracy (Williams, 2007), citizenship (Keating et al, 2010) and music (Henley, 2011), large scale enquiries into ICT have focused on the relationship between pupils' use ICT in and out of school and their performance in National Tests and GCSEs (Harrison et al, 2002), e-Safety (Byron, 2008), ICT in literacy and numeracy attainment (Higgins et al, 2005), broadband (Underwood et al, 2005) and learning platforms (BECTA, 2008). A systematic study into benefits of digital literacy for pupils' learning, development and preparedness for the world of work is important and long overdue (see STEPS, 2007, p48). We would urge that an evaluative study is implemented alongside the introduction of the revised statutory curriculum for ICT/Digital Literacy, to monitor its effectiveness and to guide future enhancements.

3.8 There is presently widespread concern over take-up rates for ICT qualifications at GCSE and A level (see Royal Society, 2010; BCS, 2010). Raising the profile of ICT and enhancing the quality of the curriculum, if handled well, would help generate interest and enthusiasm for a subject which is presently regarded by many young people (particularly girls) as divorced from the rich and exciting technological world which they inhabit. It has been acknowledged that for the UK to command a lead in the developed and developing world, we need a workforce which is digitally and technologically adept and literate (see Royal Society, 2010, Royal Academy of Engineering, 2009, e-skills UK, 2008; Nutt/CfBT, 2009).

3.9 The curricula identified by Northern Ireland, and Scotland place ICT at their heart (see DENI, 2010; HMIE, 2004, 2005) and a recent report to the Welsh Assembly calls for ICT to be made a core subject (Department for Children, Education, Lifelong Learning and Skills, 2008). The revised National Curriculum recommended by the Independent Review of Primary Education (Rose, 2009) which was due to be implemented in Sept 2011, made ICT a core subject alongside English and Mathematics and when Academies were first established they were required only to follow the National Curriculum for English, mathematics, science and ICT (See House of Commons, 2009). Other nations such as Ireland, Holland, Finland, Denmark, Norway, Slovenia, Luxembourg, USA (see Balanskat, Blamire and Kefala, 2006; European Commission, 2006; Rose 2009, US Dept of Education, 2010) have similarly recognised the importance of ICT in their curricula. We consider it would be a retrograde step to miss this opportunity to ensure that ICT and digital literacy remains high on schools', teachers', parents' and children's list of educational priorities.

3.10 There is evidence (BESA, 2009, 2011) that schools will be cutting back on spending for ICT resources in the immediate future. OFSTED (2009) has reported that schools are presently underusing their existing technological resources. A carefully structured Programme of Study for ICT/Digital Literacy which identifies clearly how opportunities for the development of ICT capability across subjects and within discrete subject teaching would help schools to make effective and efficient use of existing resources and prioritise their spending to maximise opportunities for a fully integrated approach to developing pupils' digital literacy.

3.11 It is our contention, supported by a compelling body of evidence, that ICT and digital literacy should be central to the revised national curriculum.

4. EVIDENCE BASE

PARAGRAPH 3.1

UNESCO (2011A) ICT IN EDUCATION: INTRODUCTION

There is now an irreversible trend among countries in Asia and the Pacific to transform their teaching force and educational staff into technology literate and skilled workers. In almost all countries in the region (even among emerging countries), teachers in primary, secondary and tertiary levels, are being trained in the use of information and communication technologies in education in varying degrees and scope.

Source: *http://www.unescobkk.org/education/ict/themes/training-of-teachers/overview/regional-analysis/introduction/*

UNESCO (2011B) ICT IN EDUCATION PROJECTS: TEACHING AND LEARNING

ICT pervades modern society to the extent that many countries now regard the mastery of information and communication technology as a core element of basic education alongside literacy and numeracy. But ICT is more than just another subject for students to study; ICT has the potential to be a valuable tool in enhancing the quality of teaching and learning.

Source: *http://www.unescobkk.org/education/ict/ict-in-education-projects/teaching-and-learning/*

EURYDICE (2009) INFORMATION AND COMMUNICATION TECHNOLOGIES

The promotion of ICT for learning is one of the four key activities of the LLP's transversal programme, supporting actions that address general issues concerning two or more educational sectors. It is also an integral part of the Comenius, Erasmus, Grundtvig and Leonardo sub-programmes.

Progress in the use of ICT for education and training across Europe has been substantial in the last years. However, studies show that ICT has not yet had as significant an impact as expected.

Effective integration of ICT into education must go beyond simply replacing, streamlining or accelerating current practices. It must also find new and more effective ways of operating, supporting pedagogical and organisational innovation. ICT has become embedded in our social and economic fabric and it should be similarly embedded in education and training systems.

Actions are not about developing technology itself, but about the use of ICT tools to enhance learning environments and experiences. This includes aspects such as the use of simulations, discovery learning,

attracting drop-outs back to education, enabling learning outside the school environment and bridging the 'digital divide' between those with access to technologies and relevant skills, and those without.

Source: http://eacea.ec.europa.eu/llp/ka3/information_communication_technologies_en.php

EUROPEAN COMMISSION (2008) DIGITAL LITERACY EUROPEAN COMMISSION WORKING PAPER AND RECOMMENDATIONS FROM DIGITAL LITERACY HIGH-LEVEL EXPERT GROUP

Digital Literacy is increasingly becoming an essential life skill and the inability to access or use ICT has effectively become a barrier to social integration and personal development. In response, EU Member States meeting at Riga in 2006 agreed on a series of eInclusion targets, including reducing by half the gap between digital literacy levels of disadvantaged groups and the average for the EU by 2010 (p3)

Since 2000, the European Union has stepped up its activities to improve eLearning and to develop skills. The eEurope Action Plan put eLearning and eSkills high on the political agenda and led to the eLearning Programme, which directly promoted Digital Literacy. This has continued under the renewed Lisbon Agenda, which highlights Digital Literacy as a key area for policy intervention. The working definition of Digital literacy adopted in this paper ….. is the skills required to achieve digital competence. It is underpinned by basic skills in ICT and the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet. Digital competence is one of the eight essential competences that every European should have to prosper in a knowledge-based society and economy, as defined in the recent Recommendation on Key Competences for lifelong learning. (p4-5)

Source:
http://ec.europa.eu/information_society/eeurope/i2010/docs/digital_literacy/digital_literacy_review.pdf

PARAGRAPH 3.2

EUROPEAN COMMISSION (2006) BENCHMARKING ACCESS AND USE OF ICT IN EUROPEAN SCHOOLS 2006: FINAL REPORT FROM HEAD TEACHER AND CLASSROOM TEACHER SURVEYS IN 27 EUROPEAN COUNTRIES

The use of computers in European schools has reached almost the 100% saturation point in all member states, with hardly any deviations across school types.

However, there are large variations in the number of computers per 100 pupils. The clear European leaders are Denmark (27 computers per 100 pupils, 26 of which are connected to the internet), Norway (24 computers per 100 pupils / 23 internet connected), the Netherlands (21/20) and the UK (20/19) and Luxembourg (20/18). The figures in these countries are significantly higher than the European average of 11 computers per 100 pupils (of which 10 are internet computers). (p20)

More than 80% of schools using computers use them in classrooms in the United Kingdom, Slovenia, the Netherlands, Cyprus, Ireland, Luxembourg, Sweden, Norway and Portugal. By contrast, in Greece, Hungary and Slovakia the figure is a very low 20%. This is less than a third – in some cases even only slightly more than a quarter – of the European average usage figure (61%). (p20)

It appears as if many of the old member states have already been through a phase of teaching the use of ICT as a separate subject and thereby using computer labs intensively. In the meantime they seem to have shifted the focus and have made computers and the internet an integral part of teaching of (almost) all subjects.

This can partially be confirmed when considering the responses on the question whether "computers and the internet are integrated into the teaching of most subjects". Here the more advanced countries in terms of ICT use (United Kingdom, Sweden, Finland, the Netherlands, Denmark, etc) reach very high figures as opposed to comparatively low figures on the question asking about teaching computer science as a separate subject.

The variation between countries is huge, with the United Kingdom reaching 94% of schools, where "computers and the internet are integrated into the teaching of most subjects" compared to 42% in Greece and 44% in Latvia. There is hardly any variation across school types on this indicator. There are significant variations in the intensity of ICT use in schools across Europe. Extreme values are reached in the UK where 38% of those teachers using computers in class use it in more than 50% of the lessons. (p21)

In several countries known as the European frontrunners in ICT use in schools [Slovenia, United Kingdom, Hungary and Denmark] the use of computers and the internet has become the norm for most of the teachers and pupils in all aspects of life. There no longer is the need to place a special emphasis on its use in the teaching processes at school. The use of ICT is not a "conditio-sine-qua-non" for the learning success of pupils but can contribute to it and fulfil an important role in motivating pupils to learn. (p23)

Source: http://ec.europa.eu/information_society/eeurope/i2010/docs/studies/final_report_3.pdf

OFSTED (2008) ICT IN PRIMARY AND SECONDARY SCHOOLS: OFSTED'S FINDINGS 2005/07

What needs to be done?

- Schools need better guidance on evaluating ICT development and its impact on whole-school improvement…….
- The potential for ICT needs to be recognised and built into school improvement planning to reduce the variability in the quality of pupils' experience.
- Pupils' use of ICT inside and outside school needs to be known about and taken into account in planning schemes of work.

Source: http://www.ofsted.gov.uk/Ofsted-home/Publications-and-research/Browse-all-by/Education/Curriculum/Information-and-communication-technology/Primary/ICT-in-primary-and-secondary-schools-Ofsted-s-findings-2005-07

OFSTED (2009) THE IMPORTANCE OF ICT IN PRIMARY AND SECONDARY SCHOOLS 2005-2008

Recommendations (extract)

The Department for Children, Schools and Families should:

- seek ways of reinforcing the importance of ICT as a subject and in its use across the curriculum

All schools should:

- improve the assessment of ICT by establishing pupils' and students' attainment on entry and by tracking the progress of individual pupils, including their achievement when using ICT in other subjects

Secondary schools should:

- provide the statutory National Curriculum for ICT for all students, especially at Key Stage 4, and give appropriate emphasis to all aspects
- find ways of making ICT readily accessible to students in their classrooms so that it can be used to improve learning in other subjects.(p7)

Increasingly, teachers are using ICT to improve learning in other subjects. For example, access to a wider range of software applications has improved and students are using ICT more often for manipulating digital media, composing music and reviewing their performances in dance, drama and physical education. However, during the survey, teachers of other subjects often still did not know what they could expect of students when planning to use ICT in units of work. (p21)

In the sample of schools visited since 2005, the quality of assessment has continued to be the weakest area of provision. …..... In the majority of the primary and secondary schools visited, teachers did not evaluate specifically how well pupils and students applied and used their ICT skills when working in other subjects. (p29)

Whilst teachers in primary schools usually checked work completed as part of taught ICT activities, it was rare to find they assessed pupils' use of ICT in other subjects. Hence, the extent to which pupils were able to apply what they had learnt in taught ICT lessons to their work elsewhere went unnoticed. Combined with the absence of tracking systems, primary schools' monitoring of pupils' development and wider use of ICT skills was incomplete and ineffective. (p30)

Getting assessment right is vital if standards in ICT are to improve. It is estimated that 77% of the workforce now use information technology (IT) in their job and the demand for such skills is likely to continue to increase. Schools must equip young people with the 21st century skills necessary to ensure their employability. ICT therefore needs to be given high status, both by the government and in individual schools, commensurate with its importance in young people's future economic well-being. (p30)

Source: *http://www.ofsted.gov.uk/Ofsted-home/Publications-and-research/Browse-all-by/Documents-by-type/Thematic-reports/The-importance-of-ICT-information-and-communication-technology-in-primary-and-secondary-schools-2005-2008*

PARAGRAPH 3.3

TYMMS, P., BOLDEN D. AND MERRELL C. (2008). 'SCIENCE IN ENGLISH PRIMARY SCHOOLS: TRENDS IN ATTAINMENT, ATTITUDES AND APPROACHES' IN PERSPECTIVES ON EDUCATION 1 (PRIMARY SCIENCE), PP19–41. WELLCOME TRUST.

Murphy et al. (2001) suggested that the introduction of science as a 'core' subject in the National Curriculum has increased the 'scientific literacy' of the pupils who have experienced it. They compared science test scores of a cohort of teacher trainees who had experienced a compulsory science education with a cohort of trainees who had not and found the former to have significantly higher scores. (p28)

The amount of science in the primary curriculum has increased over time, jumping abruptly in 1989 when the 1988 Education Act came into effect and made science a 'core' subject in the statutory curriculum in state schools. There was also more emphasis on a Piagetian approach to the teaching and learning of science that placed a focus on ways to develop the thinking skills of young children. (p36)

Source:
http://www.wellcome.ac.uk/stellent/groups/corporatesite/@msh_peda/documents/web_document/wtd042076.pdf

OFSTED (2009) THE IMPORTANCE OF ICT IN PRIMARY AND SECONDARY SCHOOLS 2005-2008

Key Findings (extract)

- Investment in resources had improved teaching, but had still not made ICT a part of everyday learning. Many schools were seeking to make ICT resources more readily available to pupils and students in classrooms. Some of the schools visited did not apply the four principles of best value to their purchasing and did not obtain good value for money from their investment. Only around half of the schools showed evidence that they were systematically evaluating the impact of ICT in improving learning and raising standards across the curriculum.

Progress in using ICT to improve learning in other subjects is sometimes limited because its use was not sufficiently considered when planning the work or because of individual teachers' lack of understanding of when and where ICT might make a difference. (p35)

Source: *http://www.ofsted.gov.uk/Ofsted-home/Publications-and-research/Browse-all-by/Documents-by-type/Thematic-reports/The-importance-of-ICT-information-and-communication-technology-in-primary-and-secondary-schools-2005-2008*

PARAGRAPH 3.4

UNESCO (2005) INFORMATION AND COMMUNICATION TECHNOLOGIES IN SCHOOLS: A HANDBOOK FOR TEACHERS

The new literacy, a term used more than a decade ago (Anderson 1993) to embrace the changed literacy demands resulting from the new technologies in schools, and ICT offer educators, perhaps for the first time, an opportunity to create such an ambitious scheme.(p24)

Three Rs for the 21st century

The new kinds of activities to be learned and new learning activities lead inevitably to a drastic revision of the idea of literacy, considered for many centuries the main goal of primary education..... Now, we see an urgent need for a new literacy that is ICT-based and can be presented in three components corresponding to the traditional

Three Rs:

- [Reading] – finding information by searching in written sources, observing, collecting, and recording;
- [Writing] – communicating in hypermedia involving all types of information and all media; and
- [Arithmetic] – designing objects and actions.

To sum up, we must reshape drastically both educational content and learning procedures. The new literacy shuns memorization of facts and rules. It stresses the ability to find facts and imagine unprecedented options. A capacity to understand and invent rules, posing problems to oneself, planning and designing one's own activities, come to the forefront. The goal of this kind of education is not a narrow technical fluency, but personal development alongside the core competencies for high-level thinking and acting. (p25-6)

At every level of schooling, ICT are *(sic)* not a closed or self-contained subject to be taught and learned independently from other subjects. Rather, ICT are *(sic)* a subject that, by its very nature, should be treated as interdisciplinary, integrative, and cross-curricular. (p183)

Source: http://unesdoc.unesco.org/images/0013/001390/139028e.pdf

UNDERWOOD, J. (2009) THE IMPACT OF DIGITAL TECHNOLOGY: A REVIEW OF THE EVIDENCE OF THE IMPACT OF DIGITAL TECHNOLOGIES ON FORMAL EDUCATION. BECTA.

In summary

- Digital skills are important to social and economic participation and the broader UK economy.
- There is now a growing body of national and international evidence demonstrating the positive impact of digital technologies on measurable learning outcomes.
- The so-called hard evidence is supplemented by softer observational evidence, which has an important role in explaining why the positive outcomes have or have not accrued.

The evidence tells us that integrated use of technology enables a range of positive outcomes for children and young people.

Impact on attainment at Key Stage 1

- 4.75 months' progress for high attaining girls in maths.
- Improved progress for girls, average and high attaining boys in science.
- Improved progress for average and high attaining pupils in English.

Impact on attainment at Key Stage 2

An average gain from ICT use was equivalent to:

- a term's additional progress in English.
- 2.5 months of progress in writing for low attaining boys.
- 2.5 – 5 months' progress for some groups in maths through effective use of whiteboards.
- 7.5 months' progress for some groups in science through effective use whiteboards.

Impact on attainment in secondary school

- The equivalent to a term's additional progress in KS3 science.
- An average gain in GCSE science equivalent to 52,484 students moving from grade D to C.
- Improvements to the overall percentage of pupils 5+ A*-Cs at GCSE in the year after broadband introduction.
- After controlling for KS3 results, the availability of a computer at home is significantly positively associated with Key Stage 4 test scores. This association amounts to around 14 GCSE points (equivalent to 2 GCSE grades).

Wider outcomes

- Classes with online learning, whether completely online or blended, on average produce stronger learning outcomes than learning face-to-face alone.
- Young people with a computer at home are less likely to play truant at ages 14 and 16 than those without computer access. For example, having access to a computer at home is associated with a 5.8% reduction in the likelihood of playing truant at age 16.

Source: http://www.bee-it.co.uk/Guidance%20Docs/Becta%20Files/Publications/1.%20The%20Impact%20of%20Digital%20Technology.pdf

BALANSKAT, A., BLAMIRE, R. AND KEFALA, S. (2006). THE ICT IMPACT REPORT: A REVIEW OF STUDIES OF ICT IMPACT ON SCHOOL IN EUROPE.

The countries analysed in this study did benefit from high ICT investments and a strong political will to foster ICT in education. Without that wider impact on teaching and learning cannot be achieved. The evidence showing that ICT impacts most with e-mature schools and teachers suggests that there is a take-off or tipping point in ICT use. Before that point, little change appears to be happening and investments seem to have little pay-off. Once the change occurs the benefits accrue. Work towards ensuring the majority of schools (80 per cent by 2010 for example), not just the early adopters, reach the point of e-maturity. (p7)

Sometimes education systems work against ICT impact and even if educators are not ICT-resistant, in some cases the system under which they work is. For example, in UK, national tests are not made for ICT rich schools. Studies such as the Test Bed study give some valuable results concerning the factors that impede the effective use of investments in ICT. As it was shown in the study investments in ICT are not able to have an impact they should have in secondary schools within the present education system. The study 'Innovative learning Environments' (2004) has shown that teachers and parents are still nervous about the new methods' capacity to lead to the same results in national exams and fear that schools using ICT will be less performing than traditional schools. For example, in the Impact2 study some teachers explain that very little use of ICT was made in Key Stage 3 English, because of the need to prepare for the public examinations. Indeed, existing assessment and evaluation methods primarily focus on content and neglect social and other abilities of learners. Competencies such as problem solving, presenting material in novel ways, collaboration or creativeness are only to a limited degree covered in national exams. Students receive no credit for these new competencies they have developed, even though they are important for the development of the society.

Yet, this is evident in some countries more than in others; in Finland for instance, where differences between schools are fewer and assessment is based more on evaluation, this is less the case. (pp52-3)

Overall the evidence base (actual and perceived) shows that ICT has a positive impact on attainment levels and subject related performance. Six studies show statistical evidence that ICT can enhance attainment in subjects. UK's largest impact study shows a raise in subject performance through ICT use in English, science and design, and technology. Also specific ICT uses, such interactive whiteboards in the UK, had a positive effect on pupil's performance in literacy, mathematics and science tests compared to

students in other schools. They especially improved the performance of low achieving pupils in English and impact was greatest on writing. Another large impact study in the UK, which looked at ICT impact from an economic angle, confirms ICT investment impacts positively on educational performance in primary schools, particularly in English and less so on science but not in mathematics. On an international level, the analysis of the OECD PISA results indicates that longer use of computers by students is related to better results in mathematics in PISA results. (p56)

Source: http://insight.eun.org/shared/data/pdf/impact_study.pdf

OFSTED (2009) THE IMPORTANCE OF ICT IN PRIMARY AND SECONDARY SCHOOLS 2005-2008

Key Findings (extract)

- The leadership of ICT had improved during the period of the survey and the schools visited had made ICT a high priority for development. Leaders were providing a vision for the place of ICT in learning and were investing significantly in infrastructure, resources and staff training.
- Using ICT was contributing positively to the personal development and future economic well-being of pupils and students. It developed their skills of working independently and cooperatively and was in most cases motivating and engaging**.....**

During Key Stages 1 and 2, most pupils developed their use of ICT well for communicating ideas; standards in this aspect of using ICT were higher than in others. ……. Such activities provide a considerable boost to many pupils by allowing them to express themselves visually in ways that were not previously possible. The technology allows them to be creative and work collaboratively. (p8)

Increasingly, schools are using ICT to improve learning in other subjects..... Effective use of ICT in other subjects enabled pupils to develop their independence as learners and improve their thinking skills, creativity and problem-solving. (p9)

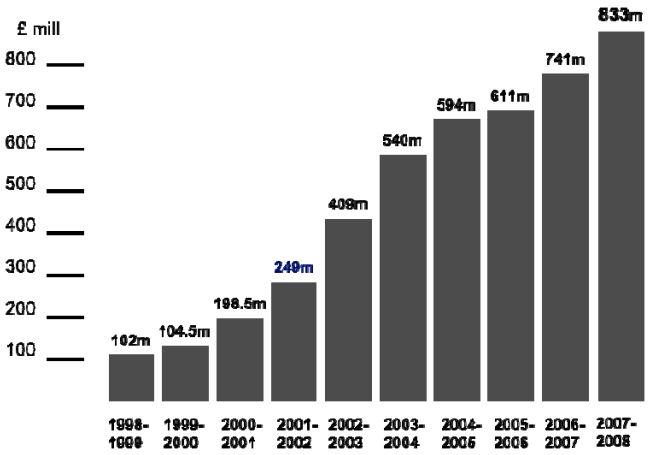
The informed use of ICT in other subjects was adding to pupils' interest in and enjoyment of learning. Where resources were used effectively, this was particularly evident for boys and for children in the early years. Some very effective teaching using ICT was seen when pupils were learning in other subjects. For example, the use of high-quality simulations to demonstrate a heart pumping blood around the body or the growth of a flowering plant from seed led to pupils' greater engagement and understanding. (p13)

In the [secondary] schools visited, students almost always enjoyed working with ICT and were well engaged by tasks that enabled them to do so. Using ICT contributed effectively to their personal development. In sharing ideas, it helped to develop the skills of working independently and cooperatively. ICT was particularly successful in motivating disaffected boys and improving their attitudes to learning, for example through giving them opportunities to record podcasts in modern foreign languages. (p19)

Many of the secondary schools visited were using the additional funding for their specialist status to invest in ICT resources and infrastructure; they saw ICT as an important vehicle for raising standards in the specialism. (p26)

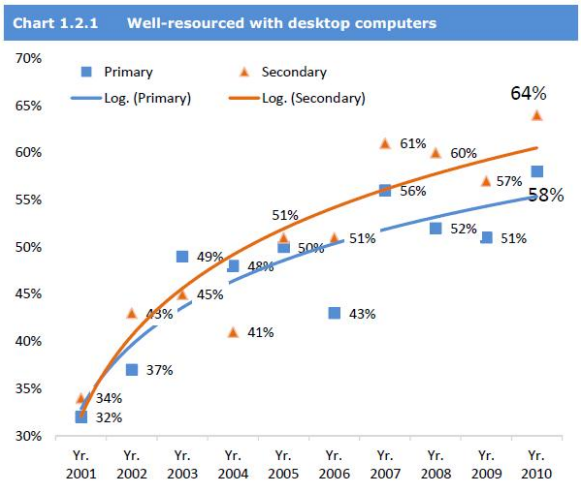
Source: *http://www.ofsted.gov.uk/Ofsted-home/Publications-and-research/Browse-all-by/Documents-by-type/Thematic-reports/The-importance-of-ICT-information-and-communication-technology-in-primary-and-secondary-schools-2005-2008*

PARAGRAPH 3.5



ICT Spend in UK schools. Figures include LA matched funding

Source: *'*Becta (2010) Presentation at Learning and Technology World Forum 2010' by Tony Richardson, Executive Director, Becta



Extent to which schools consider they are well-resourced with desktop computers.

Source: BESA (2011) ICT in UK Maintained Schools 2011.

BECTA (2008). HARNESSING TECHNOLOGY REVIEW 2008: THE ROLE OF TECHNOLOGY AND ITS IMPACT ON EDUCATION: FULL REPORT.

Over the last few years providers in all sectors have made steady progress in developing their ability to make strategic and effective use of technology to improve outcomes for learners. Primary schools in particular have made good recent progress in developing this e-maturity and have to a large extent caught up with secondary schools. Some 28 per cent of primary schools are categorised as e-enabled, compared to 25 per cent of secondary schools. (p4)

'E-maturity' or 'e-enablement' are measures of the ability of education or training providers to make strategic and effective use of technology to improve outcomes for learners. They recognise the part technology has to play across the whole range of schools' and colleges' activities. To be effective, providers need to use technology to be able to respond flexibly to the changing environment in which they find themselves. (p22)

Source: http://www.bee-it.co.uk/downloads/guidance-and-research/doc_details/149-harnessing-technology-review-2008-the-role-of-technology-and-its-impact-on-education-full-report.html

BESA (2009) ICT PROVISION & USE IN 2009/10

Schools continue to invest in ICT, with 51% of primary schools indicating that they are well-equipped with desktop computers, compared to 32% in 2001. An estimated 57% of secondary schools consider themselves to be in the same position – compared to a third in 2001.

Source: http://www.besa.org.uk/besa/documents/view.jsp?item=1326

PARAGRAPH 3.6

OFSTED (2001). ICT IN SCHOOLS: THE IMPACT OF GOVERNMENT INITIATIVES: AN INTERIM REPORT APRIL 2001

There is insufficient emphasis on the assessment of IT capability for formative purposes and to enable schools to obtain an accurate view of pupils' progress by the end of key stages. (p3)

There is too little quality assurance of the implementation of schools' ICT development plans to ensure that initiatives are achieving their purpose. In particular, there is no means of knowing how well the pupils are attaining in IT in individual schools or nationally, apart from teacher assessment at Key Stage 3. Assessment of IT capability at the end of Key Stage 2 is rare.

At national level, the need remains to:

- develop a reliable, consistent approach to the assessment of IT capability in all key stages (p5)

Source: http://www.ofsted.gov.uk/Ofsted-home/Publications-and-research/Browse-all-by/Education/Curriculum/Information-and-communication-technology/Primary/ICT-in-schools-2001

OFSTED (2009) THE IMPORTANCE OF ICT IN PRIMARY AND SECONDARY SCHOOLS 2005-2008

Key Findings (extract)

- Assessment was the weakest aspect of teaching and was inadequate in one school in five. The schools visited rarely tracked the progress of individuals in ICT, established their attainment on entry to secondary school or took into account their achievement outside school. Although the use of ICT in other subjects was increasing in secondary schools, the skills were rarely assessed. As a result, ICT teachers rarely knew how well students applied their ICT skills elsewhere. (p6)

Source: *http://www.ofsted.gov.uk/Ofsted-home/Publications-and-research/Browse-all-by/Documents-by-type/Thematic-reports/The-importance-of-ICT-information-and-communication-technology-in-primary-and-secondary-schools-2005-2008*

PARAGRAPH 3.7

STEPS (2007). STUDY OF THE IMPACT OF TECHNOLOGY IN PRIMARY SCHOOLS: SYNTHESIS REPORT

RECOMMENDATION 2. BUILD ICT INTO GENERAL EDUCATIONAL POLICIES, INCLUDING ASSESSMENT

Integrate ICT explicitly into the curriculum, a curriculum which is flexible, open and gives room for school-level initiative. Define the specific ICT functional skills and a set of skills and competencies developed with ICT. Aim for a culture of "*ICT everywhere, learning everywhere*" (p42)

…. for children, a range of knowledge, skills and competencies – both traditional and 21st century' e.g. creativity, learning to learn – are acquired through the use of ICT, including mathematics and science, language (first and second), and digital and social skills. …ICT is therefore a key enabler for initiating change in our education systems, releasing creativity and innovation and motivating lifelong learning… (p48)

Source:
http://eacea.ec.europa.eu/llp/studies/documents/study_impact_technology_primary_school/02_synthesis_report_steps_en.pdf

PARAGRAPH 3.8

NUTT, J.(2010). PROFESSIONAL EDUCATORS AND THE EVOLVING ROLE OF ICT IN SCHOOLS: PERSPECTIVE REPORT. CFBT.

There is no doubt that the digitisation of information worldwide will continue to develop at a rapid pace and if children are to participate fully in society they will need a firm and practical foundation in technology use that embraces standard equipment and online services. Information required for leisure, work, finance, communication and citizenship is increasingly electronically mediated and therefore children should reasonably expect their school to empower them in this respect. The effective use and dissemination of knowledge through technology in all kinds of professions and vocations, has become vital for anyone seeking professional recognition or success. (p18)

Source: *http://www.cfbt.com/evidenceforeducation/pdf/ICTinSchools-web.pdf*

ROYAL SOCIETY (2010). PRESS RELEASE AUGUST 2010

Numbers of students studying computing are plummeting across the UK, with a fall of 33% in just three years in ICT GCSE students, a fall of 33% in six years in A level ICT and 57% in eight years in A level Computing students in England and similar declines found elsewhere in the UK.

Professor Steve Furber, Fellow of the Royal Society and Chair of the study, said: “The UK has a proud history of leading the way in the field of computer science and associated disciplines, from the development of the world’s first stored-program computers to more recent innovations such as the invention of the world-wide web. However, from this bright start, we are now watching the enthusiasm of the next generation waste away through poorly conceived courses and syllabuses. If we cannot address the problem of how to educate our young people in inspirational and appropriate ways, we risk a future workforce that is totally unskilled and unsuited to tomorrow’s job market.”

Source**:** http://royalsociety.org/Current-ICT-and-Computer-Science-in-schools/

BCS (2010) CONSULTATION RESPONSE TO ROYAL SOCIETY’S CALL FOR EVIDENCE – COMPUTING IN SCHOOLS

Schools must educate our children so that by the time they become adults they are capable of making intelligent and informed choices about the digital technology that underpins their world and they are capable of making valuable contributions to our digital society and economy. The purpose of ICT and Computing in schools is to equip every child with the basic understanding of computers and with the IT capabilities necessary to take their proper place in a digitally enabled, knowledge based society and economy. (p5)

1. A major revision to the syllabus to provide “joined up” and relevant learning from primary school through to further education. (p8)

There is a strong case for curriculum reform,

1. To provide "joined up" and relevant learning from primary school through to further education.
2. To move ICT to be an enabling subject such as literacy or numeracy, with computing as a separate discipline equivalent to maths or physics
3. To update the content in this fast moving subject
4. Establish Computing as a proper subject discipline, learned by every student at KS1,2,3, and with rich opportunities for specialisation at KS4,5 (p20)

Source: *http://academy.bcs.org/upload/pdf/royal-society-response.pdf*

ROYAL ACADEMY OF ENGINEERING (2009) ICT FOR THE UK'S FUTURE

A key determinant for success in the recovery after the recession will be the degree of exploitation of the immense potential of Information and Communications Technology (IT and ICT.) to transform both public and private enterprise. (p5)

The UK has lost or is in danger of losing core IT skills underpinning business competitiveness. Development and maintenance of such skills are essential to the creation of a strong cadre of technicians to keep the 'virtual pipes' working for the UK economy (Page 21).

Source: http://www.raeng.org.uk/news/publications/list/reports/ICT_for_the_UKs_Future.pdf

E-SKILLS UK (2008) TECHNOLOGY COUNTS: IT & TELECOMS INSIGHTS 2008

The research evidence is unequivocal: IT & Telecoms provides the engine of future growth and the key to increasing productivity and competitiveness. Fully exploiting technology is the single most powerful lever the UK can employ to achieve wholesale productivity gain right across the economy. The prize is the potential to generate an additional £35 billion of Gross Value Added (GVA) within the next decade. But achieving this depends on the action we take today.....

The UK has one of the best track records in the world for developing IT-enabled business solutions; this is a major strength and is key to the UK's success in technology-intensive sectors such as financial services. For the UK to maintain a leadership position in the newly emerging world order, we need a vibrant, highly skilled IT & Telecoms workforce – the experts who create, implement and operate the systems, services and communications backbone on which everyone depends. …....

We need to ensure the school curriculum meets the needs of a new generation of 'digital natives'; we need to deepen links between employers and universities to put us on a par with global best practice; we need to redress the gender balance so that the sector benefits from the whole talent pool; and we need to ensure our workforce maintains world class skills in a rapidly changing environment.

Source: http://www.nwua.ac.uk/HLSP/docs/eskillsUK_TechnologyCounts.pdf

PARAGRAPH 3.9

DEPARTMENT OF EDUCATION AND SCIENCE (IRELAND) (2008) - INVESTING EFFECTIVELY IN INFORMATION AND COMMUNICATIONS TECHNOLOGY IN SCHOOLS, 2008-2013: THE REPORT OF THE MINISTER'S STRATEGY GROUP

Learning is changing. A pivotal force in bringing about this change is the use of information and communications technology (ICT) which provides richer, more immediate, world-relevant educational resources and opportunities. When used well, ICT enriches learning and enhances teaching. It invigorates classroom activities and is a powerful motivational tool that encourages learners to progress in more personalised and self-directed ways.

Ireland has achieved rapid change and growth in the past decade, but to sustain this we must prepare the next generation for the knowledge society in which they will live. (p1)

Integrating ICT in school life hinges largely on its successful curricular application. Schools must take a learner-centred, rather than a technology-centred, approach to ICT in order to create positive learning outcomes. Effective differentiation through ICT and its adaptive role for students with special educational needs must be recognised, developed and implemented. ICT should be used seamlessly within the curriculum at both primary and post-primary. Students must be encouraged to use technology in a multi-faceted way, to research and reinforce their subjects, to present their knowledge through multimedia presentations and digital video and, finally, to submit personal project work for official assessment as part of state examinations. (P12)

Source: http://www.ncte.ie/media/Final%20ICT%20Strategy_group_report.pdf

DENI (2010) THE REVISED NATIONAL CURRICULUM

Requirements

Across the curriculum, at a level appropriate to their ability, pupils should be enabled to develop skills in Using ICT. Pupils should be provided with opportunities to develop knowledge and understanding of e-safety and acceptable online behaviour.

Source:
http://www.nicurriculum.org.uk/docs/skills_and_capabilities/cross_curricular_skills/new_levels/UICT/UICT_Levels_1-7.pdf

DEPARTMENT FOR CHILDREN, EDUCATION, LIFELONG LEARNING AND SKILLS (WALES) (2008) TRANSFORMING SCHOOLS WITH ICT: THE REPORT TO THE WELSH ASSEMBLY GOVERNMENT OF THE SCHOOLS ICT STRATEGY WORKING GROUP

Our Vision for Schools

Competent Learners

- All learners are able to use technology safely, critically and responsibly to work independently and collaboratively to enhance their learning and attainment, regardless of ability or prior knowledge.
- All learners are able to select from and use a range of alternative and appropriate bilingual tools to solve real, meaningful and challenging problems using a variety of strategies.
- All learners are able to effectively use ICT across the curriculum and transfer their ICT skills to new situations in order to contribute positively to the economic development of Wales and compete in the world of work.
- All learners are provided with a means to measure progress and inform them how they can improve learning through the use of ICT - thus promoting and reinforcing life long learning.
- All learners to have the ability to learn basic information literacy, enabling them to make informed decisions over content they may be directed to in an uncontrolled environment (e.g. Internet). (P20-1)

Challenging learners through a revised national curriculum

- ***Recommendation 1*** Make ICT a core subject within the National Curriculum.
- ***Recommendation 2*** Ensure that all schools have detailed and high quality curriculum guidance on the delivery of National Curriculum ICT and the application of ICT skills across the whole curriculum.
- ***Recommendation 3*** Establish, keep under review and monitor the levels of ICT capability against which learners at different ages and stages should achieve. (p25)

Source: http://www.ngfl-cymru.org.uk/ictstrategyworkinggroup-e.pdf

ROSE (2009) INDEPENDENT REVIEW OF THE PRIMARY CURRICULUM: FINAL REPORT

In this day and age, the primary curriculum also needs to give serious attention to building children's capability with information technology. Our best primary schools already demonstrate that, far from narrowing learning, these priorities – literacy, numeracy, ICT skills and personal development – are crucial for enabling children to access a broad and balanced curriculum. Excellence in the basics supports the achievement of breadth and balance in primary education. (Foreword)

Recommendation 8

(i) Literacy, numeracy and ICT should form the new core of the primary curriculum.

3.44 Even now, a reasonable grasp of ICT is needed in education and employment, and it will become increasingly important to command ICT skills to prepare for technologies of the future. The foundations for this engagement are best formed in primary schools, where children's enthusiasm for ICT is evident. Moreover, we must avoid raising a population divided between ICT 'haves' and 'have nots', because this would pose a considerable threat to both economic wellbeing and social cohesion.

3.45 To argue against the importance of ICT in the primary curriculum is to ignore the increasing digitisation of information worldwide. This will require digital literacy of all children for their full participation in society. Information required for leisure, work, finance, communication and citizenship will be mediated electronically. In all branches of knowledge, all professions and all vocations, the effective use of new technologies will be vital. Children not only need to learn to use specific devices and applications, they also need to understand the fundamental concepts of safe and critical use. The review therefore calls for an understanding of technology to be taught and ingrained in curriculum design and delivery.

Norway

6.51 In 2006, Norway moved away from organising the first stage of the primary curriculum (ages 6 to 9/10) by areas. It is now organised according to the subjects that are already used in the second stage of the primary curriculum (ages 10 to 12/13). Basic skills in literacy, oracy, numeracy and ICT have been integrated into all subjects. The gradual introduction of subjects as pupils progressed through primary school was designed to ease the transition from pre-school. The aim is now to improve curriculum continuity and teacher co-operation across the two stages of primary education.

Source: http://www.education.gov.uk/publications/standard/publicationdetail/page1/DCSF-00499-2009

HMIE (2004) HOW GOOD IS OUR SCHOOL? USING ICT IN LEARNING AND TEACHING

This guide provides advice on auditing the contribution of ICT to different curricular areas so that the skills taught in discrete courses and programmes complement those covered in other contexts across the curriculum, and vice versa. Careful curriculum auditing and planning are essential to achieve this blend and overall balance, irrespective of the programmes followed by individual pupils. Through this auditing schools will be better placed to provide regular opportunities for the consolidation and practice of transferable ICT skills so that learners are well equipped to adapt in an ever-changing world of learning. (p2)

Many schools recognise the power of ICT to promote learning, both in improving their current practice, and responding to our developing awareness as to how, and at what pace, pupils learn, and the skills they need for effective learning. …. There is increasing evidence that by increasing the pace of learning, and motivation among pupils and teachers, the use of ICT can also contribute to raising standards of achievement. The use of ICT:

- encourages pupils to collaborate with one another and take responsibility for their own learning;
- helps to nurture individual talent, independence and a strong sense of self-worth and confidence;
- encourages pupils to use their imaginations and promotes creativity; and
- develops enquiry and communication skills and creates appropriate contexts for critical thinking, decision making and problem solving activities. (p3)

Source: http://www.hmie.gov.uk/documents/publication/hgiosict.pdf

HMIE (2005) THE INTEGRATION OF ICT IN SCOTTISH SCHOOLS

The Scottish Executive's publication of *A Curriculum for Excellence* has turned the attention of educationalists to the values of education, the purposes of the curriculum and the principles underpinning curriculum design. It is important in this current re-evaluation of Scottish education, that we ensure that ICT is a clear strand in our thinking. Progressive ICT skills development in young people is an important component of their future core and life skills. (Foreword)

9.4 …..... ICT has a key role in developing *successful learners,* with an enthusiasm for learning and an ability to think and learn independently and to use technology effectively. It can assist in developing *confident individuals* and *effective contributors* who have independent access to a wealth of information, through which they can develop and then communicate their own beliefs and views of the world. ICT can also support young people in becoming *responsible citizens* by giving them access to a wide range of political and cultural information which will help them to evaluate, for example, environmental issues and ultimately make informed choices.

9.5 With plans for the next key stage of ICT national development - The Scottish Schools Digital Network (SSDN) — now well under way, the challenge for Scotland is to maintain the momentum in ICT which has built up over the last few years. Progressive ICT skills development in young people is an important component of their future core and life skills.

9.9 Schools should ensure that:

- pupils' ICT skills are developed in a progressive way from early years experience through primary school and on through their secondary education;
- the use of ICT becomes integral to young people's learning across the curriculum;
- ICT plays an appropriate role in enriching the learning experience and improving overall achievement;

- pupils ultimately achieve a cohesive ICT skills set, to prepare them for the world of tertiary education or work, including information literacy skills;

In particular, secondary school headteachers should ensure that:

- all departments play an appropriate role in delivering a coherent and progressive development of ICT skills;

Source: http://www.hmie.gov.uk/documents/publication/EvICT%20Final%2018%20Oct.html

HOUSE OF COMMONS (2009) CHILDREN, SCHOOLS AND FAMILIES COMMITTEE REPORT

While Academies are obliged to offer a broad and balanced curriculum, they are only required to follow the National Curriculum for the subjects of English, mathematics, science and ICT. If these freedoms are thought essential for Academies we believe that they should be extended to all schools. (p4)

Source: *http://www.publications.parliament.uk/pa/cm200809/cmselect/cmchilsch/344/344i.pdf*

KRUMSVIK (2008) THE VIEW OF KNOWLEDGE AND THE NEW NATIONAL CURRICULUM IN NORWAY

The new national curriculum necessitates such question because of this curriculum increased focus on ICT and competence aims. Digital literacy has become the fifth basic competence in all subjects at all levels (1-13) and demands teachers to use ICT in all subject tied to the competence aims. This increased status of ICT is historically and both give new possibilities, challenges and dilemmas for teachers. Therefore, we can assume that since the former curriculum was implemented in 1997, we can say that the digital revolution has made huge impact in the Norwegian society and school, which demands a new debate around which kind of theoretical underpinnings pedagogy and didactic has to consider in the digitized school.

Source: http://www.teacher.org.cn/doc/ucedu200807/ucedu20080702.pdf

U.S. DEPARTMENT OF EDUCATION OFFICE OF EDUCATIONAL TECHNOLOGY (2010) LEARNING POWERED BY TECHNOLOGY: NATIONAL EDUCATION TECHNOLOGY PLAN 2010: EXECUTIVE SUMMARY

The plan recognizes that technology is at the core of virtually every aspect of our daily lives and work, and we must leverage it to provide engaging and powerful learning experiences and content, as well as resources and assessments that measure student achievement in more complete, authentic, and meaningful ways. Technology-based learning and assessment systems will be pivotal in improving student learning and generating data that can be used to continuously improve the education system at all levels. Technology will help us execute collaborative teaching strategies combined with professional learning that better prepare and enhance educators' competencies and expertise over the course of their careers. To shorten our learning curve, we should look to other kinds of enterprises, such as business and entertainment, that have used technology to improve outcomes while increasing productivity.

We also should implement a new approach to research and development (R&D) in education that focuses on scaling innovative best practices in the use of technology in teaching and learning, transferring existing and emerging technology innovations into education, sustaining the R&D for education work that is being done by such organizations as the National Science Foundation, and creating a new organization to address major R&D challenges at the intersection of learning sciences, technology, and education. (pp7-8)

Whether the domain is English language arts, mathematics, sciences, social studies, history, art, or music, 21st-century competencies and such expertise as critical thinking, complex problem solving, collaboration, and multimedia communication should be woven into all content areas. These competencies are necessary to become expert learners, which we all must be if we are to adapt to our rapidly changing world over the course of our lives. That involves developing deep understanding within specific content areas and making the connections among them.

How we need to learn includes using the technology that professionals in various disciplines use. Professionals routinely use the Web and tools, such as wikis, blogs, and digital content for the research, collaboration, and communication demanded in their jobs. They gather data and analyze the data using inquiry and visualization tools. They use graphical and 3D modeling tools for design. For students, using these real-world tools creates learning opportunities that allow them to grapple with real-world problems—opportunities that prepare them to be more productive members of a globally competitive workforce. (p9)

Participating in efforts to ensure that transitioning from predominantly print-based classrooms to digital learning environments promotes organized, accessible, easy-to-distribute and easy-to-use content and learning resources. The Department of Education can support the development of an open architecture mapping and navigation platform that will enable the visual depiction of learning progressions across all content areas and reflect 21st-century expertise. Accessible online, these learning progressions can be used to reenvision content, resources, assessments, curricula, and professional learning for teachers and encourage the sharing of best practices and new approaches to improve teaching and learning. This platform would encourage a variety of mashups and spur innovation.(p20)

***Source**:* http://www.ed.gov/sites/default/files/netp2010-execsumm.pdf

PARAGRAPH 3.10

BESA (2009) ICT PROVISION & USE IN 2009/10

English primary schools are expected to budget £39 million on curriculum software and digital content in 2009-10. Once all UK state primary schools are included, budgets are estimated at £50 million – down from £103 million in 2005-06.

English secondary schools are expected to budget £45 million on all curriculum software and content in 2009-10. Once all UK state secondary schools are included, budgets are estimated at £52 million, which is down from £65 million in 2005-06.

It is anticipated that the average primary school will spend £5,350 on desktop and laptop computers in 2010-11 – down from £5,850 in 2009-10 – representing a decline of 8.5%.

For primary schools growth in budgets for desktop computers is expected to decline by 8.5%, while secondary schools are set to spend 3.4% less than in 2009-10.

Budgets for peripherals and networking are expected to decline by 5.3% across primary and 3.2% across secondary schools during 2010-11. The average primary school will allocate £2,700 for this category of spend, which compares to £10,600 for the average secondary school.

It is expected that budgets for system and general software will decline by 2.0% across primary schools and 0.4% across secondary schools.

Source: http://www.besa.org.uk/besa/documents/view.jsp?item=1326

BESA (2011) PRESS RELEASE: 'IMPACT OF NEW TECHNOLOGIES' RESEARCH

1 April 2011: An increasing majority of schools feel they are now definitely unable, or unlikely to be able, to maintain planned new technologies investments for 2011/12 (56 per cent primary, 65 per cent secondary schools) a recent survey has revealed.

The British Educational Suppliers Association's (BESA) findings come from the annual survey into the views of English Maintained Schools on a range of new technologies used by teachers and students. The highly anticipated research, 'Impact of New Technologies' carried out in conjunction with the National Education Research Panel (NERP) provides analysis and insight into the level of use of a variety of new hardware and software technologies in schools now, as well as anticipated use, by 2012.

Source:
http://www.besa.org.uk/besa/documents/grab/pressreleaseImpactofNewTechnologiesresearch2011.pdf?item=1557&file=1

OFSTED (2009) THE IMPORTANCE OF ICT IN PRIMARY AND SECONDARY SCHOOLS 2005-2008

Key Findings (extract)

- Investment in resources had improved teaching, but had still not made ICT a part of everyday learning. …….. Some of the schools visited did not apply the four principles of best value to their purchasing and did not obtain good value for money from their investment. Only around half of the schools showed evidence that they were systematically evaluating the impact of ICT in improving learning and raising standards across the curriculum.

Source: *http://www.ofsted.gov.uk/Ofsted-home/Publications-and-research/Browse-all-by/Documents-by-type/Thematic-reports/The-importance-of-ICT-information-and-communication-technology-in-primary-and-secondary-schools-2005-2008*

REFERENCES

- Balanskat, A., Blamire, R. and Kefala, S. (2006). *The ICT Impact Report: A Review of Studies of ICT Impact on School in Europe*. European Schoolnet. Available online: http://insight.eun.org/shared/data/pdf/impact_study.pdf
- BCS (2010) *Consultation response to Royal Society's Call for Evidence – Computing in Schools*. BCS, The Chartered Institute for IT in association with the Computing At School group. Available online: *http://academy.bcs.org/upload/pdf/royal-society-response.pdf*
- BECTA (2008). *Harnessing Technology Review 2008: The role of technology and its impact on education: Full report.* BECTA. Available online: http://www.bee-it.co.uk/downloads/guidance-and-research/doc_details/149-harnessing-technology-review-2008-the-role-of-technology-and-its-impact-on-education-full-report.html
- BESA (2009). *ICT in UK State Schools 2009 annual report*. Available online from. http://www.besa.org.uk/besa/documents/view.jsp?item=1326
- BESA (2011) *ICT in UK Maintained Schools 2011.* BESA
- Byron, T. (2008) *Safer Children in a Digital World: The Report of the Byron Review.* DCSF. Available online: http://www.education.gov.uk/publications/standard/publicationDetail/Page1/DCSF-00334-2008
- Comber, C. et al. (2002). *ImpaCT2: Learning at Home and School- Case Studies'* Becta. Available online: http://www.bee-it.co.uk/downloads/guidance-and-research/doc_details/116-impact2-learning-at-home-and-school-case-studies-summary-only.html
- DENI (2010) *The Revised National Curriculum*. DENI. Available online: http://www.nicurriculum.org.uk/docs/skills_and_capabilities/cross_curricular_skills/new_levels/UICT/UICT_Levels_1-7.pdf
- Department for Children, Education, Lifelong Learning and Skills (Wales) (2008) *Transforming Schools with ICT: The Report to the Welsh Assembly Government of the Schools ICT Strategy Working Group*. DFCELLS. Available online: http://www.ngfl-cymru.org.uk/ictstrategyworkinggroup-e.pdf
- Department of Education and Science (Ireland) (2008) *Investing Effectively in Information and Communications Technology in Schools, 2008-2013: The Report of the Minister's Strategy Group*. DES. Available online: http://www.ncte.ie/media/Final%20ICT%20Strategy_group_report.pdf
- e-skills UK (2008) *Technology Counts: IT & Telecoms Insights 2008*. E-skills UK. Available online: http://www.nwua.ac.uk/HLSP/docs/eskillsUK_TechnologyCounts.pdf
- European Commission (2006) *Benchmarking Access and Use of ICT in European Schools 2006: Final Report from Head Teacher and Classroom Teacher Surveys in 27 European Countries.* European Commission. Available online: http://ec.europa.eu/information_society/eeurope/i2010/docs/studies/final_report_3.pdf

- European Commission (2008) *Digital Literacy European Commission Working Paper and Recommendations from Digital Literacy High-Level Expert Group*. European Commission. Available online: http://ec.europa.eu/information_society/eeurope/i2010/docs/digital_literacy/digital_literacy_review.pdf
- EURYDICE (2009) *Information and communication technologies.* EURYDICE. Available online: http://eacea.ec.europa.eu/llp/ka3/information_communication_technologies_en.php

- Hammond, M. (2009). *What does our past involvement with computers in education tell us? A view from the research community*.ITTE/Centre for New Technologies Research in Education, University of Warwick Available online: http://www2.warwick.ac.uk/go/centre/centre_projects/current_projects/voices/

- Harrison, C. et al. (2002). *ImpaCT2: The Impact of Information and Communication Technologies on Pupil Learning and Attainment.* Becta. Available online: http://www.bee-it.co.uk/downloads/guidance-and-research/doc_details/117-impact2-the-impact-of-information-and-communications-technology-on-pupil-learning-and-attainment.html

- Henley, D. (2011). *Music Education in England - A Review by Darren Henley for the Department for Education and the Department for Culture, Media and Sport*. London: DFE. Available online: http://www.education.gov.uk/publications/standard/publicationDetail/Page1/DFE-00011-2011

- Higgins, C. et al. (2005) 'Embedding ICT in the Literacy and Numeracy Strategies: Final Report', UK: University of Newcastle/BERA. Available online: http://www.bera.ac.uk/files/reviews/ict-pur-mb-r-f-p-1aug03.pdf

- HMIE (2004) *How Good is our school? Using ICT in Learning and Teaching*. HMIE. Available online: http://www.hmie.gov.uk/documents/publication/hgiosict.pdf
- HMIE (2005) *The Integration of ICT in Scottish Schools.* HMIE. Available online: http://www.hmie.gov.uk/documents/publication/EvICT%20Final%2018%20Oct.html
- House of Commons (2009) *Children, Schools and Families Committee Report*. Available online: *http://www.publications.parliament.uk/pa/cm200809/cmselect/cmchilsch/344/344i.*

- Keating, A., Kerr,D., Benton, T. Mundy, E. and Lopes, J.(2010). *Citizenship education in England 2001-2010: young people's practices and prospects for the future: the eighth and final report from the Citizenship Education Longitudinal Study (CELS).* London: DFE. Available online: http://www.education.gov.uk/publications/eOrderingDownload/DFE-RR059.pdf

- Krumsvik, R. (2008) *The view of knowledge and the new national curriculum in Norway.* US-China Education Review, Jul. 2008, Volume 5, No.7 (Serial No.44) *Available online:* http://www.teacher.org.cn/doc/ucedu200807/ucedu20080702.pdf

- Newhouse, C.P. (2002) *The IMPACT of ICT on LEARNING and TEACHING: A literature review.* Western Australian Department of Education. Available online: http://www.det.wa.edu.au/education/cmis/eval/downloads/pd/impactreview.pdf

- Nutt, J.(2010). *Professional educators and the evolving role of ICT in schools: Perspective report.* CfBT. Available online: *http://www.cfbt.com/evidenceforeducation/pdf/ICTinSchools-web.pdf*

- OFSTED (2002) *ICT in Schools: Effect of government initiatives.* London: Office for Standards in Education
- OFSTED (2008) *ICT in primary and secondary schools: Ofsted's findings 2005/07.* London: Office for Standards in Education
- OFSTED (2009). *The importance of ICT: Information and communication technology in primary and secondary schools, 2005/2008*. London: Office for Standards in Education
- Rose, J. (2006). *The Independent Review of the Teaching of Early Reading, Final Report*. London: DFES. Available online: http://www.education.gov.uk/publications/standard/Developingreadingwritingandnumericalskills/Page1/DFES-0201-2006
- Rose, J. (2009) *Independent Review of the Primary Curriculum: Final Report.* DCSF. Available online: http://www.education.gov.uk/publications/standard/publicationdetail/page1/DCSF-00499-2009
- Royal Academy of Engineering (2009) *ICT for the UK's Future.* RAE. Available online: http://www.raeng.org.uk/news/publications/list/reports/ICT_for_the_UKs_Future.pdf
- Royal Society (2010). *Press Release August 2010*. Available: http://royalsociety.org/Current-ICT-and-Computer-Science-in-schools/
- STEPS (2007). *Study of the impact of technology in primary schools: Synthesis Report*. European Commission, Directorate General Education and Culture. Available online: http://eacea.ec.europa.eu/llp/studies/documents/study_impact_technology_primary_school/02_synthesis_report_steps_en.pdf
- Tymms, P., Bolden D. and Merrell C. (2008). 'Science in English primary schools: trends in attainment, attitudes and approaches' in *Perspectives on Education 1 (Primary Science)*, pp19–41. Wellcome Trust. Available online: http://www.wellcome.ac.uk/stellent/groups/corporatesite/@msh_peda/documents/web_document/wtd042076.pdf
- U.S. Department of Education Office of Educational Technology (2010) *Learning Powered by Technology: National Education Technology Plan 2010: Executive Summary*. Available: http://www.ed.gov/sites/default/files/netp2010-execsumm.pdf
- Underwood, J. (2009) *The impact of digital technology: A review of the evidence of the impact of digital technologies on formal education*. BECTA. Available online: http://www.bee-it.co.uk/Guidance%20Docs/Becta%20Files/Publications/1.%20The%20Impact%20of%20Digital%20Technology.pdf
- Underwood, J. et al. (2005) *Impact of broadband in schools UK*: Nottingham Trent University, Becta. Available online: http://www.bee-it.co.uk/Guidance%20Docs/Becta%20Files/Publications/36.%20Research%20report%20Impact%20of%20broadband%20in%20schools%20The%20Summary%20report.pdf

- UNESCO (2005) *Information and Communication Technologies in Schools: A Handbook for Teachers.* UNESCO. Available online: http://unesdoc.unesco.org/images/0013/001390/139028e.pdf
- UNESCO (2011) *ICT in Education Projects: Teaching and Learning*. UNESCO. Available: *http://www.unescobkk.org/education/ict/ict-in-education-projects/teaching-and-learning/*
- UNESCO (2011) *ICT in Education: Introduction*. Available: *http://www.unescobkk.org/education/ict/themes/training-of-teachers/overview/regional-analysis/introduction/*

- Williams, P. (2008). *Independent Review of Mathematics Teaching in Early Years Settings and Primary Schools*. London: DCSF. Available online: http://www.education.gov.uk/publications/standard/publicationdetail/page1/DCSF-00433-2008