A review of the evidence on the use of ICT in the Early Years Foundation Stage

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Summary

Introduction

This report aims to gather evidence on the technology potential to support the development of educational policy and practice. Becta commissioned the University of Warwick to conduct a review of information and communication technologies (ICT) in the Early Years Foundation Stage (EYFS). This work was part of a package on primary and secondary research that Becta commissioned to investigate the use of technology in the EYFS.

Key Findings

The review addressed six key questions:

i. What technologies, hardware and software are available specifically for the Early Years Market?

In terms of everyday technology, there is a vast array of electronic and digital equipment that permeates young children's lives and shapes their understanding of the world. This includes barcode scanners, calculators, camcorders, cameras, cash machines, computers, console games, dishwashers, laptops and tablet PCs, ICT-based 'smart' toys, microwave ovens, mixers, mobile phones, networked desktop PCs, photocopies, scanners, televisions and washing machines.

In terms of what new technologies are available specifically for the Early Years market, there are as well as 'toy' versions of the above: Bee-Bot programmable floor robots, Roamers or Pixie Robots, digital audio players (DAPs), CD or cassette players, digital cameras, Digital Blue Computer Microscopes, mini DV camcorders and Digital Blue Movie Creators, DVD or video players, iPods, interactive whiteboards, laptops, mobile phones, photocopiers, scanners and televisions.

There are a number of good sources for reviews of technologies, hardware, software and websites, such as:

- http://egfl.net/teaching/itsu/Software/early.shtml
- http://foundation.ebn.org/
- http://www.gamesleyeec.org.uk/ict.asp
- http://www.hitchams.suffolk.sch.uk/foundation/
- http://www.kented.org.uk/ngfl/earlyict/
- http://primary.naace.co.uk/curriculum/earlyyears/eylinks.htm
- http://www.schoolzone.co.uk/index.asp
- http://www.surestart.gov.uk/resources/childcareworkers/technology/
- http://www.tes.co.uk

There are also online catalogues at:

- http://www.tts-group.co.uk

ii. What is the current landscape of the use of ICT more generally in the Early Years, both at home and in educational settings?

There is evidence to suggest that most young children aged from birth to five years are growing up in media-rich digital environments in which they engage actively from a very early age. Family members are positive about this and actively promote the use of new technologies through on-going social-cultural practices of the home. They welcome ICT education outside the home and believe that it should be included in the curriculum from the earliest days. Young children are confident with new technologies and are very willing to explore new gadgets that they have not encountered before.

Early Years practitioners are also generally positive about the role of electronic media and ICT. There do appear, however, to be a gap between children's access to and use of new technologies at home and in the Early Years setting, and between maintained and non-maintained settings. Smaller and non-maintained settings in particular need assistance in gaining access to and use of hard and software. It is difficult to see how this situation can be alleviated without a system or facility for lending hard- and software to settings without permanent facilities, and to childminders, whose work of its very nature is very small-scale.

iii. What is the skill-set and expertise of Early Years practitioners and how does this vary across different sectors?

There is evidence that most Early Years practitioners have their own mobile phones and computers. They word process and use the email and the Internet. Most can use digital audio players (DAPs), CD-ROM and DVD players, and programmable toys. They are, however, less confident in using software for spreadsheets and editing and downloading digit images, still and moving. Not all are confident with interactive whiteboards.

Practitioners recognise the need to develop of technological-awareness education through using ICT and report use of specific software, for instance for number or letter recognition. Not all practitioners are fully confident in using ICT. Nor are they always able to use ICT to contribute to children's learning or see how this can be integrated into the EYFS curriculum across personal, social and emotional development, communication, language and literacy, or problem-solving, reasoning and numeracy, knowledge and understanding of the world, physical and creative development.

Practitioners would like and need more professional development in ICT to promote learning across the EYFS. They need training in:

- the use of specific hardware and software;
- development of greater awareness of specific types of adult interaction that actively mediate, expand and encourage children;
- provision of routine guidance and technical assistance.

iv. How can technology contribute towards a child's learning and development, with specific reference to the EYFS themes and principles?

Technology can contribute to three main areas of learning:

- developing dispositions to learning that thread through personal, social and emotional development and across the EYFS in general;
- extending knowledge and understanding of the world in the broadest sense of communication, language and literacy, problem solving, reasoning and numeracy, creative development and recreational/ playful behaviour; and
- acquiring operational skills.

v. What are the health-and-safety issues and other risks associated with technology used by young children?

Across this review, reference is made to the use of ICT by young children from aged birth to five years and its potential impacts, positive and negative on their cognitive, social, emotional educational, visual and physical development. Despite concerns that there are no large-scale studies relating the use of ICT to specific health indicators in young children. Parents and practitioners are generally positive about the role of technologies though practitioners do harbour some concerns about the perceived amount of time spent on these activities. There is some evidence that excessive computer use might exacerbate trends in inactivity-related health problems if it is associated with a reduction in vigorous activity. Parents, however, believe that children in general lead well-balanced lives in which technology plays a role but does not normally displace other activities. Use of electronic media and new technologies is regarded as a social activity, often taking place in a shared living area, thus protection issues from exposure to unsuitable content through the Internet is not regarded as a particular concern.

vi. What advice do parents and carers need on technology and what sources of advice are currently available?

Parents may benefit from user-friendly advice on ways in which children and adults can make use of new technologies in the home together. There is evidence to support the view that parents in general are already taking a supportive role in inducting young children into the use of media and new technologies in the home. They are confident about the role of technology in young children's social, emotional, linguistic and cognitive development and would like to see this extended in EY settings. This is not to say that all children will access and use appropriate ICT equipment in the home or have models of good practice. Socio-economic and cultural factors do influence children's access to and use of technologies. Here EY settings have a particularly important role to play.

Recommendations

Recommended for development is a clear set of EYFS/ICT strategies and outcomes, a vision and EYFS framework that creates ICT services to support children grow up as competent and confident ICT communicators. Without a specific EYFS ICT curriculum statement, an EYFS strategic plan to increase participation in EYFS services, to improve services and increase collaborative relationships and a networked, flexible system, offering accessible, relevant and high-quality learning opportunities, it is difficult to see how substantive progress can be made.

Investment in EYFS/ICT will need to increase significantly over the next ten years. The sector would benefit from advice on what to invest in and how to extend use of new technologies to support learning.

Parents would welcome building stronger and more collaborative relationships with EYFS settings, through information sharing and exchange of good practice about effective use of technologies in the home to promote and enhance learning and development.

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1 Background, objectives and methodology

1.1 Introduction

As part of its aim to gather evidence on the potential of technology to support the development of educational policy and practice, Becta commissioned the University of Warwick to conduct a review of information and communication technologies (ICT) in the Early Years Foundation Stage. This work is part of a package on primary and secondary research that Becta is commissioning to investigate the use of technology in the Early Years Foundation Stage settings.

1.2 Context

The Early Years Foundation Stage (EYFS) (DfES, 2007) is a central part of the ten-year childcare strategy Choice for parents, the best start for children and the Childcare Act 2006. The Act provides the context for the delivery of the EYFS and taken together with the other elements of the strategy, the EYFS will be central to the delivery of the new duties on improving outcomes and reducing inequalities. The EYFS builds on and brings together the principles, pedagogy and approach of the Curriculum Guidance for the Foundation Stage (QCA, 2000), the Birth to Three Matters framework (DfES, 2002) and the National Standards for Under Eights Day Care and Childminding (DfES, 2003). From September, 2008 it will be mandatory for all schools and early years providers in Ofsted-registered settings attended by young children from birth to the end of the academic year in which children have their fifth birthday.

The four themes of the EYFS are: a Unique Child; Positive Relationships; Enabling Environments; and Learning and Development. These four Themes express important Principles underpinning effective practice in the care, development and learning of young children, as follows.

- A Unique Child – every child is a competent learner from birth who can be resilient, capable, confident and self-assured.
- Positive Relationships – children learn to be strong and independent from a base of loving and secure relationships with parents and/or a key person.
- Enabling Environments – the environment plays a key role in supporting and extending children's development and learning.
- Learning and Development – children develop and learn in different ways and at different rates and all areas of Learning and Development are equally important and inter-connected.

These four guiding principles work together to underpin effective practice in the delivery of the EYFS, describing how practitioners should support the development, learning and care of young children. Key elements to the successful delivery of the EYFS are:

- meeting diverse needs of all children;
- working with parents to support their young children;
- ensuring flexible provision working in more than one settings, where appropriate with effective continuity and progression through relevant information-sharing;
- underpinning the delivery of all of the EYFS with play;
- creating and maintaining quality improvement in order to offer the best experience for young children; and
- ensuring transition, continuity and coherence at the end of the EYFS through the summative assessment recorded in the EYFS Profile, discussed with children, parents and Year 1 teachers.

The EYFS learning and development requirements comprise three elements:

- the early learning goals;
- the educational programmes, taught to young children; and
- the assessment arrangements, for assessing young children to ascertain their achievements.

The early learning goals – the knowledge, skills and understanding which young children should have acquired by the end of the academic year in which they reach the age of five – cover six areas:

- Personal, Social and Emotional Development;
- Communication, Language and Literacy;
- Problem Solving, Reasoning and Numeracy;
- Knowledge and Understanding of the World;
- Physical Development;
- Creative Development.

Whilst none of these areas can be delivered in isolation from the others, they are equally important and depend upon one another to support a rounded approach to child development. So, for example, whilst an early learning goal for Knowledge and Understanding of the World states: ‘find out about and identify the uses of everyday technology and use information and communication technology and programmable toys to support their learning’, the educational programme for Creative Development includes ‘opportunities to explore and share their thoughts, ideas and feelings’ through a variety of … activities, including design and technology’. Moreover, such

activities may help children 'to develop a positive disposition to learn' that forms part of the educational programme for Personal, Social and Emotional Development. At the same time, all areas must be delivered through planned, purposeful play, with a balance of adult-led and child-initiated activities.

1.3 Scope

The review covers all forms of ICT used by children aged birth to five years and their parents, both at home and in Ofsted-accredited Early Years settings, including schools, nurseries, and Sure Start children's centres. The technology of interest includes both hardware and software designed for use by older children and adults (eg desktop and laptop computers) and those that have been designed specifically for this age range (eg educational toys).

1.4 Aims and objectives

The aim of the review is to provide evidence-informed advice on the benefits, opportunities and risks associated with the use of technology by children, parents and practitioners in the EYFS. The review aims to offer specific recommendations for policy, practice, and parents and carers. It also aims to provide a gap analysis to inform future research.

In particular the review addresses the following key questions:

1. What technologies, hardware and software, are available specifically for the EY market?
2. What is the landscape of the use of ICT more generally in the EY, both at home and in educational settings?
3. What is the skill set and expertise of EY practitioners and how does this vary across different sectors (childminders, pre-school, day nurseries, schools)?
4. How can technology contribute towards a child's learning and development, with specific reference to the EYFS themes and principles?
5. What are the health and safety issues and risks associated with technology-use by young children?
6. What advice do parents and carers of young children need on technology and what sources of advice currently exist?

1.5 Methodological approach

The review was carried out between 7 January and 31 March 2008. It was designed to draw upon:

- research literature;
- expert opinion and market intelligence.

The research questions provided a framework for the subsequent stages. They determined the kinds of studies to be reviewed and thus helped to make explicit key characteristics that the review was able to answer. The characteristics were then set out in a number of statements that were called inclusion and exclusion criteria. The following criteria were used:

Included were:

- Papers reporting studies in or after 1997;
- Papers written in English (reported studies were conducted predominantly in US, Scotland, England and Australia but also included were France, Greece, Israel, Spain and the Netherlands;
- Papers reporting an empirical study;
- Papers focusing on children aged from birth to five years, though papers referring to children aged from birth to eight were also consulted.

Excluded were:

- Papers referring exclusively to adults, young people, secondary and primary pupils;
- Papers where reference to methods was omitted or insubstantial;
- Short reviews and summaries of existing research;
- Literature not subjected to peer-review;
- Papers providing only commentary or opinion.

Multiple databases were consulted, including Applied Social Sciences Index and Abstracts (ASSIA), Educational Resources Information Center (ERIC), CSA Social Services Abstracts, CSA Sociological Abstracts and Web of Science. Search terms used were as follows:

'ICT' or 'computers' and 'young children' or 'infants' or 'nursery' or 'kindergarten' or 'early years' (generating 292 papers before exclusion criteria were applied).

A number of other people, organisations and websites were also consulted including:

- Professor Jean Underwood at Nottingham-Trent University who carried out the ICT Test Bed Project Evaluation of Crook Nursery School;
- Professor Iram Siraj-Blatchford and Dr John Siraj-Blatchford at the Institute of Education, University of London, in connection with curriculum guidance materials developed as part of the EU-funded Developmentally Appropriate Technology in Early Childhood (DATEC) , evaluation of the IBM Kidsmart initiative, training analysis carried out in the EU-supported project Kinderet, curriculum development with Gamesley Early Excellence Centre and evaluation of the Northamptonshire's Foundation Stage ICT Strategy;
- Professor Jackie Marsh at University of Sheffield who directed the project Digital Beginnings: Young Children's Use of Popular Culture, Media and New Techologies, sponsored by BBC Worldwide and Esmée Fairbairn;
- Professor Angela McFarlane at University of Bristol, Graduate School of Education, in connection with hardware and software;
- Mrs Chris Wainwright and Mrs Angela Harlock, Coventry City Council;
- Mrs. Cathy Slinn and Lorraine Lord, Solihull Local Authority;
- Mrs Carol Ward, Crook Nursery School, Co. Durham;
- Mrs. Karen Howell, Whitnash Nursery School, Warwickshire;
- The views of a range of 51 practitioners, working in a range of EY settings for birth to five-years, including those with high-profile EY ICT provision, were obtained, as well as a set of skill audits from 80 practitioners;
- Views of a sample of 39 parents from the same settings were obtained and approximately 50 children aged two to five years were also consulted.

Once the studies to be included had been determined, the next step was to obtain copies of the relevant papers that were then considered in terms of design: small controlled studies and descriptive analytical studies. The next section reports the findings from this review process. A gap analysis is then provided to inform future research. Specific recommendations for policy, practice, and parents and carers are then offered.

2 Technologies, hardware and software, available specifically for the Early Years market

2.1 Introduction

For most of the last two decades, the US literature has adopted a narrow definition of ICT that consisted mainly of desktop computers. More recently, however, Rideout et al (2003) in a nationally-representative telephone survey of more than 1,000 parents showed that a high proportion of young US children from birth to six years were using a wide range of new digital media, with many parents seeing such media as an important educational tool beneficial to their children's intellectual development. Meanwhile, Marsh et al (2005) in a survey of 1,852 English parents and carers of children aged from birth to six years also indicated that young children had access to a wide range of media and technologies.

2.2 Technologies

A broad range of new technologies is now available, used in the home and out-of-home contexts of the private, state and voluntary sector for English children from birth to five years, encompassing formal and informal environments. Over the last five years, the audio-visual landscape has changed significantly with a greater prominence now being given to children's active use of voice recorders, laptop and handheld computers, use of the email, powerpoint and Internet, DVDs, digital cameras, 'walkie-talkies' and 'smart' toys, dance mats, camcorders, electronic microscopes, robots, interactive whiteboards, touch screens and CCTV (Siraj-Blatchford and Siraj-Blatchford, 2006).

All of this argues for the need of all young children to become 'digitally literate' and a EYFS curriculum from which they will use ICT to access and enhance their learning, particularly through the 'Knowledge and Understanding of the World' area, as noted in the previous section.

2.3 Hardware

In order to achieve the early learning goal for ICT, that children should find out about and identify the uses of technology in their everyday lives, and use ICT and programmable toys to support their learning, practitioners will need to have clear definitions of 'everyday technology' and 'ICT'.

Everyday technology refers to the array of electronic and digital equipment or hardware used in everyday life. This includes barcode scanners, calculators, camcorders, cameras, cash machines, computers, dishwashers, electronic games and toys, microwave ovens, photocopiers, tape and voice recorders, television, traffic lights and zebra crossings, videos and DVDs and washing machines. Some of this equipment is available as toys, many of which simulate the full working versions.

ICT will include all the electronic and digital equipment that enables children to gather, store and retrieve information and allows them to present and communicate this information. This overlaps with everyday technology above. It refers to digital cameras, camcorders, data projectors and interactive whiteboards, personal computers (desktop, laptop and tablet) with a number of different input devices, age appropriate software, the Internet, on-line resources, webcams and email, as well as tape and voice recorders.

2.4 Software/websites

The survey by Marsh et al (2005) of 524 EY practitioners in 104 EY settings stressed the use of age-specific software to introduce 'key skills' such as phoneme/grapheme relationships, numbers and shapes. There was also regular use of art packages, but Internet use was infrequent (78 per cent said never).

Practitioners also reported the websites that they visited most frequently. These linked with children's popular cultural and media interests, with CBeebies being most popular, Bob the Builder next, followed by BBC, Noddy and Tweenies indicating the entertainment as well as educational nature of websites used by practitioners.

To improve the use of ICT in the Foundation Stage The Standards Site of the Department of Children, Schools and Families (DCSF) launched the Using ICT in EYs Project in January, 2006. The main thrust of this was to support the raising of children's achievements in ICT in the early years. The project was enquiry-based and focused on embedding observational assessment practices across the EY, involving children and their parents/carers in that process. The project aims were:

- for 20 local authorities to co-ordinate the involvement of EYFS settings and to share good practice through web-based case studies;
- for practitioners involved to gain a greater understanding and knowledge of how ICT could support their developing EY pedagogy; and
- for children's outcomes as measured by the Foundation Stage Profile (FSP) to have improved across all areas of learning, but particularly in Personal, Social and Emotional Development and Communication, Language and Literacy[1] .

The case studies can also be found on The Standards Site of the DCSF, launched in March, 2007. An ICT Strategy for Early Years policy framework website for Scotland that was launched in 2003 can also be found[2].

[1] http://www.standards.dfes.gov.uk/primary/casestudies/foundation_stage/ict_foundation_stage 26/03/2008

[2] http://www.ltscotland.org.uk/earlyyearsmatters/previousissues/issue7/ict/eystrategy.asp 26/03/2008

Local authorities such as Northamptonshire[3] that have been particularly innovative in the field have a website that outlines the FS ICT Strategy for 2003 to 2006 and includes an ICT entitlement model for reception classes as well as guidance about the range of everyday technologies children should use. The professional association for those concerned with advancing the appropriate use of ICT (Naace[4]) provides a grid for each early learning goal together with web links for examples. Indeed a variety of web sites suitable for FS children can be found[5], as well as reviews[6] and online catalogues[7].

2.5 Future directions

This rapid change in what ICT is available and used by young children, however, merely reflects a broader array of social, technological and economic factors. Kress (2003:1) has noted that two distinct yet related factors deserve to be highlighted here. On the one hand, there is a broad move from the dominance of writing to the new dominance of image and, on the other, the move from the dominance of the medium of the book to the dominance of the medium of the screen. These two together are producing a revolution in the uses and effects of literacy and of the associated means for representing and communicating at every level and in every domain.

Shifts in media, from book and page to screen, from print-based media to the new ICTs, will make it easier for a multiplicity of modes to be used, in particular the mode of image (still and moving) as well as other modes such as music and sound. Another change lies in the potential for representation and communication modes to include the role of the 'user', that is, to become a 'produser' (Bruns, 2006 cited by Marsh, in press).

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[3] http://www.northamptonshire.gov.uk

[4] http://www.mape.org.uk/curriculum/earlyyears/foundation_ict.htm

[5] http://www.poissonrouge.com

[6] http://egfl.net/teaching/itsu/Software/early.shtml

http://foundation.e2bn.org/

http://www.gamesleyeec.org.uk/ict.asp

http://www.hitchams.suffolk.sch.uk/foundation/

https://www.kented.org.uk/ngfl/earlyict/

http://primary.naace.co.ik/curriculum/earlyyears/eylinks.htm

http://www.schoolzone.co.uk/index.asp

http://www.surestart.gov.uk/resources/childcareworkers/technology/

[7] http://www.tts-group.co.uk

At the moment, potential curricular changes due to technological advances seem to be better appreciated in the field of literacy by scholars from a range of disciplines (Lankshear and Knobel, 2006; Leu et al 2004).

Suffice it to say that even the term 'ICT' is giving way to new information and communication technologies, such as the Internet that, in turn, generate new literacies required for reading, writing and communications (Bruce, 2003). The challenge for the educators of today's young children will be to improve pedagogy so that it better reflects the changes in technologies and literacies and the intersection between the two. Evidence that we have so far from Marsh et al (2005) suggests that, whilst children used a very wide range of technologies in the home, in the EY settings the technologies used were limited to CD players/tape recorders, computers, televisions and video recorders, with more limited use of both video and digital cameras, scanners and interactive whiteboards. This will be considered in more detail in the following section.

3 Current landscape of the use of ICT more generally in the Early Years, both at home and in educational settings

3.1 Introduction

For large-scale study of ICT in the EY, both at home and in educational settings using national samples the literature is dominated by the United States (US). A range of topics have been investigated, for example:

- relating early access and use in the home to later achievement in the early grades;
- access and use in different settings;
- media in the lives of infants and toddlers with disabilities;
- young school-age children's use of computers and well-being;
- relating children's age, race, parents' education and marital status to media use (Attewood, Suazo-Garcia and Battle, 2003; Espinosa, Laffey, Whittaker and Sheng, 2006; Rathburn, West and Hausken, 2003; Rideout, Vandewater and Wartella (2003); Anand and Krosnick, 2005; Let's Play Project, 2000).

Whilst there have been a number of studies of young US children's media use, no-one had explored the media use of children under six in England until the Marsh et al (2005) survey of 1,852 parents and carers of children attending 120 maintained and non-maintained EY settings and 524 EY practitioners who worked in 104 of these settings in England.

Well-designed qualitative studies in Scotland by Lydia Plowman and colleagues at the University of Stirling are relatively small-scale and focus on children of three to five years.

In England, Jean Underwood carried out an evaluation of the ICT Test Bed Project at Crook Nursery School in County Durham. Iram and John Siraj-Blatchford have carried out evaluations of:

- The UK and European IBM KidSmart project in 2001 to 2003, influenced by the DATEC project that developed an ICT curriculum for young children throughout Europe and surveyed the application of ICT to EY education;
- the Northamptonshire ICT Strategy with a group of Lead Reception Teachers (LRTs); and
- the quality of the ICT environment in the Research in Effective Pedagogy in the Early Years (REPEY) case study schools, Siraj-Blatchford et al (2002; 2003).

They have also reported the work of Gamesley Early Excellence Centre, an acknowledged centre of exemplary practice, involved in both the DATEC and IBM KidSmart projects.

Other studies, such as i3 KidStory project (Stanton et al, 2004), aimed at developing collaborative story-telling technologies lie outside the age range, focusing on children four- to eight-year-olds. The Computers and Children's Electronic Toys (CACHET) project, Lucklin et al (2003) concerning young children's use of interactive toy technology drew on the home and school experience of children aged four, five and six years-old.

One small US survey of computer availability and use in 132 childcare settings that included young children with disabilities found a relationship between childcare cost and access to computers; that childcare settings were less likely to have software for play and that designated computer centres were lacking. Given the relatively small-scale of many private, voluntary and state EYFS providers in England, and their modest budgets, this study raises interesting questions about ICT resourcing in EYFS settings.

3.2 Use of ICT in the home and in early schooling as reflected in international studies

DeBell and Chapman (2006) used data from Current Population Survey (CPS), October 2003 School Enrolment and Computer Use Supplement to examine the use of computers and the Internet by American children enrolled in nursery school and children in kindergarten through to grade 12, aged three years and older. The CPS was a sample survey representative of the civilian non-institutional population in the US, and was conducted in approximately 56,000 households each month. Key findings were that computer-use and Internet-use are commonplace and begin early. Even before kindergarten, a majority of nursery school children use computers and 23 per cent use the Internet.

In Young Children's Access to Computers in the Home and at School in 1999 and 2000 (Rathbun, West and Hausten, 2003), 20,000 US parents and more than 8,000 kindergarten teachers and first-grade teachers participated. It was noted that computer literacy and skills were increasingly necessary in a knowledge-based economy but that there continued to be a 'digital divide' between those with computer access and skills and those without. Already gaps existed across racial/ethnic groups and family income levels with respect to computer-ownership and Internet-use. For instance, a lower percentage of Black and Hispanic households had Internet access in their homes, compared to the national average (Newburger, 2001).

These differences were less pronounced in schools, where children's access to computers and the Internet were more prevalent. Noting that few studies had

focused exclusively on kindergartners' and first-graders' access to and use of computers in different settings, this report detailed data from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-9 (ECLS-K) to assess children's access to and use of computers in their schools, classrooms and homes as they began formal schooling. Findings indicated that almost all young children had access to computers, either at home or in their classrooms, and schools. However, kindergartners' access differed by the type of school they attended: public-schoolers had greater access to school and classroom resources, whereas private-school children had greater access to home computer resources.

For the most part, young children's access to school computer resources did not differ greatly by child and family characteristics. In kindergartens, however, some minority children and those from lower socio-economic families continued to have less access to the Internet in comparison to first-graders in the highest socio-economic group. Kindergartners and first-graders in the lowest socio-economic group were also less likely to have a computer area in their classroom. Socio-economic status also predicted access to computers at home.

Findings related to children's use of computers indicated that the majority of young children in public schools were in classrooms where computers were used for instructional purposes on a weekly basis. The most frequent classroom uses were to learn reading, writing and spelling, to learn maths, and for fun. Public-school children with access to home computers used them an average of three to four days a week; frequency of use did not tend to differ by child or family characteristics. Over 86 per cent used them for educational purposes. Finally, young children's classroom computer use in public schools did not differ based on whether children had home access.

Espinosa et al (2006) examined data from the ECLS-K to provide an overview of the role of technology in the home and its impact on reading and math achievement in the early grades. The results showed that access and use of technology influenced children's academic achievement. Although the results show that having access to technology can contribute significantly to the achievement of young children, mere access is unlikely to be sufficient for all young children to benefit from technology in the home. It was emphasised that adults needed to mediate the use of these potential learning tools for children. The report recommended that policy-makers should support increasing the availability of computers for low-income families and continue to discourage extensive viewing of television, and that researchers should focus on the specific methods that parents can enact to realise the learning potential of computers and the internet in the home.

Annad and Krosnick (2005) examined demographic predictors of media use among infants, toddlers and preschools. The authors noted that a great deal of research had explored the effects of media use on children but little work had explored the factors that determine how much time a child spends interacting with various media. Using data from a large-scale national survey sponsored by the Kaiser Family Foundation and focused on very young children aged six months to six years, they conducted multiple regressions predicting time spent watching television, watching videos/DVDs, reading, playing video games and using computers. Children' age, race, parents' education and marital status had significant effects across most types of media use, whereas children's sex, birth order, languages spoken at home, parents' employment status and age had only occasional, isolated effects. Family income had no impact at all.

Wartella, Vandewater and Rideout (2005) devoted a special issue of American Behavioral Scientist to infants', toddlers' and preschoolers' use of television, video and computers and its developmental impact. It was asserted that even the youngest children live in a media-saturated world and the magnitude of their media experiences differ substantially from that of previous generations.

Rideout, Vandewater and Wartella (2003) reported a nationally representative telephone survey of more than 1,000 parents of children six months to six years. The significant findings were as follows:

- children aged six and under spend an average of two hours daily with screen media, mostly television and videos;
- television watching begins very early; a high proportion of very young children are using new digital media, including 50 per cent of four- to six-year-olds who have played video games and 70 per cent who have used computers;
- two out of three six-year-olds live in homes where the television is left on at least half the time, even without viewers present and one-third live in homes where the television is on 'almost all' or 'most' of the time – children in the latter group appear to read less than other children and to be slower to learn to read;
- many parents see media as an important educational tool, beneficial to their children's intellectual development, and parents' attitudes on this issue appear to be related to the amount of time their children spend using each medium;
- parents clearly perceive that their children's television watching has a direct effect on their behaviour, and are more likely to see positive rather than negative behaviours being copied.

A small US dissertation study (Lee, 2005), whilst indicative only, sheds interesting light on the roles that socio-demographic factors (parental education, income and

ethnicity), family media (availability of media, parental beliefs about media, regulation of media use, and pervasiveness of television- watching in the home), and child characteristics (age and sex) played in predicting these aspects of use. Children whose parents were more educated used televisions and computers earlier than those whose parents had less education; those whose parents had negative beliefs about those media were less likely to start using them than were those whose parents did not. Ethnicity was also an important predictor: Black children were more likely to start television watching during the first six months of life than were non-Black children; Hispanic children were much less likely to have used a computer than were non-Hispanic children. Income was primarily related to the availability and pervasiveness of television in the home, whereas parental education was associated with regulation. Positive beliefs about television predicted greater availability and pervasiveness of television, and absence of rules about watching. Overall, television viewing began earlier among children whose parents had more education, had rules about viewing, did not have a television in the bedroom, and lived in a pervasive television environment. Lower parental education, positive parental beliefs about television, and exposure to pervasive television were linked to heavier viewing. Socio-economic status and access were the primary predictors of how early and how much children used computers, especially among Black and Hispanic children. How early television-viewing and computer use began were not related to how much time children spent with these media. The socio-demographic and family dynamics surrounding television-use were more complicated than those for computers, suggesting that television has been firmly embedded into family life and complex processes shape its use in the home.

Roine et al (2005) aimed to highlight the role played by television in pre-school-aged children's social relationships and how these social relationships related to children's capabilities to cope with their 'television fear'. 309 children aged five and six years were interviewed in three Finnish university cities and 297 parents completed four questionnaires covering family background, television-viewing habits, psychiatric well-being and quality and quantity of the child's sleep. Television viewing by pre-school-aged children was quite social in nature, although qualitative data suggested that television was also sometimes used in asocial ways. Co-viewing within the family was common, whereas the peer group was significant in the media reception process after viewing, in children's games based on television programmes. 62 per cent of children reported at least one television fear but it seemed that the presence of at least one family member might help children to cope with television fears, regarded as an additional health and safety factor to consider.

Using time-diary data from a national sample of young school-age children, Attewell, Suazo-Garcia and Battle (2003) examined relationships between time spent at home on computing with cognitive and other measures of well-being. Modest benefits were observed to be associated with home computing on three tests of cognitive skills and on a measure of self-esteem. Most young children who spent time at home on

computer-based activities spent no less time on sports and outdoor activities than children without home computers. However, young children who spent a lot of time on home computers, for over eight hours a week, spent much less time on sports and outdoor activities than non-computer-users. They also had substantially heavier body mass indices than children who did not use home computers. This study clearly suggests the possibility of an association between excessive computer use and a reduction of physical activity and raises concerns that will be revisited later in the health and safety section (Section 7).

3.3 Use of ICT in home and in early schooling in UK

3.3.1 In the home

The Rideout et al (2003) US telephone survey of 1,065 families, reported in the previous section, indicated the richness of the media environment in which US infants, toddlers and preschoolers were raised. March et al (2005) provided a similar picture for the English context, portraying young children as growing up in a digital world in which they were developing a wide range of knowledge, skills and understanding of this from birth. Family members were described as mediating this process through their own social and cultural practices.

Ownership of televisions and video/DVD players was found to be almost universal with only 2 per cent of families with no access. White families were found to be more likely to own two or more of this equipment than Black and Minority Ethnic (BME) families but no significant differences were found in ownership of televisions and video/DVD players in relation to socio-economic status or ownership of satellite/cable or digital television (73 per cent of all families owning these).

Parents reported that children lived well-balanced lives with new technologies playing an important but not excessive role in their leisure activities. On a typical day, children's screen use (watching television, video/DVDs, using computers, console and handheld games) was 126 minutes, but an equal amount of time was spent playing inside with toys. Activities were thus viewed as varied.

Media use appeared to provide opportunities for social interaction since it took place in shared family living areas and was regarded as active rather than passive, promoting play, speaking and listening. Parents were generally positive about the role of electronic media in their young children's social, emotional, linguistic and cognitive development. Parents recorded a wide range of skills knowledge and understanding across the six broad areas of the EYFS as educational benefits from watching television.

81 per cent of families reported owning one or more laptops and on a typical day 53 per cent of children aged from birth to six years used a desktop or laptop computer at home, 45 per cent for less than an hour, 8 per cent for more. Favourite use

reported was to play games on websites or on CD-ROMs/DVD-ROMs that they had purchased. For those families with Internet access (70 per cent) children were able to visit websites. BBC websites were clear favourites with CBeebies first, followed by CBBC, Nickelodeon Junior, Bob the Builder and Barbie. These websites provided games and the opportunity to colour in pictures of favourite characters that could be printed off. As with television, parents were able to specify a range of skills and understanding developed by computer games that they had purchased, such as knowledge of the alphabet (phoneme-grapheme relationships) and counting.

Just under half (48 per cent) of the surveyed families owned console games. Though the majority of young children did not plays these, use varied by sex, age, class and ethnicity. Mobile phone ownership was almost universal though there was little independent use of mobiles reported for children of this age. Young children might be involved in some family communication practices or use real, discarded phones for 'pretend talk'. Rather more (24 per cent) had played with the ringtones and some were reported to have taken photographs using the camera feature of a mobile phone. Music was a feature of young children's lives, with a mean 31 minutes spent on a typical day listening to music and 39 per cent having a CD/audiocassette player in the bedroom.

McPake et al (2005) also investigated Scottish children's technology experiences in the home through survey and case study of sixteen children. Diaries kept by parents revealed that most used were the television and the computer (in just over 56 per cent of activities described) but also included were electronic books, videos, games consoles and handheld electronic games and music technology (for example, CDs, cassette players or karaoke machines). Amount of time spent on ICT-related activities varied from ten minutes with a tape recorder to six hours watching videos, with a third of activities lasting for more than one hour. Boys spent more time on ICT-related activities than girls.

Young children were found to have open access to items such as television, video players and CD players but access to other items might be restricted, such as use of remote controls for satellite channels, inserting or playing DVDs without supervision, in case equipment got broken. Most parents with mobile phones locked them to ensure than children did not use them unsupervised, though some had taught children how to use the speed dial function to call friends and relatives. Children's use of ICT thus depended on both availability and access.

Reference was made by parents to the inappropriateness to pre-school children of certain adult-owned items and games designed for older school-aged children. At the same time, there was also evidence of controls specially designed for the motor skills of young children and electronic games based on TV programmes aimed at very young children. Parents, older siblings and other friends and relatives played a key role in enabling young children to learn to use from complex ICT. All children

were exposed to communication at a distance by telephone (landline and mobile) and television. Some experienced email and other Internet-based communication, including use of webcams. The majority of children had experienced of others' taking photographs or videos of them, and of these being displayed or played back at a later date though young children rarely took photographs or videos themselves.

ICT had a range of entertainment purposes. As well as television, video and DVD players, children listened to music, particularly nursery rhymes and other songs for young children. Some had their own cassette or CD players and collections of DVDs. Learning songs and singing with television presenters, videos and DVDs also featured.

Parents saw one of the main educational functions of a range of ICT products as being a support to children's, early literacy and numeracy development. Associated with these are minicomputers or LeapPads that have an alphabetical keyboard and tend to focus on literacy activities. LeapPads use special books, cartridges and a special pen, and involve children listening to text or basic numeracy work.

Toy telephones, cash-registers, bar-code scanners and cameras may support role play but do not necessarily have the caché of real products, old ones or those being currently used. Musical activities figured prominently. Some children had dance-mats to connect to a television or computer in order to follow visual instructions. Toy musical instruments, acoustic and electronic and including keyboards, guitars and violins were in evidence.

3.3.2 In the EY setting

Marsh et al (2005) asked 524 practitioners in 104 EY settings about their views and use of media and new technologies. They found that the vast majority (92 per cent) agreed or strongly agreed that children learned from television. Two-thirds (67 per cent) disagreed with the suggestion that television is harmful to children's language development, though 83 per cent felt that they generally watched too much of it. Two third of practitioners (66 per cent) agreed that children learned skills from playing video games. A similar number (63 per cent) felt that popular culture had a role to play in education and agreed that more activities based on this should be included in the curriculum. Indeed, the majority did use popular culture in the FS curriculum, at least occasionally and felt that popular television or popular culture characters promoted reading, writing, speaking and listening.

It was also found that there were clear differences between practitioners who worked in maintained and non-maintained settings, with the latter being less likely to say that their setting owned hardware such as television, video/DVD player, CD/audio cassette player, desktop computer and digital still camera, or had multiple copies. Moreover, ownership was reflected in usage, with practitioners reporting that there

was little use of hardware other than CD/audiocassette players, desktop computers, televisions and video/DVD players in the week previous to the survey.

Level of qualification also had an influence on the confidence that practitioners expressed towards the use of various technologies, as did age. Only one third (32 per cent) expressed confidence in their ability to analyse and television and fewer were confident with photo-editing software (21 per cent) and film-editing software (5 per cent). Practitioners were more confident to use digital cameras, though a sizeable minority (28 per cent) reported lack of confidence. 30 per cent of all practitioners stated that they did not feel very confident or not at all confident with computers, though only 8 per cent of 18 to 21 years age range felt this way. 42 per cent of the 46 to 65 years age group, however, expressed lack of confidence.

A total of 32 per cent of practitioners reported rarely (7 per cent) or never (25 per cent) planning for children to use computers individually, with practitioners in non-maintained settings much more likely never to plan for this use (30 per cent). The number of practitioners that rarely or never planned for children to use computers as a group was higher at 37 per cent. Asked if they had used the computer in the week previous to the survey, only 46 per cent had. Children were therefore more likely to use a computer at home, if their families owned one (53 per cent used one on a typical day). Given the number of settings without certain technologies and the lack of confidence in using technologies expressed by many, it was not surprising that the majority did not use of digital still cameras, video-cameras, photo-editing or film-editing software.

Interestingly, the parents' survey revealed that they felt media education should be included in the school curriculum from when children were very young. They reported that they would welcome further work on new technologies in school, believing that their children needed to be prepared for the demands of the new technology age.

3.4 Computer-assisted technology with young disabled children

The Association for the Advancement of Rehabilitation Technology (RESNA) (1999) presented an analysis of US federal data concerning use of AT among disabled infants and toddlers. The paper identified a dramatic increase in infants and toddlers receiving AT devices and services, including adapted battery-operated toys, seating and positioning systems and alternative access aids for computers. A three-year federally supported project Let's Play! (2000) used computers to promote play in disabled infants and toddlers with disabilities through the use of assistive technology (AT). A guide to using computers with infants and toddlers, introduced such topics as software selection and features for early intervention software for emerging play behaviour of making things happen, for exploring causality using a single switch. Controlling software and adjusting mouse pointers, trackballs and touch screen for

young children are examined and three types of play are identified: exploratory choices, choice-making, and purposeful choices.

The Early Childhood Comprehensive Technology System (ECCTS) (Hutlinger and Johanson, 2000) was a three-year collaborative project designed to implement and maintain a comprehensive technology system based on combining four components of nationally-recognised demonstration models and peer-reviewed outreach models funded by the Early Education Program for Children with Disabilities in the US Department of Education. The models included on-going training, follow-up and technical support for teachers and an on-site technology support team; team-based technology assessment for children with moderate to severe disabilities; technology integration into the classroom curriculum; and transition into public school kindergartens and other programs. The evaluation showed ECCTS components were effective in establishing, maintaining and institutionalising computer technology in a large preschool program for more than one hundred children with and without disabilities, each year.

Parette, Hourcade and Heiple (2000) considered the use of computers in classrooms with diverse populations including children with disabilities in three small kindergarten classes with a quasi-experimental design. It was concluded that a structured computer keyboard skills training approach was effective for young children with and without disabilities.

In fact a number of well-designed experimental studies have related computer use to learning and achievements. These will be examined in a later section.

3.5 Technology as a catalyst for social interaction

Lau, Higgins, Gelfer, Hong and Miller (2005) investigated the impact of teacher facilitation on the social interaction of young children during computer activities. The study compared eighteen dyads of children with and without disabilities who received teacher facilitation during computer activities to a group of children who did not receive teacher facilitation. The study showed that children with and without disabilities benefited from social skill instruction, had more positive social interactions and demonstrated more effective social behaviours than the children in the computer-only group.

Chung and Walsh (2006) examined the dynamics of six dyads' (kindergartners' and first graders') collaboration processes in a computer writing project over two semesters. Examination of video data and children's computer products showed that interaction patterns changed from an independent style to a more integrative style, in sharing control over the mouse and keyboard and written outputs; role patterns emerged that alternated leader and observer; and that the computer served as a reference for interaction and staying on task.

Clements (1998) reviewed the research on computers and social interaction, with children spending nine times as much time talking with peers while working at computers than while doing puzzles. Social interactions, it is reported, are influenced by the type of software used and the physical environment surrounding the computer. Effectively integrating technology into the early childhood curriculum includes matching the type of computer software used with skills desired and coupling computer and off-computer activities for maximum learning. It is suggested that computers and other technology offer opportunities to aid learning through making more visible individual and sex differences in approaches to learning.

3.6 Gender stereotypes in educational software for young children

Sheldon (2004) noted that with the increasing use of computer technology in schools and households, children are being exposed to a wide variety of new media resources. A content analysis of most highly rated US educational software for young children aged three to six years was designed to look at gender representations and stereotyping. The results demonstrated significantly more male characters than female characters in preschool educational software and may convey that girls are not as valued as boys are. Male characters were more likely than female characters to exhibit masculine-stereotypical behaviours whilst female characters more than male characters to exhibit counter-stereotypical behaviours, yet more gender stereotyped in appearance.

The Marsh et al (2005) survey noted sex differences in preferences for particular types of technology and particular media characters and hence programmes or websites. For example whilst there were no significant differences between boys and girls in relation to ownership of televisions in bedrooms, there were differences for console games (boys were more likely to have these in bedrooms) and dance mats (girls were more likely to have these in bedrooms). There were also sex differences in relation to favourite television programmes although the majority of titles were popular with both. Boys-only titles included Bob the Builder, Thomas the Tank Engine and Power Rangers and girls-only titles included Fimbles, High Five and Come Outside. Similarly with films, whilst Shrek and Finding Nemo were popular with both boys and girls, there were also differences that reflected stereotypical interests, with boys' favourite film being Thomas the Tank Engine and girl' third favourite film being Barbie.

Meanwhile, McNair, Kirova-Petrova and Bhargava (2001) identified some strategies for supporting young girls in their use of computer technology through appropriate role modelling, careful selection of software and 'gender fair' teaching differences strategies.

Graham and Banks (2000), in a one-year qualitative study, observed twelve preschoolers' initial computer use. Findings indicated initial computer use with a mouse occurred at approximately three years. Some possible sex differences were

noted. Girls tended to use the computer as a shared social activity, whilst boys tended to use the computer more as a solitary game. They approached the computer in the same way as they approached puzzles and other fine motor activities and were drawn away by open-ended creative activities. The time spent on the computer increased with age, though periods tended to vary between five and twenty minutes. Children spent longer at the computer in the presence of an adult.

DeBell and Chapman (2006), however, suggested that in contrast to the 1990s, when boys were more likely than girls to use computers and the Internet, overall computer and Internet use rates for boys and girls are now about the same. This suggests that differences found between the sexes in overall computer or Internet use rates, or wider use of ICT, may relate the time when research data were gathered and findings reported.

4 What is the Skill-Set and Expertise of EY Practitioners and how does this vary across different sectors (Child Minders, Preschool, Day Nurseries, Schools)?

4.1 Introduction

Despite the widespread US interest in the relationship of early access and use of ICT to later achievement, rather less attention has been devoted to the skill set and expertise of EY practitioners. The role of schools is seen as one that bridges the digital divide along demographic and socio-economic lines.

A study of 278 Greek early childhood teachers surveyed their views on the prospect of computer use being integrated into kindergarten and concluded that their views were shaped by their knowledge and experience of computers and by in-service training in computer-use (Tsitouridou and Vryzas, 2004).

Otherwise, evidence of the skills base of practitioners is confined in England to the Marsh et al (2005) survey of practitioners and in Scotland, the studies of Plowman and colleagues that have focused mainly on the individual practitioner.

4.2 Availability of technology, overall usage and confidence

Marsh et al (2005) noted that ownership of hardware related to overall use, demonstrating that practitioners reported little use in the week prior to the survey other than CD/audiocassette players, desktop computers, televisions and video/DVD players. Moreover, there were clear differences between practitioners who worked in maintained and non-maintained settings, with the latter less likely to report ownership of one or more copies. Given the number of settings that did not own certain technologies and the lack of confidence expressed by many practitioners in their abilities to use these technologies, there was less frequent use of digital still camera, video cameras, photo-editing and film-editing software. Level of qualification of the practitioners had impact on confidence expressed towards the use of various technologies, as did age. Practitioners with Level 4 qualifications were more likely to use this hardware than others and older practitioners were more likely to express lack of confidence. This emphasises the importance of high-quality training for EY staff particularly for those who are older, have fewer qualifications and who work in the non-maintained sector.

As noted by Beastall (2008) whilst children are ready for the digital era of education, teaching staff may need more strategic and pedagogical support in order to ensure best value is obtained from technology. She acknowledged that teaching staff recognised the benefits of being able to engage children more effectively with ICT but questioned whether they were as clear how to raise the attainment of children and improve the learning process. This highlighted a skill shortage within the teaching staff and a skill differentiation, nowhere more marked than in the EYFS that

will be difficult to bridge. This draws attention to the need for changes in strategic policy (a point that will be returned to in the 'Recommendations' section).

The quality of the ICT learning environment used by REPEY settings (Siraj-Blatchford et al (2002; 2003) was measured using an ICT Early Childhood Environmental Rating Sub-scale (ICT-ECERS) which has three items and covers provision for the development of: ICT skills, access and control of ICT tools, and learning about the uses of ICT. This rating sub-scale was modelled on the ECERS (Early Childhood Environmental Rating Scale) of Harms, Clifford and Cryor (1998) and the instrument was originally devised as part of the DATEC project already mentioned. Although the EPPE findings showed that the twelve centres involved were all effective 'outliers' from the 141 settings of the original project, they were found to be less effective in integrating ICT into the curriculum. Most of the practice observed scored between 'inadequate' and 'minimal'. Uncertainty was expressed by practitioners about the appropriate use of computers. Children were found to be using the computer mainly as a tool to develop creativity (through art, music and dance programmes) or to develop literacy through reading. Practitioners helped children access software and supported them when they got into difficulties but intervention tended to occur when children had problems. Children usually used computers without an adult. Adults who were present tended to be qualified teachers, echoing the findings of the Marsh et al (2005) study. Practitioners tended not to 'scaffold' and there was little evidence of 'sustained shared thinking' during computer activities. It was concluded that further training was called for.

From observations of practitioners in eight Scottish preschool settings over the course of 2003-2004, Plowman and Stephen (2007) found that ICT was generally conceptualised as 'computers' and that children's use of computers usually took place during periods of free play. There were few examples of adults initiating directed activities although, as in the REPEY study, practitioners would intervene to arbitrate turn-taking and occasionally observed, recorded and assessed children's progress with ICT. As they had noted in an earlier paper (2003:3) 'training opportunities were limited and generally took place on an ad hoc basis in the workplace'. The emphasis was on low-level trouble-shooting and basic skills, rather than on pedagogy, and children's interactions with the computer were referred to as 'playing with the computer'. Three broad identified categories of adult-child supervision of computer were:

- guided interaction;
- reactive supervision; and
- hybrid approach.

As in the study by Siraj-Blatchford et al (2002; 2003), reactive supervision was found to be the most common form of adult guidance: 'the approach operated by default rather than constituting a pedagogical strategy, although it was associated with

children's 'choosing for themselves when or if they would use the computer and what they would do' (Plowman and Stephen, 2005: 151). Children rarely requested help when interacting with the computer, other than to request turn-taking interventions. Overall it was concluded that children's interactions with computers 'could not be really be described as contributing directly to play or learning, other than the social aspects of negotiating access'.

Settings where there was a confident and competent practitioner seemed to have a more co-ordinated approach, favouring some explicit tuition, showing awareness of specific ways in which children could benefit from ICT and facilitating this learning. Examples of guided interaction, it was thought, suggested a way forward for professional development. This approach focused on the way a practitioner might sit with one or more children and actively assist them to interact with the computer, by explaining, guiding a hand or demonstrating a tool, suggesting alternative actions, helping to select a more age-appropriate programme, providing positive feedback and sharing pleasure, helping with errors and ensuring equal access. Given that such an approach is intensive, time-consuming and requires high levels of confidence and competence, this was observed only in isolated cases.

Lying between reactive supervision and guided interaction was a single observed example of a combination of these features, where introduction to hardware and 'basics' was followed up by one strategy or the other, depending upon the skill of the child concerned.

A final phase of this work brought together findings from earlier phases and their implications for the development of a national strategy in Scotland. The need for training or professional development dominated the responses and there were concerns about equitable access to hardware and software resources across providers in the public, private and voluntary sectors, and ways of engaging with parents through and about ICT. The value of more explicit attention to ICT in the documentation used for planning and assessing provision was identified as important. There was a need for ICT as a tool for learning or as an area of skill development to be included in curriculum guidance, but in order to become embedded in practice.

The overall aim of this study was to explore how guided interaction, 'distal' and 'proximal', could create opportunities for learning through ICT for three- and four-year-old children.

Distal interaction included:

- arranging access to ICT
- ensuring help
- modelling use of technology for a purpose

- monitoring a child's activity
- planning balance across the curriculum
- providing a broad range of resources and setting up activities.

Proximal interaction included:

- demonstrating tool skills such as moving a cursor or clicking an icon
- sharing enjoyment,
- explaining and instructing
- managing turn-taking
- monitoring difficulty level
- prompting to try a new game
- providing feedback and supporting, by staying close by.

The concept of guided interaction is thus both a tool for considering how learning can be supported in EYFS and a means of articulating a new approach for working with ICT. The following section goes further, by not only delineating the fundamental characteristics of the adult-mediated interaction, but also by demonstrating how this could lead to children's higher cognitive performance on a series of measures, as well as encourage a more reflective response from practitioners.

4.3 How practitioners can promote children's learning with ICT

The quantitative and qualitative UK studies were largely descriptive of existing practice whilst Klein, Nir-Gal and Darom (2000) examined the differential effects of three types of adult interaction with 150 kindergarten children of ages five to six years, using computers upon Israeli children's cognitive performance and style of response,. The types of adult interaction were:

- mediation or expanding, encouraging and regulating behaviour;
- accompaniment, or just responding to children's questions; and
- no assistance.

Children who engaged in adult-mediated computer activity showed higher levels of performance on a series of cognitive measures and more reflective response styles as compared to other children. Findings led to the conclusion that integrating adult mediation in pre-school computer learning environments facilitated informed use of computer techniques and had a positive effect on children's performance. This intervention study complements the descriptive studies. It not only demonstrates the importance of practitioner skills:
teacher training that involved learning about computer hardware and having experience in using specific Logo and Game software programmes (later to be introduced to children); and

specific 'meditation' training.

This mediation was designed to help practitioners to:

- focus children's attention to salient factors related to the task
- characteristic features of the computer and to their own behaviour; but more significantly,
- express meaning and affect;
- expand learning experiences beyond the immediate context (relate and contrast with past, present and future experience and ask challenging questions); and
- encourage children with explanations.

Furthermore, the study was the first attempt to use mediated learning theory to identify and explain basic characteristics of adult-child mediation as expressed in the process of teaching in a computer learning environment. The theory of structural cognitive modifiability and of mediated learning (Feuerstein, Rand and Hoffman, 1979; Feuerstein, Rand, Hoffman and Miller, 1980; Klein, 1985; 1996) identified basic components of adult-child interaction (Mediated Learning Experiences) for children and their potential effects on children's cognitive development. Mediated learning occurs when adults interpose themselves between the children and the environment and give conscious meaning to the children's experiences. The mediator therefore contributes to shaping and advancing the development of children's cognitive function through linking it to the cultural content and intellectual tools of their children's society. In line with Feuerstein's theory that the MLE processes are internalised by the children and become integrated in their future responses. In turn, the more the children experience MLE interactions, the more they will learn from direct exposure to formal and informal learning situations. Hence, three types of adult guidance of pre-schoolers using computers were compared:

i) mediation, throughout the child-computer interaction, the adult guidance included focusing, affecting, expansion, encouragement and regulation of behaviour;

ii) accompaniment, or routine adult guidance, involving the presence of an adult response to questions initiated by the child in the computer environment and with adult assistance; and

iii) no assistance, only technical or basic instructions.

Teacher training included the following components, a twenty-one hour course, seven bi-weekly sessions of three hours each in the afternoons or regular school work days, followed by ten hours personal guidance in the kindergarten whilst interacting with children, over a three-month period.

It was concluded that children interacting with adults trained to mediate in a computer environment scored significantly higher than other children on measures of abstract thinking, planning, vocabulary and visuo-motor co-ordination and on measures of responsiveness, including a measure of reflective thinking. The significant effect of adult mediation was enhanced by the finding that there were no differences in performance of children who worked in a computer environment with an adult available to answer their questions and others who received technical assistance only. No differential effects for sex, ethnic original and parental level of education were found in the study. The intervention affected all children, regardless of demographic diversity.

In line with MLE theory, experiences actively mediated by the child's primary caregivers, have the potential to affect the child's cognitive performance. On the basis of the current findings, it was concluded that children's activity with the computer, without adult mediation, does not make full use of computer technology for the benefit of children's development in the pre-school years. Particularly interesting were the findings regarding children's use of computers at home. There were no differences between children who used computers at home and those that did not. The authors noted that other possible models could be implemented in computerised learning environments, such as Vygotsky's Zone of Proximal Development (ZPD) that was drawn upon by Plowman and colleagues. It is argued, however, that whilst ZPD highlights the importance of adult mediation in raising children's thinking process, Vygotsky did not identify the processes leading to it in terms of adults' behaviours. Whilst limitations of the study are identified, such as the use of only three conditions, the length of the intervention (over a period of 17 weeks), and the lack of information on long-term effects, it serves to explicate the teacher's role within the ICT learning environment and the critical importance of appropriate training. As the authors note, teachers' roles in a computer learning environment have not been the focus of extensive educational research as yet. This section, of course, overlaps with next one that focuses on learning and development since in practice, as shown in the last few pages, it is impossible to separate learning from teaching.

5 Technologies contribution to learning and development with specific reference to EYFS

5.1 Introduction

Previous sections suggest that the emphasis in EYFS teaching should be on what children can learn through ICT and how adults can enhance their learning. A broader definition of ICT than desktop computers needs to be involved, that includes laptops, microscopes, digital cameras and camcorders, remote controls, mobile phones and electronic keyboards, robots, voice recorders, touch screens and overhead projectors. 'Smart' toys and simulated appliances such as cash registers, microwave ovens and barcode readers will also have a place.

Throughout the review, ICT has been seen to be embedded in particular social contexts jointly constructed by young children and adults, parents and carers. Sutherland, Facer, Furlong and Furlong (2000) and Sutherland et al (2004) drew upon socio-cultural theory to describe how teachers embedded ICT into everyday classroom practices to enhance learning. This is derived from the socio-historical theory of learning (Vygotsky, 1978; Wertsch, 1991; Wertsch et al 2003). Plowman and Stephen (2007) also drew upon the Vygotskian socio-historical tradition. From this perspective, all learning takes place in socio-cultural contexts and is mediated through adults by cultural tools, as noted in the previous section. The computer is thus understood as such a tool. This has implications for learning and development through ICT and demands:

> a recognition that this is more consistent with the notion of ICT products as tools. Tools are designed to be applied for particular purposes when required; they are not usually designed for continuous use for their own sake. (Siraj-Blatchford and Siraj-Blatchford, 2006: 8)

Siraj-Blatchford and Siraj-Blatchford (2006) noted that pre-school children will be finding out about and identifying the uses of technology in their everyday lives and so may be encouraged to integrate technology into their play environments through the use of pretend as well as functioning telephones, cash registers, office photocopies, supermarket barcode scanners and microwave ovens in their socio-dramatic role play.

Siraj-Blatchford and Siraj-Blatchford (2006: 9) discussed an emergent and integrated ICT education for a knowledge society that is Developmentally Appropriate Technology in Early Childhood (DATEC), promoted as a project funded by the European Commission CONNECT programme in 2000-1 that led to the development of guidance material for parents and early childhood educators based on best practice applications that:

- were educational, stimulating worthwhile learning;

- encouraged collaboration;
- supported an integrated approach to ICT;
- supported play that was representational and symbolic (role play);
- left the child in control;
- were transparent and intuitive, with functions clearly defined;
- avoided violence or stereotyping;
- supported the development of an awareness of health and safety issues;
- supported the involvement of parents.

Overall, however, as noted by Plowman and Stephen (2003; 2005), we have insufficient practice-based evidence on which to build early childhood policy and practice for three- to four-year-olds. Their own research in Scotland focused mainly on rich descriptions of home and nursery practice for three- and four-year-olds, (McPake et al, 2005; Plowman and Stephen, 2007; Stephen et al, 2008). Evidence is accumulating from evaluations of the European KidSmart programme, use of IBM equipment and software (Siraj-Blatchford and Siraj-Blatchford, 2000; 2004), evaluations of Gamesley Early excellence Centre and the Northamponshire ICT Strategy (Siraj-Blatchford and Siraj-Blatchford, 2006). But in all cases, this is small-scale and focuses on three- to five-year-olds. This leaves almost unexamined in this country, the use of ICT with our youngest children from birth to three years, and indeed very little specifically focusing on three to five years in the context of the FS curriculum. A Kinderet survey of 99 practitioners from a variety of pre-school settings and lengths of service was carried out by Siraj-Blatchford and Siraj-Blatchford in 2004 to identify training needs. In the course of the survey, practitioners were asked to indicate the particular areas of the curriculum to which they felt ICT could contribute. Areas of application highlighted included emotional, personal and social, communication and language, knowledge and understanding of the world, expressive and aesthetic and physical development and movement. Asked what objectives they had for use of ICT and what children learned from their use of these tools, however, their responses suggested a lack of clarity between educational objectives and outcomes of development of technological awareness education through using ICT. The conclusion drawn was that many practitioners were still not confident enough with their own use of ICT to enable children to use new technologies to enhance their learning in all areas.

5.2 Types of learning promoted with ICT

It has been shown in earlier sections that children of three- and four-years-old who learn through ICT can make greater developmental gains when compared to children without such experience. Haughland (1990; 200ob) demonstrated that when compared with children without computer experiences in similar classrooms US preschool children’s use of computer software led to gains in intelligence, non-verbal skills, structural knowledge, long-term memory, manual dexterity, verbal skills,

problem solving, abstraction and conceptual skills. Grubb (2000) has also affirmed the greater increase in concept age of US kindergarten children in a twenty-first century classroom than students in a traditional kindergarten classroom. As Haughland (2000a:2) noted, however, teacher training is essential as 'relatively few teachers in a relatively small number of schools have been trained to maximise technology use in classrooms'.

On the basis of their work in Scotland on guided enquiry, Plowman and Stephen (2006) argued for three main areas of learning:

i) developing dispositions to learn that thread throughout the personal, social and emotional development area and hence the EYFS, in general;

ii) extending knowledge and understanding of the world in the broadest sense of communication, language and literature, problem solving, reasoning and numeracy, creative development, and recreational/ playful activity ; an

iii) acquiring operational skills.

5.3 Developing dispositions

Clements (1998), in a review of research, noted that computers served as a stimulus to social interaction. Indeed, a number of studies in earlier sections have stressed that mere access to technology was insufficient and emphasised the important role of adults in mediating use if the potential of these learning tools is to be realised (Espinosa et al, 2006). Roins et al (2005) highlighted the role played by television in pre-school children's social relationships, with co-viewing taking place within the family and subsequent influence revealed in children's games with peers. Calvert et al (2005) drew attention to constructive engagement through early adult-child interaction that allowed children to retain control of the computer, whilst, Attewell and Battle (2003) found modest benefits associated with home computing and a measure of self-esteem in young school-age children. Overall, there seem to be good grounds for the conclusions that Siraj-Blatchford and Siraj-Blatchford (2006: 5) drew: 'if we are to use ICT to support early learning across the curriculum then the technology should be integrated to support the development of positive dispositions towards learning'.

At a broader level, Beastall (2008) concluded that there could be little argument against the claim that children and young people now have an advanced relationship with technology that has been developed right from birth. Papert (1980) asserted that technology enabled the child to think about thinking and thus to develop meta-cognitive skills. Prensky (2003), more controversially, has argued that young people have a 'natural' technological competence and a relationship with technology that can be characterised as parallel processing functions and multi-tasking. There is certainly evidence in the review that very young children are developing multi-model

skills and strategies that enable them to navigate spatial environments, recognise and manipulate visual images, and have at least some experience of the way involving sounds, images and texts interact.

As noted by Ritzer (1999) a child's preschool social environment involves many interactive games, high visual and auditory stimulation and creativity that enabled children to play an active role in their own learning. Technology has enabled practitioners to become more creative and interactive with the EYFS curriculum.

5.4 Extending knowledge and understanding of the world

A number of studies of investigated young children's developing knowledge and understanding of the world. Linebarger and Walker (2005) related television viewing of 51 infants and toddlers to language outcomes, starting at six-months-old and coding three-monthly viewing logs in terms of programme, content and intended audience. At thirty months of age, certain programmes resulted in greater vocabularies and higher expressive language scores when parental education, home environment and children's cognitive performance were statistically controlled. Teletubbies, for instance, was related to fewer vocabulary words and smaller expressive language scores. Sesame Street was related only to smaller expressive language scores.

Calvert, Strong and Gallagher (2005) exposed 53 preschoolers of mean age four years and eight months to a computer story that varied the amount of control children had over visual and verbal content. Children who controlled the computer demonstrated more attention and involvement than those who watched an adult control the experience. Control, however, had no effect on children's memory of visual or verbal content.

Weiss, Kramarski and Talis (2006) investigated the effects of learning mathematics with multimedia embedded in different styles of learning and preference for style of learning with computers in kindergarten. Participants were 116 girls and boys between four-and-a-half and five-and-a-half years. One group was exposed to multimedia embedded in co-operative learning, a second with multimedia embedded in individual learning, and a control not exposed to multimedia. Findings indicated that both computer groups out-performed the control group in mathematical achievement. With respect to disposition, the co-operative learning group increased its positive attitude about co-operative learning and the individual learning group improved its mathematical skills at a higher level.

Li, Atkins and Stanton (2006) analysed the impact of computer use on school readiness and psychomotor skills for 122 Head Start children of three and one-half to five years of age, in the only randomised control trial reported in this review. Children in the experimental group worked on the computer for 15 to 20 minutes per day with developmentally appropriate software, the controls received a standard Head Start

curriculum. The experimental group performed significantly better than the controls on the school readiness test. The effect was strongly enhanced by children's home computer experience. Findings were inconclusive regarding the potential effect of computer use on motor skills.

A number of studies focused on special needs. Regtvoort and van der Leij (2007) trained 31 'at risk' children of between five and six years of dyslexic parents on a fourteen-week computer-based phonemic awareness programme. Post-testing showed both a phonemic awareness and letter knowledge advantage over 26 'at risk' untrained 'controls'. However, the trained group did not maintain the advantage in first and second grade reading and spelling. Magnan and Ecalle (2006) tested the effectiveness of audio-visual computer training in discrimination of phonetic features of voicing on recognition of written words by sixty-seven five-year-olds 'at risk' of dyslexia. In three experiments the intervention group showed higher increases in performance in phonological skills and recoding than the control group. A small study of Ortega-Tudela and Gomez-Ariza (2006) in Spain explored the extent to which multi-media computer-assisted teaching facilitated the learning basic mathematical concepts and skills by ten six-year-olds with Down's Syndrome (DS), compared with traditional methods for eight six-year-old 'controls'. The experimental group showed a higher performance on post- test, following training on a multi-media software programme. These used such activities as counting different groups of fish and associating them with the requested quantity and counting balloons that were carried in the hand of a doll. Each of the games presented three levels of difficulty according to elements to be counted (one to ten elements) and children passed a level which they reached a score of 80% without error on the first attempt. The controls carried out training with pencil and paper exercises. The results showed clearly that teaching using multimedia materials facilitated the acquisition of basic mathematical knowledge and ability of young DS children.

5.5 Acquiring operational skills

Because there are little empirical data available on how well young children are able to use a computer mouse, Donker and Reitsma (2005) in the Netherlands examined proficiency in clicking on small objects over the screen, using drag-and-drop and click-move-click.. The participants were 104 children from Kindergarten 2 (mean age six years old) and Grade 1 (mean age seven years). Results showed that the six-year-olds clicked and moved more slowly than the seven-year-olds but that nearly all the children were able to click within three millimetres of the target. Findings also show that in educational software drag-and-drop is the most appropriate movement procedure, as it was found to be faster than click-move-click and resulted in fewer errors. Interesting differences between horizontal and vertical movements were found with vertical accuracy lower than horizontal accuracy. It was conclude that five- and six-year-olds are well capable of using a mouse to operate educational software.

Chang, Mullen and Stuve (2005) argued that the frequency and form of computing for young children was still open to definition at the classroom level. They classified general-purpose computers as desktops, laptops and handhelds (PDAs) and provide a snapshot of a kindergarten class of five- and six-year-olds in which PDAs were used. Whilst the conclusions are tentative, it is suggested that the PDA operating system requires simpler steps in overall manipulation and may be more suitable for young children. It is noted, however, that whether a PDA is an appropriate technology for young children depends largely on its implementation. Whilst children relied on the adult for overall guidance, they quickly grasped the function of icons and keys as they observed adults' actions and tried to apply those actions on their own.

6 Health and safety issues and other risks associated with technology use

6.1 Introduction

Across the review, reference has been made to the use of ICT by young children from birth to five years and the potential impact, positive and negative, on their cognitive, social, emotional, educational, visual and physical development. Despite concerns that are raised, there are no large-scale studies relating the use of ICT to specific health indicators in children from birth and up until they reach five- to six-years-of-age.

As noted in the previous section, a range of experimental studies has been conducted to test the benefits to children, able-bodied and disabled, in terms of learning gains, social benefits and skill development Throughout, the essential role of adults, parents and practitioners, in supporting and guiding, but also in monitoring the use and access of ICT, particularly in the case of television/video/DVD watching, computer games and Internet, has been stressed.

The Marsh et al (2005) survey reported that parents were generally positive about the role of media and new technologies in their young children's social, emotional, linguistic and cognitive development, feeling that they learned a lot from film and television and that this had a positive impact on many aspects of their lives. EY practitioners similarly were generally positive towards the role of popular culture, media and new technologies in children's lives, including video/console games. They reported a positive impact on children's progress in speaking and listening and literacy thought the study methods could not ascertain whether this indeed was the case. Practitioners did, however, have concerns about the perceived amount that children spent on these activities.

Despite proposed curbs on computer games to protect children proposed by a Government adviser (see, for instance headlines of The Daily Telegraph, Thursday, 27 March, 2008[8]), in practice, engagement with media and new technologies appears to be a primarily social, not individual activity, taking place for the most part with other family members and in shared parts of living spaces, and hence supervised by adults.

6.2 The association between ICT exposure and physical activity, musculoskeletal and visual symptoms and socio-economic status in Australian five-year-olds

A cross-sectional analysis of 1,600 five-year-old in Western Australia, taking part in a longitudinal cohort study was carried out to ascertain their computer use, other activities such as television and videos, playing electronic games, reading and looking at books, drawing on paper and moderate to vigorous physical activity, and specific health indicators (Straker, et al, 2006).

Nearly all children watched television, engaged in reading, drawing and some vigorous physical activity every day. More than one-half of the children (56 per cent) used computers at some time during each week. Console and hand-held games were used by 28 per cent and 9 per cent respectively. All activities showed a small but statistically significant increase in duration of time spent on them at weekends, on Saturday and Sunday, as opposed to Monday to Friday.

The relationship between computer use and other ICT-type activities was also considered. Having adjusted for all other activities, computer use during the week was related to TV viewing and playing console games. Computer use at the weekend was related to playing with consoles and hand-held electronic games. Children who used computers at the weekend were less likely to engage in high levels of vigorous physical activity (this was a statistically significant effect at the weekend).

About 0.9 per cent (less than one percent) were reported to have complained of tired or sore muscles at some stage after watching television or using a computer and 2.2 per cent were reported to have complained of tired or sore eyes after television watching or computer use. The relationships between eye and muscle symptoms and activities were also examined. Sore muscles were associated with lower levels of weekday drawing, painting or writing on paper.

The relationship between computer use and demographic and socio-economic factors were investigated. Having adjusted for all other demographic and socio-economic factors, weekend computer use was significantly associated with the

[8] Helm, T. (2008) Curbs on computer games to protect children. The Daily Telegraph, 27 March, 2008: 1.

mother being older (40+ years), having tertiary education and studying. Weekday computer use was associated with the mother being older and studying. There were very few fathers studying but there was an association between fathers' studying and children using computers (though this was not statistically significant).

Overall the findings indicate that just over half of five-year-olds in Western Australia were using computers each week in 2000 and 2001 before they entered school. Straker (2001) identified a concern that children may develop musculoskeletal disorders prior to completing their education and commencing a chosen career. Karlqvist et al (2002) reported that the risk of computer-related musculoskeletal disorders in adults increases with daily exposures of greater than two hours per day. Straker et al (2006) found that current computer use was typically less than one hour per day for over 90 per cent of five-year-old computer users. Less than 1 per cent complained at some stage of musculo-skeletal symptoms related to television and computer use. The authors noted that it is possible that a young child's musculo-skeletal system may be more vulnerable than an adult's. Drawing was associated with a decreased risk of musculo-skeletal soreness suggesting that light dynamic activity such as painting or drawing by five-year-olds may provide appropriate stresses of the type important for musculo-skeletal health (Straker and Pollock, 2005). They emphasised that more research on normal musculo-skeletal development in late childhood and particularly in adolescence is needed as the prevalence of musculo-skeletal symptoms increases in this period (Harris and Straker, 2000; Kristjansdottir, 1997). The relationship between eye symptoms and reading observed in their data was consistent with prior research on adults (Iribarren et al, 2001).

A further health concern is that computer use appears to occur in association with other sedentary tasks such as television viewing and playing electronic games. As this reduces levels of vigorous activity at the weekend, it is a further concern. A reduction (of 28 per cent) in vigorous activity in five-year-olds is worrying and warrants further investigation, particularly so since it appears that the computer may displace another less sedentary activity and result in decreased physical activity. It is possible that computer use may thereby exacerbate trends in inactivity-related health problems such as obesity (leading to later coronary heart disease, depression, osteoporosis or type II diabetes).

Of socio-economic factors measured by Straker et al (2006) only the mother's age, level of education and current study status were significant predictors of children's computer use. For this population, maternal education rather than wealth may be predictive of computer use. This may result merely from accessibility. It was noted that this is the first large-scale study of health outcomes associated with exposure of young children to various forms of ICT.

6.3 Protection issues

Other concerns focus on protection issues related to exposure to unsuitable content of a violent and aggressive or sexual nature, through Internet advertising. Interactive media, such as video and computer games are widely available and may be played on dedicated console systems, most computers and over the Internet, handheld devices and various technology toys. Several reports confirm a significant presence of video games in the lives of children and adolescents (for example, Gentile and Walsh, 2002). Many popular games contain violent content. Although such studies have not been well substantiated, some evidence for increased aggression in children as young as four to six years has emerged. Funk et al (2003) examined relationships between short- and long-term exposure to violent games and desensitisation. Sixty-six children aged from five to twelve years assessed video game experience and preferences and empathy and attitudes towards violence. They then played a violent or non-violent video game and were coded for aggression and empathy. Long-term exposure to violent video games contributed to lower empathy scores. Playing a violent versus non-violent game did not affect responses to test 'vignettes'. Findings suggest that long-term exposure to violent video games may be associated with desensitisation as reflected in lower empathy although it is concluded that the direction of causality remains unclear.

6.4 A balanced view

ICT use by young children needs to be supervised and software available in the home or EYFS will need to be vetted for suitability as would be the case for any other book, toy or video. Observation, monitoring and recording of children's ICT activities is essential. As noted by Fischer and Gillespie (2003), for technology to have a positive effect on children's development, it must be used in a developmentally appropriate manner. At the same time, they present strong evidence for the benefits of introducing young children to technology. The strongest points include support for social interaction, the use of developmentally appropriate software and the teachers' role in the use of technology.

7 Advice needed by parents and carers on technology and sources of advice

7.1 Introduction

Parents may benefit from user friendly advice on the ways in which children and adults can make use of ICT for learning in the home to support their own children's development and as a means of supporting what practitioners may be doing with their children in EYFS settings outside the home. Whilst there is a wealth of reports, papers and websites available, these may be neither very accessible nor very appropriate to parents and carers. It is still common for ICT to be narrowly construed as consisting of desktop computers and there is still much diversity in knowledge and skill in the adult population, as noted in earlier sections of this report. It is important for parents to be aware of the range of technologies available now for young children and their potential to transform learning in respect of early cognitive, emotional, social and creative development.

At present, sources of advice on the potential extent and nature of a young child's engagement with ICT, or realistic information on the need to safeguard children's health and development, may not be freely available. The greater is parents' understanding of the educational benefits of using ICT, the greater is the likelihood that their interest in children's interactive media environments will grow. Indeed, parents and practitioners need advice on the way in which children can be prepared for experience of and engagement in the media and ICT in the early years as well as advice about choosing products. Locating and navigating websites that offer guidance on hardware and software will be daunting in itself and anyway, geared more towards a professional audience.

7.2 ICT in the home

That said, the Marsh et al (2005) indicated that young children are immersed in new technologies from birth in the home, that they are engaged in a range of social and cultural practice, supported by family members in which they are developing understanding of the role of media and new technologies in society. Parents are reported to be positive and confident about the role of media in young children's early social, emotional, linguistic and cognitive development, encouraged through provision of resources and interactions. Indeed, parents would welcome more work in schools on new technologies to prepare young children for the digital age. Further, in the week prior to the survey, more children (53 per cent) were reported to have accessed computers at home than in their EY settings (46 per cent).

McPake et al (2005) also investigated children's experiences of ICT in the home through survey and case studies of sixteen children. They found that children were developing technical competence, that referred to operational aspects of performance and cultural competence that referred to their understanding of the

social, cultural and learning roles that ICT played in communication and musical skills, work (such as microwaves or washing machines) creative expression, education (early literacy and numeracy, for instance) or games and entertainment. The degree of competence that children had acquired was dependent upon factors such as access to equipment, support in learning how to use it, and the particular interests and aptitudes of older family members.

Overall, whilst the development of technical and operational ICT skills was apparent, underlying 'learning-to-learn' skills, listening to instructions and investigating cause and effect also represent important dispositions to learning to be exploited later in the course of formal schooling. The impact of low income was seen in the McPake et al study to operate in relation to purchase of ICT items and in terms of computer ownership and Internet access, video players, non-digital cameras, mobile phones and CD players. No relationship was found for other ICT items such as television, DVD, digital camera, game console, electronic handheld games, musical keyboards and robot/smart toys, presumably regarded as necessities rather than luxuries in all households. There was also a tendency for disadvantaged families to have older equipment yet show resourcefulness through swaps, car boot sales and online shopping.

As noted in the previous Australian study (Straker et al 2006), there were differences in adults' educational backgrounds and experiences of using ICT for work or leisure purposes, for example use of computers, email and Internet facilities, and these were likely to impact upon opportunities available to their children at home. Marsh et al (2005) also emphasised that whilst the majority of children benefited from the various multimedia activities 'poverty and other social and cultural factors [were] having an impact on the opportunities that children are afforded'.

7.3 ICT in the pre-school

One source of advice and information exchange for parents is EYFS practitioners and practitioners. The McPake et al (2005) study talked about sharing noteworthy technical competences that a child had developed or interest in and general computer use with parents. Moreover the value of sharing developing technical competence in ICT at transfer to primary school was widely acknowledged. However, there was an apparent low level of interest in and awareness of children's pre-school ICT experiences and particularly their ICT experience at home. Overall it was noted that children's home experiences were very varied and that pre-school and primary staff tended to have a limited or partial awareness of children's home experiences with ICT, which were rarely considered of cultural or educational value.

In terms of advice and information exchange pre-schools and primary schools are best placed to support parents, particularly those who may be less advantaged, in terms of having fewer ICT items and less expertise. Given that pre-school and primary staff in this study had limited knowledge of the range and diversity of

children's home experiences and the nature of existing ICT competences, they were neither in a good position to make use of existing competences nor well-placed to extend these. There is an increasing need to consider who is disadvantaged in this respect and how best to support children who have had and may continue to have limited out-of-school ICT experience. For such children the importance of good information exchange as well as appropriate advice to parents cannot be underestimated.

8 Recommendations for policy, practice and parents and carers

8.1 Introduction

ICT is transforming the daily lives of young children from birth to five years. Although no large-scale surveys of access and use of ICT in the home or in EYFS settings has been carried out, there are good grounds for supposing that despite high potential for transforming children's learning, opportunities across the sector are variable. However, given the wide variation in size and hence resourcing of settings, from childminder, through private, voluntary and independent, to children's centre and reception class in a primary school, it is likely that that there will continue to be the need to create centres (and leaders) of ICT innovation (such as Crook, Gamesley or Whitnash) that not only demonstrate exemplary practice for a cluster of other providers and staff training opportunities, but also offer opportunities for loan of equipment on a long- and short-term basis. The digital age requires a very flexible learning environment and this is a strength of the EYFS sector. Given the wide variation in prior qualifications, training and development within the sector, there is inevitably wide variation in skill set, competence and confidence. This raises issues of staff development. Here knowledge of technology use is not enough. This must be located within a clear understanding of its pedagogical value that in turn stimulates more innovative practice. As Becta (2004) has noted for other sectors, ineffective leadership of ICT and e-learning is one of the main barriers to the integration of successful practice. Other barriers included:

- lack of access to access to appropriate ICT equipment.
- lack of time for training, exploration and preparation.
- lack of models of good practice in ICT.
- negative attitudes to computer (and ICT) in education.
- computer anxiety and a lack of confidence.
- fear of change and a lack of personal change management skills;
- unreliable equipment.
- lack of technical, administrative and institutional support.

There is a major difference between the EYFS and formal schooling exists: the absence of a clear educational ICT strategy that equips English practitioners with twenty-first century ICT skills (an exemplary model is provided by the New Zealand

Foundations for Learning ICT policy framework (New Zealand Ministry of Education, 2005).

8.2 Recommendations

Recommended for development is thus:

- a clear set of EYFS/ICT strategies and outcomes that includes:
- a EYFS ICT curriculum statement,
- an EYFS strategic plan (to increase participation in EYFS services, improve quality of EYFS services, and promote collaborative relationships), and
- an EYFS ICT framework (that provides a networked, flexible system offering accessible, relevant, high-quality learning opportunities);
- a vision and EYFS framework (that creates ICT services to support children to grow up as competent and confident communicators);
- a set of EYFS principles and themes (these already exist in outline);
- an identified set of focus areas (that include working in partnership and collaboration, developing professional learning and capacity, using research and good practice, supporting ICT resources, curriculum materials and exemplars, and building infrastructure, systems and ICT standards for all ETFS practitioners).

The use of ICT in the EYFS is about ICT in the widest sense from DVDs and interactive multimedia programmes to digital cameras and telephones and how these can be used to support and enhance learning. This involves teaching children through mediated child-computer interaction for instance, to 'observe, explain, record and review their world in different ways to assist with the development of early literacy and maths and the development of communication skills'[9]. It also involves training the teachers.

ICT is also a valuable tool in building professional capacity, managing information systems and administration. Such a framework would be a resource to guide the EYFS sector's ICT development. It includes self-review and improvement (like the Test Bed Project). It supports the achievement of ten-year Children's Plan. It could exploit existing pockets of excellence through regional professional development, research projects and the development of ICT-based resources. But to complement existing 'bottom-up' initiatives, there would need to be a strategy that helped all practitioners and settings to incorporate ICT into the every-day learning of young children, involved parents and communities in such activity, using the framework as

[9] New Zealand Ministry of Education (2006) Foundations for Discovery. Media Statement. Wellington, New Zealand: Ministry of Education.

a guide. Investment in ICT by EYFS will need to increase significantly over the next ten years. The sector would benefit from advice on what to invest in and on the use of ICT[10]. A framework would provide guidance on what constitutes appropriate uses of ICT with young children and guard against inappropriate use. For parents, it would help to build stronger and more collaborative relationships with EYFS settings through information sharing about effective use of ICT in the home to enhance and promote learning, support and development.

[10] Northampton County Council (2003) Transforming teaching & learning through ICT Foundation Stage ICT Strategy 2003-6 advocates an entitlement for all children in reception classes of a minimum of 30 minutes a week of adult-directed activity, sufficient time, in addition to the 30 minutes for consolidation and practice of the knowledge, skills and understanding being developed, with appropriate and effective use of ICT in all areas of experience to support and enhance learning and teaching across all areas of learning. To achieve this entitlement, every reception class should have a range of everyday technologies for children to use, and for them to play with in role play (at least one tape recorder, four programmable toys of at least two different types, two digital cameras and a digital camcorder, a minimum of two networked desktop PCs, in addition a minimum of two laptops/tablet PCs. Every school should have a minimum computer/reception year child ratio of 1:8, two webcams within the classroom and an interactive whiteboard. Foundation Stage practitioners should have access to a programme of CPD, advice and support when ICT is required, examples and models of good practice and committed to working in partnerships as part of a wider network.

9 Gap analysis to inform future research

The review of literature commissioned by Becta has identified a pressing need for further research to guide the use of ICT in the EYFS, particularly in the birth to three-year-olds. For instance, as in other sectors, there is little research examining how ICT enhances children's learning and development in those settings that integrate ICT into the learning environment. The benefits of using ICT and e-learning across the curriculum to deliver a more effective education to children EYFS, need to be demonstrated.

At present there is one recent large-scale British survey of a nationally-representative sample of practitioners on implementation of ICT in the EYFS but the field is fast changing. Facilitators and barriers to embedding ICT, attitudes towards ICT and its long-term benefits, vision of an environment stimulated and structured by ICT, perceived training needs, challenges of transition to KS1 and working with parents all need to be identified, particularly in the non-maintained sector.

Given the variety of settings in the sector, their size and resultant financial constraints, it is difficult to find staff time and funds for familiarisation and innovation with ICT. There is an urgent need to identify different models of providing effective support and pooling ICT resources. It is unlikely that change can be affected without additional grants. How will it be possible to meet the gap between what is financially possible or geographically accessible in terms of future learning environments of the future with the best equipment and software and with highly trained and e-capable staff? A strategy for upgrading and dissemination of ICT skills will require investment and time.

It is also imperative to gain a better understanding of the large-scale change involved in recreating professional roles for a digital-age curriculum and reinventing what needs to be known about teaching and learning in the EYFS and developing active pedagogy to maximise the benefits of technological advances. At the same time, the impact of ICT in EYFS in terms of teaching and learning technologies needs to be monitored. As noted above, practitioners also need to be clear about how use of ICT may raise the attainment of children and improves the learning process.

It has been proposed that working digitally outside real time and space is an 'advantage that is as yet an untapped resource' (Beastall, 2008:109). Such propositions need to be tested for possible 'unforeseen side effects' (Greenfield, 2007: 31).

At the practitioner level, there also needs to be development of action research and research networks, seeking opportunities for communicating their own experiences of ICT use and` sharing existing good practice when developing new ICT services. This would complement national monitoring of ICT use and encourage critical reflection by practitioners on their own teaching and learning practices.

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11 Appendices

11.1 Appendix 1: Summary of views and skills of practitioners, parents and children on ICT in the EYFS

The views of 51 EY practitioners, 39 parents and approximately 50 children were obtained through visits to a wide range of settings in a number of different local authorities. Basic ICT skill audits were completed by 80 practitioners.

A key question was: what is the evidence for use of ICT in the EYFS?

As the new EYFS is introduced for children aged from birth to five years, there is evidence of a lack of EY practitioner awareness of what technologies, hardware and software are available specifically for the EY market. In terms of the current landscape of technology use in the home and EY setting, this seems still to be dominated by the computer, television and DVD player though EY practitioners are now familiar with and use a wider range of digital technology. The skill-set and expertise of EY practitioners is worryingly varied, with state-maintained schools and trained teachers best placed to deliver the EYFS through ICT. The gap between the maintained and non-maintained sector is wide, in terms of access and use. It is difficult to see how this can be easily changed. The training implications of this are startling. The cost in financial terms of purchasing, maintaining and, in time, replacing a range of age-appropriate digital technology is a real challenge for which imaginative solutions will need to be generated. Whilst technology is seen to contribute to learning and development through the EYFS themes and principles, practitioners do not appear to have understanding of age-appropriate pedagogy for mediating, supporting and monitoring ICT use by individual children. Health-and-safety issues and other risks associated with technology use, however, are well understood. Understanding of and contribution towards the often media-rich lives young children outside school is poor and the opportunity for home and school to work together to promote development of new technologies with young children missed in most cases. The need for an ICT champion who leads the ICT policy and practice in every setting is overwhelming.

11.2 Appendix 2: Practitioner audit of ICT skills

Introduction

As part of a review of the evidence on the use of ICT in the EYFS an audit of EY practitioners was carried out in order to gauge the skill set and expertise and how this varied across different sectors. This gave EY practitioners the opportunity to reflect on how competent and/or confident they felt with new technologies. The audit was adapted from an existing one (Tupton Hall, undated; see appendix 6).

Research question

- What is the skill set and expertise of EY practitioners and how does this vary across different sectors (childminders, pre-schools, day nurseries, schools)?

Participants

In total, 80 practitioners across 15 groups or settings completed the audit. There were nine different types of setting, including schools (infant and primary), children's centres, childminders, private day-care facilities, pre-schools, nursery schools, a special school, Montessori school and local authority (LA) advisors. Practitioners included managers and/or owners, school head teachers, teachers, senior and regular early years' practitioners (various titles), teaching or nursery assistants, local authority advisors and childminders. The practitioners came from a total of eight different local authorities although over half were from one local authority (59 per cent). Settings were located within a range of areas. These were rural, urban and mixed, including high, low and mixed socio-economic status groups.

Materials

The original audit measured only aspects of ICT relating only to computers and the programmes and peripherals for them. As the review had adopted a broader definition (McPake et al. 2005) with less of a focus on computer hardware, software and peripheral usage, it was felt necessary to other aspects of new technologies that were more compatible with EY usage and experience.

Procedure

The audit was conducted in a one-to-one situation outside the teaching area. It was completed in the presence of the researcher so that questions or queries could be addressed immediately.

Findings

Background information

Table 1: Practitioners' age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Born before 1977	55	68.8	68.8	68.8
	Born after 1977	25	31.3	31.3	100.0
	Total	80	100.0	100.0	

For simplicity and in line with the Lankshear and Knobel (2006) notion of a 'digital divide' that distinguished between 'digital insiders' or 'natives' who had grown up in a digital world and those 'outsiders' or 'immigrants' who have had to acquire digital technology skills, the year 1977 was taken as a watershed (that is around thirty years old). It was assumed that those born after this date were very likely to have had regular exposure and access to a wide range of new technologies from a young age. Practitioners were simply asked to indicate whether they were born before or after this date. Approximately one third of practitioners were born after 1977 and two-thirds before. All but one EY manager from children's centre, private day-care or pre-school, head teacher and deputy head were born before 1977. All teaching assistants and both childminders were also born before 1977. Approximately equal numbers of teachers and early years educators were born on each side of 1977, (older or younger than thirty years). Unsurprisingly, all six trainees/students included were born after 1977.

Table 2: Computer facilities practitioners had in their home

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	with ROM drive	3	3.8	3.8	3.8
	with ROM and Internet	76	95.0	96.2	100.0
	Total	79	98.8	100.0	
Missing	System	1	1.3		
Total		80	100.0		

Of the 79 practitioners who provided this information all had a computer at home. Only three practitioners did not have internet access in their home. All computers had a CD-ROM or DVD-ROM drive that could be used to access information.

Table 3: Practitioners' qualifications related to information technology (IT)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	52	65.0	65.8	65.8
	Certificate	20	25.0	25.3	91.1
	GCSE	4	5.0	5.1	96.2
	A-Level	1	1.3	1.3	97.5
	Degree	2	2.5	2.5	100.0
	Total	79	98.8	100.0	
Missing	System	1	1.3		
Total		80	100.0		

Two-thirds of practitioners said that they had no qualifications relating to IT. The highest qualification held was a degree related to IT. Two practitioners held degrees. One was an EY educator (or equivalent) and one was a head/deputy head. A quarter of practitioners held a certificate of some kind. Some were traditional qualifications such as Royal Society of Arts (RSA) text production and word processing or Computer Literacy and Information Technology (CLAIT), others held certificates for competency on the Internet or had certificates of competency in using ICT in the classroom/setting.

One local authority that contributed 59 per cent staff to the sample had the highest percentage of practitioners with at least some kind of certificate in ICT. 70 per cent of the reported certificates for ICT were held by practitioners in this local authority although, still, more than half of the practitioners in that authority had no qualification.

Confidence/believed competence with various aspects of ICT

Table 4: General computer use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	moderate skill level	8	10.0	10.0	10.0
	high skill level	72	90.0	90.0	100.0
	Total	80	100.0	100.0	

The vast majority of practitioners felt that they had a high level of skill in basic computer operating. They were happy to experiment on the computer to find out how programmes worked if they did not already know what was required.

Table 5: The use of a Graphical User Interface (GUI)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no experience	3	3.8	3.8	3.8
	moderate skill level	10	12.5	12.5	16.3
	high skill level	67	83.8	83.8	100.0
	Total	80	100.0	100.0	

When asked about using a GUI (the use of graphic icons and a pointing device to control a computer, eg Microsoft Windows or Mac OS) only three of the 80 practitioners felt that they had little or no experience. The vast majority (just over four-fifths) of practitioners felt very skilled in using a GUI and said that, as well as selecting and running a desired programme, they could switch between open windows, maximise, minimise and close windows.

Table 6: Handling computer files

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no experience	13	16.3	16.3	16.3
	moderate skill level	23	28.8	28.8	45.0
	high skill level	44	55.0	55.0	100.0
	Total	80	100.0	100.0	

Approximately half of the practitioners reported that they could organise files by moving, copying or deleting them, as well as creating directories or folders for them. Additionally, just over a quarter of people said that they could do some of this. Only a small number of people (13) said they had little or no experience of handling computer files.

Table 7: sharing information between computer programmes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no experience	19	23.8	23.8	23.8
	moderate skill level	54	67.5	67.5	91.3
	high skill level	7	8.8	8.8	100.0
	Total	80	100.0	100.0	

Two-thirds of practitioners said that they had at least moderate expertise in sharing information between programmes; they could cut and paste information between programmes. One quarter said that they had little or no experience in this area and only seven people (less than 10 per cent of the sample) said that they were able to create dynamic links between programmes.

Table 8: Connecting a computer system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no experience	24	30.0	30.0	30.0
	moderate skill level	23	28.8	28.8	58.8
	high skill level	33	41.3	41.3	100.0
	Total	80	100.0	100.0	

In terms of experience of connecting a computer system, results were mixed. A similar number of people (30 per cent) had either little or no experience or some experience – they could put together a basic computer system. More than a third (40 per cent) said they were able not only to connect a basic computer system but also additional input/output devices and load the related software.

Table 9: Finding information on a CD-ROM or DVD-ROM

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no experience	13	16.3	16.5	16.5
	moderate skill level	37	46.3	46.8	63.3
	high skill level	29	36.3	36.7	100.0
	Total	79	98.8	100.0	
Missing	System	1	1.3		
Total		80	100.0		

Most practitioners said that they had some level of skill in finding and using information from a CD- or DVD-ROM.

Table 10: Searching the internet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no experience	3	3.8	3.8	3.8
	moderate skill level	10	12.5	12.5	16.3
	high skill level	67	83.8	83.8	100.0
	Total	80	100.0	100.0	

The vast majority of respondents (over 95 per cent) said that they were able to use an Internet browser with moderate skill. Additionally, most of these (67 of the 80 practitioners) claimed to have a high level of skill. They were able to use a search engine and refine their search as required in order to find the required information.

Table 11: Using a spreadsheet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no experience	35	43.8	43.8	43.8
	moderate skill level	37	46.3	46.3	90.0
	high skill level	8	10.0	10.0	100.0
	Total	80	100.0	100.0	

Only a small number of practitioners (eight of 80) were able to use a spreadsheet with a high level of skill, being able to create and explore mathematically-based models. Of the remaining practitioners there was an almost even split between those saying they had little or no experience and those saying they did have experience to enter numerical data, perform simple calculations and create charts. Interestingly, those who said they had a high skill level were not the most qualified. Five had no IT qualification, one had a certificate and two had a GCSE.

Table 12: Word processing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no experience	6	7.5	7.5	7.5
	moderate skill level	8	10.0	10.0	17.5
	high skill level	66	82.5	82.5	100.0
	Total	80	100.0	100.0	

Very few practitioners had little or no experience of word processing. Most practitioners, indeed, acknowledged a high skill level with word processing, saying that they were able to format text in various ways as well as use additional tools within the software.

Table 13: Using a graphics package

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no experience	16	20.0	20.0	20.0
	moderate skill level	32	40.0	40.0	60.0
	high skill level	32	40.0	40.0	100.0
	Total	80	100.0	100.0	

Whilst one-fifth of respondents claimed to have little or no experience of graphics packages, the rest were equally divided between reporting to have moderate and high level of skill with such packages.

Table 14: Using e-mail

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no experience	6	7.5	7.5	7.5
	moderate skill level	13	16.3	16.3	23.8
	high skill level	61	76.3	76.3	100.0
	Total	80	100.0	100.0	

There were very few practitioners who did not use e-mail. Whilst of those who did, there were a few who said they could only send, receive and print straight forward e-mails, over three-quarters of practitioners said they were also able to send and view attachments, as well as organising contact information using an address book.

Table 15: Using and interactive whiteboard

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no experience	43	53.8	53.8	53.8
	moderate skill level	20	25.0	25.0	78.8
	high skill level	17	21.3	21.3	100.0
	Total	80	100.0	100.0	

Just over half of the participants claimed to have little or no experience with interactive whiteboards. Of the 37 who did, there were similar numbers of participants who felt they had moderate or high levels of skill with this piece of ICT equipment.

Most of those in a leadership role, (owner, manager, head teacher or deputy head teacher) three-quarters had little or no experience of using interactive whiteboards. All 13 teachers who completed the audit could use one.

Table 16: Using programmable toys

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no experience	23	28.8	28.8	28.8
	moderate skill level	17	21.3	21.3	50.0
	high skill level	40	50.0	50.0	100.0
	Total	80	100.0	100.0	

Programmable toys such as Bee-Bot, Roamer or Pixie could be used with some level of skill by almost three-quarters of the respondents. All those working regularly in a state-run nursery, infant or primary school could use programmable toys.

Table 17: Using a digital camera

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no experience	4	5.0	5.0	5.0
	moderate skill level	6	7.5	7.5	12.5
	high skill level	70	87.5	87.5	100.0
	Total	80	100.0	100.0	

Only four of the 80 practitioners had little or no experience of using a digital camera, in fact, the majority (70 practitioners) said that they could work many of the features of a digital camera rather than simply being able to take photographs.

Table 18: Editing and downloading digital photographs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no experience	20	25.0	25.0	25.0
	moderate skill level	24	30.0	30.0	55.0
	high skill level	36	45.0	45.0	100.0
	Total	80	100.0	100.0	

A quarter of respondents were unable to transfer photographs from a digital camera to a computer. Whilst that means three-quarters could do this, less than half of the respondents said they were able to edit and organise the photos once on the computer. All seven practitioners with at least a GCSE related to ICT were able to download pictures to a computer. Indeed only one could not then organise and edit the photographs on the computer. There were fewer practitioners born after 1977 who had little or no experience than those born before (12 per cent compared to 31 per cent).

Table 19: Using a video camera

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no experience	16	20.0	20.0	20.0
	moderate skill level	45	56.3	56.3	76.3
	high skill level	19	23.8	23.8	100.0
	Total	80	100.0	100.0	

Most practitioners (four-fifths) could use a video camera to record footage. Just over half of the sample said they were able to use the basic features of a video camera (record, stop, play back footage), whilst a quarter were able to use additional features on the camera as well.

Table 20: Editing and downloading video footage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no experience	60	75.0	75.0	75.0
	moderate skill level	15	18.8	18.8	93.8
	high skill level	5	6.3	6.3	100.0
	Total	80	100.0	100.0	

Three-quarters of the practitioners, who completed the audit, had little or no experience of downloading or editing video footage using a computer. Only five of the 20 people who could download video footage could actually edit and create new video files (to make into a DVD, for example). No children's centre, private day-care or pre-school manager and neither childminder could download video footage onto a computer. Five of the six EY students could. There were more practitioners born after 1977 who could download video footage but still only half of them could not (85 per cent of those born before 1977 could not).

Table 21: Using a digital audio player (DAP)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little or no experience	43	53.8	53.8	53.8
	moderate skill level	12	15.0	15.0	68.8
	high skill level	25	31.3	31.3	100.0
	Total	80	100.0	100.0	

Just over half the respondents said they had little or no experience of using a DAP, such as an iPod or an mp3 player. Most of those who could use one could also organise and search through the music/files on the DAP as they needed/wished. Three-quarters of those born after 1977 could at least use a DAP whilst only one-third of those born before 1977 could do so.

Table 22: Using a mobile phone

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	moderate skill level	8	10.0	10.0	10.0
	high skill level	72	90.0	90.0	100.0
	Total	80	100.0	100.0	

Every practitioner could, unsurprisingly in today's climate, use a mobile phone and the vast majority could also use additional features that most mobiles have these days (eg contacts, text messaging, changing settings).

Table 23: Using a CD or cassette player

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	moderate skill level	3	3.8	3.8	3.8
	high skill level	77	96.3	96.3	100.0
	Total	80	100.0	100.0	

Everyone claimed at least a moderate level of skill in operating. An overwhelming 96 per cent of practitioners said that they were not only able to use basic operations but also more complex uses.

Table 24: Using a DVD or video player

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	moderate skill level	12	15.0	15.0	15.0
	high skill level	68	85.0	85.0	100.0
	Total	80	100.0	100.0	

As with a CD or cassette player, everyone was able to use a DVD or video player although there were slightly more people (12 rather than three) who said they could only use basic operations.

Discussion

Most EY practitioners (older and younger ones) have a basic computer and use Internet, CD-ROM and DVD-ROM drive. They are at least moderately competent with GUI, word processing, emailing, finding information on CD/DVD and handling graphics packages, digital still and video camera. They use mobiles, programmable toys and handle graphics packages. Rather less can handle files, share information between computer programmes, connect the basic system and add input/output devices, use a spreadsheet, interactive whiteboard or DAP. Given the requirements for word processing profiles and reports, it is surprising that there were as many as six practitioners who professed “little or no experience” of using a word processing programme.

A challenge for those learning new computer skills is the need to practice new skills to maintain them. Lack of access is likely to lead to skills being unused and possibly lost. Where EY practitioners who responded “fairly” or “very competent” in most aspects, answered “little or no experience”, the underlying issue may well have been lack of access or use, for instance, in using an interactive whiteboard. Skills not regularly used in the setting could quickly be forgotten. Leaders and senior managers not working directly with children anymore are likely to have less skill with

new technologies. Even if they go on training, they may not use it enough to consolidate and maintain learning.

This may well come down to a matter of resource.

Better-funded settings (schools of any kind and children's centres) can afford to purchase such equipment. Those who do not have their own premises and do not have a permanent base, for instance, for practitioners meeting in a church or community hall, used for many other purposes, it is not possible to set up such equipment as whiteboards and projectors. Ownership is likely to be reflected in usage and usage in confidence and competence. This is a particular challenge for small settings. Even if the equipment can be made safe enough and is portable there still remain issues of storage – space and security, a particular problem for the voluntary and maintained sector.

Conclusions

Current use of the computer and other new technologies by EY practitioners is now quite widespread though use of software for editing digital images and spreadsheets for instance is still quite rare.

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11.3 Appendix 3: Interviews with practitioners

Introduction

Practitioners' views about ICT were requested in the course of a series of planned visits to EYFS settings. Most had been advised in advance by their leader that a researcher would be asking them about young children's use of ICT in the EYFS.

Research question

The main research question was as follows:

- What is the evidence for use of ICT in the EYFS?

Participants

In total 51 practitioners (of the 80 who completed the practitioner audit of ICT skills) from 13 different settings were interviewed briefly by the researcher. The practitioners came from seven different types of setting: schools (infant and primary), a children's centre, childminders, a private day-care nursery, pre-schools, nursery schools and an independent special school. Practitioners included managers and/or owners, head teachers, teachers, senior and regular early years' practitioners, teaching or nursery assistants and childminders. They worked in five different local authorities. These were rural, urban and mixed, and intakes of high, low and average socio-economic status.

Materials

Questions were mainly open and sought to reflect the key questions of the review.

Procedure

Practitioner interviews took place at the beginnings and ends of teaching sessions or when staff could be released to work in a one-to-one session with the researcher. Not more than ten minutes was taken for completion. Practitioners were provided with the agreed definition of ICT that followed McPake et al (2005).

Analysis

Main issues, themes and surprises from practitioners' responses were identified.

Findings

Results are presented question by question.

Question 1: What technologies, hardware and software, are you aware of that are available specifically for the Early Years market?

Practitioners were first asked what technologies were available, specifically for the early years (EY) market. Although the question was aimed at being specific to the EY market, most practitioners talked about the items, not necessarily specific to the EY setting. The table below lists all items mentioned by practitioners in descending order of frequency.

Table 25: Technologies available specifically for the Early Years market

Type of technology	No. of times said
Various educational software (CD- or DVD-ROM)	32
Programmable toys	20
Computers (including laptops)	19
Digital camera	17
Internet (especially CBeebies)	14
Interactive Whiteboard	13
Electronic toys	12
Computer games	10
Children's tape players	9
Television (and TV programmes)	7
Toy versions of domestic/retail appliances (eg shop till)	7
Video cameras	6
Digital Blue Video camera	6
Touch screen computer	5
Specific EY computer equipment (eg keyboard, mouse)	5
CD player	5
Electronic learning toys (eg V-Tech, Leapfrog)	4
Remote control toys	4
CDs	4
Special Needs communication equipment	4
Child's laptop/computer (with mouse)	3
DVDs/Videos	3
Telephone (mobile or landline, real or pretend)	3
Light box	3
Digital Blue microscope	3
Talking books/photo album	2
Tablet PC	2
Calculators	2
Overhead projectors	2
Video player	2
Headphones	2
Toy radio	2
DVD player	2
CDs – animated stories	1
Printer	1
Webcam	1
Data projector	1
Music	1
Sound recorders	1
Joy stick	1

Floppy discs	1
Digital Blue Head Camera	1
Walkie-talkie	1
Listening centre	1
Photocopier	1
Electronic (music) keyboard	1

Most commonly mentioned were computers, educational software and Internet, electronic and programmable toys, and the interactive whiteboard.

The head teachers of the two nursery settings known to have particularly good practice in terms of ICT use within their settings were the most knowledgeable regarding technologies specifically for the EY market. One head explained that "you have to keep up with [the children's] world". In both settings, other practitioners noted that the head teacher was in charge of choosing and ordering software for the computers. One of the heads noted that being sent samples was helpful – she liked to try things out before she purchased.

The head teacher of the nursery for children with special needs had a broad knowledge of the equipment specially designed and available for such children, as well as useful mainstream equipment, such as items with switches. This setting was the only setting to mention equipment that helped children with special needs to communicate.

One setting in particular talked about light boxes. They were particularly interested in working with artists and exploring 'colour and light' in their setting's environment.

In one private day-care nursery setting, two of the five practitioners interviewed said that they knew very little about ICT, with one going as far as to say "I don't know anything about it", appearing fearful of the subject. Interestingly, the manager of this nursery also claimed a narrow view of what was considered ICT: "It depends on your definition of ICT. I would sort of stop at computers". There was only one computer available to the children and staff at this nursery that had four different rooms for differently aged children. Another Early Years practitioner in the setting mentioned the internet and CD-ROMs, then explained that "we don't use very much else here."

One childminder pointed out that she did not categorise items as either for the early years or not but that "it depends on how you use them."

Question 2: What use is being made of ICT more generally in the Early Years, both at home and in educational settings, would you say?

The following table lists all ICT equipment practitioners considered were used in the EY environment, not specifically designed for that market. Most frequently mentioned items top the table.

Table 26: More general use of ICT in the EY

Type of technology	No. of times said
Computer/laptop	36
Interactive whiteboard	17
Digital camera	14
Internet	13
Various software (games or educational)	13
CD player	8
DVD player	7
Games console (eg PlayStation, Xbox 360, Nintendo DS, PSP)	6
Mobile phone	6
TV and programmes	6
Overhead projectors	6
Tape player	5
Video camera	5
Light box	4
DVDs	4
Programmable toys	4
Audio equipment (eg hi-fi, sound system)	4
Video player	3
Dictaphone/digital voice recorder	3
CDs	3
Music	3
Videos	2
Data projectors	2
Remote control toys	2
Printer	2
Headphones	2
Interactive/inquisitive toys	2
Microsoft Office programmes	1
Digital Audio Players (eg iPods, mp3 players)	1
Radio	1
Microphones	1
Keyboards	1
Tablet PC	1
Torches	1
Webcams	1
Interactive books	1
Touch screen monitor	1
Digital Blue Movie camera	1
Photocopier	1

As can be seen from above, the list generated for this question is similar to that of the previous question. Practitioners were drawing on their experience and knowledge of technologies in their own setting.

Again, the most common items mentioned were computers and related peripherals and software.

There were mixed views regarding use of ICT in the home. A deputy manager of a pre-school believed that children "learn to use these things at a very early age", and a teacher at a primary school believed that "children are coming into the setting more au fait with using the basics of a computer". One childminder believed that there were only small amounts of ICT used in the home. A key worker of a pre-school was also unsure how much a computer was used in the home with young children: "I don't think many parents really let young children on the computers".

A senior EY educator of a state nursery was of the view that "whatever you show them, within two minutes they're doing it themselves." This, she felt was why it was important to give the children opportunities to explore and use the equipment for themselves.

An issue raised was that of cost, particularly of consumables relating to ICT. The manager of a pre-school setting explained how she liked the children to be able to use the printer when using the computer but at the time interviewed the children had used all the ink. There was no mention made of immediately replacing the ink cartridges.

One of the nurseries considered to be a centre of good practice acknowledged that "we do have nearly everything that's going," and that the "children are more used to technology here than in other settings". Items that simulated real technologies were not viewed as the best for children.

Question 3: What is your view of the existing skill set and expertise of Early Years practitioners and how does this vary across different sectors (childminders, pre-schools, day nurseries, schools)?

Most practitioners said that they had very limited knowledge of the situation regarding the skills of the workforce in other types of EY settings, some saying they only knew about their own particular setting. In spite of this, only five practitioners made no relevant comments to this question.

Several factors were identified as influencing the skills of practitioners.

Training and practice

The biggest influence on skills was related to ICT training, with just over half (27) of those interviewed referring to it. The skill set was thought to vary due to access to training. There was a lack of training available. One childminder, for instance, said that in her five years as a childminder she had not been able to go on any training relating to ICT. In one private nursery setting, all four of the five practitioners interviewed suggested that there was a lack of ICT training available and certainly no one in that setting had received any.

Three practitioners said that staff needed more training. One of these felt strongly that it was needed to support the children in their care:

> *We could do with more training and support. … Some people are not comfortable with using a computer. … We're having to use it so it's better that five or ten years ago. … If we don't know it how can these children ever learn it? (Children's centre nursery team leader)*

The situation was thought to have improved but still needed to go further. For example, one private nursery manager said that her staff were "OK with the computer software if it's working fine but if it goes wrong they don't have the skills to sort it out" as they lacked confidence.

A younger infant teacher explained that "you just had to do it at university" there was no choice, so it now carried on into the classroom. One of the biggest influences, noted by five practitioners was a willingness to experiment and practice: "You have to keep using it or you forget" (state nursery outreach worker). Due to a seeming lack of courses, many practitioners, it appeared they were self-taught and would have benefited from more training: "everybody needs more skills" (pre-school key worker).

The only setting where practitioners felt that they had had a lot of training was in a state nursery that was involved in a very intensive ICT initiative. This nursery had on-site technical support for a considerable length of time. The result of this support and training, the teacher explained, was that it had increased staff's confidence to experiment with the equipment.

Personal interest/ability

Issues such as the practitioners' attitude towards ICT and their personality, how they embraced it, whether they were willing to experiment and whether it interested them, were thought to be factors that influenced people's skills by nine practitioners.

Two practitioners said that within their setting they supported each other, and were able to explore and learn about the ICT from each other.

One practitioner felt that people knew about computers in her setting, but “only the basics”, two other practitioners believed that there were some people who were not confident, even struggled with ICT. One teacher of an independent special school had recently been on an EY ICT training course and learned very quickly, and to her surprise, found that staff in some nurseries were not even aware that “ICT is not only about computers”. The head teacher of one state nursery believed, from her experience, that private nurseries often did not consider the benefits of ICT.

A lead person

Another important aspect was the priorities of people within the settings. One state nursery teacher said “I know we use a lot more than other nursery schools” and believed this was due to the interest the head teacher had in ICT. This particular head also believed that there needed to be a person actively promoting ICT in the setting:

> *You need a champion that dedicated adult, to see the bigger picture. ICT is integrated into everything else.*

This role was once hers but became another staff member who had taken on the role had now left the setting. She believed that she needed to take back that role in order to maintain the current climate where ICT was a “seamless part of the nursery’s routine”.

Six practitioners from five different settings believed that someone needed to be “driving the incorporation and use of ICT in the EY”. That might be at policy, leadership or person level.

Age

Age was considered an influencing factor by twelve practitioners. Younger practitioners (under 30 years suggested by one) were considered more used to and more competent with ICT. One of the reasons cited was that those who were younger experienced using more ICT when they were at school, also meaning that they were confident to experiment with software and hardware, to figure out how things worked. Most descriptive of the view that age made a difference was given by a university graduate working in a private nursery:

> *It's very dependent on age. … Things that to me seem really simple, for people who haven't grown up with computers, they're just not used to it. It comes through practice doesn't it? It comes through training. They're just*

> *not used to it. … It depends on the background you've had at home. People about 30 never used it at school or home.*

Older people were considered "more scared" of the equipment. One infant school teaching assistant speculated that as ICT was a "thing of the future", older people were less worried about needing it. Teachers trained in the last five years were thought to have good skills due to the ICT test they now have to pass in order to gain Qualified Teacher Status.

One nursery teacher, agreeing that younger staff probably had better skills with ICT, thought that older practitioners might have better ideas for using the equipment with young children. There were benefits to a mixed-age team.

Access to ICT in setting and home

Also important was the issue of access to ICT in both the setting (mentioned by 13 practitioners) and the home (four practitioners). It was considered that schools and state nurseries probably had more access to a larger range of equipment that other types of setting, that some childminders and private nurseries might not have a computer in their setting. These views were held by those from practitioners from a range of settings. It was thought by one private nursery EY worker that if a childminder did have a computer, then the children were far more likely to have access to it than in her nursery where there was "only one for the whole nursery and staff".

With regard to access at home, it was felt that if people used ICT in their own time then they were likely to be more competent and confident using technology in their setting.

Funding

Funding levels were thought to limit what settings could afford to buy in terms of ICT by five people. Privately-run settings, one practitioner thought, were likely to have less money available to invest in ICT for the setting.

Schools

Teachers were thought by 17 practitioners (eight from schools, five from pre-school, two from a state nursery, one from a private nursery and one from a children's centre nursery) to have better skills than most other types of practitioners. Teachers had ICT training and had to meet certain standards as part of their initial teacher training as well as accessing more training as part of their job. They also worked in settings with more funding available to invest in ICT equipment. Thus there was more equipment to use in their setting and a higher expectation to use it, "it forms part of teaching" (infant school reception teacher). It was acknowledged by one state

nursery school practitioner that the teachers of older age groups in schools tended to "do better" than EY teachers. They usually got more equipment and more access than those working with younger children.

Question 4: How can technology contribute towards a child's learning and development, with specific reference to the EYFS themes and principles?

In total 49 practitioners answered this question. The vast majority of practitioners (41) spoke about technology in a holistic manner. They believed that ICT was another tool for learning and that it supported all areas of the EYFS.

Two practitioners (a teaching assistant of an independent special school and an Early Years worker of a private nursery) indicated that they were not sure how technology could contribute to a child's learning.

> *I imagine there are pieces of technology that can deal with everything. (Children's centre nursery worker)*

> *It should be incorporated just the same as literacy and numeracy, across all areas. It's good because there are so many resources that relate to lessons across the board, all six areas. (Primary school reception teacher)*

Whilst there was great potential, one childminder added that it was important to establish how the technology was actually used: "it can support most areas but I think it's how you use it".

A state nursery head teacher agreed that the quality of experience was dependent upon how it was offered and organised, "it could be used like a conveyor belt or be a meaningful experience".

A pre-school manager concurred with this view: "you can get so much out of these computer games but you need to have the right games. We've chosen ours quite carefully".

Several practitioners mentioned the lack of fear from the children as they used the equipment. It was part of their everyday lives and they just "got on with it". It was also essential for them to do so.

> *It's the age of ICT isn't it? They just take hold of it, no fear, just pick it up and they're away. They tell us how to use it. (State nursery senior EY educator)*

> *It's just there and they use it as part of everyday stuff". Use technology to support every area. "Nice balance in what we do. (State nursery head teacher)*

> *It's important to introduce at early age because it's such a big part of life. They get a lot of enjoyment out of it. There's a wealth of resources through Internet, it gives them a more varied curriculum. It's more visual for them. (Infant school reception teacher)*

> *I'm not sure of the six area but computers are very good for kids because they will grow up with it, going to school etcetera. (Childminder)*

Other comments were made in relation to the four themes of the Early Years Foundation Stage (EYFS) and the six areas of learning.

i) The four EYFS themes

A unique child (Every child is a competent learner from birth who can be resilient, capable, confident and self-assured)

Four practitioners said that problem-solving skills could be developed through using ICT. For example, working out what happens next or how to fix something if it breaks. Three practitioners believed that an increased ability with ICT supported children to become more independent in their learning.

> *The more they can learn to use all this hardware and software, the more they can plan their own learning. (State nursery school teacher)*

Positive relationships (Children learn to be strong and independent from a base of loving and secure relationships with parents and/or a key person.)

One children's centre nursery nurse explained that using "a digital camera helps to observe them, to know their capabilities. It helps practitioners observe their development and their difficulties".

Enabling environments (The environment plays a key role in supporting and extending children's development and learning.)

Two people mentioned the value of technology in the setting environment, in terms of equipment providing aesthetic value (this setting used light boxes and coloured objects/acetates to provide coloured shapes on the walls and ceilings of the setting). ICT was "very visual" and could be calming (deputy manager of a pre-school)

Learning and development (Children develop and learn in different ways and at different rates and all areas of Learning and Development are equally important and inter-connected.)

Two practitioners from a primary school thought that ICT was useful for children regardless of their preferred learning style. It covered all learning styles: audio, kinaesthetic and visual (primary school nursery teacher).

ii) Areas of learning

Personal, social and emotional (PSE) development

Using a computer on their own or in a group was thought to assist children's PSE development. Children were believed to learn whether they were using the computer, for example, themselves or when they were observing – a common feature mentioned is most settings: "quite often two or three are around it observing" (pre-school key worker).

One childminder had strong views that computer use was a solitary activity and, therefore, she did not use it much with the children in her care. A teacher from a state nursery shared that they, as a setting, were worried about isolation as children used computers and other equipment more but she felt that it had not happened.

Communication, language and literacy (CLL)

Seventeen practitioners made reference to CLL. It was thought that ICT could assist in many ways:

- Language development/skills
- Sound discrimination/Listening skills
- Communication
- Reading
- Sequencing
- Vocabulary
- Letter recognition
- Support those with little language
- Promote imagination

A state nursery head explained that her initial fears when taking part in an ICT initiative were allayed.

When we went into [ICT initiative] we were really concerned because of the children's speech and language problems but actually they were talking a lot while using the ICT.

Mathematical development

It was thought by ten practitioners that various software supported mathematical development in a number of ways. It taught the children about numbers, shapes, measuring, colours, mathematical language and problem solving. Programmable toys, one practitioner noted, were a great way to teach children positional language.

Knowledge and understanding of the world

Sixteen practitioners gave examples of how ICT supports knowledge and understanding of the world:

- Digital cameras could be used for mapping the setting, using simple geography.
- Children need to find out how the technology works.
- Games on the computer helped them to acquire new knowledge.
- Computer as an information source.
- Metal detectors help children to discover things.
- Provides experiences that wouldn't happen in person (eg internet).
- Early life skills, ICT was essential in life.

One practitioner noted that this area of learning was the only one that made reference to ICT.

Physical development

In terms of physical development, the most frequent suggestion was that ICT helped improve hand-eye co-ordination, particularly using a computer mouse (ten practitioners). Also, general fine and gross motor skills by activities such as writing on an interactive whiteboard, using a touch screen monitor and other actions where children are manipulating items (six practitioners). Finally, using ICT to support activities like dancing or "leading exercises" was noted by two practitioners.

> *Technology plays a big part in children's development as it develops hand/eye coordination, concentration and manipulation skills. (Independent special school teaching assistant)*

Creative development

ICT was said to "encourage creativity and creative thinking" by the head teacher of an independent special school. Creating moving and still images (two people) and art-type computer packages (two people) were suggested as ways it could do this. Sound making was mentioned by one practitioner.

A teacher of a state nursery did warn that there was a danger that ICT could "take over" in the setting and limit children from using their imagination as much as they might. This teacher commented that she felt that children's baseline assessments revealed that creative development suffered a little during an intensive period of ICT use in the nursery.

Question 5: What are the health and safety issues and risks associated with technology used by young children?

When asked this question one practitioner reflected on how technology is “a good tool if used in the right way" (pre-school manager).

Four practitioners said that there were not any health and safety issues. Indeed, on private nursery manager expressed the view that children should be allowed to take risks as it is part of life.

> *I don't see ICT as more of a risk than anything else plugged in a classroom. (ICT coordinator of a primary school)*

Four practitioners talked about the need for the equipment to be checked before the children access to it; a risk assessment and/or items safety checked. Internet safety and the need for parental controls were mentioned by ten practitioners.

Children, it was thought by eight practitioners, should be supervised as they use ICT. There were risks associated with “body parts ending up where they should not be”, for example fingers being trapped in CD or tape drawers (six practitioners). It was viewed as important by six practitioners that children were advised about the dangers of ICT. They should be educated in its proper use so that they learned to respect equipment.

> *Train children to use whatever they're using in a safe and appropriate way. This is part of training anyway - valuing equipment. Tell them certain parts can hurt them. (State nursery teacher)*

Wires and cables needed to be placed out of the way so they could not be tripped over, pulled or chewed (19 practitioners). Plugs and sockets needed to be protected and covered so children could not touch them, (14 practitioners). There were also general risks thought to be associated with electrical equipment, such as electrical shocks (15 practitioners). There were also increased risks with electricity and fluids being near each other. It was important that drinks did not go near electrical items, that the water-play area was not near electrical items and hands were thoroughly dried before using electrical items (seven practitioners). Batteries and small parts needed to be well secured (six practitioners).

The length of time spent on ICT equipment was considered bad for various reasons (16 practitioners). It could lead to eye-strain from looking at a screen for too long (twelve practitioners), repetitive strain injury from doing repetitive movements with items like a computer mouse (four practitioners). The ergonomics of computer spaces, for example, were thought to be important. If the height of the desk, chair or monitor were wrong it could lead to neck strain and bad posture in children (nine practitioners). Spending a long amount of time on equipment also meant that

children were missing other important activities, namely physical exercise and social interaction.

> *The narrowing of a child's interests and lack of wider interests … Lack of physical exercise because the child becomes a 'couch potato'. ” Head (independent special school head teacher)*

One practitioner noted that some equipment had been specially designed for children and thought through for their size and shape etc. but a lot of equipment used (like computers) had not been which could cause some of these problems. Two other practitioners also acknowledged that items were not always age-appropriate. Items with glass parts could be smashed. Children could get hold of films/DVDs that were unsuitable for them in a home.

Ten practitioners noted the dangers associated with children looking at bright lights, particularly from data projectors but also from overhead projectors and torches. Heat from objects was also mentioned as a possible danger by two practitioners.

Question 6a: What advice do parents and carers of young children need on technology?

The advice practitioners thought to be useful for parents varied. Eleven practitioners from a range of settings said that they gave advice if they were asked. Most added that it was becoming a less-frequent occurrence. Parents were more competent than they used to be, so did not need to ask.

Ten practitioners thought it would be useful to let parents know how much time is suitable for children to be involved in ICT activities, such as television watching or using the computer. It was thought that it could affect aspects of a young child’s development, such as social and speech skills. One infant school reception teacher said that she had noticed a decline in the level of speech and language skills that the children have when they are in reception.

Nine practitioners felt it was important that parents were made aware of the range of ICT equipment that was available. Not only what there was, but also “what you can do with it”, “what areas of development it can help and encourage” (private nursery EY practitioner).

> *I think advice should be given on what type of technology is available for young children and what are the benefits of using them (Independent special school teacher)*

Eight people thought that parents should be given advice about what to buy. If they were to buy a computer, they would need to know how to be able to support their child’s learning; also the best value for money was important to know. It was also

important to “make sure there was potential over time” (children’s centre nursery manager). Eight respondents believed that parents needed to know what age-appropriate television programmes and computer software programmes/games were available for children.

Health-and-safety advice was mentioned by eight practitioners. Matters such as how far from a computer or television screen children should be, ways to limit eye strain, making sure children sat at the right height for a computer screen and making sure that small parts were secured, were all mentioned.

Seven people asserted that parents actually needed to increase their own skills so that they could help their children. They needed to be aware of what a computer could do. Some sort of practical course was suggested.

Encouraging parents to “embrace the ICT situation for young children” (infant school reception teaching assistant) and not to be afraid to let the children have a go themselves on equipment” was thought to be important by twelve practitioners. “The only way they really learn is by doing it themselves”, (childminder) Advising parents to make sure that the Internet in their homes had adequate protection to avoid children being accidentally exposed to unsuitable material and advising about safe and suitable sites was mentioned by seven practitioners. Six practitioners talked about the need for children to be supervised when using ICT. Not only was this for safety reasons but also for making ICT use a more social occasion.

Four practitioners thought it was important that parents were shown how they could support their children’s use of equipment appropriately and with care. Two practitioners noted that parents needed to know what their children were doing in the setting so that they could mirror or supplement that at home.

The problem with technology changing so fast was mentioned by one practitioner but is, nonetheless, noteworthy. This setting used to have a CD-ROM lending library for parents and children but as computers were updated the CDs became incompatible with home computers so they had to withdraw the service. There were fewer types of CD-ROMS felt to be of value being made for the newer computer systems. This was a challenge to settings and parents alike when they were trying to keep up with technological changes and advancements.

Question 6b: What sources of advice currently exist?

The majority of practitioners (30) were unsure of existing sources of advice available for parents. Eight practitioners said that the Internet provided a variety of advice and guidance for parents. Two practitioners mentioned the Becta website (http://www.becta.org.uk), one the BBC web pages (http://www.bbc.co.uk) and one the ThinkUKnow website, parents’ page (http://www.thinkuknow.co.uk/parents). One practitioner said that most educational websites had a teachers and/or parents page

on them. Others were less specific. Six practitioners, from a range of settings said that the staff provided information but usually only if and when a parent asked for it.

> *They come and ask for advice now and then but no one comes nowadays really. (A nursery senior early years educator)*
>
> *They can come and talk to us whenever. (A nursery teacher)*
>
> *If parents ask us then we give them guidance but I don't know if parents are aware of it or not." (A pre-school worker)*

Two practitioners, a primary school reception teaching assistant and a childminder mentioned the library as a source of advice.

Discussion

The interviews provided a valuable snapshot of current practice and practitioners' views about EYFS. Overall, the interviews illuminated the findings from the practitioner audit. ICT in practice tended to be used in a narrow sense of computer technology. Overall, there was a strong sense that access and use related to overall resourcing levels with non-maintained settings having fewer resources, less experience staff or relevant training. State-maintained schools and trained teachers appear to be better placed in terms of access to a range of hard- and software and in terms of staff expertise to deliver the EYFS. Low levels of awareness of the potential of new technologies in the non-maintained sector are a concern.

Practitioners are able to identify a potential for the contribution of ICT to the EYFS though it is difficult to judge how this would be applied in practice. A serious lack of training is identified that combines with relatively low levels of confidence, competence and expertise. The lack of awareness of children's experiences of new technologies outside the EYFS context is also of note.

Conclusion

Whilst, there is some evidence from the practitioner audits that most practitioners are familiar with, and use a range of new technologies, they are less certain of technologies, hardware and software available specifically for the EY market. Patterns of access and use seems worryingly varied, as is the skill-set and expertise, with schools and trained teachers substantially better equipped to support learning of young children in the EYFS. Practitioners are able to identify a role for ICT in the EYFS though it is less clear how children's learning is guided and extended in this respect. Health-and-safety issues are well understood but there seemed to be a lack of awareness of advice that might be provided to parents on children's use of and learning through new technologies. This may relate to practitioners' own variable knowledge, skills and understanding.

11.4 Appendix 4: Interviews with parents

Introduction

Parents' views about ICT in the EYFS were solicited by the researcher as they brought or collected their children from the EY settings in question. Most had been advised in advance that a researcher would be approaching some of them with a view to ascertaining whether or not they would be willing to answer a few questions about young children's use of ICT.

Research question

The main research question was as follows:

- What is the evidence for use of ICT in the Early Years Foundation Stage?

Participants

In total 39 parents from ten different settings were interviewed briefly. The parents came from seven different types of setting. These were schools (infant and primary), a children's centre, a childminder, a private day-care nursery, pre-schools and nursery schools. There was still a mix of local authority, rural, urban and mixed and socio-economic status, high, low and mixed.

Materials

Questions were mainly open and sought to reflect the key questions of the review.

Procedure

For speed of administration the researcher fixed the questions to a clipboard and recorded parents responses as the interview proceeded. Not more than ten minutes was taken for completion. Parents were provided with the agreed definition of ICT that followed McPake et al (2005).

Analysis

Main issues themes and surprises from parents' responses were identified.

Findings

Results are presented question by question.

Question 1: What use do you and your child/ren make of ICT in the home?

Table 27: Technologies used in the home

Type of technology	No. of times said
Computers (including laptops)	28
Internet	20
Television (and TV programmes, including satellite stations)	11
DVD player and discs	10
Children's computers (eg V-Tech, Leapfrog)	8
Landline and Mobile phone	5
Electronic toys	4
Games console (eg Xbox, PlayStation, Wii)	4
Camera	4
CD-ROMs	3
Handheld computer games console (eg Nintendo DS, PSP)	3
Printer	2
Music CDs and/or CD player	2
Video player	2
HiFi	1
Touch screen	1
Soft toy that connects to a computer	1
Video camera	1
Remote controls	1

Most commonly used items were computers and the Internet, followed by television and DVD player. Most parents believed their young children to be "very competent" with the items of technology they used at home with one parent even suggesting "he can teach me". Another parent added that in their house "the TV is never off". The child could fully operate it, turning it on and off as well as selecting channels from the satellite box.

Four parents said that their child did not use ICT at home – the child was "not that interested" or "we don't use an awful lot really".

Question 2: How does this match with your child/ren's ICT use in preschool/nursery?

When asked to compare home use with the child's use of ICT in their EYFS setting, ten parents said they did not know what their child used at the setting. Most parents only mentioned one use of ICT for their child. The following activities were mentioned at least once: watches DVDs, listens to stories on a CD, plays with telephones, turns the radio on and watches the television.

One parent explained that she did not have "much knowledge as I'm not here during the session". Two parents believed that their children did not really use ICT when at

their setting. One parent's view was: "They're so little, do they really need to know that much?"

Twenty parents said that their children used the computer (or laptop) and four added that they also used the Internet and one that they played educational games on it. Two parents mentioned that their children used digital cameras when at nursery.

Question 3: Have you ever talked to preschool/nursery staff about your child/ren's use of ICT in the home or in the preschool/nursery? If so, what have you talked about?

When asked if they had talked to the setting about their children's use of ICT in the home or in the setting 26 parents said they had never done so. One parent added that she asked her child what she had done at nursery and this sometimes included ICT-related activities.

Twenty parents said that there had been some discussion of ICT although only five gave an unambiguous "yes". Nine parents said that the subject had been covered as part of a more general discussion at open days or parents' evenings. One parent commented that information had been exchanged "just in passing". The impression given was that most conversations, however formal, involved parents being informed what their children did in the setting. Two parents, however, specifically stated that they had been asked what activities their children engaged in at home, including with ICT: "They ask what she does at home."

Two parents said that they knew what their children did at nursery, with one adding that the setting did not know what her child did at home with ICT. Another parent expressed the view that children were "left to their own devices on the laptop" and that this was not appropriate for such young children. She believed that at least "initially children do need to have people to guide them".

Overall there was little sense that parents were regularly asked to report on the nature and extent of ICT use in the home.

Question 4: Do you think technology contributes to a young child's learning and development? If s, how?

An overwhelming 38 of the 39 parents interviewed thought that technology contributed to a young child's learning and development. Many comments made stressed the importance of technology in today's society. Nine parents said that "it enhances learning and development … It's another way of learning". ICT provided a different medium to learn with and could contribute to all the different areas of development. Four others said that children could learn from ICT. Other general comments were related to children's "getting more knowledge" (four parents).

When asked how technology contributed to a young child's learning and development, eleven parents asserted that such skills were needed for life in today's society: "It's the way of the modern world"; "they've got to have computers to get on these days".

Factors such as controlling a mouse and hand-eye coordination were mentioned by twelve parents as contributions made by technology. Eight parents said that ICT helped the children with 'basics' such as letter, number and colour recognition. Two parents said it was a good tool to help children to learn how to follow instructions and one parent said it could aid speech and language development.

Two parents added that it was "important to have face-to-face help too", rather than leaving children to "learn from a computer" themselves.

Four parents added that children "needed a whole range of experiences", that "it was not overly important that they used ICT at this stage" and that "it shouldn't been seen as a substitute for sitting down with them". One parent did not think that ICT contributed. She explained that her child "uses it but not particularly".

Overall, there was recognition that ICT contributed to children's learning and a range of specific contributions was reported.

Question 5: What are the health and safety issues and risks associated with technology used by young children?

The most frequently mentioned issues related to spending too much time in front of a computer or television. Twenty-four parents believed that spending too much time in front of a screen led to a lack of activity which was bad for the child both physically (in terms of exercise and posture) and socially.

> *They're very isolated on the computer. They should be playing with toys as well. Technology is part of it but not the whole part.*

Other consequences of over-use were "eye strain" from sitting too close or just "focusing at the same distance for too long" (13 parents) and repetitive strain injury of wrists or hands, due to using the mouse in a repetitive manner (two parents).

Three parents said they were unsure what the health-and-safety issues and risks were. A further three said that there were not many, due to the age of the children in question. Three more parents said that the most important thing was for children to be supervised as they used technology.

Internet safety, making sure the children did not access unsuitable, was mentioned by eight parents. Ensuring that software from whatever source was age-appropriate, was noted by one parent.

There were general concerns related to young children using electricity, including the risk of electrocution (four parents). Electrical equipment, it was thought, needed to be checked for safety. Making sure wires were out of the way and not put into the children's mouths was mentioned by two parents and that plugs and sockets were protected so that children were not touching them, was mentioned by three parents.

Other issues raised were: radiation from mobile phones (two parents), making sure batteries and small parts were well secured (one parent), the risk of children trapping their fingers in equipment (one parent) and the effect of flashing lights for some children (one parent).

Overall, parents appeared to have a realistic awareness of the main health-and-safety hazards.

Question 6: What sources of help and guidance (if any) are available for parents on children's use of ICT?

Few parents were able to identify sources of help or guidance related to children's use of ICT. Indeed, 31 parents said they were not sure of any such sources. One parent explained:

> *I'm an infant teacher and had parents ask for sites to help. Apart from putting it into Google[11], I didn't know how to find appropriate sites to help them.*

Four parents said that there was help available on the Internet, there was "lots on there, if you know where to look". Two mentioned the CBeebies website (http://www.cbeebies.co.uk) one parent mentioned the site education.com (http://www.education.com). Two parents said that children's television programmes sometimes mentioned websites that children could visit to play games but said nothing about advice for parents.

One nursery school ran courses for parents on using ICT and two of the ten parents interviewed from this setting mentioned these. One parent said that she would ask her child's school and two said they would go to the library. There was no common view about where advice was to be found.

Question 7: Have you ever tried to get help or guidance in this area?

Only five of the 39 parents interviewed said that they had actually tried to get help or guidance related to children's use of ICT. Two had completed a course run by the nursery; one had used the local library and visited different websites; and one had used the search engine Google to find help. Of the 34 who said "no", one parent

[11] Google is a search engine. It is a tool used for finding information on the internet.

used to work in information technology (IT) support and one stated: “I know what I’m doing; I’ve got my head screwed on”.

Question 8: What specific advice about young children’s ICT use would be helpful to you as a parent?

When asked about the advice that would be useful to them, eleven parents said they did not know. As one parent described it: “I don’t know what I don’t know so I’m not sure really.” Another parent thought “anything would be useful” and one thought that she needed no advice:

I’m a psychologist so I feel confident I could work it out for myself.

Four parents would have liked advice related to Internet safety, both how to keep children safe on social networking sites and how to make sure they did not access inappropriate sites.

Nine parents wanted to know what types of software and internet sites were useful for make learning “simple and fun”, as well as aiding their development and what technology they could use with young children.

Four parents would have liked to improve their own computer skills so they could support their children when using it. One other parent said it would be nice to have lessons jointly with the child so that they could “learn together the best ways to use the computer” to support the child’s learning and development.

Health issues (effect on eyes and repetitive strain injuries) were mentioned again by two parents. They wanted to know best how to protect their child, whilst still allowing them to benefit from using technology.

Two parents thought that it would be useful to have details about what was being done with technology in the EYFS setting so that they could support and complement those activities in the home.

Finally, five parents were keen to know “what’s best for a child of a specific age to develop skills for learning”. One parent described her idea for a method of providing information to parents about ICT. She thought that if there was an equivalent to Bookstart[12] for ICT it would be a great way to introduce parents to age-appropriate and relevant ICT information and software from the start, “because then you’re given the advice straight away”.

[12] Bookstart is the national programme that encourages all parents and carers to enjoy books with children from as early an age as possible. They deliver their first free pack of books to babies, usually when they are aged around 8 months old. The next two packs are then gifted at 18 months and three years. To find out more, visit: http://www.bookstart.co.uk.

Discussion

Overall, as other studies have found, televisions, computers and DVD players in the home are more or less universal. There was little sense that parents were well informed about technology use in the EYFS setting or that practitioners were well informed about home use. Sensible health-and-safety issues were raised without parents seeming to be unduly or unnecessarily concerned. Many areas of advice related to children's ICT use were raised, though few parents received any or thought to ask.

Conclusion

The findings point most strongly to the need for better sharing of information and good ICT practice for young children between home and school.

11.5 Appendix 5: Interviews with children

Introduction

As part of the review of evidence on the use of ICT in the EYFS, it was important to gain the perspective of the young children themselves. Accordingly the views of small groups of children solicited in the settings.

Research question

The key question was:

- What is the skill set and expertise of the young children in EYFS settings?

Participants

In eleven of the settings visited a small group of was asked about a variety of ICT items: what they were, what they knew about how the items worked, what these were used for and whether they, the children, used them at home and in their setting.

In total there were four groups of reception children (two from infant schools and two from primary schools), four groups of nursery children (two state nurseries, one belonging to a children's centre and one private), two pre-schools (privately run) and a childminder (children were of pre-school age). The childminder had two children in the setting at the time visited. In the other settings, a group of between four and six children were interviewed. Ages ranged from three to five years with the exception on two-year-old.

Materials

A number of items were assembled that included: a laptop, portable HiFi, optical mouse (wired), digital camera, mini DV camcorder, Digital Blue Movie Creator, remote control, Bee-Bot (programmable toy) and Digital Blue Computer Microscope. Questions that guided the interview were also used (see appendix 9).

Procedure

Drawing on children's relish for fantasy play, Marvin the visiting alien (an electronic toy) was introduced to them. It was explained that whilst visiting the researcher he had come across a range of gadgets that he had not encountered before. He wanted to know what they were and what they did. Whilst the researcher had tried to explain about them to Marvin, he still did not understand. Accordingly, the researcher had decided to take him to the children's setting and ask some of them to explain about these items.

The children were then asked if this would be OK with them – whether they were happy to stay in the group to help Marvin. On all occasions, all children gave their consent and the interview proceeded. Items were removed from a box, one at a time, by the researcher and placed in front of the children. Before exploring each item, children were asked briefly what it was and what it did. Once this information was received, the children were invited to explore and demonstrate what they knew about the item, taking turns. They were also asked if they had items that were the same or similar at their setting and at home. Once each item had been explored it was placed to one side until all items had been shown to the children. At this stage the children were allowed to look at all items and freely explore them for a while before they returned to their activities.

Findings

Children from every setting and of varying ages were very willing to pick up, explore and experiment with the items. There was no fear of breaking or hesitation shown in pressing buttons in an experimental or trial-and-error way. In most cases, where children did not know how to use an item they worked out, at least partially, how it functioned after a short time of exploration.

i. Toy till (with scanner, walkie-talkie and credit card swipe facility)

Different names given by each group:

- A pay shopping thing
- A till (five groups)
- A counter
- A cash machine
- A checker
- A money pressing
- A shop toy

All groups had an understanding of what the toy represented and what it was used for, although some were more able to articulate this. They were all able to open the till drawer and take the money out. Seven groups knew what the scanner was and its purpose in “scanning things at the shop so that you can buy them”. Two groups knew that the walkie-talkie was to communicate with people and two groups were able to activate the card swipe. (When a card was swiped through it correctly a notice on the top of the till popped up.) They all know that one needed to press the buttons to work out what money needed to be used, although they were unclear as to who was to give and who was to receive money (the person working the till or the other person).

ii. Laptop

When shown the laptop, five groups referred to it as a computer, three groups as a laptop and three groups said it was both a computer and a laptop. One child explained that the computer and laptop, “they’re the same thing”.

All groups knew which part of the laptop had to be manipulated in order to open it although a couple of groups had trouble in doing so and needed help from the researcher. Nine groups commented on turning the laptop on and six knew how to do this. In two groups a child commented that you had to “wait for it” to “load” once you had turned the laptop on. Once loaded, five groups knew to log on to a user profile to be able to access programmes.

Seven of the eleven groups immediately used the touch pad to move the cursor and log on, and selected an icon which they knew to double-click in order to load up the programme they had selected. In one case, a child selected the ‘Start’ menu and then a programme from there, instead. One group said that the touch pad was “where the mouse is”, whilst another group said that the touch pad was “not a mouse” even thought it moved the arrow. One group said merely that it made the arrow (the cursor on the screen) move. A further group knew the touch pad moved the mouse and made programmes work: “you have to click on the website to play a game”.

One reception-age child was particularly adept at making the laptop work. He explained that you had to double-click on the icons and you got an egg timer, “then you know it’s loading”. Three groups in total explained that the pictures (icons) were clicked on to make programmes work.

As for other uses of a laptop, four groups mentioned or demonstrated typing on it, one child even typed his name. Most groups mentioned playing on it and three groups talked about accessing games through the computer. Two groups found the disc-drive. Comments were made about “putting a disc in and playing a game and watching DVDs”.

iii. Portable hi-fi

Five groups said this was a radio, five groups mentioned that it produced music, four groups talked about the need for a CD to be in the machine to make it work and two groups said it was used for dancing. Unsurprisingly, no group knew what a cassette tape was, the closest guess being that it was some sort of video. Eight of the groups experimented with the machine with differing degrees of success in making it play (either, the CD, radio or tape-deck). Three groups had at least one child in them with a more sophisticated approach. They were more aware of how to make the CD play with one child even knowing that the triangular symbol (►) meant ‘play’ and the square (■) meant ‘stop’.

iv. Optical mouse (wired)

When shown the optical mouse, separated from the laptop, all eleven groups knew immediately that it was for a computer with ten groups referring to it as a mouse. Seven groups explained that it had to be attached to the computer with five groups pointing to the USB plug and saying that this part had to be “plugged in”. One child went further and asked for the laptop. When presented with it he turned it around until he found a USB socket and plugged the mouse into it. He then demonstrated how it moved the cursor on the screen. Two other groups also said that “it moves the arrow – the mouse thing”. Two groups discussed how the mouse had to be plugged in to make the computer work (“it turns the computer on and off”; “that bit plugs in and the computer will work”). All groups demonstrated how the mouse was held and how you depressed the buttons at the front to “select things”, for example, you “click on a game” with it

v. Digital camera

All children in all groups recognised this item as a camera, with one child specifying that it was a “digital camera” and a couple of groups saying that “it’s a normal one” or ”a different one” (compared to the video camera already seen). They all knew it took pictures, how to hold it and that the screen on the back displayed what the camera could ‘”see” and also the pictures taken. Three groups were able to turn the camera on unaided. There was an equal mix among groups as to who knew which button to press and those who needed to be shown which button to press in order to take a picture.

vi. Mini DV camcorder

Again, all groups knew hat his was a camera, with one group calling it “a movie camera” and six groups calling it a “video camera”. There were varying degrees of competence in getting the camera ready to work. They took the lens cap off, managed to open the viewing screen, some looked through the viewfinder instead, and knew that you needed to press the red button. Two groups thought that it was for taking still images. One child talked in detail about how you had to put your hand through the strap, demonstrating how it was held to shoot video footage. Another child talked about the importance of making sure the battery did not go flat or it would not work. Once the camera was switched on, there were two groups who managed to record some footage.

vii. Digital Blue Movie Creator[13]

Three groups knew that this item was a video camera “as well”. Two groups were from reception classes in schools and one was a state nursery. All three settings had these cameras themselves and the children had experienced them. Two other groups guessed that it was a camera of some sort from the outset and another group, after exploring it, came to the same conclusion. Other possible functions for the item were thought to be that it was a game, a scanner (“like one at a shop”), a “mouth checker”, a “tool to test your eyes” or a “hammer”. Of those who did not know what it was, several groups managed to turn it on and a couple of groups managed to take pictures and/or footage. In five groups, the children held the camera up to their eyes in the correct manner.

viii. Remote control

All groups knew that this was “a remote” and two groups that it was “to turn a TV on and off”. Three groups explained that you needed to “press all the buttons” and three groups said it was used to change the channels on a television. Other uses for a remote control were said to be for a DVD player, a CD player, a video machine and a car (“to lock and unlock it”).

ix. Bee-Bot (programmable toy)[14]

Three groups were familiar with the Bee-Bot as they had versions of it at their setting. Others said that they had a similar robot. Five groups referred to it as “a bee”, one as “a beetle”, one as “a robo-bot” and one said “it’s a mouse and you drive it”. Eight groups managed to switch the Bee-Bot on (picking it up and moving a small switch to the ‘on’ position). Of these eight groups, three were reasonably skilled at programming the toy to move, the others experimented with varying levels of success. One group knew that the ‘clear’ button had to be pressed after the Bee-Bot had moved so that it only followed the new instructions, rather than repeating the old ones first.

[13] The Digital Blue Movie Creator is a purpose-made video camera for children. It proffers to be child-friendly and easy to use. It captures digital video and audio at or away from the computer. It comes with software to edit footage and add special effects. It also takes still pictures like a digital camera. See http://www.digitalblue.org.uk/digital_blue/index.html

[14] A Bee-Bot is a programmable floor robot that can be used for teaching control, directional language and programming to young children.

x. Digital Blue Computer Microscope[15]

Only one group (from a nursery) knew what this item was because they had used it in their setting. They did not know the name of it but knew that you viewed items under its lens which made them bigger and that images could be captured on the computer – it had to be "plugged into the computer to work".

xi. Use of items at home

In every group, most children claimed that there was a computer or laptop, with a mouse in their home. In some cases, the computer or laptop was reported to be for use by a parent but, in most cases, the children were able to use it. The most common use was to play games on it. In four settings, some children said that they had toy items that simulated real things, for example, a toy till. All children had remote controls in their homes, in most cases they boasted several - "I've got four in my house". Nine groups mentioned that there were CD players in their homes with some children saying that they had their own. Cameras, both digital still and video cameras were another piece of technology frequently mentioned item. Video cameras were mentioned in three groups and still cameras in six groups. One child said that he had his own camera.

Discussion

The children appeared to enjoy explaining to Marvin the alien what the items were. They were very comfortable with the equipment and showed no fear to experiment with items if they did not know what they were or how they worked.

Conclusion

Overall children, even the youngest interviewed, had a wide knowledge of ICTs and could judge use relatively accurately and logically, even if they had not come across an item before.

[15] The Digital Blue Computer Microscope allows you to view items through several differently magnified lenses. Images are displayed on the computer screen and can be permanently captured and changed using the software provided. See http://www.digitalblue.org.uk/digital_blue/index.html

11.6 Appendix 6: Practitioner ICT skill audit

ICT in the Early Years Foundation Stage

Practitioner Audit

Please answer as truthfully as possible. Name information is only to create identifiers later and will not be used in any reporting. Don't worry if you answer 'no experience' for most things – we hope to be able to help with that!!

Personal access to a computer at home:	**Any IT qualification:**
☐ None ☐ Without CD/DVD-ROM ☐ With CD/DVD-ROM ☐ With internet access	☐ None ☐ Certificate (eg CLAIT, RSA) ☐ GCSE ☐ A-Level ☐ Degree ☐ PG Degree/Diploma

1. Using a computer
   - ☐ Computers terrify me: I have hardly ever used them
   - ☐ I can only use computers if someone else shows me what to do or helps me log on first
   - ☐ I am happy to experiment; I find out how programmes work by trial and error, or by consulting the manual from time to time

2. Using a Graphical User Interface (eg Windows, MAC OS)
   - ☐ I have little or no experience of using a graphical user interface
   - ☐ I can select and run programs using a mouse
   - ☐ I can switch between open windows and maximise, minimise and close windows

3. Handling Files
   - ☐ I have little or no experience of handling computer files
   - ☐ I can move, copy and delete files (eg make a back up)
   - ☐ I can move, copy and delete files and create directories or folders of files

4. Sharing Information Between Programmes
   - ☐ I have little or no experience of sharing information between programmes
   - ☐ I can 'cut and paste' information between programmes (eg place something on clipboard produced in Paint and put into a Word document)
   - ☐ I can create dynamic links between programmes (eg place a chart within a report which is updated as the data in a linked spreadsheet is changed)

5. Connecting a Computer System
   - ☐ I have little or no experience of connecting a computer system
   - ☐ I can connect a basic computer system (eg processor, monitor, keyboard, mouse)
   - ☐ I can connect additional input/output devices (eg scanner, printer) and load related software)

6. Finding Information on CD/DVD-ROM
   - ☐ I have little or no experience of finding information from a CD/DVD-ROM
   - ☐ I can use indexes (of subjects, authors, etc), keywords and narrowing-down strategies to find information that is held on a disc
   - ☐ I can find information using a variety of electronic data sources. I can print from them and transfer information into other packages from them.

7. Searching the Internet
   - ☐ I have little or no experience of using the Internet
   - ☐ I can use a WWW browser to follow links and view, save and print pages
   - ☐ I can use a 'search engine' to find information on the WWW and refine the search, if required, using two or more search terms

8. Using a Spreadsheet
   - ☐ I have little or no experience of using a spreadsheet programme
   - ☐ I can enter numerical data, perform simple calculations and create charts
   - ☐ I can use a spreadsheet to create and explore mathematically based models (eg mortgage payments, population growth)

9. Word Processing
   - ☐ I have little or no experience of using a word processor programme
   - ☐ I can enter and edit text, save and re-open and print text files
   - ☐ I can format text (eg change fonts, margins and indents, paragraph layouts), add headers/footers and use a spelling checker and other proofing tools

10.Using a Graphics Package

- ☐ I have little or no experience of using a graphics package
- ☐ I can use a simple 'paint' programme to produce pictures
- ☐ I can use a graphics package to modify photographic images (eg resize, adjust colours and change graphics mode) captured by a scanner or camera

11.Using e-mail

- ☐ I have little or no experience of using e-mail software
- ☐ I can send, receive and print e-mail messages
- ☐ I can send and receive 'attachments' and use an 'address book' to send e-mail messages to individual or group contacts

12.Using an interactive whiteboard

- ☐ I have little or no experience of using an interactive whiteboard
- ☐ I can set up an interactive whiteboard and use basic software packages
- ☐ I can use most packages on an interactive whiteboard and change between them as appropriate

13.Using a digital camera

- ☐ I have little or no experience of using a digital camera
- ☐ I can use a digital camera to take photos
- ☐ I can use a digital camera to zoom in and out, use the basic settings, view and delete pictures

14.Editing/downloading digital photos onto a computer

- ☐ I have little or no experience of managing digital photos on a computer
- ☐ I can download photos from a camera to a computer
- ☐ I can use software to edit and organise my photos

15.Using a video camera

- ☐ I have little or no experience of using a video camera
- ☐ I can use a video camera to record, stop and play back footage
- ☐ I can use additional features on a video camera (eg to fade in and out, control white balance)

16.Editing/downloading video footage onto a computer

- ☐ I have little or no experience of editing and downloading video footage onto a computer
- ☐ I can download video footage onto a computer
- ☐ I can edit video footage and create video files

17.Using a CD or cassette player

- ☐ I have little or no experience of using a cassette/CD player
- ☐ I can start and stop a cassette or CD player
- ☐ I can use a cassette or CD player to play, record and search through tracks

18.Using a video or DVD player

- ☐ I have little or no experience of using a video/DVD player
- ☐ I can use a video or DVD player to view footage
- ☐ I can use a video or DVD player to play and record and I can search through titles/recordings to find what I want

19. Using programmable toys (eg Bee-Bot, Roamer, Pixie)

- ☐ I have little or no experience of using a programmable toy
- ☐ I can use a programmable to move in the basic directions (eg forwards, backwards)
- ☐ I can use a programmable toy to make it perform certain sequences/tasks

20.Using a digital audio player (eg iPod, mp3 player)

- ☐ I have little or no experience of using a digital audio player
- ☐ I can use a digital audio player to store and listen to music
- ☐ I can organise my music and search for specific songs on my a digital audio player

21.Using a mobile phone

- ☐ I have little or no experience of using a mobile phone
- ☐ I can use a mobile phone to make and receive phone calls
- ☐ I can use a mobile phone to store numbers, send texts and change settings

Thank you!

11.7 Appendix 7: Questions for practitioners

1. What technologies, hardware and software, are you aware of that are available specifically for the Early Years market?

2. What use is being made of ICT more generally in the Early Years, both at home and in educational settings, would you say?

3. What is your view of the existing skill set and expertise of Early Years practitioners and how does this vary across different sectors (childminders, pre-schools, day nurseries, schools)?

4. How can technology contribute towards a child's learning and development, with specific reference to the EYFS themes and principles?

5. What are the health and safety issues and risks associated with technology used by young children?

6. What advice do parents and carers of young children need on technology and what sources of advice currently exist?

11.8 Appendix 8: Questions for parents

1. What use do you and your child/ren make of ICT in the home?

2. How does this match with your child/ren's ICT use in preschool/nursery?

3. Have you ever talked to preschool/nursery staff about your child/ren's use of ICT in the home or in the preschool/nursery? If so, what have you talked about?

4. Do you think technology contributes to a young child's learning and development? If so, how?

5. What are the health and safety issues and risks associated with technology used by young children?

6. What sources of help and guidance (if any) are available for parents on children's use of ICT?

7. Have you ever tried to get help or guidance in this area?

8. What specific advice about young children's ICT use would be helpful to you as a parent?

11.9 Appendix 9: Questions for children

Show children a tray of ICT items (laptop, programmable toy, various cameras, etc.)

1. Here is Marvin (an alien). He needs to know how these gadgets work. Can you tell him what they are called? Point to each one?

2. Can you show Marvin how to use any of these?

3. Can you tell him which ones you use at home/in preschool/nursery?

4. Can you tell him any more about that?