ALREADY AT A DISADVANTAGE?

ICT IN THE HOME AND CHILDREN’S PREPARATION FOR PRIMARY SCHOOL

FINAL REPORT TO BECTA

CONFIDENTIAL: NOT FOR CIRCULATION OR CITATION

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1. Preface

1.1 This study
The aim of this study is to investigate the impact of socio-economic disadvantage on pre-school children’s development of competences in information and communications technologies (ICT). The study focuses on children’s experiences of ICT in the home and in pre-school settings, in the year before they begin formal education, and seeks to investigate concepts of advantage and disadvantage in this context.

The research is based on:

- a survey of the views of parents of children, aged 3 to 5, attending eight nurseries in two local authorities in central Scotland;
- case studies of 16 children, aged 3 to 5, from families selected following the survey; eight of these families are defined as ‘disadvantaged’ and eight as ‘more advantaged’;
- interviews and discussions with pre-school staff and observations of children’s activities in the eight nurseries, collected as part of the Interplay project, with which this study is linked (see Section 1.3, below); and
- interviews with staff in four primary schools to which some of the children from the eight nurseries are likely to transfer.

1.2 Definitions
In use throughout this report are three terms which require careful definition. These are ‘pre-school’, ‘information and communication technologies’ and ‘disadvantaged socio-economic status’.

1.2.1 Pre-school
Almost all four-year-olds (99%) and over four fifths (83%) of three-year-olds in Scotland are in part-time pre-school education, funded by the government and provided by the public, private or voluntary sectors (Scottish Executive, 2003). Provision ranges from nursery classes in primary schools to playgroups run by volunteers. For concision, pre-school providers are sometimes referred to as ‘nurseries’ in this report. There is considerable diversity in the qualifications of adults employed in pre-school settings and we refer to them here as practitioners or pre-school staff, rather than teachers.

1.2.2 Information and communication technologies (ICT)
BECTA (2002) lists a number of products available to young children that incorporate some aspect of ICT. These include activity centres, musical keyboards, tape recorders, programmable and radio-controlled toys as well as everyday items such as remote control devices, photocopiers, telephones, fax machines, televisions and computers. For the purposes of the study we used a similarly broad definition of ICT that encompassed a variety of audio-video resources, ‘smart’ toys and everyday technologies. We have also included toys that simulate appliances such as mobile phones, laptops, cash registers,
microwaves and barcode readers. This is because, in common with the Scottish policy framework for ICT in the early years (Learning and Teaching Scotland, 2003), our starting point is that ICT is embedded in a range of children’s everyday experiences. This broad definition contrasts with a widely held view of ICT as consisting mainly of desktop computers and peripherals.

If we define ICT strictly in terms of *information and communication technologies*, then not all of these products have the functionality to demonstrate these features. Many of the toys used in nurseries or at home are electronic, but the level of information or communication created by flashing lights or the production of sounds such as animal noises is minimal by adults’ standards. However, many of these products can serve to familiarise children with a concept of *interactivity* in which pushing a button or squeezing a body part produces a response and we see this operational interactivity as another defining property of ICT.

This broad definition is equivalent to the now commonplace understanding of the texts to which children are exposed when they are learning to read, such as advertisements, magazines, labels, signs, lists and newspapers, as ‘environmental print’. A more traditional definition of literacy texts would focus solely on printed books in the same way that the ‘traditional’ definition of IT tends to refer solely to computers.

### 1.2.3 Disadvantaged socio-economic status

Tackling child poverty has been a major focus of the Labour government since 1997, both across the UK as a whole (Department of Health, 1999; Bradshaw, 2001) and in Scotland (Brown et al., 2002). Currently, just under a third (30%) of Scottish children are growing up in low income families, officially defined as families whose income is 60% or less than the average UK wage (Scottish Executive Statistics Unit, 2003). For the financial year 2001/2, average net income across the UK, including earnings, tax credits, benefits, grants and pensions, was £274 a week. Low income families are therefore defined as those with a net income of £164 a week or less (under £8500 annually).

Many commentators argue that living on a low income means not simply experiencing material hardship but that it is also often linked to other factors which together contribute to a more complex concept of disadvantage. For example, social exclusion is identified as both a cause and an effect of poverty, though not all poor people may feel themselves to be socially excluded, and not all those who experience social exclusion are poor. Low income also has an impact on quality of life, but other factors, such as family and social relationships, the impact of crime on a community, or the availability of a range of leisure facilities, are also influential. (See McKendrick et al., 2003, for a detailed discussion of these issues.)

In this study, we use the term ‘disadvantaged socio-economic status’ to refer to families who are on a low income (60% or less than the average national wage), and who may also be socially disadvantaged as a result of social exclusion or of diminished quality of life. These families’ experiences of ICT may therefore be limited primarily on financial grounds. They may not have the money to purchase the range of technological items
which more affluent families can afford. They may not be able to update their technology as regularly. They may not be able to finance the continuing use of new technologies to the same extent (e.g. replace batteries, repair equipment, pay mobile phone bills).

They may also experience disadvantage as a result of social exclusion. For example, they may not have access to educational provision which would enable them to make the best use of the equipment they possess. They may not belong to networks of people who make regular use of ICT, in order to be able to share and develop knowledge and skills collectively. Quality of life may also have an impact. Low paid workers who work extra shifts or have two jobs may have limited time and energy to explore the potential of ICT. Lone parents, those who care for elderly or disabled relatives, and those who themselves have disabilities, may experience similar obstacles. In identifying families to take part in this study we have therefore focused firstly on income, but subsequently on other factors such as living in a deprived area, family members with disabilities or suffering from long-term illness, unemployment or low level educational qualifications.

1.3 Linked project
*ICT in the Home and Children’s Preparation for Primary School* is linked to *Interplay*, a two-year study funded by the Economic and Social Research Council (ESRC) Teaching and Learning Research Programme. The aim of *Interplay* is to observe and analyse current practice in nurseries, and identify ways of enhancing young children’s experiences with ICT through *guided interaction* with practitioners, peers and parents. *ICT in the Home* extends the work of *Interplay* by

- focusing in more detail on children’s home experiences of ICT;
- addressing transfer from pre-school to primary school; and
- considering concepts of advantage and disadvantage in this context.
2. Executive Summary

2.1 Already at a disadvantage?

Already at a disadvantage? investigates the impact of socio-economic disadvantage on pre-school children’s development of ICT competences at home. The research on which it is based took place between August 2003 and March 2004, and involved:

- a survey of over 400 parents whose children were attending eight nurseries in central Scotland;
- case studies of eight ‘disadvantaged’ and eight ‘more advantaged’ children, aged 3-5;
- interviews with staff in four primary schools linked to the nurseries.

It also draws on data collected from a concurrent linked study, Interplay, which focuses on children’s developing ICT competences in pre-school settings. Already at a Disadvantage? was funded by a BECTA bursary, and the research was conducted by a team of researchers from the Institute of Education at the University of Stirling.

2.2 Context

The assumption underlying this study is that young children who have varied and extensive access to ICT at home may be in a better position to take advantage of the opportunities to learn about and via ICT when they start primary school. Children’s early experiences with ICT at home are likely to be affected by their families’ socio-economic status – i.e. their income, the educational and work backgrounds of adult family members, their families’ and communities’ cultural affiliations and, more specifically, their families’ interest and expertise in relation to ICT.

There is a considerable body of research establishing links between socio-economic disadvantage and subsequent educational disadvantage. More recently, concern about the ‘digital divide’ has raised similar questions about the potential for educational disadvantage among children growing up in families with limited access to ICT, although there has been little qualitative research to date on this issue. One model on which researchers might draw to explore these issues is that developed in the context of ‘new literacies studies’. This focuses on the social contexts in which people develop and make use of skills or competences (such as literacy or numeracy) outside formal education. Work in this tradition indicates that to counter educational disadvantage, it is necessary not only to consider the distribution of resources but also to change attitudes within educational establishments.

2.3 Policy

Scotland and England have different (but largely complementary) sets of guidance for pre-school and primary practitioners on the development of ICT competences. Both countries recognise the need for pre-school practitioners to take account of children’s
home experiences with ICT, and the Scottish guidance makes explicit reference to the broad range of ICT items pre-school children may encounter. As they make the transition from pre-school to primary, the emphasis seems to shift from a wider to a narrower definition of ICT (i.e. mainly computers) and to learning with ICT.

2.4 Findings
Our findings focus on three issues:

- the ICT competences young children are developing at home;
- the impact of socio-economic disadvantage on these developing competences;
- the links between children’s home experiences and pre-school and primary practice.

2.4.1 ICT competences
We found that children are developing three types of competence: technical, cultural and learning. Technical competence refers to the ability to switch items off and on, and conduct other necessary operations for the desired activity. Cultural competence refers to children’s understanding of the social roles which ICT plays, and to their ability to harness ICT for a range of social and cultural purposes, such as communication, work, self-expression or entertainment. Learning competence is a subset of cultural competence, but one of particular significance to young children. In this study, we found that ICT was being used at home to support early literacy and numeracy, communication and musical skills, and also had a role to play in helping children learn how to learn.

In each case, the degree of competence children had acquired was dependent on a number of factors, including access to equipment, support for learning to use it, and the particular interests and aptitudes of older family members.

2.4.2 The impact of socio-economic disadvantage
We found it difficult to establish the impact of socio-economic disadvantage per se on these developing competences, principally because of the complexity of the family contexts we studied. For example, although income is likely to affect the amount and the quality of equipment families possess, resourceful families on low incomes found ways of acquiring the equipment they wanted. Children growing up in disadvantaged families who were enthusiastic about ICT may be exposed to a wider range of activities and experiences involving ICT than children in more affluent families whose parents restrict access or are less interested in involving young children in ICT-based activities. Furthermore, the very wide range of activities in which children from different families were engaged made direct comparisons difficult.

2.4.3 Links between home and pre-school
We found few links between children’s developing competences at home and at pre-school. Although pre-school practitioners had ways of informing parents about their children’s activities and development at the nursery (including their engagement with ICT), they were less well-informed about what children did at home. Some staff
expressed negative views about the amount of TV children watched, or about the kinds of games they played. The main concern of pre-school practitioners was the development of certain basic technical skills, in particular those associated with computers.

2.4.4 Transition to primary school
A similar picture emerged in relation to primary school perspectives, with little systematic collection of information about children’s home experiences. Teachers relied largely on anecdotal evidence or on their own assumptions about the relationship between socio-economic status and the kinds of ICT activities in which children from disadvantaged or more advantaged families might engage. The kinds of competences which teachers expected to develop in the early years of primary school related principally to the use of computers, and were largely of a technical nature, supporting children’s school-based learning with ICT.

2.5 Discussion
Our findings suggest that currently pre-school and primary practitioners have limited knowledge of children’s home experiences of ICT and that therefore they are not in a position to build on these skills. Moreover, the kinds of ICT-related skills which primary schools seek to develop in their pupils have little in common with the competences that they are developing at home. For these reasons, we argue that, in the short term, children with limited home experience of ICT are unlikely to be disadvantaged on entering school, as the kinds of competences expected are of a low level and will have been developed in the pre-school. In the longer term, the impact of disadvantage is difficult to establish, because we do not know enough about the ways in which children’s earlier experiences are likely to influence their learning, whether or not schools overtly take these into account.

2.6 Recommendations
We recommend that a more substantial study addressing the issues raised by this research is conducted, particularly in order to explore the longer term effects of children’s different experiences of ICT at home, now and in the future. We suggest that policymakers may wish to reflect both on the impact which these experiences may have on children’s learning and on the potential to build on children’s developing competences in a range of educational contexts. We also recommend training for practitioners which draws their attention to the nature of children’s home experiences and to their cultural and educational value.

However, if pre-school and primary schools are successful in recognising children’s developing competences and in finding ways of integrating and further developing these, they will also have to consider how best to support children whose home experiences are limited.
3. Introduction

3.1 The starting point
The starting point for this study is that children who have varied and extensive access to ICT in their homes and at pre-school may be in a better position to take advantage of the opportunities in primary school to learn to use ICT and to learn via ICT, than those with limited or no prior experience. A number of factors are likely to influence the range and extent of access to ICT available to pre-school children, at home and in pre-school settings. These include the socio-economic status of their families; familiarity within their families and in the wider community with the range of uses to which ICT can be put, and a corresponding range of opportunities for using it; and the expertise and enthusiasm of pre-school practitioners for ICT. This report focuses principally on the first two of these factors, and makes some reference to the third, which is the more substantive focus of Interplay, the study linked to this (see Section 1.3 of this report).

3.2 Links between socio-economic and educational disadvantage
There is a well-established view, dating back at least to the Plowden Report (Department of Education and Science, 1967), that socio-economic disadvantage translates into educational disadvantage. This is understood as manifesting itself initially in poor levels of literacy and numeracy, and, subsequently, in low levels of attainment in national examinations. Considerable research and policy activity has been invested in identifying and combating elements of this vicious circle. For example, it is often argued that children of pre-school age from socio-economically disadvantaged families have more limited opportunities to develop the kinds of literacy skills which will be valuable to them when they start school, compared with children from more advantaged families. Consequently, a number of initiatives, such as SureStart, BookStart, or Books for Babies, have been introduced to enable these children to gain greater relevant experience before they start school. Complementary school-based policies, such as the literacy hour in England and early intervention in Scotland, have been devised to ensure that, by the end of primary school, as many children as possible have acquired age-appropriate levels of literacy, and are thus able to cope with the demands of the secondary curriculum.

3.3 Links between socio-economic disadvantage and ICT disadvantage: the ‘digital divide’
Concern that socio-economic disadvantage may also affect children’s opportunities to engage with ICT, and thus similarly lead to educational disadvantage, is one of the issues raised by the ‘digital divide’. BECTA’s review (2001) of the literature on this issue defines the term ‘at the broadest level to refer to the gap between those individuals and communities who own, access and effectively use information and communication technologies (ICT) and those who do not’ (p3). The review makes reference to the implications of the divide for education and standards, economic competitiveness and employment, and social inclusion, including citizenship and participation.
There is an extensive body of work setting out to map the divide, largely through quantitative means, in terms of ownership and access. Surveys conducted in 2002 showed that around three quarters of UK families with school-aged children had PCs in the home (Hayward et al., 2002), and that about half had digital TV (BBC, 2002). Four fifths of such families had internet access. These surveys reveal that the impact of disadvantage on ICT access in the home is complex. For example the above-mentioned study by Hayward et al. shows that almost all (93%) children in social classes A/B had personal computers at home, compared with under two thirds (60%) of children in social classes D/E. However, children in the latter group were more likely than children in the former to have access to a games console (79% compared with 70%), and there was very little difference in mobile phone ownership (93% for children in social classes A/B compared with 88% for those in social classes D/E).

However, there has been limited qualitative work exploring the implications of the statistics gathered. For example, the fact that a household possesses ICT equipment does not mean that everyone in the family makes use of it; nor does lack of ownership mean that people have no access to ICT if they can make use of equipment at school, in offices, or in libraries or community centres (Facer et al., 2001; Tobin, 1998). Among the few who have addressed such issues, Becker’s research (2000) indicates that children from higher income groups are likely to use ICT for a wider range of activities than is the case for children from lower income families. However, a study of pre-school children by Brooker and Siraj-Blatchford (2002) did not find strong evidence of socio-economic advantage translating into educational advantage, in relation to ICT, although this work does suggest that the interaction of gender, ethnicity and low income is potentially disadvantageous.

3.4 Alternative perspectives: new literacies studies
The notion that children from socio-economically disadvantaged families have limited experience of literacy (and numeracy) in their home or communities has been challenged by a number of researchers working in the field of ‘new literacies studies’. Writers such as Heath (1983), Street (1984), Barton and Hamilton (1998) and Gregory and Williams (2000) have established that many such communities have rich cultural traditions. These often draw on a wider range of literacy knowledge and skills than may be available to the kinds of middle class communities usually held up as role models for children’s early literacy. New literacies writers argue that schools tend to hold a narrow view of ‘appropriate’ literacy development and therefore may not value the experiences of children who are not from middle-class backgrounds. They imply that teachers should develop a broader view of literacy, and learn how to harness the wide range of skills which children of all socio-economic backgrounds bring to school, to support their learning.

As yet, few researchers have applied these approaches to understanding the ways in which children may learn to use ICT in their homes or communities. Sefton-Green’s review of informal learning with ICT (2004) indicates that the approach developed by the new literacy theorists would be of value in this area. Basing his discussion on research
into the home use of ICT among children of school age (and largely over the age of 11), he argues that the kinds of competences children may be developing with ICT at home have the potential both to support traditional educational goals and also to instigate new kinds of learning. Therefore, it is important that educators learn more about what children are able to do through ICT outside the classroom, and that they value and build on existing competences. They also need to re-evaluate the traditional curriculum in the light of emerging new competences which may be of greater relevance in the future. Similar points are made by Marsh (2002; 2003) and Snyder et al. (2003).
4. Policy Framework

The Scottish and English education departments have both produced guidance materials to enable practitioners to support the development of ICT competences in the early years.

4.1 Scottish Policy
*The Curriculum Framework for Children 3 to 5* in Scotland (Scottish Consultative Council on the Curriculum, 1999) makes only a passing mention of ICT, noting the use of a computer as one way in which young children become aware of the everyday use of technology. However, in 2003 the Scottish Executive launched a strategy for *ICT for Early Years* (Learning and Teaching Scotland, 2003). This includes a training programme for practitioners and a policy framework for the effective use of ICT in pre-school settings. The framework establishes a broad definition of ICT (beyond desktop computers) and stresses the importance of developing pedagogy and practice for learning about and with ICT across the curriculum. The need to allow for individual learning styles and preferences and children’s varying experiences with ICT outside the playroom is explicitly acknowledged. Practitioners are urged to recognise children’s use of ICT outside early years settings as an important learning resource; to use the capacity of ICT to support and value cultural diversity; and to take advantage of the opportunities to work with parents that ICT can offer.

For school-age children, the *Information and Communication 5 -14 National Guidelines* (Learning and Teaching Scotland, 2000) specify seven strands within which children should be developing ICT capability: use of the technology, creating and presenting ideas; collecting and analysing information; searching and researching; communicating and collaborating with others; controlling and modelling and developing informed attitudes about the use of ICT in society. Like the policy framework for ICT in pre-school settings, the *National Guidelines* acknowledge children’s exposure to technologies outwith school and that this exposure will vary with individuals. However, the attainment goals set out imply a concentration on computer use and on moving children from diverse entry capabilities to desired knowledge and skills targets.

4.2 English Policy

In England, guidance is linked to the National Curriculum. In the *Curriculum Guidance for the Foundation Stage* (QCA, 2000), early learning goals for information and communication technology are identified as part of children’s development of *Knowledge and Understanding of the World*. The relevant section describes progression, from showing an interest in ICT to finding out about and identifying the uses of everyday technology and using information and communication technology and programmable toys to support their learning. It also describes the pre-school practitioner’s role in supporting progress, including building on the ICT skills children develop at home.
The *Programme of Study for ICT* at Key Stage 1 (QCA, 1998) describes the knowledge, skills and understanding to be developed as follows:

During key stage 1 pupils explore ICT and learn to use it confidently and with purpose to achieve specific outcomes. They start to use ICT to develop their ideas and record their creative work. They become familiar with hardware and software.

and identifies four attainment targets:

- finding things out
- developing ideas and making things happen
- exchanging and sharing information
- reviewing, modifying and evaluating work as it progresses.
5. Aims and Objectives

The aim of this research is:

- to study the impact of socio-economic disadvantage on pre-school children’s development of ICT competences.

More specifically, we set out:

- to explore the range of children’s interactions with ICT among disadvantaged and more affluent families;
- to map links between children’s home use of ICT and their use of ICT in pre-school settings, and;
- to investigate teachers’ perceptions of ICT competences on entry to school.

In the course of the research, we identified six questions to be answered by the study:

1. What technical competences with ICT are children developing at home?
2. What cultural competences with ICT are children developing at home?
3. What learning competences with ICT are children developing at home?
4. Does socio-economic disadvantage make a difference?
5. What links can be made between home and pre-school practices?
6. What are the primary school’s expectations?

Although the overall aim of this study is ambitious, it is important to acknowledge the small scale of the study. As section 1.1 makes clear, the research is based on case studies of 16 children and their families, drawn from eight nurseries in central Scotland. We conceptualise this research as a scoping study to identify some of the key issues and we do not claim that we can generalise beyond this sample. Nevertheless, Section 8 (Discussion) indicates some of the issues that we identify as likely to be of more widespread importance.
6. Research Design

6.1 Data collection
The research design for this study was developed to capitalise and build on that of Interplay, which is based in eight nurseries, in two local authorities in central Scotland. In the course of Interplay, data is collected via interview and discussion with the pre-school practitioners, and observations of the children’s use of ICT equipment in the nurseries. The eight participating nurseries were selected by representatives of the two authorities, on the basis of a number of criteria. These included an interest in ICT and a willingness to participate in the study, but also the importance of representing a range of types of provision, and of including nurseries serving areas of disadvantage in the authority.

In addition to the data collected for Interplay, this study involved:

- a survey of all families with children aged 3 to 5, attending the eight nurseries;
- case studies of 16 families, selected from the survey respondents: eight of the families were defined as ‘disadvantaged’, having an annual net income of under £8 500 and/ or other circumstances which would be likely to make life difficult (e.g. none of the adults in the family were employed; one or both parents disabled), while eight families were defined as ‘affluent’, having an annual net income of over £20 000 and no reported adverse circumstances;
- interviews with staff from four of the primary schools which some of the children from the project nurseries were likely to attend.

6.1.1 The survey
In October 2003, questionnaires were sent to all the families of children aged between three and five years old at the eight pre-schools. Of the 405 questionnaires distributed, 204 were returned, a completion rate of 50%. We asked the families what technologies they had at home, and whether their pre-school age children made use of these technologies. We also asked if the children used the technologies on their own, or whether they needed help or supervision by adults.

6.1.2 The case studies
Respondents to the questionnaire were asked to volunteer to participate further in the study, and approximately 40 did so. It was made clear that further participation would be rewarded by store vouchers, which were given to the participating families just before Christmas. Participants were selected to fit the criteria of ‘disadvantaged’ or ‘affluent’ set out above. In addition, we aimed to include an equal number of families from the two authorities, an equal number of pre-school girls and boys, and an equal number of three- and four-year olds across the sample. Table 6a shows the distributions of these characteristics.
Each case-study family was visited twice, once in November or December 2003, and once in January or February, 2004. Two researchers visited each time, in part because it was sometimes necessary for one researcher to entertain the child in order for the other to talk to the parents, but also because it was found that this generated richer data: different researchers noticed different things in the course of the visits, and in some cases it was possible for one researcher to conduct an extended interview with a parent while the other engaged in sustained observation of the child’s activities with ICT.

In between the first and second visits, the families were asked to complete a week long diary providing details of activities involving ICT in which their child had participated, and also to take photographs showing the children taking part in such activities. The diaries and the photographs were used mainly as stimuli for the second round of interviews, and proved to be a successful method of engaging parents and the children themselves in the discussion. As Christmas fell between the two visits, many families acquired new ICT items at this time, and parents drew our attention to the ways in which these had enabled their children to develop new competences or build on those which they had discussed with us during the first visit.

6.1.3 Primary staff interviews
We interviewed a member of staff in each of four primary schools associated with four of the eight nurseries. There were two schools in each authority. In each case the member of staff interviewed was either the headteacher or a member of staff with particular responsibility for ICT in the school. These interviews focused on primary school teachers’ expectations of children’s ICT competences as they enter school, their knowledge of children’s ICT experiences at nursery and at home, and what they expected to children to learn about ICT in the course of their first year of primary school. We also asked them whether they believed that there was a digital divide, and if so, how primary schools might combat this.
6.2 Analysis

6.2.1 Survey data
Analysis of the survey data was conducted using SPSS to generate frequencies and cross-tabulations of the data, focusing in particular on differences between disadvantaged and more affluent families, and on differences between families in which the relevant child was either a boy or a girl.

6.2.2 Case study data
The case study data consist of a number of items. The discussions which took place during our visits were recorded on tape. These have not been transcribed conventionally, in most cases, but written up as summaries of the issues raised, based on subsequent replaying of the tapes, in conjunction with the researchers’ recollections of their visits. Thus the summaries contain not only an account of the discussions, but also, for example, notes on children’s activities while the discussion was taking place. These data are very rich and have raised a wide variety of issues, summarised in the section on findings (Section 7). In addition, we have the photographs and diaries which parents compiled between the visits. Their principal function was to act as a stimulus to the second round of interviews, and therefore these data have not been separately analysed.

Analysis of the visit summaries has been based on iterative content analysis, shaped initially by our literature review and subsequently by categories emerging from the data themselves, through extensive discussion amongst the researchers, drawing on perspectives which are both multiple (because different researchers visited different families) and shared (because there were always two researchers on any one visit).

6.2.3 Pre-school and primary staff interviews
Interviews with staff in primary schools and with pre-school practitioners were audio-recorded and transcribed in full. The starting point for the content analysis of both sets of practitioner interviews was the framework of questions posed. Responses were considered first within the framework before they were searched for additional categories of interest or emerging concerns not anticipated by the interviewers.
7. Findings

7.1 Introduction
In seeking to establish whether socio-economic disadvantage has an impact on pre-school children’s development of ICT competences, it is necessary to consider what kinds of competences pre-school children are developing, or might develop. We identified three types of competence: technical, cultural and learning. The first part of this chapter (Section 7.2) examines in more detail our findings in relation to each of these competences. In the second part (7.3), we consider whether socio-economic disadvantage makes a difference to the development of these competences; and in the third part (7.4), we address the links between home practices and those of the pre-school settings and primary schools.

7.2 Developing ICT competences in the home

7.2.1 Technical competences
Technical competences include the ability to switch ICT items on and off and to conduct other operations necessary for the desired activity (e.g. rewinding a tape, finding and opening games stored on a computer, dialling a number on a mobile phone). They also include the application of knowledge about how games or other applications work, whether instructions for specific games which have been learned and internalised, or a more general ability to apply knowledge derived from earlier experiences to new experiences (e.g. when playing a game for the first time).

The technical competences demanded by different ICT items vary considerably, but regardless of the type of technology concerned, we found that children’s acquisition of these competences is dependent on

- whether they have access to particular types of technology, and whether this access is open or restricted;
- whether the technologies to which they have access are appropriate for their age; and
- whether their parents or other family members or friends are willing and able to teach them how to use the technologies, and to support the children as they learn to use them.

Each of these conditions is discussed in more detail below.
Access

Our survey data show that all or almost all respondents, regardless of income, possessed TVs, videos and CD or cassette players, while over four fifths owned mobile phones and computers. These, then, are the technologies most accessible to children. Figure 1 summarises our survey findings about the range of technologies families have at home.

Figure 1: Family ownership of technological items

From our case study data, we found that young children have open access to certain items, but that access to other items may be restricted or prohibited. Restriction appears to depend to a great extent on the value or the newness of the equipment. For example, case-study parents tended to be unconcerned about their children using TV and video players, but some did not allow them to use remote controls for satellite channels, or to insert or play DVDs without supervision, in case the equipment got broken or the channelling system was scrambled. Most case-study parents with mobile phones locked them to ensure that children did not use them when unsupervised, though some had taught children how to use the speed dial function so that they could call friends and relatives. Children’s ability to use ICT items thus depends not only on whether these items are available in the home, but also on the degree of access permitted by parents.

Age-appropriate technology

In some cases, parents explained their policies of restricted access on the basis that they did not think certain items were appropriate for children of pre-school age. These views were expressed not only in relation to adult-owned items such as mobile phones, video-cameras, etc. but also to items such as games consoles or hand-held electronic games, seen as more appropriate for older children. The case study data suggest that while parents may invoke age appropriateness to protect valuable equipment that may not, in fact, be beyond their child’s competence (e.g. remote controls), many games items are technically challenging for children of this age. However, games manufacturers seem to be becoming more aware of the interests and abilities of pre-school children. We
encountered special controls geared to the motor skills of young children, and electronic games based on cartoons or TV programmes aimed at very young children, and involving very simple, but apparently engaging, tasks. In these circumstances, some children become enthusiastic game players.

**Support for learning to use ICT**
Most of the children in our case studies had already learned how to use battery operated toys and the basic controls for items such as TVs or CD players. They could – and did – use these independently, when access was unrestricted. Parents, older siblings and other friends and relatives played a key role in enabling young children to learn to use more complex ICT items. For example, some parents were in the process of teaching their children how to use computers: we observed a parent showing a child how to click a mouse, and how to close down a computer correctly. One or two of the case-study children were using adult computers with some (sometimes very limited) adult supervision. These children could switch computers on, find the games or activities they wanted to play, play the games (using a mouse or other peripherals) and print out drawings or other outcomes of their work virtually without help. However, many of the children needed someone to explain the instructions for games the first time, as these tend to be written and therefore inaccessible to children who cannot read. Once they understood the rules of the game, they could play independently. Some games designed for young children provide oral instructions – and in these cases, children needed considerably less help from parents, although they sometimes had to be reminded to listen to and follow the instructions.

7.2.2 Cultural competences
Cultural competences entail an understanding of the roles which ICT plays in society and an ability to harness ICT for a range of social and cultural purposes. Children’s understanding of the social roles of ICT may derive from their experiences in the home, in their communities, and at pre-school, and perhaps also from books, films and TV programmes. These experiences may have introduced them, for example, to the communicative role of ICT, its role in facilitating a range of work-related tasks, to its potential to support self-expression, and to its entertainment role.

We summarise here our findings in relation to these first four roles. Learning, which is of particular significance for young children, is addressed in the following subsection.

**Communication**
All of our case-study children were exposed to the role of ICT in supporting communication at a distance, with family and friends, mainly by telephone (land-line and mobile), and from ‘familiar strangers’ such as TV presenters, newsreaders, etc. Some children also had experience of email and other internet based communication, including the use of web-cams. In their imaginative play, particularly in the nursery, they were encouraged to use toy telephones (of both types). However, most children of this age seem to have limited opportunities to use real equipment themselves, for a variety of reasons. As noted earlier, parents tried to keep a careful eye on their telephones (e.g. keeping their mobile phones locked), to prevent children from making accidental calls,
running up large bills inadvertently or making nuisance calls. Some children’s parents used email to communicate with distant friends or for work purposes, although in these cases too, it seemed that young children are not particularly encouraged to use this medium themselves, presumably because of their lack of reading and writing skills. In some families, parents were helping their children learn how to communicate via ICT, for example by dialling the telephone numbers of friends or relatives themselves and letting children speak, or by allowing them to use the speed dial function to call listed contacts. One family had installed a web-cam in order to communicate with relatives in the USA, and had encouraged their son to develop a relationship with them in this way.

**Work**

Although the children in our study are too young to make use of ICT for work purposes, they see adults and older children use ICT to facilitate work tasks in the home and in the community, in a variety of contexts. In the home, washing machines, dishwashers, microwaves and other programmable machines are commonplace; and several of the children (mainly girls) had toy versions of such machines, to use as props for imaginative play. One boy was learning to use the washing machine (see Section 7.3). Similarly, children see cash registers and bar code scanners used when shopping with their parents, and some had toy versions to play with at home or in pre-school.

Some children’s parents worked from home, using computers for a variety of work purposes, including reading and sending email and using the internet to research topics for work purposes. These children are thus familiar with the notion that computers are used in work contexts, but may not have a very detailed idea of the range of technologies in use, or their functions. Their seeming lack of awareness may be connected to the relatively undeveloped potential of ICT to convey information in an appropriate form for young children. The internet and other information-bearing technologies such as CD-ROMs are difficult for children to access because of their reliance on the written word, despite the potential of these media to use other forms. However, children’s interest in wildlife documentaries on TV was noted by several parents, and it seems likely that TV and other technologies which habitually present information in visual form (such as videos and DVDs) are the most obvious ICT-based sources of information for children of this age.

**Self-expression**

An important function of ICT in the family context is in recording family events and allowing these to be reviewed or replayed subsequently. Traditional and digital cameras (still and video) play a key role in this context. Some of the case-study families had highly developed practices in this regard, while others had little interest in such activities. Almost from birth, the majority of our case study children had experience of others taking photographs or videos of them, and of these being displayed or played back at a later date. As these children grew older, they became increasingly interested in seeing themselves as babies, and remembering family events, such as Christmas or birthday gatherings, holidays, etc.
However, young children rarely took photographs or videos themselves. The equipment was regarded as too fragile for them to handle and too complicated for them to use. Traditional cameras also pose the problem of wasted film and associated costs. But the case-studies provided some evidence of changing attitudes as parents became more familiar with the equipment and particularly with the ‘infinite’ capacity of digital cameras to take photographs which can be instantly discarded if valueless. Some of the children in our study had been allowed to use mobile phone cameras and other types of photographic equipment.

Entertainment
Our data indicate that ICT fulfils a very wide range of entertainment functions for children in the case study families. Television, video and DVD players are virtually universal features in the homes of the children in our case-studies, and all the children had extensive experience of watching TV programmes, cartoons and films on screen. They also listen to music, particularly nursery rhymes and other songs aimed specifically at young children. Some children have their own tape or CD players at home, and have collections of cassettes or DVDs (in addition to access to the collections of other family members). Learning songs and singing along with the presenter is also a feature of children’s TV programmes and videos or DVDs. Several families possessed cassette players with microphones, which enable children to sing along, and in one family, a full-sized karaoke machine had been purchased as a Christmas present for the four year old boy participating in the study.

The range of computer and video game playing equipment which families possess differs considerably from household to household and, as a consequence, the opportunities which children have to play games, and the kinds of games they play, are very varied. In this context, young children with older siblings or, on occasion, fathers who retain an interest in game playing, are privileged compared with those who are the oldest children in the family and those whose parents are not interested in game playing. This kind of equipment is very rarely bought specifically for children of this age, and therefore, to gain expertise, young children need to have access to equipment belonging to others, and support in learning how to play games from older and more experienced family members.

7.2.3 Learning competences
Learning competences are an important subset of the cultural function of ICT, given the high level of interest among parents and educationalists (and commercial companies) in the potential of ICT for enhancing learning among pre-school and school-aged children. Perhaps the most obvious area in which ICT is expected to support young children’s learning is in relation to early literacy and numeracy, but, in the course of the research, we also identified the potential of these technologies to support children’s communication skills, musical development, and learning how to learn.

Literacy and numeracy
Parents saw one of the main educational functions of a range of ICT items as being to support children’s development of early literacy and numeracy skills. The items which are primarily associated with this type of activity are ‘mini computers’, LeapPads and
certain types of computer games. ‘Mini computers’, toy laptops, etc. seem mainly focused on literacy type activities, perhaps because of their dependence on alphabetic keyboards as the main interface. On the basis of what we have observed in this study, the activities they presented did not seem particularly suitable for children of pre-school age, because they assumed a certain pre-existing level of literacy which few of the children possessed. As they could not read, playing the games tended to involve pressing letters at random until the right answer was achieved, or else they asked parents or older siblings for answers. In some cases, however, the mini computer was reported as having stimulated a desire to learn to read and write. Certain computer games and similar games on children’s websites or on interactive TV sites for children were similarly overtly designed to teach literacy and numeracy skills. The examples we saw of computer games specifically aimed at children of this age seemed more appropriate than those on the mini-laptops.

LeapPads involve the use of special books and cartridges from which children can choose a range of activities, activated by the use of a special pen. These activities largely involve hearing the text read aloud, or basic numeracy work. Children who possessed LeapPads were said to be enthusiastic users, and parents were convinced of their educational value. However, the researchers found it difficult to establish the extent to which children were acquiring literacy or numeracy skills from these activities.

Communication skills
ICT often acts as a stimulus to children’s imaginative play, seen as important in developing communication skills and an understanding of drama and narrative. On several of the home visits, we encountered children who liked to dress up as fairy-tale or comic book heroines and heroes. Often, the stimulus to this type of activity came via television programmes or films, and these children possessed dressing-up clothes which had specific links to such films. Sometimes they re-enacted scenes from programmes or films. Sometimes they invented new adventures for their favourite characters. Another similar form of imaginative play was stimulated by toy versions of ICT items.

Toy telephones (land-line and mobile), cash-registers, bar-code scanners, cameras, etc. can also become props in a range of imaginative games, enabling children to represent the role which such items play in people’s lives. Old or toy computers seemed most often to be used in imaginative games about school, perhaps indicating that children of this age are already keenly aware of the place of computers in educational environments.

Musical development
Music is a prominent feature of many of the ICT-related activities in which young children engage. For example, in the diaries parents completed for us of their children’s activities over a week, a number noted that their children had learned from children’s programmes to sing a song. Some children had dance-mats, which can be connected either to a TV or to a computer, so that children can dance, following visual instructions. It is also possible to compose tunes, by stepping on different squares on the mat. Tunes are stored by the mat and can replayed. Among our case-study families, dance-mats had
been bought for girls, although boys in those families were reported to enjoy playing with them too.

Children had a variety of toy musical instruments at home, some acoustic and some electronic, the latter including keyboards, guitars and violins. We did not observe children playing any of these instruments on our visits, though one child was photographed playing a toy guitar. None of the children were reported to be having any formal instruction in learning to play musical instruments of any kind, nor did parents mention providing any informal support or tuition.

Learning to learn
Certain ICT items support the development of learning skills per se. From the case studies, this was most apparent from some children’s computer game play experiences, where some children had acquired not only the technical skills needed to play games but had also learned about listening to instructions and acting on them (valuable skills for starting school). These children were also reported to be able to spend long periods of time on games (over an hour in some cases), suggesting that game play may support the development of skills of concentration.

7.3 Does socio-economic disadvantage make a difference?
In reporting our findings on developing ICT competences among pre-school children in the previous section, we have not differentiated between children from disadvantaged and more affluent families. In this section we present our findings in relation to four issues raised by the literature on socio-economic and educational disadvantage, and on the digital divide:

- the impact of low income;
- the impact of parents’ educational backgrounds and experiences with ICT;
- the impact of social exclusion and quality of life factors;
- the impact of cultural difference.

As we saw in the introduction to this report (Section 3), a number of earlier commentaries on these issues have called for more qualitative work in order to understand them more fully. Although our study is limited in scope and therefore cannot be regarded as providing definitive answers, its value lies in establishing the complexity of these issues, partly because of the wide range of variables to be taken into account, and partly because there is, as yet, no established view on the ‘ideal’ or most ‘appropriate’ model of a home environment which supports the development of early ICT competences.

7.3.1 The impact of low income
It is clear that families on low incomes have less money to spend on ICT items than more affluent families. In line with previous surveys, our own survey data show statistically significant differences between disadvantaged and more affluent families in relation to ownership of items such as mobile phones, cameras of all kinds, and computers, and also in relation to internet access. From our case study data, we came across several examples,
among the disadvantaged families, of the need to make difficult choices in relation to ICT: one family with a limited budget swapped their computer for a car; while a lone mother, seeking work now that her daughter was about to start school, had to decide whether a computer or a car would be more useful. We also found that disadvantaged families tended to have older equipment than those who are more affluent, that they acquired much of their technology second-hand, and that they often purchased software for their children on the basis of cost rather than content.

However, we also found that some people were very resourceful in overcoming some of the financial barriers which might have limited access to ICT. They were highly knowledgeable about potential sources of second hand ICT equipment, visiting car boot sales, swapping items with friends and neighbours and possibly, on occasion, acquiring goods which had fallen off the backs of lorries. The resourceful families were then using ICT to save money, by comparing prices on-line, or by accessing a much wider network of second-hand suppliers than was possible locally – not only for ICT equipment but for a wide range of needs. They had learned to minimise the costs of internet access by seeking out deals which provided free or very reduced rates at certain times of day, and ensuring that they used the internet only during those periods, or by accessing the internet from libraries or community centres.

7.3.2 The impact of parents’ educational backgrounds and experiences with ICT

There are clear differences in the educational backgrounds of the parents from the disadvantaged families in our study, compared with the parents from the affluent families. Among the disadvantaged families, two had no qualifications at all; in five families, the highest qualification was Standard Grade (similar to GCSE) or equivalent; and only one parent had any Highers. None had a university degree or professional qualifications. In contrast, in only one of the affluent families were the highest qualifications reported to be O-Grades (the examinations which preceded Standard Grades); in five of the families, both parents had at least a first degree or equivalent qualification; while the other two families, parents reported Highers, A-levels or equivalent, and professional qualifications.

There were also differences in their experiences of using ICT, for work or leisure purposes - in particular their use of computers, email and internet facilities. Among the disadvantaged families, only one parent used ICT for work purposes (he ran a small business from home, over the internet). Another father was interested in ICT, though he did not use it at work: in addition to being a keen PlayStation player, he was learning to build computers from second hand parts, and encouraged his children to join in this activity. None of the mothers were working, nor had they used ICT when working in the past, but three were currently on part-time college courses which included some basic training in word-processing, email and internet use. One of the mothers was an enthusiastic user of ICT at home, particularly of email and the internet, but the others seemed less confident or uninterested.

In contrast, the parents of the more affluent families had much more extensive day-to-day interaction with ICT. Six of the eight fathers used computers at work and all used home
computers for work purposes, for shopping and/or for other leisure purposes. Four of the mothers were working part-time, though none mentioned using ICT in the workplace, and only one of the eight had had a job in the past (for a computer company) in which ICT would have played a key role. However, all had basic computing skills and were able to help their children learn to use various ICT items. Several mothers were very enthusiastic users of email, the internet, chat facilities and webcams; but two were more ambivalent, making little use of ICT themselves, and seeking to restrict their children’s access to ICT of various kinds because they believed that too much activity of this kind was damaging for young children.

It seems likely that parents’ educational backgrounds – and in particular their own experiences of using ICT – have an impact on the opportunities available to their children at home. Examples from our case studies include a disadvantaged family which disconnected their computer from the internet because they did not know how to use it, and seemed unable to get help; and another family where the lone mother had no experience of using computers and was therefore unable to help her daughter learn to use equipment which they had in the house. In contrast, among the more affluent families, we encountered families with considerable experience and sometimes specialised skills: for example, a father who was an architect had installed some basic computer-assisted design software on his four-year old son’s computer and taught him to use this; and several parents who were competent internet users and encouraged their young children to take part in internet-facilitated activities.

However, although the lowest levels of knowledge and experience were found among the disadvantaged families, some of the most enthusiastic users of ICT were also in this group. Some members of disadvantaged families possessed high levels of technical competence and others knew people who could help them to resolve the technical problems to which second hand equipment (particularly equipment which comes without instructions) may be prone. It is possible that the enforced greater self-sufficiency of such families may mean that their children develop more sophisticated technical competences than children who live in families with the latest equipment and service contracts.

7.3.3 The impact of social exclusion and quality of life factors

Commentators on socio-economic disadvantage argue that low income is only one of a number of factors contributing to disadvantage. Social exclusion and quality of life are also influential, although they do not always correlate directly with income. Our study suggests that such factors can have an impact on young children’s experiences of using ICT, though there were limits to the researchers’ ability to raise questions about social exclusion and quality of life in our interviews with parents. We observed, for example, that the four disadvantaged families which were headed by lone mothers, and particularly the two families where the lone mothers were very young, had the lowest incomes of all the disadvantaged families, and it seemed that the mothers were more isolated from the local community than was the case with the other, two-parent families. These were also the families where the children’s ICT opportunities were the most limited.
Similarly, the facilities available to the wider community are likely to influence quality of life. In one village, inhabited by three of the disadvantaged families, a community centre with computer and internet facilities had recently closed down. This represented not only the loss of material resources but also of opportunities to learn to use these technologies and for knowledgeable support if things went wrong, whether at the community centre or with home equipment. These factors do not only affect disadvantaged families (though they are more likely to be affected). In another village, inhabited by one of our more affluent families, broadband was unavailable and internet connections via conventional telephone lines were slow and unreliable, to the great frustration of the family in question.

7.3.4 The impact of cultural difference
On the basis of our case study data, it is not easy to identify cultural differences between the two groups of children. Each child has a wide range of experiences with ICT, and these differ from one family to another, so that it is difficult to make direct comparisons between the two groups. For example, although all the children had extensive experience of watching children’s programmes, cartoons and films, they did not necessarily watch the same programmes. They might (at different times) prefer watching new programmes on TV or rewatching for the 100th time, a favourite video or DVD. Their behaviour while watching also varied from total absorption (which might be interpreted as ‘passive viewing’) to high levels of interaction – or alternatively, they might be ‘watching’ a video in order to fall asleep. All of these behaviours have cultural implications, but each child demonstrates different combinations at any one time, and also over time, given that they are at an age at which socio-cultural development is very rapid, so that it is not possible to attribute their behaviour to socio-economic status.

It is perhaps easier to identify cultural differences between the two groups of parents. As we noted earlier, the groups of parents differ not only in terms of income, but also in terms of educational background and in terms of the kind of work they do. These differences may have implications for the cultural environments in which their children are growing up, but we do not have enough information to be able to comment on these.

7.4 Links to pre-school and primary school practice
To what extent are pre-school and primary school staff aware of children’s home experiences with ICT, and how do they seek to build on these? In this section, we look first at the evidence from our linked study, Interplay, concerning children’s experiences generally with ICT in pre-school settings, and then at the ways in which links can be made between home and pre-school experiences. We then address the issues arising as children transfer from pre-school to primary school.

7.4.1 ICT in pre-school
Practitioners do not generally define ICT as broadly as in this study, tending to view it principally in terms of computers and printers, even at sites where they use items such as digital cameras and tape recorders. Based on the Interplay settings and findings from our earlier study (Stephen and Plowman, 2003), one or more computers are present in all
nurseries, although not always in working order. Both PCs and Macs are used, ranging in age from brand new to many years old. The computer is typically placed in the main activity room along with a range of other resources such as a water tray, nature table or book display. Children are offered daily opportunities to use a computer during free-play periods but scheduled practitioner-directed time at a computer is unusual. Most sites have access to the internet from the office but it is unusual for children to use the internet. All settings have access to television, video and audio equipment and digital cameras are becoming more widespread.

Among the pre-school practitioners interviewed for *Interplay*, the use of ICT resources was viewed as a normal and welcome part of the activities that they expected to provide in the playroom. Much of their concern was with the children’s use of desktop computers but they also referred to children using audio tape players to listen to (though seldom to record) stories and music and, in some cases, to their use of digital cameras to record and recall playroom events. In the nurseries attended by the children involved in this study (as in most pre-school settings) computer play was an activity offered in free play but was not part of the learning experiences offered in the brief small group, adult-directed times. Television and video were used sparingly, generally only when children remain beyond the normal two hours of the pre-school education sessions (e.g. if they stayed over lunch time or perhaps until 5pm).

The practitioners recognised that most children were enthusiastic about the use of ICT, particularly the playroom computer, although they were aware of some children who were not attracted to the computer. This lack of attraction was ascribed to personal preferences in some cases, but also to individual children using a computer at home and choosing to be ‘busy with other things in nursery’. Playroom staff expressed concern for the place of ICT in the balance of the curriculum experienced by each child, as they do for any curriculum area or activity. Reluctant computer users are encouraged to take part while others who want to spend long and frequent periods playing with the computer are invited to participate in other activities.

Children’s developing technical competences (especially the use of the computer mouse) were commented on by practitioners. In addition, they mentioned developing social skills prompted by interactions around the computer, for instance, taking turns and working co-operatively. However, some practitioners were concerned that playing computer games could be a solitary activity that minimised the socialising contact with other children which they saw as fundamental to the purpose of nursery education.

### 7.4.2 Linking home and pre-school experiences

Practitioners talked about sharing any especially noteworthy technical competences that a child developed, or interest in computer use more generally, with parents and primary school practitioners through child’s profile document. Any knowledge of children’s ICT experiences at home was gathered informally during the induction period, the daily contact with parents and from conversations with children. Some, but not all, practitioners commented on the greater confidence demonstrated by children who use computers at home, arguing that these children were better able to operate the mouse and
access and exit programmes. Nevertheless, practitioners tended to consider home use of computers and electronic games to be qualitatively different from the computer play offered in nursery. Some expressed explicit concern over the length of time that children spend watching television or playing computer games at home and talked of offering advice to parents about restricting the time that children spend viewing or playing with ICT as well as recommending particular software or programmes.

7.4.3 Transferring to primary school
The value of developing technical competences with ICT in pre-school before transferring to primary school was widely acknowledged by our respondents. They argued that, as children would have to be able to use a computer readily to succeed in the primary classroom, those who had acquired technical skills, ways of working co-operatively and confidence in using technology were advantaged as they started school. Indeed, some practitioners argued that this early experience was important for life not just primary education.

Primary schools receive written information from children’s pre-school settings and many are also able to learn about the children who are about to begin school through informal discussions with nursery practitioners and visits to pre-school provision. Despite all of these sources of information being available to the schools where we conducted interviews, there was an apparent low level of both interest in and awareness of children’s ICT experiences in pre-school. The transition records used typically pay little specific attention to ICT although they might note a child’s special interest in using the computer much as they would an interest in construction or physical play. A low level of interest in or awareness of specific aspects of the pre-school curriculum among primary school staff is not uncommon (Stephen and Cope, 2003). Primary school teachers often refer to very basic life skills as all they expect from new entrants and to their preference for making their own judgements about children’s competences.

When primary school teachers were aware of children being introduced to specific skills in nursery provision (e.g. one nursery class was involved in an intervention targeted at use of tape players for stories) then they would expect children to have some technical competence that could be built on in school. All of the primary schools where we interviewed staff had a structured programme designed to extend children’s ICT skills (very largely computer based) across the years of primary education in order to reach the attainment expectations set nationally.

There was one exception to the general lack of expectations about ICT competences and previous experience. One of the primary school teachers interviewed had some precise expectations: ability to use a TV remote and change channel; use a mobile phone; put on a tape to play a story (but not necessarily to rewind or fast forward); access a CD ROM; play games on a mobile phone or games console if helped by adults or older siblings; be familiar with a PC (use of the mouse, CD ROMs linked to curricular work); use a digital camera to take photographs; interact with a roamer. However, it was clear that, apart from using games with adults and siblings, all these expectations were based on a detailed
knowledge of the children’s experiences in the nursery class attached to the primary school.
In every case the primary school practitioners’ knowledge of any computer or other ICT experience at home was anecdotal and usually the result of casual conversation with a parent or child. Each of our respondents was aware of the socio-economic status of the families whose children attended their school and this influenced their judgements about home experiences of ICT and their awareness of what one respondent described as not so much a digital divide as a ‘financial divide’. For instance, one of the teachers said that as many of the parents were single mothers ‘they don’t have that sort of thing’, although some would like to have ICT resources. For some, the divide was principally financial:

> It is where parents don’t have £1000 to splash out on a computer system at Christmas. … Where there is a little bit more money around, for parents [ICT] is a higher priority.

But others identified also a divide in opportunities and experiences:

> In a predominantly professional sort of catchment area parents are often out working perhaps in professions and they use computers themselves and there is one at home or they are bringing a work place laptop home [so their] children are getting experience that not all children are.

Another respondent suggested that some ‘poorer’ homes did have computers but that they ‘do different things with them’.

At two schools the practitioners referred to ways in which they try to widen the opportunities that children have for access to a computer if they do not have one at home. One school ran an ICT club after school and ensured equitable access, although this was only available to the oldest children in the school. Elsewhere they adopted a more ad hoc approach, suggesting the use of library computers for project research for example.

Our school respondents shared a focus on school ICT experiences as opportunities to acquire technical, data handling and research skills. Although the use of email to friends was mentioned at one school the communication function was not the dominant use of ICT, nor was the use of a computer to facilitate learning in particular curricular areas. One respondent described how new facilities would allow some straightforward teaching, how to set up a spreadsheet, how to navigate around a computer.

This focus on computer use for specific tasks that necessitate the acquisition of particular computer skills or competence with specified functions relates to the primary school respondents’ perspectives on what they generally assume to be the most frequent encounters that children have with ICT outside educational settings, that is, playing games. Although perhaps expressed more stridently than most, the perspective of one head teacher appears to represent a widely held view among educational practitioners:
I wouldn’t say they were learning computer skills, they are only playing games and pressing buttons and shooting people . . . They are not to my mind increasing their computer skills . . . I don’t really count that . . . So the school [perspective] is about computer skills? Yes I would say so - for the work place.
8. Discussion

8.1 Introduction
To what extent will children be able to make use of the ICT competences they have developed at home when they start primary school? The discussion in this chapter focuses on two issues:

- policy and practice in pre-school and the first years of primary school;
- potential for disadvantage to develop or become exacerbated.

8.2 ICT policy and practice in pre-school and the early years of primary school

8.2.1 Taking account of children’s home experiences
As noted in Section 4, Scotland and England both recognise the need for pre-school practitioners to take account of children’s home experiences with ICT. However, there is little discussion in either document either of what these might consist of, or of how practitioners might build on these experiences.

This study suggests that children’s experiences are very varied. The extent of their interaction with ICT at home ranges from the very limited – principally TV, video and music playing equipment – to opportunities to make use of a very wide range of technologies with a variety of applications. But the kinds of things which children do with the same equipment also differs considerably from one household to another. We noted in the previous section, in discussing the impact of cultural difference (7.3.4), that children in different families watch different TV programmes and that they watch them in different ways. The same is also true, for example, of the computer games they play, and the manner in which they play them.

Our findings indicate that children acquire a range of cultural competences, including learning competences, through these and other kinds of interactions with ICT. However, we have also seen that pre-school and primary staff tend to have a limited or partial awareness of children’s home experiences with ICT, and that they rarely consider their cultural or educational value. Inasmuch as these experiences were discussed at all, practitioners tended to express negative views, suggesting, for example, that children’s TV viewing should be limited, or that computer games have no relevance to educational goals. Our study has not provided examples of pre-school or primary practitioners exploring children’s existing competences or setting out to build on these.

8.2.2 Supporting children’s learning with ICT
In addition to making mention of the importance of taking account of children’s home experiences with ICT, the Scottish and English policy documents imply a twin focus in children’s developing competences, particularly as they begin school: learning about ICT (e.g. the uses of everyday technology); and learning with ICT. As children move from pre-school to primary school, the emphasis in the documents appears to move from a
wider to a narrower definition of ICT (i.e. the main focus in schools is on computers) and, though the twin focus is retained, the emphasis appears to be on learning with ICT. In this regard, the English document identifies four attainment targets, and the Scottish document seven strands, as set out in Table 8a.

**Table 8a: ICT goals identified in English and Scottish policy documents**

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<th>England Programme of Study for ICT: KS1</th>
<th>Scotland Information and Communication 5-14</th>
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<td>1. developing ideas and making things happen</td>
<td>1. use of the technology</td>
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<td>2. finding things out</td>
<td>2. creating and presenting ideas</td>
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<td>3. exchanging and sharing information</td>
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<td>4. reviewing, modifying and evaluating work as it progresses</td>
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The experiences with ICT at home described in our Findings section can be seen as relating to these goals in various ways. As an example, we consider here the competences children may have already developed in relation to information handling (point 2 of the English goals listed above; points 3 and 4 in the Scottish list) and the implications for schools.

We have seen that young children have some experiences of finding things out via ICT, but that this tends to be via oral and visual presentations of information (e.g. wild-life documentaries), because of the lack of literacy skills among children of this age. Nevertheless, it is likely that some children are developing more sophisticated skills in this regard, with the support of children’s TV presenters who encourage them to look out for information in the programme they are about to watch and then to answer questions subsequently, or to develop their ability to discover visual clues through programmes such as *Dora the Explorer*\(^1\) which were popular with several of the children in our study. In addition, some children are becoming familiar with websites, usually those linked to their favourite TV programmes, films or toys, and in their exploration of these sites, may be learning the conventions of such sites (e.g. clicking on highlighted sections). Teachers could build on these skills if they were aware of them. In particular, the sophistication with which some children may approach visual material, as a result of their home experiences, raises interesting questions about the nature of the information sources to which they have access at school. Traditionally, children have learned search and research schools from books, and through training in ‘library’ skills, where literacy rather

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1 This is an American programme in which children follow the adventures of Dora and help her to solve a series of puzzles to which visual and oral clues are provided. Following maps is a key element in the programme. Some of the puzzles require children to learn Spanish words and phrases (as the characters are Hispanic Americans).
than ‘visuality’ tends to be privileged. As teachers move to incorporating CD-ROM or web-based material in project or other work designed to encourage children to develop research skills, to what extent do they encourage children to make full use of the multimedia resources, visual and oral as well as written? Does their practice enable children to develop these other research skills, in addition to those based on literacy?

The other goals raise similar questions. In seeking to develop children’s communication skills via ICT, do teachers take into account their existing skills with telephones (landline and mobile), with webcams, or the ways in which their imaginative play around ICT items has developed communicative competence? Or, is it the case that teachers primarily understand communication via ICT to relate to email and the construction of websites (i.e. again privileging literacy over oral and visual forms of communication)? In encouraging children to develop and present ideas or to work creatively, are they aware of their existing experiences of self-expression via still and video cameras, or of their ideas about how others create and present ideas via TV programmes and computer games? We cannot answer these questions, partly because the teachers we interviewed did not identify such possibilities when we discussed ways in which they might build on children’s home experiences, and partly because answers would require a more detailed focus on primary practice than has been possible in this study. But we suggest that further research into these possibilities is needed.

8.3 Potential for educational disadvantage
The key question we set out to address in this study is whether children with limited experiences of ICT at home are likely to be at a disadvantage when they start school.

In the short term, our findings suggest that the children who participated in our study are not likely to be particularly disadvantaged, principally because we have not found much evidence to suggest that primary schools take children’s home experiences into account, or that these are greatly valued. Much of the focus of pre-school practitioners and primary teachers appears to be on the development of basic technical skills, such as the use of a mouse or computer function keys. All of the pre-schools in our study ensured that their children had acquired these skills, whether at home, or through use of the pre-school computer, and therefore, in this very narrow sense, all the children will start primary school with the required minimum level of competence.

In the longer term, it seems likely that children’s home experiences, now and in the future, will influence their interaction with ICT at school, but in ways which are difficult to identify. Much of the debate in this area has focused on the extent to which children can or do engage in ‘school-like’ activities at home – e.g. using computers to write essays, searching for information via the internet, producing their own webpages, etc. Given that all of these activities are dependent on literacy, our study of pre-school children could not address these issues. However, we have drawn attention to the very wide range of ICT-mediated activities in which they do engage, and have suggested that some of these activities could have relevance for the kinds of goals which policy-makers
have identified for ICT at school, particularly if the multimedia potential of ICT were to be fully realised in school contexts.

Do some children have more ‘valuable’ experiences than others in this regard? Our findings indicate that some children have more opportunities than others to engage in a wide range of ICT-based activities, and that (at least) five dimensions of these opportunities can be identified:

- the range of equipment available to the child in the home or in the wider community;
- children’s interest in using this equipment;
- models which family members or others in the community provide for use of the equipment;
- family or other community members’ knowledge and expertise in using the equipment;
- family or other community members’ support in enabling children to learn to use the equipment.

We can see that there are some links between socio-economic disadvantage and limitations on these opportunities. Children from families with little money may have fewer ICT items in the house, and these may be older and of poorer quality than those to which children in more affluent families have access. Similarly, children whose family or community members have little expertise in using the equipment themselves are likely to have fewer models of interaction with ICT. But these conditions do not always cluster together: for example, disadvantaged families may have limited or less up-to-date equipment, but family members may be enthusiastic users of the ICT at their disposal and provide a supportive environment for young children to begin to develop competences in this regard. Similarly more affluent families may possess very sophisticated and expensive equipment but forbid young children to use it for fear of damage. Thus we would argue that socio-economic disadvantage need not necessarily lead to educational disadvantage in relation to ICT, though it may be more likely to do so.

This report has focused on socio-economic disadvantage primarily in terms of low income. We have not addressed other areas which potentially also have a bearing on educational disadvantage, such as gender, ethnicity and disability. On these last two categories, we have no relevant data, as our case study families happened not to include children with disabilities or from minority ethnic backgrounds.2

In relation to gender, our data suggest some issues for more further study, in two areas. Firstly, they raise the question of whether certain ICT items are associated more with one gender than the other. Games consoles, for example, seemed to be bought for male family

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2 Our survey data indicated that two of the 204 respondents were of Pakistani origin, but neither of these families volunteered to take part in the case studies. We did not collect information relating to children with disabilities but consider that this could be a fruitful area for further research, particularly as there is some discussion in our case study data about the support which ICT provided for older children with disabilities in the families which participated.
members, and to be of limited interest to girls, or their mothers. In contrast, dance-mats were seen as more attractive to girls than to boys, although young boys were reportedly keen to play with these too, when given the opportunity. The educational implications of these divisions are not clear but would benefit from further exploration. Secondly, we found that the families in our study which were headed by lone mothers had the lowest levels of ICT equipment in the home. This may be simply because these families were also those on the lowest incomes of all. It may be, as we suggested in 7.3.3, that these families, for a variety of reasons, are more socially isolated than the others and therefore, in addition to having little money to spend on such equipment, do not have access to the kinds of networks which other low income families had, enabling them to swap equipment or find out about car boot sales and other opportunities for acquiring equipment at low cost. Or it may be that men rather than women are the principal purchasers of ICT equipment for family use, and therefore in families without adult or older males, such items are not seen as particularly attractive or useful.
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