Young children engaging with technologies at home: the influence of family context

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Abstract

This paper is about with the ways in which young children engage with technological toys and resources at home and, in particular, the ways in which the family context makes a difference to young children's engagement with these technologies. The data reviewed come from family interviews and parent-recorded video of four case study children as they used specific resources: a screen-based games console designed for family use, a technology-mediated reading scheme, a child's games console and two technological 'pets'. We found the same repertoire of direct pedagogical actions across the families when they supported their children's use of the resources, yet the evidence makes it clear that the child's experience was different in each home. The paper goes on to present evidence that four dimensions of family context made a difference to children's engagement with technological toys and resources at home. We argue that understanding children's experiences with technologies at home necessitates finding out about the distinct family contexts in which they engage with the resources.

Key Words: technological toys and resources; preschool children; home, parents, family context; children's preferences

Introduction

There is a growing literature about young children's interactions with technology. The developmental appropriateness of young children engaging with computers has been the subject of considerable debate (e.g. Cuban, 2001; Alliance for Childhood, 2004; Palmer, 2006) and there is an emerging literature on internet safety issues (e.g. Ey and Cupit, 2011). Others have looked at the implications of technology use for new forms of thinking and learning and at the pedagogical practices that will support these developments e.g. Yelland et al., 2008 and Parette et al., 2009.

Ljung-Djärf et al. (2005) have looked at children's social relationships as they use technologies together.

Much of this literature has been concerned with children's experiences with technology in educational settings but there is a smaller body of evidence about how technologies are used at home. For instance, Marsh (2004) described the techno-literacy practices which preschool children developed at home as they used mobile phones and played computer games and Stephen et al. (2008) examined children's preferences and perspectives as they engaged with the technologies available at home. This paper is contributes further to our understanding about the ways in which young children engage with technological toys and resources at home and, in particular, the ways in which family context makes a difference to young children's experiences with technology designed specifically for use at home: screen-based games to play alone or with others; explicitly educational resources; and resources marketed as technological toys.

It is widely acknowledged in policy documents that parents are the child's first educator and preschool practitioners are urged to establish an effective partnership with all families in order to further learning and development (National Association for the Education of Young Children (NAEYC) 2009; National Strategies, 2007). In the academic literature too there has been a long-standing interest in the ways in which family background can contribute to children's learning outcomes in the formal learning environment of preschool or primary school (Melhuish et al, 2008; Siraj-Blatchford, 2010). Cohort studies have demonstrated how the home learning environment and the actions of parents can make a difference to longer term educational attainment (e.g. Feinstein et al, 2007; Bromley C, 2009). However, while such studies have established broad patterns and trajectories between groups of children, they cannot make predictions for individuals nor explain the elements of the learning process that are the product of local circumstances in each case (Sylva et al, 2011). This paper offers the kind of complementary qualitative approach which Sylva et al argue for;

an analysis of rich, case study data to explore the influences and processes involved in 3- to 5-year olds play and learning experiences at home.

The data described were gathered as part of *Young Children Learning with Toys and Technology*, an Economic and Social Research Council (ESRC)-funded study of preschool children playing and learning with technological resources at home. This is the latest in a series of studies of preschool children's engagement with technologies at home and in preschool settings conducted by Plowman, Stephen and McPake. From earlier work we learned that if children were to have effective encounters with technology in the preschool playroom they needed the support from adults provided by both distal and proximal scaffolding (Stephen and Plowman, 2008). In addition, we found that while access to technology at home was not dependent on socio-economic status, family circumstances, such as parents' attitudes towards and interactions with technology, did make a difference to the resources available to children and the use made of them (McPake et al, 2005; Plowman et al, 2010). We also found that parents typically underestimated their own contribution to their children's learning, believing that their 3- and 4- year olds 'picked up' their competencies with technology through incidental learning, copying and trial and error (Plowman et al, 2008). In the evidence reported here we looked at the experiences of preschool children in four case study families in order to explore the ways in which family context influenced children's encounters with specific technologies.

The paper begins with an overview of the theoretical position we have developed to understand interactions between children, their parents and learning with technology before moving on to introduce the method we employed in the study and explore the empirical data.

Theoretical Framework

This study was framed by a socio-cultural perspective on learning. The questions we posed, our methodology and the process of interpreting the data have all been influenced by our interest in the

ways in which learning is mediated through the tools and artefacts used, interactions with adults or more able peers and the culturally and historically defined social situation of the child's learning circumstances (Vygotsky, 1978; Rogoff, 2003). Hedegaard (2009) has extended this concern with the social context of learning to consider the relationship between the child and the practices of the institutions, including the home in which they are growing up. She argues that the cultural traditions of each institution are shaped by the values and beliefs of adults and also that children's interactions in any context are mediated through their motives and preferences.

In what can be characterised as a contextualist approach we have conceptualised engagements with technology as cultural activity manifest in the actions of individuals, clusters of people and everyday routines (Rönkä and Korvela, 2009). Weisner (2002) argues that development is influenced by cultural pathways or patterns of cultural activities that individuals experience and that these pathways reflect the values and expectations, resources, relationships, tasks and emotions that are implicit in the situation. Tudge, Freitas and Doucet (2009) argue that at the core of any contextualist theory of development are the typical activities of children and the others with whom they interact and that it is necessary to take account of the characteristics of the people involved and the local, cultural and temporal context, including the homes in which children live and learn. Included in their discussion of the context for learning are differences associated with social class and child-rearing practices, values and beliefs.

Tudge et al. (2006) have stressed the need for an ecologically valid approach to studying the contexts in which children live and grow across or within societies and suggest that this can best be achieved by investigating 'children's everyday activities across groups that are not maximally dissimilar' (Tudge et al., 2006, p 1449). This is the approach adopted in the case studies presented here. We aimed to extend our understanding of young children's encounters with technology at home by studying the ways in which family members are involved in learning and 'teaching' at home

as part of everyday routines and practices and to identify features of the home environment that make a difference to playing and learning with technological resources.

Study Methods

The child-orientated technologies we chose to focus on for these resource case studies were selected because we aimed to include a popular item, varied interfaces and a product explicitly marketed as promoting learning. The funding available to purchase technologies to give to each family and the time demanded to video episodes of play with each item led us to select three resources per family. The technological resources consisted of:

- Wii games console already owned by each of the four families (offers screen-based games operated through remote controls which can simulate appropriate physical actions e.g. bowling, cycle racing, fantasy adventures).

- Leap Frog Tag reading system (consisting of a book and stylus which 'reads' out the story or associated puzzles when held to the page) supplied by the research team

- technological 'pet ' or child's game console chosen by the child and parent from a range of six products offered by the researchers .

More details about the resources and the choices children made are given in Table 1.

Table 1 about here

The Wii fulfilled our desire to include a ubiquitous resource (11 of the 14 families in our main sample owned a Wii), while the Leap Frog Tag reading scheme was promoted as an aid to learning. Our earlier work had made it clear that individual children would have particular preferences among the technologies (Stephen et al, 2008). The choice we offered between several technological pets and games consoles as the third resource allowed some scope for individual preferences and added variety in the child/product interfaces.

The data presented here come from four families living in central Scotland. All of these families were already participating in *Young Children Learning with Toys and Technology* and agreed to take part in additional rounds of data collection for the resource case studies. Like all the families participating in *Young Children Learning with Toys and Technology,* they had volunteered when we invited the parents of children attending local authority nursery settings in a socially mixed small town to participate in the study. Families were invited to take part in the resource case studies on the basis that they already owned one of the items we were interested in (a Wii), were willing to take video at home in the specified time period and the children involved were comfortable with their interactions being video recorded.

To the extent that they, like most of the families taking part in *Young Children Learning with Toys and Technology*, owned a Wii the four households participating in the resource case studies can be said to be typical. However, we make no claims for representativeness for any of our case study families; our purpose was to explore the influence of family context through rich data sets. Two of the resource case study target children were girls and two were boys. At the time of the data collection, towards the end of the study, the children were aged between 4 years 9 months and 5 years 2 months. None of the four families were economically disadvantaged but there was a range of incomes across the group. Three of the families owned their own home and one lived in a privately rented home. One of the mothers was a single, working parent and in another case our main informant was the target child's grandmother who cared for him while his parents worked. One distinctive feature of this sub-sample became apparent as we collected the data. All four of the adult respondents in the resource case studies had some experience of training as an education professional. Two of the mothers had trained as secondary school teachers, although one now worked for a retail company. A third mother began to train as a preschool practitioner during our study and the grandmother involved was a retired nursery practitioner. The potential influence of these parental backgrounds is discussed below.

Each family taking part in the resource case studies was asked to record their child using each of the selected resources over a period of one week. It is this video data along with the interactions when the children were introduced to the toys and interview responses following the video sessions which constitute the evidence presented here.

The families were given detailed guidance about video recording. The research team video-recorded the conversations as they introduced the children and their parents to the new resources and audio-recorded the interview with parents about their child's use of the resources which followed the video recording week. We did not make any requests about the number of episodes to be recorded or the duration of individual episodes within the one hour of recording possible with the cameras provided by the research team. Two of the families produced over 20 video clips, most lasting for just a few minutes, while the others videoed fewer but longer episodes. In total we have 77 video episodes with an average length of 4 minutes 45 seconds. The video recordings and records of the introductory and post-recording interviews were analysed by an iterative process of systematic content analysis which began with the categorising of the pedagogic strategies and interactions observed as parents sought to support their child's use of each resource.

At the beginning of the resource case studies we asked our respondents for their written consent to participate and for their agreement that the data collected could be used in presentations and publications. The data described in this paper were gathered in the 14th month of the study, by which time the children were very familiar with the researchers who visited their homes. Nevertheless, when we engaged directly with the children we ensured their verbal assent before we began and they were of course able to withdraw from the activities at any point they chose. All the names included in this paper are pseudonyms.

Supporting learning: direct interactions

We have previously conceptualised adult support for young children's learning in terms of distal and proximal interactions (Stephen and Plowman, 2008). Proximal interactions are direct exchanges which occur when adults observe and engage with children as they engage with technological or any other resources in the playroom or at home. Distal actions are indirect activities, plans and decisions which support and influence children's actions and learning opportunities. In this section we will focus on evidence of proximal or direct interactions in the videoed episodes when the focal children, their parents, and sometimes their siblings, used the technological resources selected.

The range of direct actions taken by parents to support their children's encounters with technological toys is summarised and illustrated in Table 2. Parents' actions were multimodal, involving verbal and non-verbal responses and interventions, physical actions, cognitive activity in the form of reading and socio-emotional behaviours. This repertoire of scaffolding interactions was common across the families. Although the nature of the technologies selected by the children dictated, to some extent, the form of support parents offered, the range of pedagogic actions and interactions observed was similar across households. These ways of supporting encounters with technology also paralleled the forms of scaffolding observed amongst practitioners in preschool settings (Stephen and Plowman, 2008).

Table 2 about here

Because each family already owned a Wii and all the children had experience of using this technology, direct interactions around this resource were often focused on responding to the child's typical game choice and pattern of engagement. In particular, parents paid attention to their child's emotional response to the competitive element of the games and the likelihood of success or failure. There were instances of instruction about how to use the equipment, how to move or position their bodies and verbal feedback about ways of improving performance. Parents and siblings were seen suggesting an alternative game (likely to be more successful for the young child) or selecting an appropriate level of difficulty. Adults and older siblings sometimes had to explain the scores

obtained as the children did not always understand the numbers involved and could be uncertain about who had won or whether they were improving their results.

The boys who chose to receive a games console from the research team were already experienced users of consoles at home. Nevertheless, there were instances when they needed their parents to explain how to use the new technology (e.g. Arden's mother described the controller as 'just like the steering wheel on the Wii'). As with the Wii, parents interpreted scores and offered praise and encouragement. In most cases only one player was involved in the activities available on the games console so there was less need for emotional support to overcome frustration or disappointment caused by rivalry or disagreements with the play partners. Nevertheless, there were instances of frustration when the child was not able to use the controller successfully. Activities available on the games console included games of skill and speed (e.g. driving a car through obstacles) where parents offered support in terms of how to position the car or reflection on ways of improving performance. There were also games designed to support the development of particular areas of knowledge such as literacy and healthy eating. In these games support from parents included identifying the 'healthy choice', prompting counting to solve a number puzzle and giving clues about rhyming words.

The girls needed help with the operational features of the dogs they had chosen. This was achieved by their mothers or older siblings reading out instructions or pointing out how to use an accessory. In both cases the mothers stimulated play by posing extending questions and making suggestions about the way in which their daughter could react to the dog, e.g. taking it for a walk or putting it to bed. On one occasion Jasmine's mother joined in the play by adopting the role of nervous observer reacting to the approach of the dog. When Kelly appeared to be unsure about engaging with the dog her mother offered emotional support and checked how her daughter felt about playing with the pet ('are you scared?').

The Tag reading system was new to all four children and it was the most avowedly educational of the technological toys we asked families to include in the video episodes. The accounts of parents and

the video data suggest that it was the least likely of the case study resources to be used spontaneously by the children. Across the families parents took on a more 'teacherly' role when the children engaged with the Tag than was observed with the other technologies. They were recorded explicitly introducing the Tag resource to the children, guiding them to the interactive symbols on the page, demonstrating how to listen to the story, prompting letter recognition in the puzzles, giving the sound for an initial letter to be identified or helping to find a rhyme.

There was one difference noted between the kind of direct support for encounters with technology at home and those previously observed in the preschool playroom. More episodes of negative behaviour (e.g. frustration, unhappiness at losing in a game) were observed when children were playing with technological resources at home than had been recorded when they engaged with them in the playroom. Parents were involved in helping their children to manage their frustration when they could not compete successfully against older siblings or when the level of difficulty was not appropriate for them to tackle alone. While practitioners did offer praise and share children's positive reactions there was less likelihood that the tasks encountered at preschool would be inappropriate for 3 to 5 year olds. In the playroom there were fewer games where children competed directly against each other, a more homogeneous ability group and clear expectations about self-regulation, all of which resulted in very few instances of distress or frustration.

Although the same repertoire of direct pedagogical actions was evident in each of the four families, the videos and accounts from the parents during interviews suggested that the child's experience was different in each family context. For example, Arden often appeared to struggle to understand how to play the games on his console. On the other hand, Jasmine was a confident user of the Tag, although she only made use of a limited range of functions. Robert was often observed playing screen-based games alone while Kelly was usually engaged with the screen-games only alongside her mother or brother. We turn now to examine the indirect influence of the family contexts in which these children engaged with the resources. We will argue that, while the families shared a common

repertoire of direct actions in support of children's engagement with the case study resources, differences in the home context were an important influence on the nature of the children's encounters with technology at home.

Supporting learning: family contexts

Socio-cultural and eco-cultural models of learning have a number of elements in common, including the mediating influences of values, beliefs and preferences. Growing up in an industrialised, schooled society or a developing nation, an urban or rural setting or a more or less socially and economically advantaged family makes a difference to a child's experiences and to child-raising practices (Tudge et al., 2006). The four families who took part in our resource case studies all lived in an urban area in central Scotland. They all lived in modern houses and had a least one parent in full time employment. They had broadband access at home and each owned at least one computer and one laptop, as well as a range of other domestic and leisure technologies such as televisions and DVD players, mobile phones, Wii and other games consoles. There were some differences in the families income but none were economically disadvantaged and earlier work has suggested that there is no clear relationship between income levels and access to and use of digital technologies at home (McPake et al., 2005).

Yet despite the similarities in their socio-economic circumstances, these families provided differing contexts for their children's development and learning. The evidence gathered in this study suggests that there were four dimensions of family context that made a difference to children's encounters with technological resources at home:

- family perspective on the efficacy of technology as an educative tool

- parents' perspectives on ways of supporting young children's learning

- family interactions, the presence of siblings and other demands on parents' time.

- children's preferences and personal characteristics.

The ways in which these differences in family contexts can influence children's experiences are described below, drawing on examples from the case study families. These are summary accounts - offered here as illustrations of the ways in which specific dimensions of the family context shape children's experiences of play and learning.

Family perspectives on technology

The children's exposure to technological play and educational resources at home, the encouragement they received to make use of the technologies and the value placed on these interactions varied across the families. Jasmine Searl's mother was sceptical about the benefits for learning of technology, and technological toys in particular. While she was happy for Jasmine to select and play with the FurReal puppy Ms Searl had no expectations that this would support learning and would not have purchased the toy. She was more positive about the educative potential of the Tag, although she argued that it was better used as a tool for reinforcement and assessment than initial teaching. In contrast, Arden Bain's mother expected new understandings and skills emerging from encounters with technology to generalise to other forms of play or daily living. For example, Mrs Bain suggested that using the V.Smile Motion games console had helped Arden to learn about healthy foods and that he could transfer this into everyday life. Mrs Bain was positive about the educative potential of technological toys. She talked enthusiastically about the learning that had followed from Arden's use of a child's computer and had gone on to purchase the same product for other children she knew. Robert Johnson was a frequent and intensely involved user of games consoles and computer games. His grandmother (Mrs Johnson) tended to discount these games as a source of learning specific information. On the other hand, she did think that technology could lead to incidental learning and saw games consoles as 'a brilliant way to get boys to do letters and things'.

Parental perspectives on learning

Both Jasmine's mother and Robert's grandmother talked about the importance of appropriate timing when introducing new opportunities for learning. Mrs Johnson had a general concern that children were expected to master some cognitive competencies too early. She advocated allowing children to explore and play without adult 'interference' and talked of leaving Robert to use the computer, games consoles and other technological and traditional toys himself.

> I haven't tried to teach Robert his letters as I don't agree with that. It is better with the children's slant and then you can come in after and help . . . It is the same with play. I would never interfere with play unless I was asked. (Mrs Johnson, Round 7.1)

Ms Searl was aware of typical age and stage expectations for development and learning at preschool and school but her concern was focused more specifically on her understanding of the way in which her daughter engaged with new opportunities, arguing that if Jasmine perceived something new as too difficult then she was likely to reject it.

> She is very reluctant to try things on her own. Jasmine is adventurous but if she can't do something she will get fed up quickly and become discouraged. (Ms Searl, Round 7.1)

As a result Ms Searl only introduced new learning opportunities and resources when she felt that Jasmine was ready to respond positively and she made careful preparations to avoid negative encounters.

Learning to read was considered a school-based activity by two of the case study families. Mrs Fletcher, Kelly's mother, was confident about her ability to support her daughter's learning. For example, she ensured that Kelly could count and recognise numbers before she started school. However, she thought that learning to read was best left to the school. Arden Bain's parents saw

some kinds of learning, and reading in particular, as the distinct responsibility of the school. Reading was not something they expected Arden to work out for himself or to be engaged in before going to school.

> Mum asks if he knows any of the words the [Tag] book is saying or can write or spell them. Arden looks at Mum while she is talking to him and shakes his head saying no, he will learn these at school. Mum agrees. (Video annotation, Round 7)

Mrs Bain did not explicitly support his use of the Tag or phonics exercises on the games console. Arden was not keen to use the Tag and was observed on video failing to complete phonics tasks and turning to other activities. He had become used to experiencing difficulties with some toys, asking for help if one of his parents was available but if they were not moving on to something else. Mrs Bain was completing an early years practitioner qualification during the study. She was clear that preschool children learn through observation, exploration and practice, arguing that 'he seemed to get a lot better just with practice' and that Arden had learned to use the Wii through watching his parents. Mrs Bain was keen that he should work things out for himself and tried to avoid directly instructing or explaining unless Arden asked or became very frustrated.

> [Arden] would have been able to work it out . . . himself eventually . . . I say 'why don't you look at the symbols' and things like that, trying to make a few pointers. But he would have worked that out himself. (Mrs Bain, Round 7.2)

Robert's grandmother was now retired but had worked as a preschool practitioner and was a keen advocate of learning by exploration and experience. She had not looked at the Tag or the V.Smile Motion games console with Robert as she preferred to let him figure things out unless he asked for help. However, Mrs Johnson did acknowledge that Robert's older sister Carla was a significant and constant source of help to him when engaging with the games consoles. Carla interpreted scores,

offered suggestions about how to succeed, attempted to calm her brother and encouraged him to persist when he became frustrated with the games console.

Family interactions

Ms Searl was a single parent, a full-time secondary school teacher and studying part-time for a further teaching qualification. In order to ensure that there was space in the family's busy schedule for time together she scheduled opportunities for playing games, such as using the Wii or board games into the family routines. Jasmine's mother and older brother patiently helped her to take part in these carefully selected activities so that she could join in and enjoy success.

> Let's not talk, she does better if we don't talk (Ms Searl to Jasmine's older brother,
>
> Round 7 Video)

Ms Searl was very explicit about her desire that her children should use all resources as they were designed to be used and pay careful attention to their correct storage. She extended this concern with 'proper' use to herself too; sometimes learning how to use a new technological resource alone before introducing it to the children. When introducing a new game or technological toy Ms Searl was willing to engage in direct teaching, such as when she introduced Jasmine to the interactive features of the Tag reading tool and then 'tested' her understanding before she began to use it independently.

Arden was the oldest of three children and his access to technological toys and domestic technologies was restricted by his mother's desire to protect their resources from the destructive behaviour of his younger siblings. While Arden knew that games resulted in scores and winning and losing he seemed to have a limited understanding of these concepts and of his own competencies but was apparently reassured by his mother who did not focus on winning.

> Arden: Did I catch up?

Gail Bain: Nearly there, it was an OK time darling. (Mrs Bain reassures Arden at the

end of a Wii game, Video, Round 7)

Kelly Fletcher's mother had time to spend with her alone while her elder child was at school. Mrs Fletcher had trained as a teacher but now worked part-time as a retail co-ordinator and enjoyed the mornings she could spend with her daughter who attended preschool for afternoon sessions. Both Kelly and her brother were encouraged to play outside and socialise with other children and while this was a household with access to ample technologies they did not dominate the children's play experiences. Mrs Fletcher also actively encouraged creative and craft activities. She was a keen advocate for the benefits of imaginative play and aware that she probably encouraged this over other forms of activities for Kelly. Kelly's imaginative play received further support from her mother's extending questioning and prompting. Scenarios were suggested, props offered or made together and Kelly was encouraged to elaborate the plots/stories that she created.

[Referring to the puppy that 'Grows & Knows Your Name'] Mrs Fletcher asked Kelly

what she could do with a dog. Kelly replied that you could take it for a walk but she

had no lead. Mrs Fletcher suggested that they could make a lead and offered some

materials. (Video annotation, Round 7)

Children's preferences and characteristics

Mrs Fletcher recognised that Kelly was not very interested in technology and Kelly's play was largely with traditional toys, affording imaginative and gendered play (e.g. with dolls, Polly Pocket, Barbie).

She just loves imaginative play . . . I guess you just have to go along with what they

enjoy playing with. (Mrs Fletcher, Round 7.2)

Kelly incorporated technology into her imaginative and creative play. For instance the 'puppy' was given a role in an evolving story about a family of toys going to a ballet class. Her mother supported this by taking the side off a cardboard box 'train' to allow the puppy to fit in and later by switching

off the puppy's 'voice' when it became clear that Kelly was uncomfortable with this and that it interfered with her play. Using the Wii was not an activity that Kelly typically chose to engage with so when, at the request of the researchers, she videoed her daughter using it Mrs Fletcher paid careful attention to Kelly's affective state, asking if she was comfortable with the game, selecting games that seemed most appropriate and consulting Kelly's brother about the techniques involved as she did not regularly use the Wii herself.

The story in the Tag book did not engage Robert. His grandmother explained that he had had LeapFrog products before but they had not appealed to him. Mrs Johnson felt that he liked more active stories that allowed him to interact and input ideas. Robert frequently chose to play with technological toys but was careful about the games he selected as he was reluctant to be involved in any that he found difficult or where he struggled to succeed, a reluctance that extended to traditional toys too. There was a considerable focus on winning whenever Robert used the Wii or games console. Mrs Johnson described Robert as liking to win and said that he enjoyed scoring points and was motivated by being timed. However, when Robert did not win or could not succeed with the task he readily became distressed.

> Robert's throw of the Wii Frisbee landed out of bounds again. He began to swing
>
> more energetically and to shake the controller. He was reminded by his sister to do it
>
> gently. Robert snapped back that he was doing it gently then lost his temper and
>
> gave up. (Video annotation, Round 7)

Discussion

In this paper we have explored the context for engaging with technological toys that young children experience at home. Our evidence from four families has demonstrated that parents and, in some cases older siblings, contributed to young children's engagement with technology through a range of multi-modal interactions. They gave instructions, explained, praised, monitored scores, modelled

engagement and prompted actions and answers. These scaffolding actions and interactions at home were very similar in range and substance to those we found when exploring the pedagogic actions of preschool practitioners which led to sustained and purposeful engagement with technology in the playroom. However, at home additional support was offered to help to overcome the emotional and behavioural consequences of the children's frustration at lack of success or mastery of the functions or competitive elements of the technologies. In preschool settings resources are more likely to be finely matched to the needs and competencies of the children than can be achieved at home where the technologies present are used by adults and older children. At home children are exposed to the more developed capacities of older brothers and sisters and to emotionally charged sibling relationships that are not present in the playroom where there is a much smaller age span and a focus on creating an environment that promotes positive behaviour and self-regulation.

While all four children in this study experienced a similar range of supportive actions and interactions in their encounters with technological toys at home the evidence described in this paper demonstrates that each had a different experience of playing and learning with the resources. The children's experiences were different because they were located in specific family contexts with distinct cultural pathways (Weisner, 2002). In relation to their engagement with technological resources at home we found evidence of difference along four key dimensions. Parents differed in their perspectives about the value of play with technological toys, in their understandings about how learning should be supported and in their typical ways of interacting with their children and balancing the demands of family life. The fourth dimension was the children themselves. Their individual interest in specific forms of technology or lack of interest in any engagement with technology beyond television or watching DVDs, their preferred way of engaging with family members and their emotional reactions to encounters with technology and siblings all contributed to their individual experiences. Just as individual children cannot be separated from the context in which they live and grow no understanding of a child's experiences and learning can be complete without an awareness of their preferences and social circumstances and cultural practices of their

home. It seems likely that specific features of the technology will also influence the children's encounters – an analysis to be reported on in later publications arising from the data collected during *Young Children Learning with Toys and Technology.*

The account we give here of young children's engagement at home with technology reflects and extends our theorising, allowing us to identify specific dimensions of the socio-cultural environment that mediate encounters with what is often written about as the powerful and negative influence of new technologies (e.g. Palmer, 2006; Alliance for Childhood, 2004). Our understanding of the literature and empirical work on the complex and contingent nature of children's learning experiences suggested that case studies conducted over an extended time period (18 months) were the appropriate way to explore young children's engagement with technological toys and resources (Flyberg, 2006). Our aim was to produce the kind of rich, nuanced case studies that tell the story of the influences, differences and preferences that shape individual experiences. However, like Hodkinson and MacLeod (2010) we were aware that there is a danger that the focus on context can risk decentering the learner. Our earlier work had demonstrated the significance of young children's individual preferences and choices (Stephen et al., 2008) and our framing of them as agentic participants in their family context demanded that our methods allow us to explore their individual actions and interactions.

We feel confident that two aspects of our methods helped us to secure the kind of data we were aiming at. Firstly, as part of a larger study involving nine rounds of data collection over 18 months we had established relationships with the participating families which were characterised by a developed focus on and understanding of individual children on the part of the researchers and by willingness on the part of the parents to actively engage with the researchers' questions and to reflect on their child's engagement with technology. Secondly, the parent-recorded video afforded opportunities to observe the kind of everyday, personal interactions that are not normally available to researchers whose presence can be said to change family interactions into public interactions. As

well as examples of intimate family engagement with the technological games and toys the video recordings gave insights into the kinds of behaviours that were less likely to happen when there was a 'visitor' in the home e.g. children expressing displeasure and frustration, sibling disagreements. These incidents give us confidence that our methods resulted in authentic glimpses into everyday life. That we found differences in experiences in what might be considered 'minimally different' cases (Tudge et al., 2006) reinforces our contention that the four case studies reported here offer an important insight into the ways in which children's experiences are shaped by the socio-cultural context in which they live and the individual contributions which they bring to this context.

However, there are two aspects of this data set which require further comment. Firstly, the choices which children made from the range of technological toy options offered by the research team suggest gendered decision-making, a finding already present in the literature (e.g. Francis, 2010). In the case of three of the children (Jasmine, Robert and Kelly) their choices reflected existing preferences and patterns of engagement with technological and traditional play resources. Arden's mother reported that he had been tempted to select one of the technological pets (a choice that would have been in line with his preference for imaginary play props) but had chosen the games console because she could not offer access to the Wii as often as he wished. The scores for these children on the Pre-School Activities Inventory (completed by their mothers) suggested that their gender role behaviours were within the normal range (Golombok and Rust, 2009). Our evidence suggests that for Arden there was a tension between his tendency to choose nurturing and imaginative play and his family's expectation that he should engage in more stereotypical male activities.

The second feature of the data which we wish to elaborate on is the educational background of each of the four adult respondents. Parental occupation and qualification were not among our selection criteria for this sub-sample nor the full sample of case study families and these four women were the only participants with educational training. While it may not be unexpected to find that parents who

worked or had worked in educational settings were more likely to volunteer to participate in a study like this we acknowledge that their experience of training as education professionals may have influenced the data collected, for instance, giving them enhanced understanding of concepts such as readiness to learn or educational progression or expectations about appropriate forms of interaction.   To some extent there is evidence of this in the data. Ms Searle sought to make the resources offered to her daughter match her stage of development. On the other hand, Ms Fletcher was happy to leave responsibility for key aspects of primary education to Kelly's class teacher. Robert's grandmother and Arden's mother shared a conviction about the importance of play as a medium for learning which could be attributed to their training in preschool practices. However, while Arden's mother argued for the value of technological resources, Robert's grandmother was sceptical about the extent to which they supported learning. Experience of training in educational provision did not then result in a common parental perspective but must be considered as part of the 'mix' that has contributed to the actions and attitudes of each of the parents in our case study families and to the differentiated contexts in which the target children are growing up.

This work raises implications for those who are engaged with children in formal educational settings. Like the work of Gonzalez, Moll and Amanti (2005) with school-aged children our findings point to the value and challenge of learning about the individual interests of each child and the family learning cultures and practices that influence their experiences outside the playroom or classroom and shape their expectations of learning. If formal learning is to build on the experiences and strengths that children bring to the early years setting there can be no normative assumptions of competencies or interest in technology and technology-mediated learning. Our findings suggest that, despite the market claims of the producers of technological toys and educational resources, and the assumption of some educators, the experiences of 3- to 5-year olds are mediated by each family's distinct socio-cultural context and each child's preferences. The technology did not dominate or drive the children's experiences; rather their desires and their family culture shaped their forms of engagement.

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Table 1: Resource Case Studies – Children, Families and Toy Choices

Child	Family	Family circumstances	Toy choice
Jasmine Searl	Lives with mother and older brother Main informant: **Catherine Searl** - Jasmine's mother	SES: High Family technology ownership: High Mother's attitude to technology: guarded	Fur Real Lil' Patter Pup
Kelly Fletcher	Lives with mother, father and older brother Main informant: **Grace Fletche**r – Kelly's mother	SES: High Family technology ownership: High Mother's attitude to technology: guarded	'Puppy Grows & knows Your Name'
Arden Bain	Lives with mother, father, younger sister & younger brother Main informant: **Gail Bain** – Arden's mother	SES: Low Family technology ownership: High Mother's attitude to technology: enthusiastic	V.Smile Motion games console
Robert Johnson	Lives with mother, father and older sister, cared for in week by grandmother Main informant: **Marianne Johnson** – Robert's grandmother	SES: High Family technology ownership: High Grandmother's attitude to technology: relaxed	V.Smile Motion games console
Nintendo Wii –games console 		LeapFrog Tag Reading System 	

Table 2: Direct support from families

Direct support/scaffolding for child	Examples – from video taken by resource case study families	Mode
Demonstrating/Modelling/ Showing how to use	Mother joins in football & wobble board games on Wii	Physical
	Father places his hand over child's on the controller	Physical
	Mother shows where to press on the controller	Physical/verbal
	Dad says that it is necessary to use the arrows to move the cursor	Verbal
	Mother joins in pretence	Physical /emotional
	Adult points to where to place Tag pen	Gesture
Share enjoyment/fun	Sister praises and shows pleasure at boy's number knowledge	Emotional/verbal
	Mother laughs at the nicknames the Tag suggests	Oral – laughter
	Mother and brother get excited at girl's progress on Wii game	Emotional/verbal
	Father smiles encouragingly at child's success	Facial expression/emotional
Explaining	Sister explains that competition is 'where you both play'	Verbal
	Mother explains what 'Hang out' mode means	Verbal
	Sister explains that have to pass between flags	Verbal
	Mother systematically explains the function of each button	Verbal/gesture
	Mother explains which Tag button to use to hear the story on the page	Verbal
Instructing	Sister reads out choices and gives instructions about how to choose	Reading/Verbal
	Mother says 'point the controller to the blue bit'	Verbal
	Mother says 'stand still . . . stay relaxed . . . put more weight on the left leg'	Verbal
Managing/Supporting	Sister says 'you have to play together' when other child is visiting	Verbal
	Mother says 'we are all out of practice' and selects the training module	Verbal/ physical
	Sister encourages boy to have another turn and keep trying	Verbal/emotional

	Mother turns sound up on Tag stylus	Physical
Monitoring	Mother tells child 'press to see if you are right'	Verbal
	Father asks girl is she wants any more adaptations to her avatar	Verbal
		Verbal
	Brother suggests game of appropriate difficulty	Gesture
	Father nudges and points back to the task	
Prompting/extending questions	Mother suggests should put puppy to bed	Verbal
	Mother reads word and asks – what letter is missing	Reading/Verbal
	Mother asks if the puppy and all the other toys are going on the train	Verbal
Providing feedback	Mother says 'that was the best time yet and a high score'	Verbal / praise
	Sister reads out the score	Reading
	Brother recognises moved to a higher level	Verbal