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Exploring Young Children's Social Interactions in Technology-rich Preschool Environments

A thesis submitted to the University of Stirling for the degree of Doctor of Philosophy in Education

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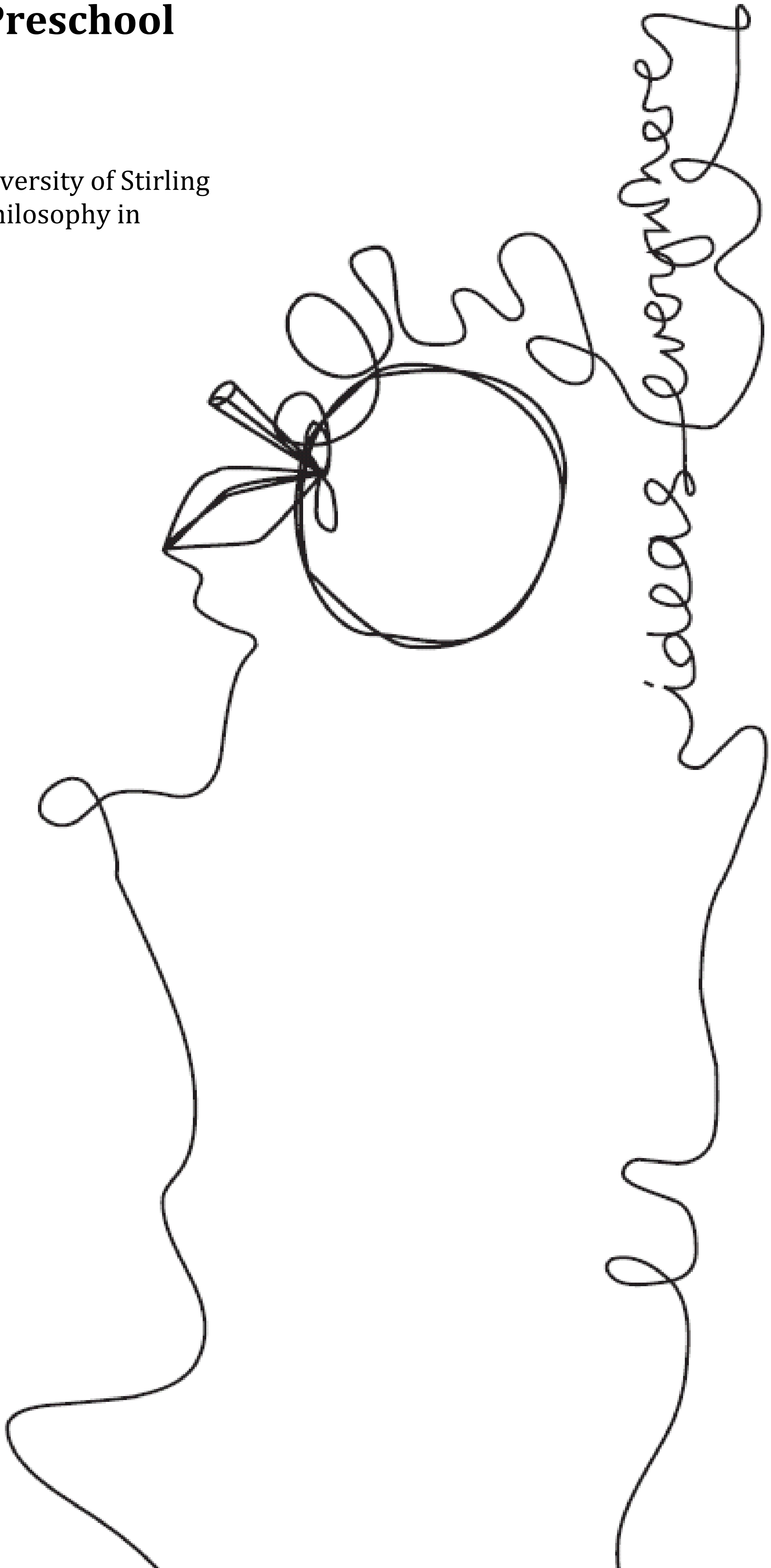

Abstract

In contemporary UK preschool, technological resources have become a standard feature of the environment. This has prompted widespread discussion around the appropriateness of technologies in preschools and for some time concerns were raised that technology is socially detrimental for children. These concerns have since been challenged as it has been argued that they are unsubstantiated and not evidence-based. Yet despite this realisation, few studies have been conducted about children's social interaction around technologies in order to contribute to this debate. Furthermore, negative concerns have largely been attributed to the technological artefacts themselves and the cultural and wider preschool context is often overlooked. In the 1980s, research on the ecological preschool environment in relation to children's social behaviours was widely available but similar studies situated in contemporary technology-rich preschool environments is limited. Thus, a body of literature to inform the technology debate in relation to social interaction is restricted.

This study provides an empirical foundation to begin exploring 3 to 5 year old children's social interactions in technology-rich local authority preschools by: identifying the observable child-child interactions as children engage with technology in preschools; exploring the preschool characteristics which may contribute to these interactions; and exploring the role that technologies play in contributing to these interactions. The study adopts an inclusive definition of technology and addresses a broad range of resources, providing a new perspective on the role of technologies in education and in relation to social interactions.

These areas of interest were addressed using four qualitative methods: observation, activity mapping, researcher-led games with children and interviews with practitioners. Following the nine-month data collection phase and iterative thematic analysis, two key findings emerged from the data. Firstly, children's social interactions during technological activities in preschool were complex and multifaceted with few discernible patterns emerging. Secondly, the wider preschool context made a large contribution to the contingent and divergent interactions observed, diluting claims that technological artefacts alone influence children's social interactions.

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Acknowledgements

Throughout this project, this is the page I have been dreaming of writing as it signifies the completion of the project and represents the culmination of many years of celebrations and commiserations. Most importantly, this page gives me the opportunity to recognise those people how have been fundamental to every stage of this project (and my life) and although it is only a token, it gives me a platform to formally thank them all individually.

First and foremost, I must turn to the children, practitioners, parents and educational institutions, without whom this study would have been a non-starter. I am eternally grateful for their hospitality, for always making me feel welcome and for allowing me to spend some vibrant and thought provoking hours with them. Similarly, I thank both Local Authority Councils for allowing me to enter these institutions and giving me the opportunity to meet these truly wonderful and interesting people.

This leads me on to the organisation that made this whole project possible, the School of Education at the University of Stirling. I was fortunate enough to be funded by the department directly and was privileged to become part of an innovative research community which takes pride in developing high quality researchers through their doctoral programmes. This department not only provided me with the knowledge required to be a researcher but also invested in my personal development by giving me the opportunity to travel the world and present my work at prestigious conferences where I was able to listen to and meet leading scholars in my field.

My education at the University of Stirling would have been nothing without the outstanding support of my supervisors Dr Christine Stephen and Prof Lydia Plowman. Prof Plowman remained fairly impartial throughout the study and as such she was able to provide a critical eye at crucial times. She provided such clarity at times when I was too closely involved in the project to see the wood for the trees and for that I cannot thank her enough. Now to Dr Stephen - I am forever in her debt. I have so many areas for which to thank her, not least her: patience, time, extensive notes, feedback and continual constructive criticism. She has provided unfaltering support throughout this entire process and I thank her wholeheartedly for always having her door open.

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Background to the PhD

My nephew and niece were my first insight into how technological advances have impacted upon 3 to 5 year old children's lives in fascinating ways. They both had a keen interest in technological resources, but they were also enthusiastic about other 'traditional' activities. They enjoyed many activities which I remember doing as a child, but they also had an array of new games to draw on and I found these new resources and activities captivating.

At the time when I was considering the prospect of doctoral study my nephew was a toddler and followed my brother's lead, becoming an avid technology user. He grew up in a household which valued technology and where digital resources were widely available. He quickly learned valuable skills through using these technologies. For example, he was able to type his name on a computer keyboard before he started school and by the age of six he could write his own name by hand competently - although he began doing this in capital letters in line with the letters on a computer keyboard. Through using technology he also learned basic shapes and directions as he was taught to use the PlayStation controller by my brother, who gave verbal instructions to him using technical language such as 'press the circle, then the right arrow'. During these situations, I had the opportunity to observe the educational potential of technologies when supported by adult tuition.

The social potential of these resources also became clear as my nephew became fascinated with the communicative ability of modern technology. He was able to video call his Grandmother over Skype and speak to her using a headset from a young age, as well as calling us using the Personal Sony PlayStation (PSP) rather than the desktop computer. As his understanding of the resources grew he asked for a camera to attach to his PSP for his birthday so that he could video call with this device, rather than voice call.

This, combined with his interest in making standard phone calls, made me consider the social potential of technologies. However, because my nephew is the oldest of three I did not observe him using technologies with other children; only with adults. This made me curious about the interactive potential of technologies, possibly because of my background and interest in interpersonal relationships. I was completing a Master's dissertation which explored adolescent romantic relationships and I started to wonder how people's experiences contributed to their interpersonal relationships. Observing my nephew and niece having different experiences to me as a child made me question how technology shaped their development and how technology contributes to child-child social experiences. When I began to explore this question further, I discovered that technology in education and children's lives was a contested area and had been extensively debated, but little empirical work was available about 3 to 5 year old children's social interactions around these resources. As a result, a doctoral project was born and it is this project that is described throughout this thesis.

Declaration

This thesis is a presentation of my original research work.

Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgement of collaborative research and discussions.

The work was conducted under the guidance of Dr Christine Stephen and Professor Lydia Plowman, at the School of Education, University of Stirling.

Signature ....

Date ....

Introducing the Study: Exploring Young Children's Social Interactions in Technology-rich Preschool Environments

Defining the Problem

In contemporary Western society children are growing up in a world filled with technologies and engaging with them on a daily basis (Morgan & Kennewell, 2005). Wang and Hoot (2006: 317) suggest that technologies are 'inundating' children's daily lives while Berson and Berson (2010:1 emphasis added) state that 'children are coming of age *surrounded* by information and communication technology (ICT)'. The range of available technology is also expanding. Almost a decade ago computers were described as a 'familiar feature' for most children (Brooker & Siraj-Blatchford, 2002). However, more recently Plowman *et al.* (2008) indicated that in their studies children were growing up in households with mobile telephones, interactive televisions and digital toys like musical keyboards, remote control cars, portable audio devices like MP3s, CD or cassette player, DVD players, still and video cameras and games consoles. Children are therefore immersed in a technological world from birth and are being labelled with new technology-related nicknames, such as the 'Net Generation' (Tapscott, 1997).

The availability of technologies for 3 to 5 year old children in preschool is also expanding and technological resources are now clearly identified and present in this environment (Plowman *et al*., 2010b). While computers have long been available in primary classes (Jackson, 1990), the ICT framework for Early Years (Scottish Executive, 2003) saw the expansion of technology more widely in preschool and called for a broader definition of technology, beyond the computer.

The greater focus on technology in society in general has resulted in wide spread discussions - in both the mass media and academic research - about the appropriateness of these resources for young children. The focus is often on the measurable benefit, or detriment, of technology for cognitive, social or physical development (e.g. Cordes & Miller, 2000; Espinosa *et al*., 2006; Klein & Darom, 2000; Li & Atkins, 2004; Palmer, 2007; Plowman *et al*., 2006; Subrahmanyam *et al*., 2000) and only relatively recently has the discussion started to explore children's social interactions around technologies (Heft & Swaminathan, 2002; Ljung-Djarf, 2008; Wang & Ching, 2003). This focus on interactions and technologies is still very much in its infancy compared to the wealth of literature around technology and learning or development. In particular, there is still a limited understanding of the social nature of technological activities in preschool education. This study begins to fill the gap by providing empirical evidence about the social experiences of children using technologies in local authority preschool institutions in Scotland.

Key Terms

This thesis frequently references two key terms: 'technology' and 'social interaction'. These terms can be interpreted in multiple ways, so in order to ensure their meaning is clear for this study they are defined below.

Defining Technology

Technologies have been described as:

- 'electronic objects that are found in homes and educational settings' (Plowman *et al*., 2010b: 15);

- Information and Communication Technologies : artefacts that promote communication, interaction or simulate appliances (Plowman *et al.* 2007; Plowman & Stephen, 2005; Scottish Executive, 2003).

Beyond this, a definition of technology is generally not provided in the early years literature. The term 'technology' is now so commonplace in society, it appears the assumption is made that its definition is already clear. Those studies which address a broader range of technologies rarely specify the parameters of what is considered technology (Alliance for Childhood, 2004; Ching *et al*., 2005) and in many cases, papers focus on one specified technological artefact, for example the computer (Chen & Chang, 2006; Clements, 1997; Heft & Swaminathan, 2002; Ljung-Djarf, 2008) interactive whiteboard (Kennewell and Morgan , 2003) or television (Cline *et al*., 1973) and as such there is no requirement to define the term 'technology'.

A more definitive and publicised understanding is required, particularly in relation to preschool education because it has been highlighted that in most cases practitioners often still define technologies within the confines of the computer or the interactive whiteboard (Plowman & Stephen, 2007b). Yet, it is clear that technologies encompass many more artefacts than this. For example, Early Learning, Forward Thinking: the ICT Strategy for Early Years (Scottish Executive, 2003) indicate that technologies can include: digital still and video cameras, audiocassettes, video/DVD, internet, mobile phone, e-mail, programmable toys and robots, musical keyboards, activity centres, digital interactive TV, children's websites and remote controlled toys. These resources have different affordances as it has been recognised that some are educational, some are drill and practice and some are violent commercial games. It has been suggested that other technologies may offer different opportunities for interaction because, for example, they may stimulate mobility and collaboration (Plowman *et* *al.* 2007; Plowman *et al*., 2010b; Wang *et al*., 2010) and Wang (2004) argues that the technology in question is likely to have significant impacts on the way that they are used, how children learn from them and the social interaction which is likely to take place. Thus, the properties, or *affordances,* of specific technologies are vitally important when exploring how technology influences children's lives (Clements & Sarama, 2003).

It is this inclusive definition of technology which will be adhered to throughout this study. Drawing on contemporary literature about technology to inform my understanding of what should be considered technology, the study will explore those 'artefacts' which promote communication (internet, mobile phones, still and video cameras), interaction (programmable toys, activity centres, musical keyboards, remote controlled toys) or toys that simulate appliances (cash registers, barcode readers and microwaves) (Plowman *et al.* 2007; Plowman & Stephen, 2005; Scottish Executive, 2003). In addition, guidance was also taken from Morgan and Siraj-Blatchford (2009) who are paving the way for a more inclusive as their recent book *Using ICT in the Early Years* explores more role-play or general technology resources which offer differing opportunities than the computer: including washing machines, metal detectors, digital weighing machine, cash registers and pretend play telephones.

This gives an understanding of the kinds of resources which are likely to be addressed, but this is not an exhaustive list for two reasons: 1) the resources available in each preschool will vary considerably between institutions and 2) it is not appropriate to limit the study to those technologies which are deemed to have some sort of interactive or communicative capacity because other technologies which contribute to children's interactions could be overlooked. In essence, the above examples provide a benchmark against which to evaluate resources in preschool, while continuing to adopt the broader understanding that technologies are 'electronic objects' set out by Plowman *et al.* (2010b). For these reasons, and also because ICT is a term widely used in policy documents but may not relate to wider societal understandings of these resources, a wider perspective is employed and artefacts under investigation are referred to as *technologies,* rather than ICT resources (Plowman *et al*., 2010b).

Defining Social Interaction

Providing a definition of social interaction is particularly difficult because often the term can be used interchangeably with other related terms, such as: social competence (Hutchby & Moran-Ellis, 1998; Raver & Zigler, 1997); social practices (Reckwitz, 2002); social processes (Saracho & Spodek, 2007); social conventions (Nucci & Turiel, 1978); social skills (Ladd, 1999; Oden & Asher, 1977) and the list continues. These terms are all interrelated, for example Driscoll and Carter (2004) define social interactions as a path to social competence. They argue that social competence includes "initiating and maintaining fulfilling interpersonal relationships with peers" (Driscoll & Carter, 2004: 7) which is observed through the behaviours which take place during interactions. Thus, they argue that "social interaction is the foundation for social competence".

Yet despite the overlapping nature of terms, two complementary definitions of social interaction stood out and were adopted in this study. One definition is provided by Miell and Dallos (1996) and the other by Radley (1996). Miell and Dallos (1996: 17-18) argue that a commonly used meaning of social interaction is "two or more people engaging in some activity together for a period of time". They argue that interactions are "visible, in the sense that we can observe and record them from the 'outside' – behaviours, patterns of actions, what is spoken and so on". This definition allows an exploration of all encounters in preschool where children engage with each other around technology. Alternatively, Radley (1996) argues that social interactions encompass:

- 'norms' - expected ways of behaving;

- 'roles' - which are a result of the group interaction;
- 'language' - which is often at the forefront of interaction studies because it is through language that people make sense of others;
- 'non-verbal behaviour' - including facial expression, voice intonation, gestures and posture.

Radley's (1996) description provides an understanding of social interaction which is helpful for this study because it takes account of external social factors; something that is often lacking in technological studies. Drawing upon both these conceptualisations, the definition of social interaction used throughout this study is *two or more people engaging with each other and exhibiting norms, language, non-verbal behaviours or roles.*

The Current Study

This study is exploratory and will inform the technology debate by providing empirical evidence for one specific area of the discussion: social interaction in relation to technology use within preschools. It does not measure outcomes, achievements or learning and development as traditional educational studies do. Instead, this study will provide original knowledge to contribute to a particularly underdeveloped comprehension of social interactions and behaviours in educational settings around technologies. This is vitally important for an educational study because it is clear that children's earliest learning experiences are shaped by their interactions (Siraj-Blatchford, I. & Siraj-Blatchford, J. 2006).

At present, technology research only provides evidence of:

- the cognitive benefits of digital resources (Clements & Sarama, 2008; Segers & Vermeer, 2008);

- how best to integrate technologies into early years settings (Brooker, 2003; Morgan & Kennewell, 2005);
- the role of the practitioner or the teacher in facilitating learning around technology (Morgan & Kennewell, 2007; Plowman & Stephen, 2007a);
- the use of robotics and programmable toys as a learning tool for early years children (Bers, 2008; Bers & Horn, 2010; Janka , 2008);
- developmentally appropriate technology use (Saracho & Spodek, 2008b).

However, more detail is required about the kinds of interactions that take place around technologies to provide an empirical foundation for any assertions regarding technological effects.

Outline of the Thesis

The remainder of this thesis is divided into four parts and seven chapters. **Part 1** provides a thorough overview of the literature which informs the study and is presented via two distinct chapters. **Chapter 1** provides an overview of the technology debate and considers the available perspectives on children's social interactions in the literature. It begins with an understanding of the polarised debate around the appropriateness of technology in early years education and for young children in general before providing a general overview of the ways in which social interactions have been explored in previous work and have been observed in the non-technological literature. The chapter continues by demonstrating that explorations of social interaction in technological studies are limited and then goes on to provide an indication of the kinds of work which may be lacking in relation to early years social interaction research with regards to technology. **Chapter 2** explores perspectives on context which may contribute to children's social interaction. This chapter not only introduces the preschool playroom context, and describes the ways that social interactions have been explored in various contexts but it also describes the ways which context has been discussed from a range of theoretical perspectives.

Part 2 addresses the methodological and analytical considerations for this study. It is addressed across two separate chapters. **Chapter 3** describes the pre-data collection considerations including the theoretical frame which guides the study and goes on to present the research design derived from these frameworks. **Chapter 4** explores the data collection process and provides an overview of the four empirical qualitative methods which were used to gather the data to inform the results. It then discusses the post-data collection procedures including the thematic analysis and coding. In addition, this chapter provides an overview of the data collection timescales and the key phases of collection.

Part 3 presents the key findings from the study across two chapters. **Chapter 5** describes the wide range of different social interactions that children exhibited during the observation process while **Chapter 6** then addresses the various components of context which appeared to contribute to the interactions observed.

Part 4 summarises the key conclusions in the study. **Chapter 7** demonstrates that children's interactions were complex, multifaceted and influenced by a range of contextual factors. It concludes by presenting a diagrammatic model which illustrates the contextual factors that contribute to interactions.

PART 1. LITERATURE

CHAPTER 1
Social Interactions and Technology: Perspectives from the Literature

Section 1.1 The Current Situation: The Technology Debate

Childhood is a cultural experience (Fleer *et al*., 2009; Tudge *et al*., 2006) and it changes over time, as society and culture change. Within just one generation, differences in childhood and children's experiences are explicitly evident. To better describe the context within which this study is taking place, the following section outlines how concerns about technology have developed over time.

The increased presence of technology in Western society has led to widespread debate about its appropriateness in the lives of young children. This is not a new issue because watching television was criticised for taking up a substantial part of children's days in the 1960s (Tudge, 2008), but the increased availability of a wide range of new technologies has resulted in a greater focus on technologies in children's lives. Polarised positions have emerged with some parents and academics becoming concerned about the perceived dangers of too much technology for developing children (e.g. Henry, 2010; Palmer, 2007) while others have advocated the benefits of integrating technology into children's lives at young ages (e.g. Marsh *et al*., 2005; Saracho & Spodek, 2008a).

The debate is wide-ranging and multifaceted, but Plowman *et al.* (2010a) suggest that the concerns fall into three categories: cognitive, wellbeing or socio-cultural. Cognitive concerns, among other things, focus on the potential negative effects of technology on children's literacy. Alternatively, wellbeing concerns highlight issues like the potential for children to become obese due to lack of exercise because it is believed that technological activities replace outdoor play. The socio-cultural concerns focus on children's ability to take part in society and, for example, highlight the potential lack of social interaction as a result of the digital age, because children are believed to use technologies in isolation which may be detrimental to social development (Palmer, 2007).

The most prominent and most published arguments in the mass media represent the deficit perspective, where concerns are presented about the potential negative effects of technology on children's development. Apprehension about the changing nature of childhood experiences and the impact of available resources can be found throughout the media and Plowman *et al.* (2010b) indicate that technology is often presented as a 'threat' to children's development. However, the negative focus may be over represented because "effects research generally makes connections between media use and what are seen as undesirable outcomes; it is rarely interested in possible links between media and desirable outcomes" (Plowman *et al*., 2010b: 23). As a result, the negative findings are often generalised by the media, resulting in fear and panic.

This section will now turn to the debate about the impact of technology on children's cognitive development, wellbeing and social development, but it will do so (as much as the literature will allow) from a more neutral position, illustrating both advantages and disadvantages of technology, rather than fixating on the negative perceptions of technology.

1.1.1 Impact of Technology on Children's Cognitive Development

Perhaps some of the most voiced concerns about technology focus on the injurious effects of technology for cognitive development. Cordes and Miller (2000) warn of the 'intellectual hazards' of children using technology, including: impoverished language and literacy skills, poor concentration, attention deficits, too little patience for the hard work of learning, lack of creativity and stunted imaginations. Palmer (2007) argues that children's brains are becoming 'damaged' and goes on to claim that screen-based media are linked to Attention Deficit Disorder (ADD), dyslexia and autism.

This early debate was founded in America, fuelled by organisations like The American Academy of Paediatrics (AAP) and Alliance for Childhood. The AAP argued that children under the age of 2 should not be subjected to screen-based media at all because it does not optimise brain development in the ways that other activities do (Center on Media and Child Heath, 2005). Similarly, the Alliance for Childhood state that children are being pushed to engage in 'premature brain work' (Cordes & Miller, 2000) and Dr Aric Sigman is reported suggesting that "technologies are damaging young children whose brains are not yet fully formed" (Henry, 2010).

The central claim in technology research is that young children are not developmentally ready to work with these artefacts (Attewell *et al*., 2003), because of their virtual nature. Yelland (2010) suggests that this fear arises because technology does not align with the long standing principle, that children should take part in concrete activities involving physical, malleable objects. This is associated with Piagetian ideas about the stages of child development, which suggest that children under the age of 6 or 7 are not yet in their *concrete operational stage* of development and have difficulty performing mental operations and prefer physical operations. Technology provides virtual, second-hand or screen-based experience rather than real, first-hand experience (Cordes & Miller, 2000) and using these resources, it is believed, requires children to have reached that concrete operational stage. This is perpetuated in contemporary literature by Dr Sigman who argued that 'screen technology' is better placed in latter school years (Henry, 2010).

This theory, however, is not without its challenges as Bers and Horn (2010: 51) indicate that "when a task and its context are made clear to children, they exhibit logical thought and understanding long before the ages that Piaget suggested as a lower limit". In addition, Brooker and Siraj-Blatchford (2002) suggest that children do not distinguish between screen-based media and concrete toys in the way that adults do, rather they treat them in a similar manner and as such "manipulation of symbols and images on the computer screen represents a new form of symbolic play" (p19).

Furthermore, it has become clear that new specialist hardware is available which has been designed specifically for young children. For example it has been highlighted that there are a wide range of resources which can be integrated into socio-dramatic play including traffic lights, programmable washing machines and telephone, to name but a few, which are tailored to meet children's developmental stage. Similarly, developmentally appropriate software has been designed for computers weakening criticisms that children are not ready to use these resources (Siraj-Blatchford, I. & Siraj-Blatchford, J. 2006). For example, innovative researchers at both The University of Southampton and the University of Birmingham are designing and testing specialist software for children with Autism as part of the COSPATIAL project and ECHOES project. The software, like many other hardware and software resources, is designed to support the learning of children and is grounded in the long-standing perspectives on child development in order to ensure their appropriateness for use by children.

Throughout this debate it is the screen-based nature of the resources which is of concern and much of this debate focuses around screen-based media (Plowman *et al*., 2010b). One of the major misconceptions with this work is that ICT is referred to as part of this panic as a homogenous commodity rather than a variety of resources, each with their own specific affordances. The assertion that 'technologies' are not appropriate for young children is therefore not only contested because empirical studies have shown that screen-based media may not be as problematic as suggested, but also because perspectives on a wider range of resources (including resources that are not screen-based) are required to fully understand the debate.

More recent literature does not question the need for concrete resources in children's activities, but suggests that the meaning of the term 'concrete' has altered somewhat in light of the understanding that new digital resources provide alternative experiences for children. Wang *et al.,* (2010) for example, describe how the understanding of concrete experiences now rests in the child's relationship to the object and how, over time, the materials become more 'real' and 'meaningful' to the child, rather than the object itself. They argue that the multitude of activities which can be conducted with technologies may 'provide more affordances for children's imaginative and meaningful activities' (Wang *et al*., 2010: 35). Similarly, Yelland (2010) argues that we need to rethink the nature of children's experiences as contemporary research has indicated that concrete experiences are possible with technologies. For example, the recent literature on robotics claims that robotic materials provide concrete experiences.

> *Digital manipulatives are now supplementing these traditional manipulatives because they also afford students the opportunity to explore ideas and concepts beyond what traditional manipulatives can provide, for example dynamic feedback . . . Robotic manipulatives [therefore] extend the potential of digital manipulatives by enabling children to use their hands and develop fine motor skills, as well as hand-eye coordination. But even more important, they provide a concrete and tangible way to understand abstract ideas (Bers, 2008: 109).*

Contemporary research therefore challenges many of the early perspectives that technology does not have the potential to provide appropriate experiences for children. Counter arguments to the deficit perspectives on technology are far ranging and despite the dominance of the deficit model in the mass media, research evidence indicates that many of the negative claims are actually unsubstantiated and that children are able to develop positively with the use of digital media. For example, studies have shown that screen-based media like Sesame Street can help children learn words and vocabulary (Fisch *et al*., 1999). Similarly, children using developmentally appropriate software have shown improved intelligence scores, non-verbal skills, dexterity and long-term memory (Center on Media and Child Heath, 2005). Evidence has further shown that students who had watched more educational television as pre-schoolers achieved better grades and read more books in high school (Anderson *et al*., 2001) and that children who had access to computers outperformed those on school readiness tests and cognitive assessments than those who had no access to computers (Li & Atkins, 2004). Moreover, many technological studies highlight the potential of these resources for cognitive development as it has been suggested that computers can improve:

- children’s mathematics learning (Clements, 2002);
- their operational knowledge (Stephen & Plowman, 2007);
- knowledge of the world (Stephen & Plowman, 2007);
- school readiness (Li & Atkins, 2004);
- reading skills (Mioduser *et al*., 2000).

The multitude of available perspectives described here has moved research on young children using technology past this early focus on cognitive development. Wang and Hoot (2006) indicate that there is now a general consensus in the published literature that technology, when used appropriately, can support cognitive development. For over a decade, research questioned the ‘appropriateness’ of technology in education, but this is no longer necessary (Clements, 1999; Clements & Swaminathan, 1995). Current literature is less focused on creating causal links between development and the technology itself and is more concerned with discussing *how* these resources should be incorporated into early years (Bers & Horn, 2010). Wang *et al.* (2010: 34) indicate that "the focus has shifted away from the deficit model of ICT and instead emphasizes the identification of developmentally appropriate practices with ICT", i.e. the effective use of ICT for children's learning and development (Wang & Hoot, 2006).

1.1.2 Impact of Technology on Children's Wellbeing

While anxiety about the influence of resources on cognitive development may be less prominent in the literature since 2010, reservations about children's wellbeing as a result of increased availability of technology still linger, particularly in the mass media. Discussions around wellbeing relate to society's understanding or belief about what children should be doing in order to be healthy. It has been highlighted, for example, that children should have access to a range of activities including outdoor play, exercise and interaction with other people (Cordes & Miller, 2000) but with the 'technologisation' (Plowman *et al*., 2010a) of children's worlds there are concerns that digital resources detract from these experiences (Cordes & Miller, 2000). Despite evidence suggesting that children under 6 years old spend, on average, equal time using screen-based media and playing outdoors (Clements & Sarama, 2008), the idea persists that because of technology children are spending time indoors that would be better spent outdoors (Alliance for Childhood, 2004). Plowman *et al.* (2010b) and Siraj-Blatchford (2010) indicate that this has led to concerns that children's health is endangered by technologies because sedentary use increases the child's risk of obesity.

However, it should be noted, that the use of technology does not need to be sedentary and its use rests in the quality of the educational provision (Siraj-Blatchford, 2010). Thus, it should recognised that parents and teachers structure children's daily experiences and as such the technology should not necessarily be solely culpable for any perceived adverse effects. Certainly it has been highlighted that children's use of resources, space and time is governed by adults as they manage their engagement with resources through curfews etc. (Wyness, 2011). From a structuralist perspective it is important to recognise the role that children's spaces have on their use and learning with resources but also how these spaces are constructed. It has been suggested, for example, that 'children are positioned within school as recipients of structural forces' and from this it can be seen that the environment imposes strict temporal constraints on how the children use resources, weakening assertions that artefacts alone contribute to children's wellbeing.

This premise extends to the home as parents are criticised for allowing children to spend their time using screen-based media as it is argued that there is an overreliance on technology to occupy children's time and that digital media are becoming digital babysitters used to keep children safe in the home and occupied so that parents can carry on with their busy schedules (Buckingham, 2000; Palmer, 2007). This represents the general panic about children's safety in modern society. Children are viewed as 'innocent', vulnerable entities that need protecting from physical and mental danger and so there is a belief that parents are happy to have their children in the home where they know they are safe.

This contrasts with concerns about children's safety when using technology. Croll and Kunze (2010) for example explore the risks associated with online social spaces which are accessed by many young people today and other studies have focused on issues of cyber-bullying (e.g. Smith *et al*., 2008). Concerns about online safety are also presented in the national press, making it more widely recognised. For example, in a recent report *Online safety for five-year-olds* (BBC News, 2010) the BBC documented the Government-backed safety awareness programme for children as young as 5 years old. As a result, parents must negotiate a balance between concerns about children using potentially 'dangerous' technologies, such as the internet, with fear for children's safety when they are outside the home. It is this 'balance' which is considered fundamental by Siraj-Blatchford (2010) in a recent press release which states:

> *The key point here is, of course, 'balance'. Sitting the children in front of the computer, the television or even an adult during 'sharing' or 'story time' has to be balanced with opportunities for the children to move around in their play within and outside the setting.*

Another prominent strand of concerns around wellbeing relate to children's emotional development. Buckingham (2000) describes the current position in society as 'the death of childhood' and he suggests that the line between the adult's world and the child's world is deteriorating. He argues that childhood is becoming hurried and children are being forced to grow up too quickly. Sue Palmer (2007) in her book: *Toxic Childhood: How The Modern World Is Damaging Our Children And What We Can Do About it* also depicts the deterioration of children's behaviours, as she saw it. Palmer (2007) argues that contemporary childhood experiences are contributing to less docile and more hostile individuals. She suggests that children are becoming less well-mannered and less pleasant-natured and instead children have become 'angered' and 'unhappy'. Children, Buckingham (2000) further argues, now offer quicker resistance to parents and elders and as such we are seeing the demise of docile children who have a respectful nature and in their place we see critical children who challenge their elders and engage in anti-social behaviour. Palmer (2007) therefore depicts the modern child as lost, discontent and dysfunctional as a result of the digital age.

In particular these concerns about the 'deterioration of childhood' are believed to be linked to children viewing content far beyond their years on television and screen-based media (Buckingham, 2000). These concerns arise from theories which link children's development to what children observe during their daily lives. Bandura's Social Learning Theory (Bandura, 1977: 22), for example, argues that individuals learn through observing others.

> *Most human behavior is learned observationally through modeling: from observing others, one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action.*

Assimilating this theory with the contemporary technological society led scholars to conclude that because children learned through observation they were typically learning inappropriate behaviours from watching television which was too mature for them (Center on Media and Child Heath, 2005). Research from the 1970s argued, for example, that children were more violent in later life if they had a preference for violent content on television during childhood (Eron *et al*., 1972). Similarly, it was indicated that children who regularly watched television became more desensitized to violent images than those who watched under four hours of television per week (Cline *et al*., 1973). Furthermore, Silvern and Williamson (1987), while attempting to prove that hands-on aggressive behaviour during game play would later defray aggressive behaviour, found that children were more aggressive after playing certain video games. However, many of these studies created a simulated environment, for example in Silvern and Williamson's (1987) children were observed in an experimental setting rather than in the naturalistic environment and therefore it is unclear whether said findings would have been observed had the methodology and methods for these studies been different, calling into question the reliability of this work in relation to children's experience with technology in preschool. Yet, as is often the case with technology literature, counter-arguments for these claims are also available. For example, television such as Sesame Street was shown to help children learn pro-social messages (Rideout *et al*., 2006).

Two positions have been presented throughout this section. Firstly, the deficit perspectives, which are generally based on individual perception rather than empirical evidence and Plowman *et al.* (2010b; 2010a) describe this negative position as resulting from fear and nostalgia for the past. This is evident in Palmer's work as she, for example, looks back fondly to her childhood and panics in light of the new childhood experiences she views in society today. Secondly, advocates of technology indicate that technology is not intended to replace all other activities. For example, Saracho and Spodek (2008a: 13) argue that "it is important to remember that technology is a tool rather than a solution. Technology does not replace human interactions". This line of reasoning argues that technologies are complementary new resources rather than replacements to traditional resources and certainly Bers (2008) found that new digital manipulatives *complement* those traditional manipulatives that were originally introduced by Froebel. They argue that they provide different opportunities for children because the affordances of these resources differ.

1.1.3 Impact of Technology on Children's Social Development

The social development debate focuses on preparing children for the future and here too it is possible to see polarisation in the debate as technology continues to be perceived as a double-edged sword. On the one hand there is the understanding that children need to be 'technology literate' to succeed. Yet on the other hand, it is argued that it is not vital, or even healthy, to become technology literate too young (Henry, 2010).

Stephen and Plowman (2003) suggest that with the push towards a 'knowledge economy' technology is shaping children's futures. They argue that it is important to find a way to incorporate technology into education because children need to learn about technology in order to operate in society. Marsh *et al.* (2005) and Rosen and Jaruszewicz (2009) also highlight the potential for technology in developing children's lives, not least because children are developing in a technologised world and will eventually need to master technological resources anyway because they will be faced with them every day. While, in the project "*Already at a Disadvantage?"* the authors raise questions about the potential disadvantage that children may face if they do not have easy access to technology in the home compared to children who regularly accessed technology (McPake *et al*., 2005), particularly as "science education community perceive technology to serve as an entrance to children's understanding of scientific concepts" (Saracho & Spodek, 2008a: viii). Yet, Dr Sigman argues that there is no urgency to have children using technology, computers in particular until the age of nine, no matter its role in society (Henry, 2010; Siraj-Blatchford, 2010) because of the concerns that have been raised that children's social development is at risk because children play alone with technology (Cordes & Miller, 2000).

The latter anxiety has emerged from the belief that a lone child will use the computer in preschool as an adult would use a computer at home or in the workplace; as an individual device and a *personal* computer. The prominent use of technology to occupy time, it is argued, has created splintered households where individual members are all simultaneously using their own technologies in different rooms of the house (Palmer, 2007) and children's face-to-face social interactions are more infrequent. This panic occurs despite the existence of research which indicates that engagement with media and technologies tends to take place in social spaces and most often with other family members in shared living areas (Marsh *et al*., 2005). This challenges Palmer's (2007) concerns about splintered households. Moreover, it is thought that the computer can promote group interaction and cooperation (Jackson, 1990; Orleans & Laney, 2000) because children not only form small groups but they look to peers for support (Wartella & Jennings, 2000). Thus, studies categorically indicated that computers did not promote isolation (O'Hara, 2008) and instead, it has been demonstrated that most often children use the computers in small groups rather than as an individual device.

> *When children gather around the computer and verbally interact about what is happening on the screen, it is regarded as a valuable activity. Participation in the learning situation around the computer offers individuals with limited experiences with computers a good opportunity to watch and learn, and provides more experienced children with the opportunity to express and share experiences in the group (Ljung-Djarf, 2008: 35).*

This quote suggests that children are having these social learning experiences around technology. This is support by Siraj-Blatchford, I. and Siraj-Blatchford, J. (2006: 21) who indicate that “co-operative social interactions between children and between children and adults functions to promote cognitive, affective and moral development” . Thus, Clements and Sarama (2003: 4) conclude that "computers can serve as a catalyst for positive social interaction and emotional growth".

1.1.4 The Debate: Evidenced or Asserted?

The previous section demonstrated the polarisation of opinions about technology and early childhood; for every criticism of technology, there appears to be a counter argument. One of the major retorts to the deficit or negative perspectives about technology is that claims are generally unsubstantiated. The ‘toxic childhood’ and other similar portrayals of modern childhood have often been criticised for being assertions and not based on empirical evidence (Brooker & Siraj-Blatchford, 2002; Plowman & Stephen, 2005). Clements and Sarama (2003) for example highlight the questionable validity of some of the deficit model, such as claims that technologies are socially detrimental. In particularly they refer to the “Fool’s Gold” article (Cordes & Miller, 2000) in their criticism.

> *We believe that its presentation of half-truths and misleading interpretations of theory and research under the guise of academic respectability not only presents an*

> *unfortunate one-sided picture of the issues and related empirical research, but, more generally, plays the U.S. media game to the detriment of research, intellectual discourse, and, ultimately children (Clements & Sarama, 2003:2).*

Marsh (2002) argues that the concerns voiced in the last section, represent a general 'moral panic' about the increasing presence of technology in the world. In a later article, *The techno-literacy practices of young children,* Marsh (2004) suggests that when individuals fear something new they adopt one of two perspectives:

- the active child approach - children can understand the messages themselves and learn from them;
- the passive child approach - children need to be protected from the potential dangers of technology.

The passive child approach is presented by Palmer (2007) when she argues that change is required to bring children back to their previous well-mannered nature. It relates to the traditional view of childhood which fails to see children as active agents who are able to make their own choices in life (See James *et al*., 1998 for an overview).

The construction of children as passive agents and concerns over their welfare is not a new phenomenon specific to this generation; similar examples of moral panic were well documented when 'film' was introduced in 1904 (Wartella & Reeves, 2003), when radio was first introduced in the 1920s (Wartella & Jennings, 2000) as well as when television was introduced in 1948-1949 (Schramm *et al*., 1961). Buckingham's fear in modern times of children progressing and maturing too quickly was a concern almost a decade ago when children were believed to be seeing images far beyond their years in movies (Blumer & Hauser, 1933 cited in; Wartella & Jennings, 2000). Similarly, scholars in the early 1920s raised concerns that radio content would increase crime levels (Wartella & Jennings, 2000). The reasoning that new technologies detract from other activities was also a concern in the 1920s when it was feared that radio would undercut activities like reading (Wartella & Jennings, 2000). Then again in the late 1940s when research explored whether television detracted from *radio* (Riley *et al*., 1949), which itself was criticised only 20 years prior. Debates are therefore a continual feature of the literature as resources are developing and children's experiences are changing. These debates around technology are cyclical and repetitive as Wartella and Jennings (2000: 32) state that debates about technology and young people 'recurred' , and also that they 'echo those surrounding the introduction of other new media throughout the past century". This debate is likely to continue as new and innovative materials are being made available to children in preschool and empirical evidence is required to inform the debate.

Those who neither present themselves as technology advocates nor technology adversaries are beginning to think about both sides of the debate. For example Mikropoulos *et al*. (1994) highlight that technology can both aid and hinder communication. Similarly, working from a socio-cultural perspective, Plowman *et al.* (2010b) suggest there are a multitude of other factors which may contribute to a child's development (e.g. opportunities for play, sleep patterns or family stability) and therefore it is impossible to argue a causal link between technology and developmental delay. More caution is therefore required when drawing conclusions from the data. This thesis adopts this neutral perspective by attempting to explore both advantages and disadvantages and does not intend to unequivocally link technological resources to any form of development or learning.

Section 1.2 Social Interaction and Technology

This project began with an investigation of the technology debate (presented above) to understand what knowledge of children's social interactions during preschool technological activities was already available. Three problems were identified with that literature.

1. The debate addressed a broad range of issues around technology and only a small proportion of that literature specifically focused on social interactions and technology.
2. None of the debate explored social interaction with the definition of technology employed in this study, i.e. a more inclusive definition of technology rather than restricting the study to a select few resources or ICT.
3. The technology debate was often constructed from a series of position statements or opinions rather than evidence-based accounts.

To fully inform this study a narrower focus on social interactions and technology from an *evidence-based* stance was required. However, in order to decide what literature to look for, it was essential to understand how social interactions can be observed and addressed as part of a research project. For this, it was appropriate to turn to explorations of social interactions, social actions and behaviours to investigate how these have been described or defined in psychological, sociological and educational literature. Subsequently, it was possible to investigate how these ways of exploring social interaction had been utilised in technological studies. However, literature searches quickly demonstrated that relevant empirical investigations of social interactions in technological preschool contexts were sparse and did not provide the depth required. The areas which were lacking were quite clear and these areas shaped the direction of this study by indicating what needed to be addressed.

This chapter continues by presenting the evolution in my thinking and reading in relation to social interaction and technology.

1. Section 1.2.1 illustrates how social interactions have been defined in the broader literature as well as how they have been observed in research.
2. Then in Section 1.2.2 the chapter then turns to the limited empirical evidence that is currently available about children's interactions around technologies in preschool.

1.2.1 Conceptualising Social Interactions

The Introductory chapter to the thesis defined interactions as a form of exchange between two or more individuals, but it did not describe in-depth some of the ways that we actually observe children's interactions. This chapter focuses on how, for this study, interactions can be observed and goes on to describe how these approaches have been applied in empirical literature. In particular, the chapter focuses on three different approaches to observing social interactions:

1. the focus on descriptions of actions and behaviours;
2. detailing sociability and participation;
3. the explorations of social relationships in early childhood and group dynamics (as well as the distinction between adult-child and child-child relationships).

Describing Actions and Behaviours

Research on social interaction is somewhat segmented as scholars have struggled to reach a consensus about what constitutes 'social' (Parten, 1932). As a result interactions have been described in multiple ways including pro-social and anti-social behaviours (see Hay, 1994 for a review), positive social behaviour (Oden & Asher, 1977), social reinforcement (Charlesworth & Hartup, 1967) and social skills (Oden & Asher, 1977). Yet, despite this lack of consensus on what constitutes social interaction, one thing is clear; it is possible to describe interactions in terms of observable reciprocal behaviours that children exhibit (Driscoll & Carter, 2004; Miell & Dallos, 1996). From this perspective, data collection and observations focus predominantly on documenting behaviours since social interactions and skills are believed to be "behaviours that appeared to enhance peer acceptance, friendships, or other positive relational outcomes" (Ladd, 1999: 335) and pro-social interactions are defined as "actions that intended to benefit another person" (Shaffer, 2008:325).

Focusing on observable behaviours and actions as an exploration of interactions is often used in empirical studies, and Table 1 below shows the kinds of behaviours and actions that are often cited. This is not a comprehensive list but provides an idea of the ways in which interactions have been detailed.

Table 1 - Examples of Behaviours

• Imitation • Physical contact • Sympathy • Listening • Hitting • Throwing or grabbing toys	• Smiling • Helping • Participating in the game • Giving attention • Pushing • Kicking	• Laughing • Sharing • Taking turns • Physically aggressive • Raising a fist in a threatening manner • Pleasant conversation	• Giving tokens • Displaying kindness • Talking • Hostile or threatening acts • Hair-pulling

(Doctoroff *et al.*, 2006; Hay, 1994; Oden & Asher, 1977).

One particularly useful approach for this study is the work of Pat Broadhead. Her Social Play Continuum (SPC), "charts actions and associated language through four, increasingly sophisticated levels of development" (Broadhead, 2001: 24). Broadhead lists a far more extensive range of behaviours (described by her as observable actions and language) than that presented above and her framework provides a very detailed overview for observing children's interactions. A full list of these behaviours and actions is provided in Appendix 1. The continuum therefore provides a comprehensive 'start list' of actions and behaviours which we may expect to see when observing children in preschool.

Describing Sociability and Participation

Another approach for exploring interactions is to document higher-level inferences about children's sociability or social participation. This approach often groups together the observable actions and behaviours into silos or domains of sociability. For example Broadhead (2004) categorises her list of observable behaviours into four domains of increasing sociability: associative, social, highly social and cooperative.

Alternatively, others have described the higher-level silos or domains of interactions through more narrative summaries as shown by Mildred Parten (1932b) in Table 2 below. She describes social interactions in terms of forms of social participation and argues that children take part in play as; unoccupied, onlooker, solitary, parallel, associative or organised supplementary play. She illustrates or describes these domains in a detailed way but does not list typical actions and behaviours.

Parten's approach is particularly useful for this study because it provides a holistic overview of interactions at a snapshot in time. That is to say it allows an instant judgement about children's participation based on her knowledge and understanding of each form of participation. For this study both approaches (the SPC and social participation) have the additional benefit that they are well recognised and respected in terms of describing interactions as well as observing interactions. Parten's model offers a classic description of children's social interaction and because of its history it is often used as a transparent way of describing the social nature of play. Over time, the descriptions of children's play have been truncated and scholars tend to focus on describing play as solitary, parallel or 'interactive' (Pellegrini, 1984) and although it may have its challenges and some feel there is a need to move beyond Parten (Fleer *et al.*, 2008), the basic terms are largely recognised and understood, particularly in early years education, making descriptions of interactions clear for the reader. Similarly, Broadhead's work offers a tried and tested framework for observing interactions as her work has undergone several revisions and developments, enhancing its usability and reliability and this work has been in the early years domain for several years and is also well established.

Table 2 - Parten's Categories of Social Participation

Category	Description
Unoccupied	Not playing and appears aimless only occasionally watching an interesting aspect of the play.
Onlooker	Most of the time is spent observing play.
Solitary independent play	The child plays alone and independently with toys that are different from those used by the children within speaking distance and makes no effort to get close to other children. He pursues his own activity without reference to what others are doing.
Parallel activity	The child plays independently, but the activity he chooses naturally brings him among other children. He plays with toys that are like those which the children around him are using, but he plays with the toy as he sees fit, and does not try to influence or modify the activity of the children near him. He plays beside rather than with the other children. There is no attempt to control the coming or going of children in the group.
Associative play	The children begin to borrow one another's cups, they explain why they need two cups, they advise and offer sand to one another. They call a child to the sandbox, and ask those present to make room for him. The others may or may not move over, depending upon their own wishes. No child or children dictate what the various children shall make, but each makes whatever he pleases. Someone may suggest that they all make a road but in that case each child makes his own road, or none at all, as he chooses, and the other children do not censor him. There is much conversation about their common activity.
Organized supplementary play /cooperative Play	The child plays in a group that is organized for the purpose of making some material product, or of striving to attain some competitive goal, or of dramatizing situations of adult and group life, or of playing formal games. There is a marked sense of belonging or of not belonging to the group. The control of the group situation is in the hands of one or two of the members who direct the activity of the others. The goal as well as the method of attaining it necessitates a division of labor [sic], taking of different roles by the various group members and the organization of activity so that the efforts of one child are supplemented by those of another.

(Parten, 1932b: 250-251)

Describing Social Relations and Group Dynamics

Conversely to exploring social interactions in terms of individual behaviours or degrees of sociability, many studies focus on describing and exploring social interactions in terms of relationships and group dynamics. Interactions are a reciprocal process involving multiple people (Miell & Dallos, 1996) and Schaffer (1984) argues that all children's behaviours are embedded in social relations, suggesting that children's actions are mediated by their relations with others. As a result, in order to fully understand interactions it is insufficient to focus solely on observable behaviours exhibited by an individual. Instead, we must understand the relational process between children and their play partners.

Relationships in preschool are categorised in the literature as either adult-child interactions (Barbuto *et al.* 2003; Durden & Dangel, 2008; Rudasill & Rimm-Kaufman, 2009) or the child-child/peer relationships (Charlesworth & Hartup, 1967; Corsaro, 1985; Dietrich, 2005; Heft & Swaminathan, 2002; Ikegami *et al*., 2007; Kutnick *et al*., 2007; Kutnick & Kington, 2005; Kyratzis, 2004; Legendre, 1999; Licht *et al*., 2008; Oden & Asher, 1977; Parten, 1932b). Even studies which explore both relationships, perpetuate this dichotomy by comparing adult-child versus child-child relations (Harper & McCluskey, 2003). This is because there is a perception that adult-child and child-child interactions are qualitatively different and are unlikely to take place simultaneously, as research indicates that peer interactions may be reduced when teachers are present (Innocenti *et al*., 1986). Adult-child relationships are often considered didactic, transmissions of knowledge from adult to child (Barbuto *et al.* 2003), with adults being in a position of authority, while child-child relationships are presented as evolving processes of negotiations and struggles for power (Corsaro, 1988a).

In particular, it has been documented that children's peer relationships are characterised in terms of maintaining control (Cobb-Moore *et al*., 2010) which can be achieved in two ways: by assuming ownership and by becoming a leader. Ownership endows the child with control over their peers through their specific 'ownership rights' (Laupa *et al*., 1999: 132) and enables children to manage the claimed items or places, thus providing them with a means of directing or controlling the interaction and their peers and even denying access to their peers (Cobb-Moore *et al*., 2009). Similarly, leadership turns children into figures of authority, giving them more opportunities to shape their role (Parten, 1932a). The children have to negotiate their own role and level of control and as a result, these social relationships are fraught with struggles for power. This is important to understand because the mediation of other playmates influences how children behave and interact during activities (Broadhead, 2004).

In essence, these approaches document how children negotiate membership in a community of some description, whether that be preschool on the whole or small groups arranged to complete a task. In comparison to explorations of behaviours or sociability, this approach requires greater inferences during analysis because the relationships are often implicit and not immediately observable. I have demonstrated that social interactions can be explored and described in terms of: observable actions and behaviours, descriptions of sociability and participation or in terms of peer relations and group dynamics. The next section of this chapter describes how these approaches have been applied in technological studies.

1.2.2 Perspectives on Social Interaction and Technology

The small amount of empirical evidence available about social interactions and technology portrays both as positively related (Haugland & Wright, 1997), countering concerns raised in the toxic childhood debate. Evidence suggests that at the computer children often demonstrate high levels of social play (McCormick, 1987) and spontaneously collaborate and help each other (Clements, 1994; Clements & Natasai, 1992) by providing a form of 'assisted performance' (Brooker & Siraj-Blatchford, 2002) and demonstrating Sustained Shared Thinking (Sylva *et al*., 2004), particularly as they mature and have less desire for control of the resource (Clements & Sarama, 2008). Conflicts over access to the computer were minimal (Webb, 1987) and children who are 'socially delayed' benefited from increased turn-taking and pro-social behaviour around the computer which lead to 'refine[d] social and language skills' (Villarruel *et al.* 1985 cited in McCormack 1987). Furthermore, evidence suggests that more than half the time when children used the computer they did so with peers (Muller & Perlmutter, 1985) and this is supported by Yelland (2005) who indicates that children are motivated to use technologies and share their experiences with others. This is likely to be because group work alleviates the pressures associated with the lack of resources in preschool (Heft & Swaminathan, 2002; Webb, 1987) and children preferred to work with peers rather than alone (Muller & Perlmutter, 1985).

In fact, children's peer interactions around the computer have been known to be more extensive than their interactions with some non-technological resources (Muller & Perlmutter, 1985). For example, talking to peers was more often observed around the computer, compared to other traditional resources like puzzles, as 95% of children were observed talking while using the computer programme 'Logo' (Clements, 1999; Muller & Perlmutter, 1985). Thus, it has been suggested that "children exhibit a rich versatility of social interactions at the computer" (Heft & Swaminathan, 2002: 172) including:

- talking, commenting or being ignored (Clements & Swaminathan, 1995; Heft & Swaminathan, 2002; Webb, 1987; Yelland, 2005);
- sharing, explaining or helping (Heft & Swaminathan, 2002; Muller & Perlmutter, 1985);
- negotiating access and taking turns (Plowman & Stephen, 2005);
- observing and acknowledging each other (Heft & Swaminathan, 2002);
- managing operations (such as deciding where to click) (Plowman & Stephen, 2005);
- activity related conversations (Webb, 1987);
- sharing enjoyment (Plowman & Stephen, 2005).

When exploring social interactions around technology it became clear that the focus on observable actions and behaviours in the literature, as an approach for describing interactions between peers, is limited and the above summary represents the general extent of this knowledge. As an alternative, research studies often focus on the higher-level descriptions of social interactions such as describing sociability, peer relations and group dynamics. As part of this approach, references may be made to actions and behaviours to add clarity to the discussion but it is rarely the main focus. Three frameworks stand out as particularly informative about children's social interactions around technologies in this manner:

- Ljung-Djarf's description of technological positions;
- The Transactional Model of Social Processes and Mediating Artifacts;
- Guided Interaction.

Ljung-Djarf's Technological Positions

Some of the most advanced research in the field of social interactions in relation to technology use, particularly in terms of child-child interactions, comes from Ljung-Djarf's (2008) work which draws on what she describes as 'positioning theory' to characterise children at the computer as 'owner', 'participant' and 'spectator'.

- The owner is the child controlling the mouse and keyboard and the child who is central to the activity.
- The participant is the child who stands or sits close to the owner and participates in the common play by offering suggestions, which the owner accepts or rejects.
- The spectator stands behind observing the activity but has no active involvement.

She describes this study as an exploration of the 'social dynamic that takes place when children gather around the computer in early childhood education' (Ljung-Djarf, 2008: 63). Throughout the study, the author adds detail to the perception that computers afford collaboration, and by describing children's positions around the computer she is able to understand the complex way children collaborate. The findings indicate that the computer drives children into positions which influence the dynamic of the group because, for example, the owner can direct other children's play and involvement. Furthermore, this study demonstrated that technology may: support language development; provide opportunities to offer and receive assisted performance; and promote collaboration, pro-social behaviour and play behaviour.

It is important to note that this study, like many other explorations of technology (e.g. Bers, 2008; Carr, 2001; Haugland, 2000; Klein & Darom, 2000; Plowman *et al*., 2008) is founded on an exploration of how the child and the technology interact, or how children use technology. In essence, the positions in this study are the children's positions in relation to the computer, rather than their positions in relation to peers (although the study goes on to describe the consequence of these positions for relations between peers). Thus, the study only goes so far towards exploring interactions between peers around technology. Nevertheless, it provides a foundation for understanding the context of social interactions around technology as it demonstrates that:

- children regularly form groups around technologies, providing an insight into the situations in which interactions may occur;
- children's 'positions' within these groups contribute to how they interact with the resource, and consequently how they interact with each other.

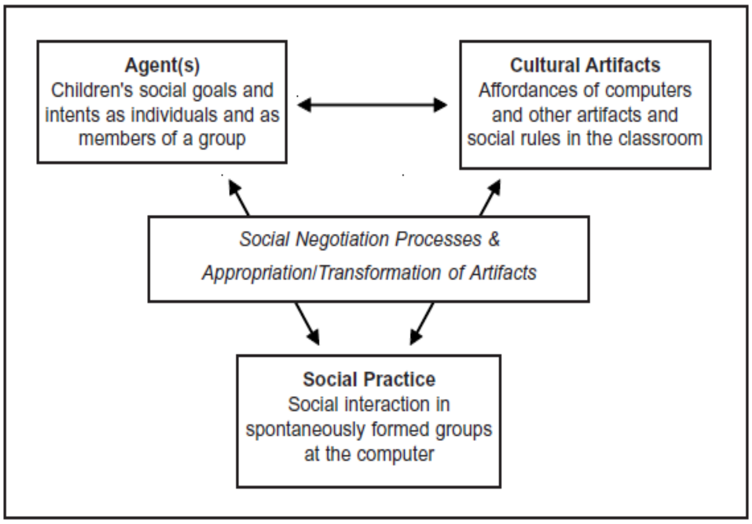
Wang and Ching's Transactional Model

Another model which focuses on 'groups' of children is presented in the paper *Social Construction of Computer Experience in a First-Grade Classroom: Social Processes and Mediating Artifacts* (Wang & Ching, 2003). In contrast to many studies of technology, which often focus on the child interacting with the technology (Ljung-Djarf, 2008), this paper addresses children's wider experiences including how various aspects of the preschool context contribute to children's technology use. The model describes:

- the children's role in shaping experiences;
- the environmental factors which contribute to technology use;
- the role of the artefacts in directing children's experiences.

Figure 1 - Wang and Ching (2003) - Transactional Model

Transactional model of social processes and mediational artifacts.



This model is represented in Figure 1 and it demonstrates that children are active agents in their own learning and they have the freedom to make choices driven by their motives and goals. These personal motives and goals, combined with the rules of the social environment, affect the way that they interact with the tools available in the preschool and other children in the group.

This model draws heavily on socio-cultural theory which argues that children not only co-construct their experiences but through mediating artefacts/tools they 'determine the nature of the activities' (Wang & Ching, 2003: 338). The authors therefore make a concerted effort to present the child as having agency, rather than highlighting those factors that impose themselves on the children. They argue that it is important to "examine not only how children are affected by the social environments in which they find themselves, but also how children shape these environments as active agents" (Wang & Ching, 2003: 338).

This model does not present the child as the sole determining factor of actions and activities; instead, it suggests that both the child and the setting influence the social activities taking place. Of paramount importance is the way that children negotiate and mediate all the different components of the activity, and they argue that "social practice is the result of negotiation among children's goals and intents, affordances of the cultural artefacts, and the social rules in the classroom" (Wang & Ching, 2003: 338).

From Wang and Ching's (2003) description of the model it is possible to identify some of the interlinking components of the preschool that contribute to children's experiences around the computer. This highlights the need to address a broad spectrum of environmental factors when investigating social interactions, but also to understand that it is the relationship between these factors which is fundamental. This model also reinforces the work of Ljung-Djarf (2008) by demonstrating that large groups generally form around the computer and the ability to form groups contributed to children's ability to collaborate. These findings suggest that focusing on clusters may provide a good platform for understanding interactions. However, Wang and Ching (2003) have taken a similar approach to Ljung-Djarf (2008) by describing the higher-level descriptions of the group and their negotiation processes. Hence, detailed observations of explicit actions and behaviours are still required.

Guided Interaction

As a result of the continued focus on using technology for cognitive development (see Section 1.1), much more literature is available about helping, supporting or 'scaffolding' (Wood *et al*., 1976) learning around these technologies (See for example Driscoll & Carter, 2004; Kennewell, 2001; O'Hara, 2008; Plowman *et al*., 2006; 2007; Siraj-Blatchford, I. & Siraj-Blatchford, J. 2006;

Stephen & Plowman, 2007; Watson, 2001; Yelland & Masters, 2007) in comparison to the general studies of social interaction presented above. These studies do begin to explore the observable interactions of interest for the current study; however, they often explore adult-child interactions rather than child-child interactions. Nevertheless, this literature provides a useful insight into interactions that children exhibit and this provides a foundation for further exploration in child-child contexts.

One description which skilfully articulates adult-child interaction around technologies is Guided Interaction by Plowman and Stephen (2007a). This framework demonstrates how the materials and the social environment make a difference to how children engaged with technology in preschool. It describes how practitioners support children using technology, not solely by face-to-face practitioner-child interaction but also through practitioner planning (Plowman & Stephen, 2005). This distinction is made in their description of the kinds of interactions observed in their study.

- 'Distal' interactions defined as "interactions which take place at a distance from specific learning interaction so has an indirect influence on learning".
- 'Proximal' interactions defined as "face-to-face interactions between adults and children that have a direct influence on learning".

(Plowman & Stephen, 2007a: 18)

Plowman and Stephen (2007a) indicate that distal interactions can include: arranging access to technology, ensuring access to help, modelling, monitoring, planning, providing resources, setting up activities. This framework describes how children's experiences are fundamentally limited or implicitly directed through practitioner planning. Furthermore, through their descriptions of proximal interaction (which are the observable interactions of interest in this study), Plowman and Stephen (2007a) provide an understanding of the types of behaviours observed between practitioner and child, listed as: demonstrating, enjoying, explaining, instructing, managing, modelling, monitoring, prompting, providing feedback and support. These are observed through physical action, touch, laughter, facial expression and gestures.

The distal and proximal categories aligns with the description of pedagogical approaches documented in the Research Effective Pedagogy in the Early Years project (Siraj-Blatchford *et al*., 2002a) which characterised adult support for learning in educational environments as pedagogical interactions (face-to-face encounters) and pedagogical framing (behind the scenes work). The proximal interactions provide an understanding of observable actions and behaviours but the usefulness of this framework does not end there. The focus on distal interactions provides an understanding of the construction and development of the preschool as a social place or space which contributes to children's experiences with technology. It aligns with the work of Wang and Ching (2003) where it was made clear that the preschool environment is also important to explore in relation to interactions. It is not sufficient to address the child in isolation but it is also essential to investigate the other factors in the preschool, such as the technological resources as demonstrated in the following quote.

> *Recognise that both people and artefacts have a role in developing children's competences with technologies and that these extend beyond the operational (i.e. how to use them) to include understanding the role of technology in work and play.*
>
> *(Plowman et al., 2008: 305)*

Section 1.3 Areas for Exploration

Throughout Section 1.2, I have demonstrated that social interaction can be classified according to: actions and behaviours which constitute an interaction, sociability and participation or social relations. From this, it is clear that there is already a considerable knowledge base about children's interactions in preschool settings including the perspective that:

- children exhibit a wide range of actions and behaviours across varied domains of sociability;
- children engaged in varied levels of participation during play which informs our understanding of the social nature of their play;
- child-child relationships are often fraught with power struggles and attempts to gain control.

Yet when addressing the technological literature it became clear that work around these classifications of social interaction is limited, particularly in relation to actions and behaviours. That is to say that with the exception of a few studies like Heft (2000), technological research rarely addresses the mediating interactions around these resources. This is at odds with the wide-ranging literature available about actions and behaviours around non-technological resources in preschool and as such a clear gap in the literature can be identified. From the literature presented thus far, there is a disparity between the ways that interactions have been explored in general, compared to technological social interaction studies. In particular, three areas appeared to be missing from technological studies:

- the focus on observable behaviours and actions;
- child-child interactions, particularly *around* technologies rather than how children interact *with* technology;
- a wider definition of technology, rather than focusing on the computer.

1.3.1 Observable Behaviours and Actions

Miell and Dallos (1996) and Driscoll and Carter (2004) suggested that interactions are observed through actions and behaviours yet, the technological literature discussed in this chapter has predominantly focused on the highest-level interactions in terms of social relations and group dynamics. With the exception of a few studies such as Heft and Swaminathan (2002), it was considerably more difficult to locate studies of observable behaviours and actions as well as studies of sociability and social participation around technology.

Research in this area is required as the toxic childhood debate suggests that technologies are socially detrimental (e.g. Cordes & Miller, 2000) and in reality little evidence is available to inform this debate because research typically explores the cognitive benefits of technology and interactions with the resources rather than the mediating interactions around technologies. As such, this study must focus extensively on observable behaviours around technologies in order to provide a new perspective to the literature.

1.3.2 Child-Child Interactions Around Technology

Literature suggests that there is a qualitative difference between adult-child and child-child relationships. Adult-child relationships are considered 'complementary' whereas child-child relationships are believed to be 'reciprocal' (Turner, 1991). That is to say that child-child relations are believed to be based on mutual understanding and being able to 'compare self with other comparable individuals' (p. 1475), which is not possible for the child to do with adults as they recognise adults are figures of authority and as qualitatively different to themselves. It is the 'norms of behaviour' that create a divergence between the position of adults and children in the social structure and Wyness (2011) argues that it is "grounded in the children's imputed dependence" and adult's "imputed independence".

In technological studies, adult-child interactions are well documented, in for instance the work on Guided Interactions (Plowman & Stephen, 2007a), but the nature of child-child interactions in traditional contexts, let alone technological contexts, is far less transparent (Kutnick *et al.*, 2007). This is an under-developed area in research despite Corsaro (1988b) suggesting over two decades ago that few studies have explored the interactional process between peers and Broadhead (2001) and Kutnick *et al.* (2007) indicating that most studies of the classroom focus on adult-child interactions. Even studies which do explore peer processes, mostly explore the societal phenomenon of individual children and so the collective peer interactions are not always addressed (Corsaro, 1997). Yet this has been highlighted as a key area of study, as shown below.

> *By engaging in them [activities], individuals learn what is expected of them, which activities are considered appropriate or inappropriate, how they are expected to engage in these activities, the ways other people will deal with them, and the ways in which they are expected to deal with others. People initiate activities themselves, and try to draw others into those activities, and it is in the course of these activities and interactions that they try out different roles and observe the roles of others. There are thus clear theoretical grounds for studying the typically occurring everyday activities in which children engage (Tudge et al., 2006: 1447).*

However, theoretical grounds provide only one perspective on the situation; what is required is a thorough, empirical investigation of child-child interactions around technological activities. While studies have begun to document the power struggles around computers (Ljung-Djarf, 2008), non-technological literature about peer social relations (albeit limited), is more comprehensive (Corsaro, 1985; Faulkner & Miell, 1993; Harper & McCluskey, 2003; Kutnick *et al*., 2007; Kutnick & Kington, 2005; Lynch & Cicchettie, 1997; Pianta, 1997) but this has not been translated into technological studies. Thus, more literature is required which moves away from adult-child explorations towards understanding child-child interactions in both technological and non-technological studies.

Similarly, when looking at interaction around technology, the focus is nearly always on how the child interacts with the computer. Ljung-Djarf (2008) begins to move towards a more social focus, but the positions she creates have been developed in relation to how the child uses the computer, rather than how the children interact with each other. Hutchby and Moran-Ellis (2001: 3) describe how technology use in childhood should be examined from a social perspective when they state that:

> *the significance of technology lies not in what an artefact 'is', nor in what is specifically does, but in what it enables or affords as it mediates the relationship between its user and other individuals. Thus, the important question is not 'what is the impact of technology use on childhood?'...but rather, what are the shapes and the outcomes of specific situated encounters with children and technologies: how do children interact with, and in light of, the affordances that technologies have: how do these affordances constrain these interactions.*

1.3.3 An Inclusive Definition of Technology

Many technological resources are readily available in Scottish preschools (Plowman *et al*., 2010a), yet, the central tenant of technology research remains narrow and in most studies 'technology' is defined as the computer (e.g. Brooker & Siraj-Blatchford, 2002; Chen & Chang, 2006; Jackson, 1990; Plowman & Stephen, 2005; Shinegold *et al*., 1984). So vast is the literature on computers (predominantly around the role of the computer for cognitive development) that a review of research is available over a 10 year period for this resource alone (Yelland, 2005).

In relation to social interactions Quilitch and Risley (1973) argue that differences in social play were directly related to differences in play materials (non-technological materials) and not differences in the children themselves. Hence, different technologies may offer different opportunities for interactions and must be explored. For example it has been highlighted that the availability of only one mouse, keyboard and monitor at the computer means that the technology does not lend itself to group or collaborative use of the same resources as other resources may (Ljung-Djarf, 2008) because these resources are designed for individual and personal use. Of course, one mouse does not impede collaborative discussions around these resources, but it does limit the ability for joint control of the technology. Similarly, it has been suggested that not all technologies are bound to one physical location, as a computer is, and so they are more adaptive to different activities (Ching *et al*., 2006) and Stephen and Plowman (2007) indicated that computer desk tops were not ergonomically suitable for young children and this influences how they are used.

There are now a wealth of technologically enhanced toys and 'intelligent toys' (Siraj-Blatchford, I. & Siraj-Blatchford, J. 2006), beyond computer technologies (Saracho and Spodek 2008a) particularly in relation to supporting role play (Morgan & Siraj-Blatchford, 2009) and these resources must be explored to understand how the affordances of these resources contribute to their use and the social interactions around these resources. Despite the diverse opportunities afforded by these different technologies, studies have not yet begun to explore the learning potential of these technologies, let alone social experiences (with the exception a small number of researchers including Plowman *et al.* (2010b)). Studies have begun to investigate the interactive whiteboards or SMART boards in early years (Beauchamp & Parkinson, 2005; Morgan, 2010; Terreni, 2009), but in comparison to the volume of literature on the computer, these studies are sparse. In addition, despite the wealth of 'intelligent toys' now available, with the exception of Lurkin *et al.* (2003) few studies have explored these resources (Siraj-Blatchford, I. & Siraj-Blatchford, J. 2006).

It is essential to follow in these footsteps and to provide an empirical foundation around a range of technologies to inform the toxic childhood debate which unequivocally links technological resources, particularly screen-based media, with reduced social interactions without having a sufficient foundation upon which to draw conclusions. Based on the understanding that different artefacts afford different kinds of interaction it is therefore essential to investigate a large range of resources and not focus on the computer.

Section 1.4 Summary of Literature about Social Interaction

This chapter has provided a starting point for understanding children's social experiences during technological activities. I have attempted to demonstrate the marginalised focus on social interactions in technology literature. While perspectives on helping and group dynamics linked to social interaction and technology are available, little is known about children's observable behaviours and actions in these situations. This has been demonstrated by highlighting the multi-faceted nature of children's social interaction in non-technological literature which was overlooked in technological studies. Furthermore, it was clear from the technological studies available that key areas of development are required in technological studies of social interactions including an exploration of:

- observable actions and behaviours around technologies;
- child-child interactions rather than adult-child interactions including how children interact with peers around technologies rather than interacting with technologies;
- more technologies than just the computer.

CHAPTER 2
Technology, Social Interactions and Context: Perspectives from Literature and Theory

Section 2.1 Introducing Context in Relation to Social Interactions

Based on explorations of social interactions in non-technological contexts, for which there is a well-established literature base, it was evident that context was linked to social interactions. From this it was clear that understanding context in relation to technologies is vital since the technology debate implied that technological artefacts (which form a part of the preschool context) may determine interactions. The importance of this area of study was also introduced in the previous chapter as part of the description of Wang and Ching's (2003) model. They indicated that it was not sufficient to focus on the individual child and attention must be paid to exploring the wider context in relation to children's social experiences. Furthermore, they suggested that it was pertinent to explore the relationship between the various aspects of context as an influence on the social experience. However, attempts to understand social interactions in relation to technological preschool contexts were particularly fruitless. It appeared that "many studies also largely ignore the classroom community and conveniently define 'children-at-computer' as a bounded and visible physical setting for study" (Wang & Ching, 2003: 338). As a result, it became clear that a focus on social interactions in relation to technological contexts had to be central to this study.

In order to achieve this, it was necessary to explore the ways that context could be addressed and observed as part of this study. This knowledge was gained from theoretical perspectives on context which describe the elements or components of context that should be central to a contextual research investigation. However, these theories offer a generalised perspective and in order to position this within the preschool context it was necessary to explore the theoretical perspectives in conjunction with empirical literature about the nature of preschools in the UK. When explored together it was possible for me to develop a comprehensive list of areas to focus upon as part of this project.

The chapter documents my progression through this part of the study and is broken down into three sections.

1. The first section presents an understanding of a typical preschool context.
2. The second section begins with an overview of the literature on social interactions in relation to the wider preschool context and concludes by highlighting the disparity between non-technological and technological literature and the need to redirect technological studies towards social experiences.
3. The third section then documents the possible ways of exploring the context from theoretical perspectives and empirical understandings of the preschool environment and culture.

Finally, this chapter concludes by documenting the research questions which emerged from the literature searches.

Section 2.2 Describing the Preschool Context: A Play-Based Setting

In early years education "the emphasis is on the whole child, play as a medium for learning, experiential learning and the crucial role of adults as supporting learning" (Plowman *et al*., 2010b: 53). The typical preschool playroom resembles a large open-plan room which is used for a variety of activities and contains many materials. It is customary for the materials to be grouped according to themed activities or 'learning centres' (Prochner *et al*., 2008), for example most preschools have a role-play area or dramatic play centres (Petrakos & Howe, 1996), an art area and a construction area (Pellegrini, 1984), blocks, puzzles, and dress-up (Fleer, 2003). Children are then able to move between resources freely (McEvoy *et al*., 1991) taking part in a range of activities throughout their day.

Contemporary literature suggests that the central aim of these activities is to encourage Sustained Shared Thinking. This perspective was founded out of the complementary work of Effective Provision for Pre-school Education (EPPE) (Sylva *et al*., 2004) and Researching Effective Pedagogy in the Early Years (REPEY) (Siraj-Blatchford *et al*., 2002a) and argues that:

> *'Sustained shared thinking' occurs when two or more individuals 'work together' in an intellectual way to solve a problem, clarify a concept, evaluate an activity, extend a narrative etc. Both parties must contribute to the thinking and it must develop and extend the understanding (Sylva et al., 2004: vi).*

This extends the work of Vygotsky because with sustained shared thinking the focus remains on mutual exploration rather than the centrality of the expert other (Brock *et al*., 2008). It welcomes an exploration of children 'working together' with practitioners or peers and is achieved through the fundamental characteristics of a preschool environment, i.e. playing and experiential learning and is therefore greatly influenced by children's social interactions.

Thus, sustained shared thinking is believed to occur as part of the established customs and ways of behaving in preschool which Prochner (2008: 190) describes as directed by a "belief in the value of learning through the hands-on manipulation of materials, in particular, and through self-directed play". Play, defined as "an imaginary, illusory world in which unrealisable desires can be realised" (Vygotsky, 1978: 93), entailing "interpretation, evaluation and diagnosis" (Bernstein, 1975) is viewed as an essential part of providing that hands-on learning; especially because play is believed to aid reciprocity and diminish aggression (Broadhead, 2006), improve creativity (May, 2007) and fuel self-exploration (Broadhead, 2004). The assumed link between play and learning, or development, seems to be quite commonplace within the literature as it is often said that "for children to make the most of their childhood and develop appropriately, then the need for play is important" (Thomas & O'Kane, 1998: 2). From this, it is often argued that play is the mechanism through which early years children's needs and desires are both expressed and realised (Vygotsky, 1933).

This approach to preschool provision builds on work from the founders of early years education like Froebel (1782-1852) who is regarded the creator of the first kindergarten (Smith & Connolly, 1980) and Susan Isaacs who advocated free play as a medium for learning (Stephen *et al*., 2010). That is to say, the practices of a preschool are 'inherited' (Bennett *et al*., 2000) and socially constructed (Rivlin & Weinstein, 1984), based on the historically developed views of childhood.

Yet, the perception that children benefit from play so profoundly is challenged by Bennett, Wood and Rogers (2000) who argue that this assumption is purely theoretical and not supported by empirical evidence. Certainly, play is believed to add value to child development (Singer, 1994) but from a socio-cultural perspective it is not possible to say whether it is the play itself, the instructive teacher or some other social experience which has caused the learning or development because the individual, their social world and development are inseparable (Rogoff, 1993a; Rogoff, 1993b; Sawyer, 2002). Moreover, there are many different forms of play including, but not limited to, constructive play, dramatic play and socio-dramatic play and so to say that play in general is needed to aid development and learning is misleading because one would assume that different types of play offer children different opportunities to learn different things. Nevertheless, play occupies a considerable proportion of children's time in preschool so it provides an opportunity to explore children's interactions with peers.

Section 2.3 Explorations of Social Interactions in Preschool Contexts

Having provided an understanding of the typical preschool environment it is now possible to explore this context in relation to social interactions. There is a wealth of literature about the ecological environment and how it relates to social interaction. This literature was prominent in the 1980s and does not take account of contemporary technology-rich preschool context; nevertheless, these studies provide a foundation for understanding how context is likely to influence interactions.

In the discipline of human geography, texts are available which explore the connection between people, their environments and their behaviours (e.g. Walmsley & Lewis, 1993) or which highlight the importance of understanding the relationship between the material and the social world (Thrift, 1996). Similarly ecological psychology, behavioural psychology and the theory of affordance indicate that the environment is seen as affording different opportunities (Gibson, 1986) and the 'design elements' of the environment are considered to influence behaviours (Read *et al*., 1999). In essence, the physical milieu of the preschool is thought to influence children's social behaviours (Rivlin & Weinstein, 1984) and dramatic play behaviours (Petrakos & Howe, 1996).

In particular, research has been conducted on social interactions in relation to:

- the physical preschool environment;
- group composition;
- space;
- preschool artefacts.

2.3.1 The Physical Preschool Environment and Social Interactions

Studies of the preschool environment in relation to children's social interactions were particularly prominent in the 70s, 80s and 90s (e.g. see Smith & Connolly, 1980). The work presented in this section is somewhat dated, hence, the technology is often absent from the literature because these resources were not readily available in preschool when this research was conducted. This in itself is noteworthy as it represents the fading frequency of ecological studies of social interaction.

Evidence from this area is far ranging. For example, studies have focused on mainstream versus specialist settings and the importance of having adequate pathways (e.g. for wheelchair users) between resources to increase the frequency of interactions and participation (Doctoroff, 2001; Guralnick *et al*., 1995). Activity types have also been linked to increased interaction, for example the 'housekeeping corner' (Rubin, 1977) and the 'doll corner' (Shure, 1963) have been found to promote 'the highest proportion of complex social interactions.' In addition, attractive furnishings have also been known to improve grades compared to standard, plain classrooms with traditional desks and chairs and white painted walls (Horowitz & Otto, 1973), while warming tones are considered to create calmer atmospheres (Moore *et al*., 1995) and less interactive play.

2.3.2 Group Composition and Social Interaction

Group compositions are also considered fundamental to children's social interactions. Smith and Connolly (1980) discovered that when larger groups form there were more instances of children within the group observing the playroom aimlessly and they indicated that larger groups around a resource could themselves consist of smaller subgroups.

> *In larger overall groups, there were many more occasions of children playing with other children whom they seldom played with (weaker friendships), fewer cases of*

medium strength friendships and perhaps one or two cases of very strong friendships (where the larger group has provided the children with a real buddy) (Smith & Connolly, 1980: 82).

Similar research indicated that social interactions were more likely to occur in groups of two or three; when group sizes reached four people one individual is typically left out (Trowbridge & Durnin, 1984). Clements (1994) argued that children should use the computer in groups of two to promote interaction and collaboration, yet further research suggests that the ideal size for learning centres is one which accommodates two to five children (Moore, 1986).

2.3.3 Space and Social Interactions

Research on space, spatial density and crowding has been particularly popular in relation to children's behaviours but there are some contradictions in the literature making the actual influences inconclusive. Loo (1976) for example argued that more 'self-involved' behaviours, such as solitary play were observed in spaces with a low density of children, which is supported by Fagot (1977) and more social interaction was observed in high density areas by Hutt & Vaizey (1996). Yet in contrast, it has also been demonstrated that more social interaction is expected in low-density areas (Driscoll & Carter, 2004) causing some confusion in the literature. In terms of negative behaviour, Loo (1976) discovered less aggression in more crowded areas, Rogers and Evans (2008) discovered more aggression or anti-social behaviour in environments with less space while Siraj-Blatchford and Sylva (2004) found that children had better social outcomes in places with ample space. Interpretations of these data suggest that small spaces have been linked to less solitary play because children are in close proximity to each other (Driscoll & Carter, 2004; Shure, 1963) and therefore there are fewer opportunities to find the room to play individually. However, Smith and Connolly (1980) argue that discrepancies occur in these findings due to the measurement of density, with some scholars defining density differently from others.

Additionally, the layout and positioning of activities in the preschool is considered fundamental and has been linked to social behaviours and interactions, or at least to some forms of social or non-social play. For example studies have found links between behaviour and ceiling height as Read *et al.* (1999) remind us that reduced ceiling heights may encourage quiet play while differentiated ceiling heights is associated with more cooperative play. Moore (1986) suggests that well-defined behaviour settings (with clear division of activities) showed evidence of more exploratory behaviour, more cooperative behaviour, higher degrees of social interaction and children were more engaged or immersed in the activity and were less likely to aimlessly observe the playroom. Thus, research provides evidence that the design of learning centres either promotes or hinders social interactions. For example, Petrakos and Howe (1996: 73) explored solitary-designed centres (equipment was designed in a solitary manner – 1 seat at a train) and group-designed centres (e.g. 2 or more seats at a train) and discovered that:

> *Group-designed centres facilitated children's social interactions by allowing children to focus on each other (e.g., double seating on a train) and engage in complementary role play (e.g. a ticket seller and buyer).*

2.3.4 Preschool Artefacts and Social Interactions

This study has an explicit focus on technological resources and therefore artefacts as part of the ecological environment warrant discussion in their own right in this thesis. There is a clear foundation to argue that varying kinds of social interactions and social play can be attributed to specific artefacts (Rubin, 1977; Shure, 1963). Yet this literature base pre-dates the digital age in preschool and therefore technological research is not yet available which links social interactions to specific *technological* artefacts, Nevertheless, studies are available which demonstrate that resources can be viewed as social or isolate (Ivory & McCollum, 1999), which for this study is a valuable perspective for understanding the social potential of preschool artefacts. The terms 'social' and 'isolate' were used in a few studies to describe these different social properties, for example, the terms described whether resources afforded use by one individual child or multiple children (Driscoll & Carter, 2009; Ivory & McCollum, 1999; Quilitch & Risley, 1973). Hence, 'social' toys are resources which can be used by two or more children while 'isolate' toys are only used by one child.

The general understanding is that specific resources and artefacts prompt greater social interaction while others inhibit it (Chandler *et al*., 1992). For example, dolls and games (Shure, 1963) and dramatic play materials (Rubin, 1977) were linked to more cooperative play or social interaction. While, art and puzzles were linked to more solitary or parallel play (Rubin, 1977). A study comparing blocks and clay found that clay was associated with more observational behaviour amongst children, children were more likely to accept suggestions from peers when using clay and they demonstrated more cooperative and social behaviours. However, with blocks there was less observational play and more mutual activity, but suggestions were less likely to be accepted and play was less sociable or cooperative (Updegraff & Herbst, 1933). Similarly, other research demonstrated that children most often 'play together' with wagons, dish blocks, doll houses and dump trucks (Quilitch & Risley, 1973).

These studies provide empirical evidence which demonstrated links between resources and behaviours. However, the individual resources are not the only focus and in fact the volume or density of equipment available has been linked to social interaction. Prochner (2008) suggested that the greater the number of resources the greater the instances of object play and Johnson (1935) and McCormack (1987) argue that the greater the number of resources, the less frequently social contact was observed and vice versa. Similarly, Quilitch and Risley (1973) argue that the fewer the resources, the increased instances of sharing while Smith and Connolly (1980) states that with more resources children were less likely to share them. The latter point however has also been contested in empirical research because fewer resources are believed to be correlated with aggressive behaviour, with the majority of conflicts relating to the possession or ownership of toys (Smith & Green, 1975).

2.3.5 Summary: The Preschool Context as a 'Co-Educator' of Social Interaction

The literature presented above provides an insight into how the physical setting may contribute to children's social interactions, but it is not without criticism. Two specific problems may be identified. Firstly, technologies are lost in the literature. While some of the evidence presented above is more recent, and a small number of studies were published shortly after the Millennium, they are significantly outweighed by the wealth of studies published in the 70s and 80s. Contemporary ecological studies are far more sporadic, providing a more fragmented understanding of the contribution of contemporary, technology-rich preschool environments.

Secondly, ecological literature assumes a causal link between the physical environment and interactions without considering other aspects of context; hence, it is often considered deterministic. In this literature, the environment is modelled as a third-teacher (Maxwell, 2007) or a 'co-educator' in the similar sense that neighbourhoods have been described (Visscher & Bouverne-De, 2008). In essence, it may be argued that children's experiences are shaped by what the environment affords. As Read *et al*. (1999: 414) argues:

> *What the physical environment affords would have an influence on children's perception, learning and behaviour within that environment.*

Links like this raise concern because they suggest that there can be ‘one logical behavioural outcome in any given situation’ which is reductionist in nature and can lose sight of individuals’ own motives and attitudes which may contribute to social interactions (Walmsley & Lewis, 1993). Nevertheless, these studies provide an understanding of one potential factor (the ecological environment) which contributes to children’s social interactions.

Based on these findings, it is reasonable to assume that if different traditional resources offer differing opportunities for interaction, so too may technological resources and as such it is essential to extend explorations into technological contexts in light of the suggested correlation between technological artefacts and social interactions in the toxic childhood debate. Almost three decades ago, Shinegold *et al.* (1984) pointed out that there was a need to move research on technology, microcomputers at that time, beyond the exploration of learning potential towards understanding how “hardware fit into the organization of classroom social and physical space” (p.4). She highlighted that “classrooms are well established cultures, with social organisations and work-related agendas embodied in long-standing curricula” (p.4) and with this in mind more studies need to explore the potential of computers for social development, in addition to cognitive development, in order to provide an holistic perspective on children’s experience with technologies in preschool.

Thus, the focus of research needs to be redirected away from studies of cognitive development (of which there are already many) towards explorations of the social nature of these resources. Moreover, these studies need to move beyond studies of social interactions confined within the context of the technology, to take into consideration the wider technology-rich preschool context and the associated influences on social interactions. By focusing on the wider culture it is possible to see how beliefs and values shape children’s experiences as Tudge (2006: 1447) indicates:

> *Different cultures make available to their young different types of settings and different experiences within those settings, as children are encouraged to engage in some types of activities and discouraged from engaging in others, depending on the values and beliefs of the particular cultural group.*

Wang and Ching (2003) have started to pave the way for this kind of research but more is needed to fully understand the importance of the technological preschool context in relation to social interactions. As a result, the current study was driven towards a central focus on the wider technological context in relation to social interactions.

Section 2.4 Theorising Context in Relation to Preschool

One of the ways in which this project intended to contribute original knowledge to technology-related research was to explore how the wider context contributes to social interactions around technology because there is a scarcity of literature in this area. This is described as developing a 'wholeness approach' (Fleer *et al*., 2009) and moves the research on from those studies which explore context as 'children at the computer' (Wang & Ching, 2003). However, because this area is so underexplored there was a general lack of guidance to direct the data collection and analysis for my project. As a result, it was important to understand how context is theorised elsewhere and to transfer this knowledge into my work on children's social interactions in technology-rich preschool contexts.

The focus on theory was required from the perspective of understanding how context should be observed and explored for this study. This was aided by drawing on Dewey's external nature of experience.

> *We live from birth to death in a world of persons and things which is in large measure is what it is because of what has been done and transmitted from previous human activities. When this fact is ignored experience is treated as if it were something which*

goes on exclusively inside an individual's body and mind. It ought not to be necessary to say that experience does not occur in a vacuum. There are sources outside the individual which give rise to experience (Dewey, 1938: 39).

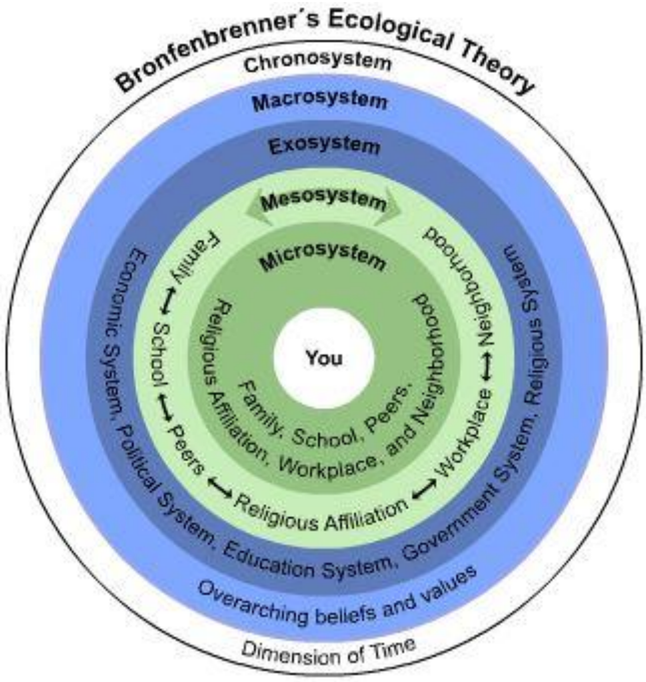
This last sentence is particularly important because it indicates that not only people but also a number of different 'sources' contribute to children's experiences. From this, it became clear that it was these 'sources' which should form the basis of contextual observations. Thus, in order to frame the data collection it was essential to understand on which key 'sources' or components of context to focus in relation to social interactions and technology. There are several ways of conceptualising context or how people operate in context e.g. Bourdieu's Theory of Practice (Grenfell & James, 1998), Lave and Wenger's Community of Practice (Lave & Wenger, 1991), Actor Network Theory (Latour, 2005). However, for this study Bernstein's Pedagogic Discourse (Bernstein, 1990; 2000), Ecological Systems Theory (Bronfenbrenner, 1979) and Activity Theory (Engestrom *et al.*, 1999) offered various perspectives on the components of context which contribute to children's experiences.

2.4.1 Bronfenbrenner's Ecological Systems Theory

Bronfenbrenner suggested that children's development is influenced by five nested environments; the micro-, meso-, exso-, macro- and chrono- systems (Bronfenbrenner, 1977; 1979; 1986).

- The microsystem describes the child's relation to, and interaction in, their immediate setting (e.g. the preschool).
- The mesosystem explains the interaction or relation between two or more microsystems (the home-school relation for example).

Figure 2 - Bronfenbrenner's Ecological System



- The exosystem describes an environment to which the child is unassimilated and may never have physically been but by which the child may ultimately be affected (e.g. their parents place of work).
- The macrosystem describes wider cultural values and norms in society.
- The chronosystem describes the influence of time.

This model is typically presented in a nested cyclical diagram as shown in Figure 2.

The Macrosystem: Informing Developmentally Appropriate Practice

Bronfenbrenner, like many other contemporary theorists (e.g. James & Prout, 1997), argued that childhood is a cultural construction influenced by wider society and 'global politics' (Fleer *et al*., 2009), as societal values and laws provide a 'frame' for children's activities (Hedegaard, 1999; 2009). Thus, society shapes the institutions within which we all operate and it is this aspect that Bronfenbrenner describes as the macrosystem.

> *Within a given society, one school classroom looks and functions much like another. The same holds true for other settings and institutions, both informal and formal. It is as if they were constructed from the same blueprints. These "blueprints" are the macrosystem.*

With regard to preschool playrooms, these "blueprints" are set out by developmentally appropriate practice (DAP) (National Association for the Education of Young Children, 2009). This is the consensus view of schooling in the USA and is also considered the 'default perspective' (Stephen, 2006a) for UK preschool practices. DAP emphasises:

- a balance between children's self-initiated learning and practitioner guidance;
- opportunities for children to make meaningful choices between activities offered;
- scope to explore through active involvement;
- a mix of small group, whole group and independent activities;
- play as a primary (but not the exclusive) medium for learning;
- adults who demonstrate, question, model, suggest alternatives and prompt reflection;
- systematic observation of children's learning and behaviour.

(National Association for the Education of Young Children, 2009)

An exploration of DAP guidelines illustrates the value placed on children's own decision-making and on a child-centred agenda. This portrays children as 'social actors shaping and being shaped by their circumstances' (James *et al*., 1998: 6); an understanding which can be traced back to the romantic school and to the work of pioneers like Jean-Jacque Rousseau who, through his portrayal of Émile, created the image of the child as a person. As a result, preschool environments are designed as a place for children to 'experience their childhood' (Goouch, 2008) and while, early years education in the UK has a long history of 'routines, practices, rituals, artefacts, symbols, conventions, stories and histories' (Fleer, 2003: 75), the overarching premise is that children are granted control over their activities (Maxwell, 2007). It emphasises the need for children to have an active role in planning and choosing their own activities and there is an understanding that practitioners should be supporting learning in a responsive manner, rather than directing or leading it (Stephen, 2006a).

Essentially, based on views of childhood and DAP, the macrosystem provides a framework for institutional practices and conditions (Fleer *et al*., 2009) within which children's immediate experiences are located. 'Blueprints' for preschool are developed by the UK macrosystem and shape the expectations for preschool practices and children's experiences. This is important to explore during a study on social interactions because allowing children agency in their activities gives them freedom and control over two key aspects of their preschool experience: who they interact with and the resources (including technological resources) around which these interactions take place.

The Microsystem: Institutionalised Practices and Rules Govern Behaviours

For this study, one of the most useful components of Bronfenbrenner's model is the microsystem, the preschool itself, particularly when combined with other literature on preschool culture because this was the setting where the data would be collected. The microsystem is the immediate environment within which the child is developing and Bernstein (1990) describes this environment as characterised by the regulative discourse (the rules of social order) and the instructional discourse (rules of discursive order). The former is concerned with the rules which govern how children behave, while the latter focuses on the sequencing and pace of how children learn (Bernstein, 2000). These discourses 'frame' children's experiences and behaviours within the environment and are therefore central to this study. Certainly the regulative discourse is clear in much literature on children's preschool environments and is understood to form part of the culture of the preschool. Wyness (2011: 34) for example argues that "in all sorts of ways children are expected to behave according to codes and frames laid down by adults, usually parents and teachers". While Vygotsky argues that children's behaviour in learning environments must fit into a predefined expectation and describes education as "the organisation of acquired habits of conduct and tendencies to behaviour" (Vygotsky, 1978: 81) providing a strong regulative discourse for children to follow. Thus, preschools have social conventions defined as:

> *Behavioural uniformities which coordinate interactions of individuals within the social systems...thus, social conventions constitute general and shared knowledge of uniformities in social systems (Nucci & Turiel, 1978: 400).*

For example, in early years education children's behaviours and the appropriate use of resources is governed by adults who induct children into the "ways of speaking and listening to other, sitting, sharing, taking turns and putting your hand up" (Brooker, 2002: 76). Despite, efforts to offer children agency in their daily experiences, young children's lives in preschool, and beyond, are rule-bound (Alcock, 2007; Siraj-Blatchford *et al*., 2002a) and preschool children typically follow a habitual pattern of routines which are believed to offer the child security and a sense of belonging (Siraj-Blatchford *et al*., 2002b). As a result, when attending preschool children become a member of a behavioural setting.

> *An individual entering a behaviour setting will experience 'pressures' to act in a manner consistent with the perceived character of the setting, which contributes to maintaining a particular behaviour-milieu (Barker, 1968: 31).*

These rules provide expectations for children's behaviour (Cobb-Moore *et al*., 2009) and Corsaro (1997) argues that cultural rules allow children to understand where they belong in a social group and social norms prescribe appropriate attitudes, values and behaviours in a given situation (Rutland *et al*., 2005). In essence, children's 'internalisation' of rules is considered a fundamental part of their moral development (Jordan *et al*., 1995). From a socio-cultural perspective, this is described in terms of 'artefacts that they [children] must learn to handle' (Jordan *et al*., 1995). Alternatively, Hedegaard describes this process in terms of participating in institutionalised practices that "initiate but also restrict children's activities and thereby become conditions for their development" (Hedegaard, 2009: 72). Institutional social practices, processes and conventions are therefore something greater than the habitual behaviours or actions of the child. They are the structural factors which influence and impact upon behaviour. As Hedegaard (2009) points out, these rules then "initiate but also restrict children's activities", and arguably, their social experiences.

Based on the above perspectives, 'rules, roles and artefacts' form the foundation of everyday practice (Alcock, 2007) and provide an understanding of what counts as 'appropriate' practice (Cobb-Moore *et al*., 2009), 'behaviours, use of resources and interactions (Jordan *et al*., 1995). These rules are therefore essential to maintain order and control in preschool. Alcock (2007: 281) defines culture as the process "whereby values, rules, roles, artefacts and ways of doing things become, over time, part of the everyday practices". In this sense preschools are cultural environments. Seeing preschools in this way, as places shaped by cultural values and goals (informed by the macrosystem) and as agents of cultural transmission which consist of a range of institutional practices, develops a more comprehensive understanding of the microsystem to which Bronfenbrenner refers. It demonstrates that the preschool is more than the physical setting and while the preschool building is the 'setting' where children are afforded face-to-face interaction (Bronfenbrenner, 1977) the wider preschool in general is a microsystem defined as:

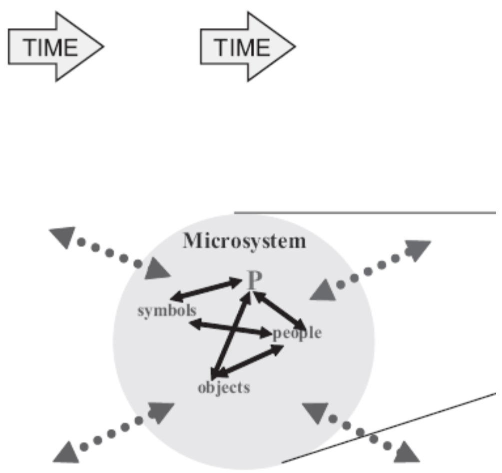
> *A pattern of activities, social roles and interpersonal relations experienced by the developing person in a given face-to-face setting with particular physical, social, and symbolic features that invite, permit or inhibit engagement in sustained, progressively more complex interaction with, and activity in, the immediate environment (Bronfenbrenner, 1993: 39).*

Proximal Processes: Children's Peer Cultures

Inherent within microsystems are proximal process defined as "enduring forms of interaction in the immediate environment" (Bronfenbrenner, 1994: 572), (such as parent-child or child-child activities, group or solitary play, studying, learning new skills etc.). This thinking reflects the later refinements of Bronfenbrenner's theorising and the second phase of his work where the original ecological model of human development is transformed into the bio-ecological theory which focuses not just on the context but also the developing child. At this time Bronfenbrenner argued that interactions occur between the child and three features of the immediate environment: persons, objects and symbols (Bronfenbrenner, 1995). In line with Hedegaard however, Bronfenbrenner indicates that the microsystem constrains or facilitates how interactions happen.

This mirrors (albeit using different terminology) the components addressed thus far by the Transaction Model of Social Processes. This perspective on the Microsystem has been unpicked by Tudge (2009) as they graphically demonstrated that an individual person (P) interacts with other people, symbols and objects over time, as shown in Figure 3. The focus on processes provides a place for understanding social experiences because it is one of the few frameworks which examines the observable processes between people.

Figure 3 - The Microsystem Unpicked



An alternative way to consider proximal processes is to think of them as the inter-related processes that take place within the environment. In preschool they may be explored in terms of peer cultures. Rules which govern preschool experience provide a frame for children's peer cultures (Corsaro, 1990). Corsaro defined peer cultures as "a stable set of activities or routines, artefacts, values and concerns that children produce and share in the nursery school" (Corsaro, 1988b: 3). There are two central components of peer culture:

1) children's persistent attempts to gain control; and
2) the collective production and sharing of social activities with peers.

(Corsaro, 1985)

Socio-cultural explanations of play suggest that children continually negotiate rules during playful experiences (Alcock, 2007; Vygotsky, 1978). Rules in play, however, are of a different form from the ones aimed at maintaining social order because they are not necessarily laid out explicitly by adults. Instead they reflect the child's understanding of the rules and roles of society: they are implicit rules which reflect 'shared local understandings' (Alcock, 2007). Thus, through play children recreate key societal roles, for instance Vygotsky (1978) uses the example of a child pretending to be a mother and in doing so they must abide by the rules of 'maternal behaviour'. Similarly he described two children playing at being sisters and assuming the rules involved with being a sister (Holland & Lachicotte, 2007).

Peer cultures are therefore defined as children "begin[ning] life as social beings within already defined social networks and, through the growth of communication and language, in interaction with others, construct their social worlds" (Corsaro, 1993: 64). This is supported by Tudge (2008: 5) who argues that "engaging in practices – activities and interactions in which we engage alone and with others – that we both recreate the culture of which we are a part and help change that culture". This is particularly relevant in preschool life because children are attempting to negotiate the predefined social networks which have already been established for them by the very nature of preschool itself. Within these cultures children take on board what they have learned and observed in the adult world without simply reproducing these behaviours, values or interactions. Instead children use the knowledge they have gained from the adult world and use this information and experience to create their own peer cultures (Corsaro, 1993). This premise holds that the adult world therefore not only influences the child's world but the child's world also impacts upon the adult's world. Corsaro therefore argues that "the individual development is embedded in the collective production of a series of peer cultures which in turn contribute to reproduction and change in the wider adult world, society and culture" (Corsaro, 1997: 26).

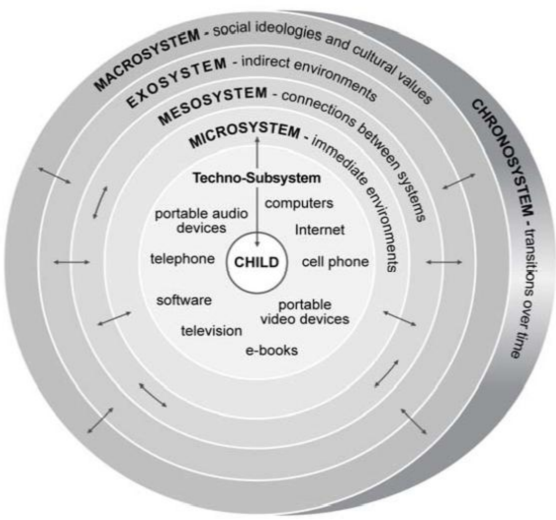
Lave and Wenger (1991: 98) suggest that such power struggles may occur in a Community of Practice, defined as "a set of relations among persons, activity, and the world, over time and in relation with other tangential and overlapping communities of practice". Within such communities, it is possible to see 'masters' (longstanding members of the community that have developed an extensive knowledge of the appropriate process to participate) and participants who are not yet fully independent members. The basic premise argues that within communities, children become participants in the culture which allows them to be immersed in the setting rather than simply observing what others do. Children engage in Legitimate Peripheral Participation (LPP) and Situated Learning where they gain knowledge and experience by 'doing', so that they are able to understand how the culture is created by exploring how 'masters' conduct themselves. These 'masters' provide an archetype for new members. This resembles the ideas put forward by Corsaro who argues that through interpretative reproduction children reproduce the adult world. They do this by becoming a member of the preschool and contributing to it, rather than merely appropriating or internalising the culture already established. Corsaro (1992: 161) describes this process as he indicates that "children enter into a social nexus and, through interaction with others, establish social understandings". Children's positions within the community therefore contribute to their interactions and relations as it is recognised by all members of the community that the 'masters' are the most knowledgeable members and are therefore gifted with authority.

Thus if proximal processes are the 'enduring forms of interaction in the immediate environment' then from the perspectives of Corsaro, Lave and Wenger and many others, proximal processes are the peer cultures that children negotiate and mediate throughout their time at preschool. This project intends to document how these processes have been observed around technologies in preschool.

Contemporary Theorising of Technological Contexts

Bronfenbrenner's model was a particularly useful way of conceptualising the preschool and understanding what aspects of the preschool should be considered as part of this study. Its relevance is heightened by recent reconceptualisations of the model which considers the role of technologies through the various systems (Johnson, 2010a; Johnson, 2010b; Wang *et al.*, 2010). Wang *et al.* (2010)

Figure 4 - Johnson (2010) Technological Subsystem



reworked Bronfenbrenner's model to explore young children's technology experiences in multiple contexts, while Johnson (2010a) developed a techno-subsystem derived to account for the interaction between children, technologies and the other systems.

Johnson (2010a) argues that a technological subsystem mediates development and is described as:

> *a dimension of the microsystem which includes child interactions with both human (e.g., communicator) and nonhuman (e.g., hardware) elements of information, communication, and recreation digital technologies* (Johnson, 2010a).

The model explores the place of internet technologies and they describe the internet's influence through an example. They argue that the microsystem is influenced by the internet as peers use online communication etc. and the internet connects microsystems in a 'mesosystemic' fashion (e.g. parents can track assignments and work online). They then argue that as parents use the internet at work this may influence the home or school microsystem, while cultural material is accessed and marketed over the Internet, projecting the macrosystem. They therefore argue that the whole ecological system is connected through the Internet.

Figure 5 – Wang *et al.* (2010): Beyond Bronfenbrenner's Ecological Theory

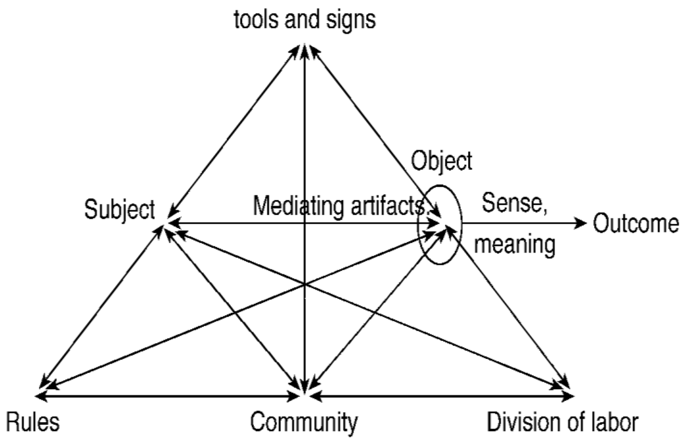
This theoretical perspective is consistent with the revised model put forward by Wang *et* *al.* (2010: 29). They also argue that Internet virtual worlds allow children to transcend system boundaries which may result in the mesosystem (which describes the interactions between microsystems) being obsolete (Johnson, 2010a). This is represented differently in their graphical model but the principles are similar to Johnson (2010a). Furthermore, they argue that Internet creates new microsystems entirely – virtual microsystems. This creates challenges to Bronfenbrenner's representation because the virtual microsystems (such as online communities) can be accessed by the child who is operating within another microsystem. The virtual and real-world microsystem themselves then become nested.

For this study, the revised models demonstrate how technology is transforming the microsystem and indeed the connection between systems. Although the focus of this study does not sit with online interaction, but rather face-to-face interaction, these reconceptualisations highlight the importance of recognising how technologies are altering the microsystem. It demonstrates the importance of not relying on one pre-established model of context because the introduction of technologies is continually altering and changing context. As a result, this study will draw on the various systems of Ecological Systems Theory as a guide for what to explore but will not limit the discussion to these aspects of context alone.

2.4.2 Activity Theory: Identifying Key Components of Context

In the last section, context was explored in terms of the multiple environments with which children have some form of relationship or interaction. From that perspective it may seem reasonable to describe the activity or proximal processes of children as something which occurs within the "context" of the preschool environment. From an activity theory perspective however, it is possible to present a different notion of context.

Figure 6 - The General Activity System



(Engestrom *et al*., 1999: 135)

Although, Activity Theory is wide ranging and there are many variations of it, for this study the focus remains on Cultural Historical Activity Theory (CHAT) because the components of context are neatly presented and inter-linked in the diagram below, which is a particularly concise way of highlighting the components of context which may form the basis of observations. Within CHAT the subject is working towards the object based on motives and goals. This process is mediated by tools which can be material or symbolic and these tools aid the transformation of the object (the physical or mental product sought) into the outcome. The subject is part of a community or communities because the whole activity system is situated within a community of practice. As with most communities, there are rules and regulations which shape and constrain the subject's actions and there are power differences which impact upon people's responsibilities and task delegation (Division of Labour).

From an activity theory perspective human behaviour and nature is altered by the cultural tools of society (Jonassen & Rohrer-Murphy, 1999). Tools shaped by prior human practice are considered artefacts (Cole & Wertsch, 2002) and are viewed as instruments that are the legacy left by previous generations (Nardi, 1995; Rogoff, 1990). They can be either material (e.g. a laptop computer) or symbolic (e.g. heuristics devices such as mental maps) (Cole *et al*., 1997) and are broadly defined by Nardi (1995) as instruments, signs, language and machines. Due to the historical undertones inherent in artefacts, it is argued that they contribute to people's actions (Kaptelinin, 1995) as they shape individuals' ways of thinking and thus their ways of acting. As cultural perspectives shape people's thinking, the individuals (or subjects) themselves also influence experience because activities vary based upon a person's own motives and goals. Thus an activity can be accomplished with a variety of actions as individuals mediate the activity through different tools and with different motives (Lantolf, 2000). From this perspective, context is not the preschool itself but the activities that occur within the preschool.

> *Activity theory, then, proposes a very specific notion of context: the activity itself is the context. What takes place in an activity system composed of object, actions, and operation, is the context. Context is constituted through the enactment of an activity involving people and artifacts. Context is not an outer container or shell inside of which people behave in certain ways. People consciously and deliberately generate contexts (activities) in part through their own objects; hence context is not just ``out there'' (Nardi, 1995: 38).*

In terms of understanding what to observe in preschool, the general components of CHAT resonate with the various aspects of Ecological Systems Theory, such as rules and regulations as part of the microsystem, the division of labour as part of the peer culture or proximal processes etc. Hence, these two frameworks complement each other in terms of identifying the central components of context. However CHAT provides the additional understanding that activities should be the central focus of the observation with the wider components of context emanating out from the activity. This aligns with literature from Chapter 1 where it is highlighted that children typically use technological resources in groups and the technology becomes the activity focus for that group.

2.4.3 Summary: Areas of Preschool to Address

The last section has highlighted the alternative ways that context has been theorised and reconceptualised to account for contemporary technological resources. These studies have demonstrated the important components of context but few of these frameworks provide an overview of children's social interactions in these contexts. This study aims to extract these components of context and explore them in relation to children's social interactions in contemporary technology-rich preschools.

The previous chapter (Chapter 1) demonstrated that few studies of technology moved beyond the child at the computer as the focus on context. Yet, focusing on the wider context provides opportunities for understanding the factors which contribute to children's interactions. Models, like Bronfenbrenner's Ecological Systems Theory (1979), and Activity Theory provide an understanding of the multiplicity of influences contributing to children's overall development as well as their daily lives. While there are multiple other models and frameworks which relate to context, the two presented here (in conjunction with references to Bernstein, Lave and Wenger and Corsaro) are considered the most valuable to this project because they skilfully describe the components of preschool and wider society which may influence children's interactions. In particular, contextualist theorising demonstrated that it is important to address four areas of context.

1. The wider society contributes to institutional practices and therefore children's interactions and behaviours. It should be noted that for this study this perspective is provided by a well-established theoretical base because the scope of the empirical data collection does not extend beyond the preschool itself.

2. When exploring the microsystem it is vital to address a wide variety of components such as the children and practitioners, technological artefacts, rules and regulations as well as observable behaviours.
3. It is important to understand the proximal process which takes place within preschool, i.e. the relations between factors in preschool.
4. There is a need to explore group activities that children complete with technologies as the central focus of context and the observations.

Section 2.5 Aim and Research Questions

Research about the learning potential of technology significantly overshadows any focus on technology and social experience (Edwards, 2005) and Fleer, Hedegaard and Tudge (2009: 10) argue that "in developmental psychology much research focuses on children's cognitive and emotional development without considering the traditions in the settings of children's everyday life". This is also demonstrated by exploring Yelland's (2005) review of computers in preschool; of the 32 page review, only just over two pages were devoted to social experiences with computers, reflecting the proportion of literature in this area. This study is concerned with bridging this gap and understanding children's social experiences – rather than learning experiences - around technology in preschool settings.

Similarly, in contemporary research it is still recognised that little is known about how children spend their time, who they spend this time with, the activities engaged in or the interactions taking place in these activities (Tudge, 2008). Research in developmental psychology is recognised as being concerned with the epistemic child, in other words the concern is on creating generalised theories of child development rather than capturing the individual child (Tudge, 2008). This study aims to provide this more narrowly defined focus and it is the intention of this study to provide a description of the observable social interactions which children exhibit during technological activities in preschool and the aim is to:

Explore children's social interactions as they use technology in preschool playrooms

In order to do so we need to redirect our attention away from the typical adult-child or institutional focus and move research towards a child-child focus. This focus then needs to provide a more thorough description of the dynamics of the interactions taking place rather than just providing a list of the potential influences on the social situation. In doing so, we cannot exclude those influences all together because from the contextual theories presented in this chapter it is understood that other people, artefacts and social conventions or norms will bear weight on the interactions observed but they must be presented in such a way that they represent the dynamic and changing nature of children's experiences due to these multitude of factors. In particular, a range of technological resources need to be explored in order to provide a fuller picture of the role that technology plays in shaping interactions.

In summary, the literature has established that research is required which:

1. explores the wider technological context (including the artefacts themselves) in relation to peer interactions;
2. documents observable behaviours and actions;
3. explores child-child, rather than adult-child, interactions around preschool;
4. adopts a more inclusive definition of technology and move beyond studies of the computer;

Based on the required knowledge bulleted above, this project specifically attempts to address the aim for this project by answering the three research questions presented below:

1. What forms of interactions can be observed while children engage with their peers around technology in preschool playrooms?
2. What are the distal and proximal characteristics of the playroom that make a difference to interactions observed around technology in preschool playrooms?
3. In what ways do the affordances of the technology relate to the child-child interactions observed?

It should be noted that references to 'distal' and 'proximal' in research question two, relates to the definitions provided by Plowman and Stephen (2007a) when they suggest that distal characteristics are indirect influence on learning (e.g. practitioner planning) while proximal characteristics are face-to-face interactions which have a direct influence on learning. Guided interaction is set within the preschool and the same premise is adhered to throughout this project and as such distal characteristics, for this study, do not extend to factors outside the preschool. For example a child's extended access to technology in the home or familial beliefs about technology is not within the scope of this study. Similarly, understandings of cultural traditions and norms which contribute to practitioner planning are understood from available theorising and literature rather than exploring wider societal/cultural influences from outside the preschool directly. This would be a broader project than would be manageable by one researcher in the time scales available, and as such wider external distal characteristics could be considered for future research, but is not practical for this introductory study.

Conducting this study is justified, not only by the under-developed literature but also by the nature of preschool education. It is important to explore social interactions in preschool because it has been suggested that promoting social competence is a key objective in early years education (Driscoll & Carter, 2004; Scottish Executive, 1999) and interaction is considered fundamental to children's development (Rogoff, 1993a). Wang and Ching (2003) draw on the characteristics of the preschool environment as a justification for their studies about children's social experiences with the computer because:

1. the insufficient supply of technological resources in preschool necessitates collaborative and shared use and provides an opportunity to understand the nature of interactions during collaborative use;
2. preschool is a time for children to develop an understanding of their place in the social order of school;
3. understanding children's processes with technology will inform practitioners about how to use technology to the full potential, thus making a connection between explorations of social interaction and the fundamental aspect of preschool education; learning and development.

These reasons are also applicable to this study and based on these justifications, this thesis will extend our understanding of children's experiences in preschool settings.

PART 2. METHODOLOGY, METHODS AND ANALYSIS

CHAPTER 3
Methodology and Research Design

The aim of this study was to provide original knowledge about children's peer social interactions as they engage with technologies. The aim was broken down into two main parts:

1. A description of the interactions observed when children use technologies in preschool playrooms;
2. An exploration of how the preschool context contributed towards the interactions observed (this includes a discussion of the technological artefacts as part of that context).

This chapter highlights the theoretical frame which helped to shape the research aim as well as the qualitative inquiry method which was used to address the research questions.

Section 3.1 Theoretical Frame

This study was informed by an overarching theoretical frame: socio-culturalism. However, it was also useful to draw on related perspectives such as contextualism or eco-culturalism in order to address all aspects of this multi-dimensional study. These approaches (socio-culturalism, contextualism and eco-culturalism) are very closely linked and indeed several aspects of each are based on, or align with, the ideas of Lev Vygotsky among others (Tudge, 2008).

Each of these approaches could be considered an overarching paradigm, within which more narrowly defined frameworks and concepts can be discussed. For example, under socio-culturalism you would expect to see discussions of Activity Theory, Guided Interaction, Communities or Practice and Guided Participation, as addressed in the previous chapter.

Alternatively, under a Contextualist frame you may see discussions of Bronfenbrenner's Ecological Systems Theory, but the distinction is not clear cut and others may argue that Bronfenbrenner's work also rests in Socio-culturalism. This is because there is such a considerable overlap, particularly between socio-culturalism and contextualism, that the distinction between them can at times be unclear. This is to be expected when multiple paradigms have similar roots.

For this study clear separation of these paradigms is not necessary or welcomed as it is the harmonising nature of these frameworks that is useful for this broad project. Each approach carries its own merits and while Socio-culturalism is considered central and should be viewed the overarching paradigmatic frame employed, the other two frameworks are complementary and each approach offers its own advantages.

- Socio-culturalism is fundamental because of its marrying of the individual and the role of social interaction in everyday life. The focus here remains on the individual within society and within the environment;
- Contextualism is useful because of its focus on the key components of context and 'practices'. Thus, this framework highlights the pivotal nature of the environment and context within which individuals develop rather than focusing on the children themselves;
- Eco-culturalism is favoured for its emphasis on activities as a unit of analysis, and allows an exploration of children's experiences around technology, giving weight to how technology is incorporated into learning activity as a key focus to the study.

3.1.1 The Socio-cultural Perspective

Socio-cultural theory was particularly useful for understanding social experiences in the preschool context because of its focus on the social nature of learning. It draws heavily on Marxist principles which indicate that:

- social contexts affect not only what we think but also how we think;
- interaction is considered fundamental to children's development;
- knowledge is co-constructed rather than passively taken on board.

The theory suggests that "human activities take place in culturally constructed contexts, mediated by language and other symbol systems" (John-Steiner & Mahn, 1996: 191). Fundamental to this perspective is the concept that physical activities are mediated by physical tools (i.e. technology) while the human mind is mediated by symbolic tools and signs (including language). These tools and signs are also culturally constructed, passed on through generations and altered by new generations. Vygotsky argues that an individual does not act directly on the world, instead the tools and symbols establish an indirect relationship between the human and society (Lantolf, 2000).

This relationship is considered inseparable and it is argued that an individual is shaped by, and shapes, society (James *et al*., 1998) and therefore individuals and society are seen as a dualism (Engestrom *et al*., 1999). Vygotsky (1978: 51) states:

> *It may be said that the basic characteristic of human behavior in general is that humans personally influence their relations with the environment and through the environment personally change their behavior.*

Essentially socio-cultural theory suggests that experiences and development should be viewed as a social construction which constantly draws upon the knowledge, values and beliefs of the culture (Cole & Wertsch, 2002; Tudge, 2008). Based on the understanding that cognitive structures are constructed through social interactions (Rogoff, 1993a), Vygotsky 'conceptualized development as the transformation of socially shared activities into internalized processes' (John-Steiner & Mahn, 1996: 192), using language as the transmitter of cultural tools. Vygotsky maintained that learning and development always involve other people and that learning and development are inherently social before they become individual.

> *Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first between people (interpsychological) and then inside the child (intrapsychological) (Vygotsky, 1978: 57).*

This was considered to contrast with views of Piaget who suggested that the child is a 'lone scientist' (Wood & Wood, 1996) who develops at his/her own pace and because development precedes learning the process is individualistic. It is often the perception among the educational community that Piaget had no interest in the social nature of learning and that he overlooked this in his work but this is a misunderstanding (See for example DeVries, 2000; Piaget, 1964; Siraj-Blatchford, I. & Siraj-Blatchford, J. 2006). Rather, Piaget became known for his description of development as a linear process to maturation (Onks, 2009) while Vygotsky is remembered for focusing on social interactions in learning (irrespective of his considerable focus on cognitive functioning through his work on higher mental functioning).

Vygotsky's work has been criticised for being too 'monological' as it is not directly concerned with joint intellectual activity (Wegerif & Mercer, 1997). It is for this kind of reason that the work has been expand and perspectives on Sustained Shared Thinking (Sylva *et al*., 2004) and The Social Modes of Thinking (Wegerif & Mercer, 1997) have emerged in the literature. Nevertheless, for this study which is concerned with observable interactions and behaviours, it is the nature of children's experiences, which is of most interest rather than their joint intellectual activity and Vygotskian perspectives do provide this frame.

As development is considered to first be social, it reflects Vygotsky's Marxist roots and his belief that traditions, practices and values inherent in any culture are passed down through generations (Schwandt, 2003). He suggests that these traditions and values shape an individual's behaviours but also that the individual continually re-moulds the cultural values and traditions. Hence, emergent work from a socio-cultural perspective frequently focuses on context. Lave and Wenger's (1991) concept of 'Community of Practice', for example, explores the social and cultural customs and ways of operating within a community in their explorations of learning. Rogoff's (1989; 1990) concept of guided participation focuses on the nature of tacit learning in informal learning contexts. While Edwards (2004: 88) explored the context of 'practice' in early years education, indicating that "cultural context is incorporated into interactions and their outcomes".

Based on this, and pivotal to socio-cultural theory, is a social-constructivist epistemology and specifically the understanding that knowledge is 'constructed' (Crotty, 1998). Children learn in the Zone of Proximal Development (ZPD)[1] and thus they are able to achieve more with the help of a more knowledgeable or 'expert' other (typically during a tutor/tutee exchange which is often referred to as scaffolding (Wood *et al.*, 1976)) than they would be able to achieve alone. The premise holds that children have an independent performance level, the ability at which they can complete a task in solitary manner, at one end of the spectrum and an assisted performance level, the ability to complete more of the task with the help of a partner, at the opposite end of the spectrum. The space in between is considered the ZPD and it is within this zone, and certainly not beyond the child's assisted performance level, that children's activities should be planned in order to aid progression.

[1] "The distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers" (Vygotsky, 1978: 86).

Hence, Vygotsky's joining of the cognitive and the social provides opportunities to understand children's social experiences. For example, through his description of the interpsychological and intrapsychological space he provided an opportunity to explore the complementary nature of the individual child and the social situation in which he/she is developing. Importantly for this study, socio-cultural theory recognises the weight that must be given to traditions and practices as influential to social interactions and process and discussions of the ZPD also provided an understanding that the social interactions of children may benefit their cognitive understanding (Vygotsky, 1978) and the role of the expert other in aiding children's progression (Plowman & Stephen, 2007a; Sylva *et al*., 2004; Tharp & Gallimore, 1988; Wood *et al*., 1976).

3.1.2 The Contextualist Frame

Under the contextualist frame, context can be understood as: local (e.g. peer groups), social-structural (e.g. interrelated roles of ethnicity, race or class) or cultural (Tudge, 2008). Contextualism is considered a 'paradigm' (Tudge, 2008), 'world view' (Morris, 1988) or 'world hypothesis' (Pepper, 1942) which guides research (Morris, 1988; Tudge, 2008) and is a complex theory which has been described in multiple ways. For example, some argue that contextualism is a variation on other well-known perspectives including: structuralism, ecological psychology and gestalt psychology (Ratner, 2006). Hence, for the purpose of clarity, this study adheres to the description of contextualism put forward by Tudge (2008) in the book *The Everyday Lives of Young Children: Culture, Class, and Child Rearing in Diverse Societies,* which is described below.

Contextualist models explore a range of contexts or 'social worlds' including "familiar individuals and institutions – our friends, family, working associates, governments, companies, and churches - as well as countless media figures and nameless 'persons on the street'"

(Damon, 1977:1). However, more than this, and of particular relevance to the focus on preschool institutions in this study, they also explore the micro factors or components *within* contexts. For example, Bronfenbrenner's Ecological Systems Theory (See Chapter 2), is regarded as a contextualist model (Tudge *et al*., 2009) and has been described as "a comprehensive view of environmental influences on development by situating the child within a system of relationships affected by multiple levels of the surrounding environment" (Johnson, 2010a). Contextualist theory is therefore concerned with exploring various aspects of context as well as the relationships and connections between these aspects of context. From a contextualist perspective context is described as more than just the people and the things in the setting but includes the importance of historical and cultural influences on activities. Elements of context are described as "a complex blend of its [the element's] own properties and those of context" (Ratner, 2006: 22). These elements inform this study by emphasising the role of the context on experiences as well as suggesting those fundamental aspects of context to explore as part of the data collection.

Furthermore, and useful for understanding the role of developing original knowledge for this study, is the contextualist perspectives on the nature of reality. This framework suggests that the nature of reality cannot solely be understood through a realist ontology which indicates that structures influence each other in a cause-and-effect manner. Under contextualist thinking, reality is not 'out there' waiting to be uncovered; rather it involves a level of interpretation and construction on the part of the individual. It therefore holds elements of relativist ontology and within this frame, multiple realities are considered to exist depending upon the 'social, economic, cultural and historic nature of the group under consideration' (Tudge *et al*., 2009: 118) and similarly activities vary depending upon the make-up of the individuals, the setting and the cultural and temporal context (Tudge *et al*., 2006; 2009). This not only demonstrates the importance of understanding the matrix of complex influential factors as part of the study, but also illustrates the difficulty with presenting data as if it were factual. Instead, it shows that data throughout the study can only be presented as my interpretation of reality.

3.1.3 Eco-culturalism

Eco-culturalism focuses, more fundamentally than socio-culturalism and contextualism, on the environment under exploration. Weisner (2002: 277) suggests that "an eco-cultural perspective takes account of ecological and institutional forces that impinge on everyday activities". Activities or daily routines become the central unit of analysis (Bernheimer *et al*., 1990) and therefore its relevance for this study is clear as it aligns with previous discussions in this thesis which have highlighted the need to observe activities (See Activity Theory: Identifying Key Components of Context on p68). In particular, this framework takes heed of everyday routines and activities and how individuals make use of their understanding of the cultural processes including 'scripts and plans' to inform their decision making, directing the data collection and analysis for this study.

Section 3.2 Research Design

It has been argued that designing a study is 'straightforward' and is simply a 'practical process of logically considering the relative merits of a range of approaches to the problem to be researched (MacNaughton *et al*., 2001: 77). Yet, Marshall and Rossman (1999) state that "real research is often confusing, messy, intensely frustrating and fundamentally nonlinear" (p21). The latter description provides a better representation of the design process (and the coding and analysis process) for this study. While the process is not accurately described as 'messy' it was certainly complex, non-linear and at times most definitely frustrating. In order to logically consider a range of approaches and to produce 'good' research, as suggested by

MacNaughton (2001), the research design, the data analysis and the conclusions drawn emerged from a series of cyclical iterations, which were in no way 'straightforward', but they were necessary to ensure that high quality research was being conducted. The research design process for this project was informed by Cohen *et al.'s* (2000) *planning sequence for research* which can be summarised into four stages.

Stage 1) Identify the purposes of the research.

Stage 2) Identify and give priority to the constraints under which the research will take place.

Stage 3) Plan the possibilities for the research within these constraints.

Stage 4) Decide on the research design.

(Cohen *et al*., 2000: 88)

For this study, Cohen *et al.*'s (2000: 88) stages were lengthy processes because of my multidisciplinary background. I originally trained as an economist and conducted labour economics research at undergraduate level and prior to the present study I explored social interactions between adolescents rather than young children. I had no experience of early years education or technology in education and this PhD study was initiated from my own personal interest and curiosity in this area. After this initial curiosity and upon further exploration I was able to identify a gap in the literature which spurred the study on further.

My limited experience with this subject area meant that the design stage for this project was preceded by a phase of learning new concepts and familiarising myself with early years education as a new discipline, including:

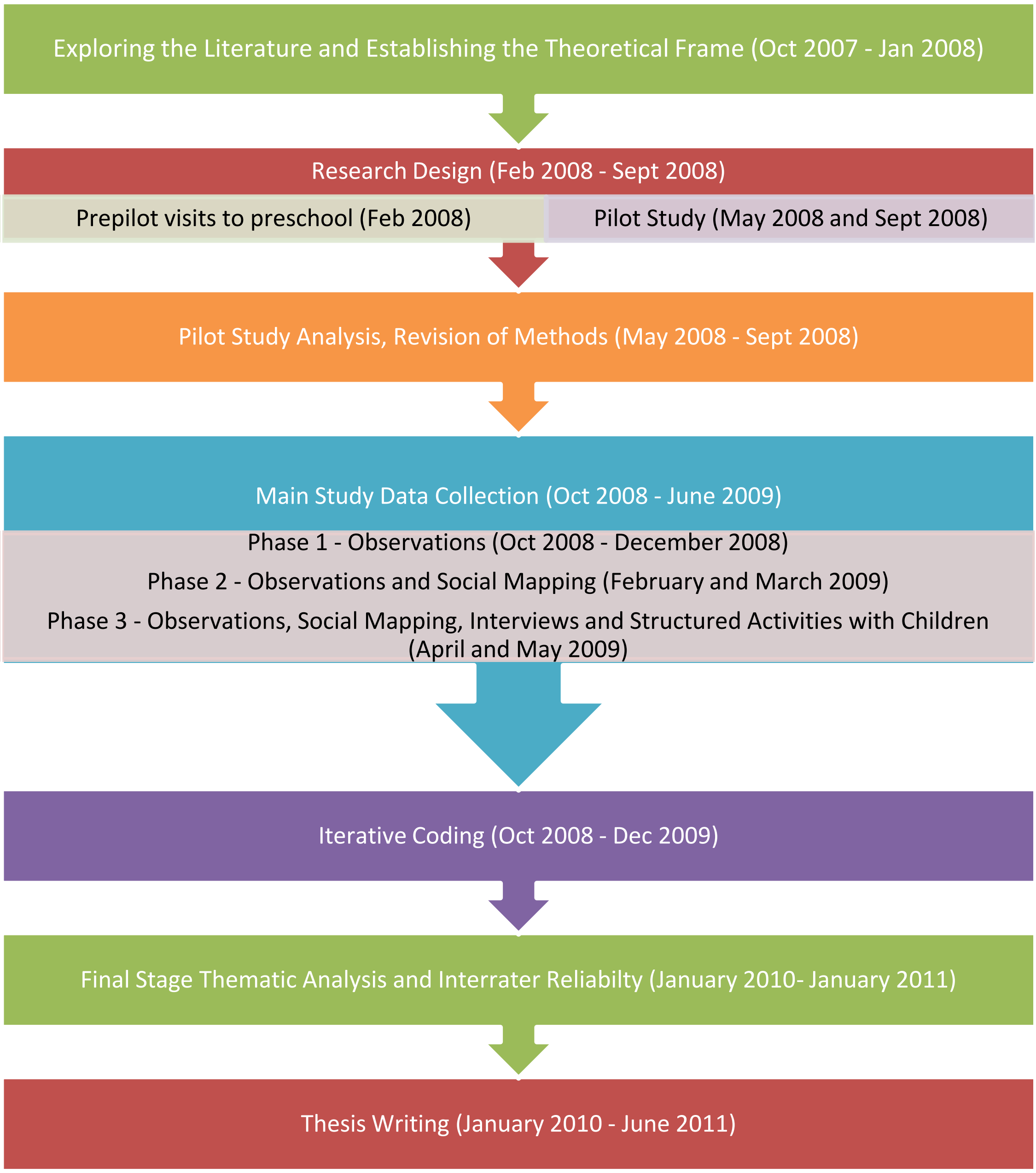
- learning about relevant theories which often form the foundation of educational research (i.e. the works of Piaget, Vygotsky, Bruner, Bernstein etc.);
- reading a broad range of social interaction, technology and early years empirical studies;

- exploring unfamiliar theoretical frames;
- understanding what a typical Scottish preschool context looks like;
- understanding child-centred methodologies which are widely used in early years research;
- considering the power imbalance between researcher and child participant;
- understanding the ethical issues of early childhood research;
- transitioning from quantitative to qualitative research.

The fundamental transition in moving from economics to education, for me, involved a shift in my perceptions about what counts as knowledge, which subsequently influenced my choice of theoretical frame and ultimately, the research design for this project. Economics research is characteristically positivist, objective (Crotty, 1998) and seeks the 'truth'. Yet, discussions of early years methods and methodologies in literature (e.g. Birbeck & Drummond, 2007; Fargas-Malet *et al*., 2010; Mauthner, 1997) demonstrate that this research is often interpretive (MacNaughton *et al*., 2001), subjective and focused on understanding, describing or interpreting multiple perspectives (Creswell, 2007). These significant differences between disciplines meant that I had to learn to develop research questions in an entirely new way.

Only after completing this process and after the appropriate knowledge and experience had been gained was it possible to complete the research design. Thus, the first year of this study was concerned with learning the customs and exploring the theories of early years research before designing the study; the second year of the study was concerned with data collection techniques and coding the data, while the third year focused on analysis and drawing conclusions. Figure 7 on the next page illustrates the key stages of the research process for this study and demonstrates the timescales available for completion.

Figure 7 - Key Stages in the Research Process



Given my considerable shift in disciplines, writing styles, my understanding of knowledge, my perception of the preschool environment as well as methodological approaches and methods, it was important to describe the conclusions I came to in these areas. Throughout the remainder of this chapter, I address some of the key areas which I had to consider and re-evaluate when moving into early years education, but rather than continually comparing these perspectives to my past knowledge, I summarise the approaches and understanding that I developed which were applicable to this study. Thus, this chapter summarises my current position on all these issues and explains why I conducted the study in the way that I did.

3.2.1 Children's Right to Participate

It was clear that perceptions of children and childhood would contribute to the design of the study because the late 20th century saw unprecedented recognition of children's rights, evidenced by The Children Act 1989 (Great Britain, 1989) in the UK and United Nations Convention on the Rights of the Child, 1989 (Unicef, 2008). This shift may be attributed to:

- citizenship drivers which encouraged children's involvement in their community;
- economic drivers that argued that children are consumers and customers in their own right (Clark *et al*., 2005);
- academic drivers, particularly The New Social Studies of Childhood, which argued that children are active agents in a social world (James, 1996);
- the children's rights movement.

These changes resulted in children having a voice in society and having the right to express themselves and participate in decisions that affect them (Birbeck & Drummond, 2007; Mauthner, 1997). Thus, whereas the Victorian's believed that children should be sheltered from the adult world, the current Postmodern view asserts that children are fully-fledged members of society (Gabler , 2004). In contemporary society it is believed that children are able to participate and make sense of their social surroundings through the use of language and interaction and children are now thought of as having the ability to direct their own lives (Danby & Farrell, 2004). The contemporary understanding is that 'childhood' is different for every child and is a social construction rather than a biological stage in development and therefore is culturally differentiated (Powell & Smith, 2009). As a result it is vital to design this study by recognising children as competent individuals allowed me to develop methods that respected their needs and considered how best to involve them appropriately in the project.

3.2.2 Qualitative Inquiry

The research questions for this study, and the lack of previous discussion of social interaction and technology in the literature, warrants an exploratory study and rich data. This, combined with the understanding of preschool and children presented in the previous two chapters suggested that qualitative inquiry was considered most appropriate to provide this type of data because it attempts to explore a social problem (Creswell, 2007) by obtaining an in-depth understanding of the phenomenon through multi-methods (Denzin & Lincoln, 2003).

Furthermore, a number of different methods are often chosen in order to strengthen the validity of the study through triangulation (Pollard & Filer, 1996) and to add scope and richness to the data (Denzin & Lincoln, 2008).

> *Combinations of visual, audio and written data . . . permit multilevel analysis, allowing the researcher literally and metaphorically to 'zoom in' on individual children's uses of different communicative modes with different people, at particular activities in particular moments of time, to 'pan out' by observing the children over time and across different social settings and to explore the relations between these different perspectives (Flewitt, 2006: 30).*

Qualitative inquiry recognises that it may never be possible to represent an objective reality, additionally it is questioned whether one such reality even exists. Researchers must always be aware that their understanding of participants' experiences will always been seen through their own eyes and not the participant's. It will always be an interpretation or representation of their experience (Denzin & Lincoln, 2003).

3.2.3 Child-Centred Research Methods

A wealth of literature on so-called 'child-centred' methodologies (James *et al*., 1998; Mayall, 2008; Scott, 2008); children's participation in research (for example Johnson *et al*., 1998) and research 'with' rather than 'on' children (Christensen & James, 2008) is available to inform this study. Child-centred methodology advocates listening to children and understanding their experiences directly (See Clark *et al*., 2005; Clark & Moss, 2005) because the recognition of choice and agency alone necessitate the collection of data from children personally about their own experiences and future aspirations (Scott, 2008). It is viewed that good information about children begins with the children's own experiences (Mayall, 2008).

Based on this understanding, a range of different approaches are available to listen to children. For example, the 'mosaic' approach has been designed to allow researchers to 'listen' to children through a variety of different methods (Clark & Moss, 2005), and 'photovoice' approaches are believed to allow children more autonomy in expression during the research process (Darbyshire *et al*., 2005).

This contrasts with the conventional understanding, up until around two decades ago, that children do not possess the necessary skills to be competent research participants (Danby & Farrell, 2004; Scott, 2008). This was based on the perception of children as passive objects and incomplete adults (Danby & Farrell, 2004). It draws upon Piaget's early work which indicates that children under the age of seven are in their preoperational stage of development and are regarded as socially incompetent because they are egocentric and therefore unable to understand another's perspective or think rationally (Christensen & James, 2008). From this viewpoint, children's views were considered immature and not respected or reliable however, this view is now challenged. As a result, adults and caregivers were often called upon to take part in research on their children's behalf (Christensen &

James, 2008; Cook & Hess, 2007) and children's views were often overlooked (Barker & Weller, 2003).

More recently, it is not a question of whether children can be involved as research participants but rather *how* they can be involved with two perspectives being apparent. Firstly, the understanding is that the appropriateness of approaches tends to vary according to the age of participants (Hill, 1997). Some would argue that child-centred methods and listing to children necessitate researchers considering their participants' social and intellectual abilities and adapting their methods, where appropriate, to the needs of the children (Birbeck & Drummond, 2007; Christensen & James, 2008). From this perspective children's competence to be research participants directs the level of children's involvement, for example 'why, when or how' questions are considered particularly troublesome for children of preschool age (Evans & Fuller, 1996) thus many child-centred approaches avoid these question. Alternatively, others have criticised the suggestion that specific methods need to be created for children because doing so only strengthens the dichotomy between adult and child (Punch, 2002). To allow involvement of children in research, researchers must re-evaluate their conceptual framework to cater for children's participation but 'research with children does not necessarily entail adopting different or particular methods' (Christensen & James, 2008). Instead, the focus remains on selecting *appropriate* methods for the participants; this approach was adhered to for this study.

3.2.4 The Researcher in the Study: Non-Interfering Companion

Central to qualitative approaches is the need to be reflexive (Hertz, 1997). The aim is not to unlock the 'truth' through a controlled experiment, as may be the case in psychology for example, but to describe the interactions being observed. From a socio-cultural perspective, it is important to recognise that my past experiences (for example moving from economics to education) as well as my presence in the preschool setting, will influence and shape my understanding and interpretation of the data and the context (Hertz, 1997). It is vital to recognise that I am an active participant in the research process and that I bring my own experience and perspectives to the data collection and analysis.

Part of this reflexive process is understanding my role as a researcher. For this study, my role was that of *non-interfering companion* (Mandell, 1988: 434). In recent times, there has been a tendency for researchers to join in with children's activities and take on the role of a 'participant' observer, in line with ethnographic work. Inherent in participant observation is the requirement for the researcher to become an 'insider' into the participant's culture. However, concerns have been raised about whether an adult can ever truly become an insider in the child's culture (Corsaro, 1988a; 1988b), thus it was considered inappropriate to adopt a participant observer role. Yet, it was also considered inappropriate to suggest that I was a detached observer because I recognised that my presence in the preschool would always influence the research setting. One argument in the literature is that you can never disappear into the background and will always participate in the process in some way. As Woodhead and Faulkner (2008: 17) for example state that:

> *In numerous classic studies, the observer may be found backed-up against the corner of the classroom or playground, trying to ignore children's invitations to join in the game and at worst – kidding themselves they can appear like the metaphoric 'fly on the wall'.*

I see the non-interfering companion role as somewhere between these two; I was not a full participant, yet I was not completely detached from the research setting. At times, children would asked me for help and I could not at this point leave them to work on their own and it would not have seemed appropriately respectful or caring to pretend that I was just another child because those children were astute enough to know better. I therefore tried to guide the children towards their practitioners as much as possible.

Despite efforts to be a non-interfering companion, in reality assuming this role was met with challenges because children often misinterpreted my role in the preschool and the following vignette demonstrates my understanding of children's perception of me.

Vignette 1 - Extract from Researcher's Reflections

Sylvester's Preschool, several visits

With each different visit I seemed to acquire a different status with the children. In the initial stages of my study the term had just begun and the staff had not fully put into place their 'planned experiences' so children were typically arriving in the preschool and immediately engaging in free play activities. During this time I was never formally introduced to the children and due to my age I felt that the children quickly thought of me as a practitioner because they asked for help with activities.

During my third visit to Sylvester's Preschool however the 'planned experiences' had been put in place and the sessions always began with a 'welcome time'. During welcome time I was then introduced to children as 'someone to play with' which was not entirely accurate. During this session I noticed a huge shift in my role as a researcher and children seemed to see me as playmate and no longer a practitioner; one child in particular asked to play with me on several occasions. I felt that this was useful because children began to feel more comfortable around me but I didn't want to become a participant observer because the study was to focus on child-child interactions.

It became progressively more difficult to reject her welcome offers and I explained to her that I was busy 'writing a story' and therefore could not play. I was aware that the parent of this particular child had provided consent for me to carry out activities with her child at a later stage in the study and therefore I did not want to distance myself from her completely but at the same time I did not want become her frequent playmate. I therefore attempted to explain to her that I was writing a story about the children until Christmas and then after Christmas I would have more time to carry out activities with children. Although she still frequently asked me how my story was going she never again asked for me to play with her.

3.2.5 The Researcher and the Researched: Disparity of Power

The decision to assume the non-interfering companion role was based not only on my understanding of the research setting and my inability to go unnoticed, but also on the power differences between adult and child that are well-documented in the literature. Power is defined in the dictionary as “a person or thing that possesses or exercises authority or influence” (Dictionary.com). In preschool settings, it was demonstrated that adults are considered to have authority or control over children; whether they are practitioners or researchers who are visiting the institution. The position of adults as figures of authority might lead to concerns that children are being marginalised because of their inferior and vulnerable position in relation to adults (Barker & Weller, 2003). Thus, “children’s lack of power relative to adults in the social world limits the extent to which children’s agency can be exercised” (Glassman & Wang, 2004; Uprichard, 2009), a situation which is particularly acute for young children (Coad & Lewis, 2004).

In research situations, researchers can create their own position of authority because studies are often designed by adults and the focus of the research derived by the researcher. This has been interpreted as research being carried out on a subject that researchers believed to be most important for children. The researcher, therefore, choosing the subject of the study creates a power imbalance which views adults as ‘experts’ about children and children as passive (Woodhead & Faulkner, 2008).

Young children’s lack of communication skills can mean that some children are being included in social research without a desire to be involved (Evans & Fuller, 1996). Furthermore, it is believed that the researcher has an implicit position of power which allows them to present the findings from their own perspective with little challenge from the children.

> *In doing so, the [researcher] enjoys greater power than the members of the culture being studied because it is the ethnographer who does the decoding and recoding, ultimately turning the living subjects of the host culture into written about objects to be consumed in the home culture (Michalowski, 1997: 50).*

Implicit in the quotation above is the understanding that power is embedded in the individual and in many cases is believed to be held by the adult researcher rather than the child. It assumes that agency and power are finite principles which can only be possessed by either the adult or the child in a mutually exclusive manner. It implies that by empowering the child the consequence is disempowering the adult or vice versa. It also assumes that all adults hold equal power over the child but adults and children are heterogeneous groups, thus not all children or adults have the same degree of agency (Pole *et al*., 1999). An alternative understanding is that power is not necessarily inherent within the researcher or the research participant but that it is embedded in the research process (Christensen, 2004; Pink, 2001) and therefore it is more fluid and can be observed in varying degrees.

The ability of children to employ their own agency therefore is socially dependent and in a research setting may be influenced by the researcher's ability to empower the children. Reducing the power imbalance is therefore not dependent upon allowing children to be co-researchers; it is dependent upon the child-researcher relationship. Thus power relationships are created by the situation (Christensen, 2004).

The role of non-interfering companion went some way to reducing such power imbalances because I attempted to distance myself from being an authority figure by directing children to practitioners to resolve issues and problems. Yet, this does not overcome the fact that I have designed this study, collected the data and analysed the data. This literature highlighted the importance of wanting to go further in balancing power and allowing children's voice to be heard.

Section 3.3 Summary

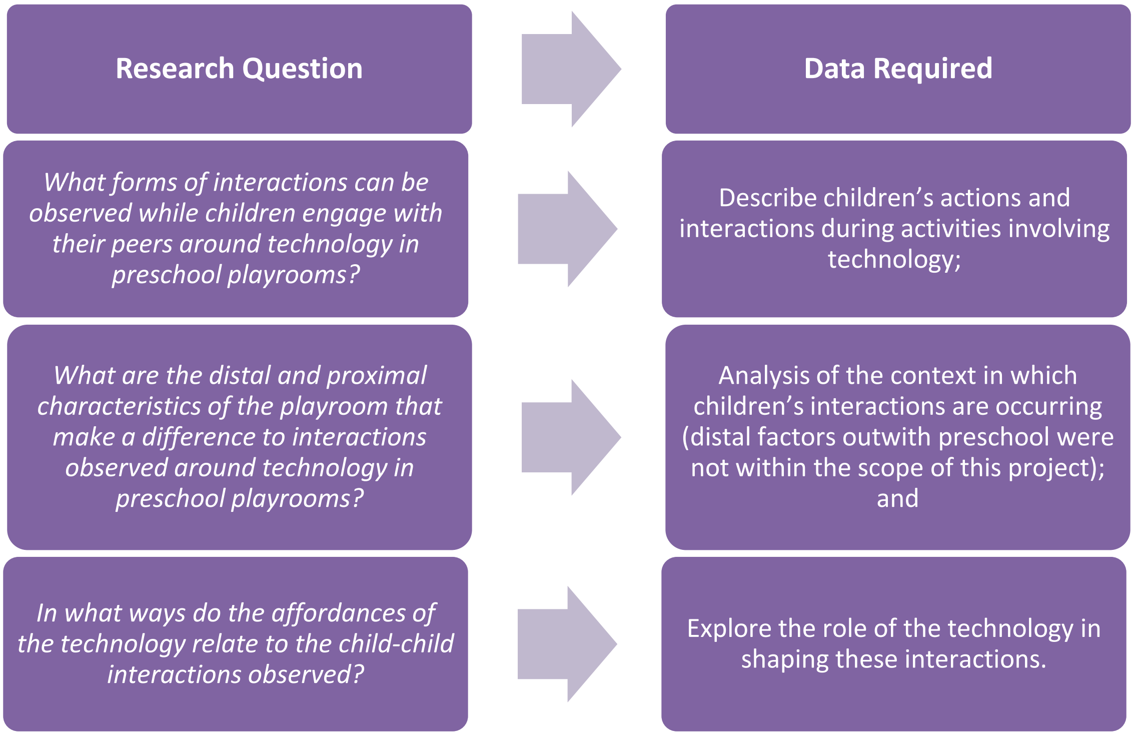
Throughout this chapter, I have attempted to demonstrate how the three theoretical frames (socio-culturalism, contextualism and eco-culturalism) have informed the design of this study. The theoretical frames indicated that it was essential to explore the wider preschool context including values, traditions, practices, technological artefacts; other people in the preschool; and multiple perspectives rather than searching for one absolute truth.

It was established that the study should be qualitative and while children's ability to take part in research should be based on their competence rather than their age, it was fundamental to select methods that are appropriate to answer the research questions and for the research participants. Finally, I decided to assume the role of non-interfering companion during observations but to further reduce the power imbalance between researcher and participant it was important to select a variety of methods to be used in a triangulated manner.

CHAPTER 4
The Methods, Data Collection and Analysis Process

When planning this project I set out to collect data in order to address the research questions as shown below.

Figure 8 - Relating Research Questions to Data Collection



The process of arriving at this data is now described in depth.

Section 4.1 Data Collection Process

Throughout the study, a phased data collection process was adhered to. This involved pre-pilot visits to preschool, two stages of piloting and three phases of main data collection. Table 3 provides an overview of the methods used in each phase of data collection process.

Table 3 - Data Gathering Schedule

Phases	Purpose
Pre-pilot visits	- Familiarise myself with preschool environments.
Piloting Phase 1: May 2008	- Understanding the type of establishment required for the main study – private institution, local authority provision, appropriated sizes etc. - Define an activity and an episode. - Establish whether the research questions were answerable.
Piloting Phase 2: September 2008	- Testing the proposed methods.
Phase 1: October 2008 to December 2008	- Establish a general overview of children's interactions and technologies available. - Focus on interactions over an extended period during activities.
Phase 2: January 2009 to February 2009	- Continue to focus on interactions over extended periods. - Develop an understanding of interactions in snapshot intervals.
Phase 3: April 2009 to May 2009	- Continue to focus on interactions over extended periods. - Continue to develop an understanding of interactions in snapshot intervals. - Understand children's perspectives. - Validate understanding of preschool context via practitioner's perspectives.

4.1.1 The Pilot Study

Pre-pilot and pilot study stages gave me an opportunity to become acquainted with unfamiliar research settings and early years methodologies. The pre-pilot and pilot studies were conducted in three preschools across Central Scotland, in three phases. One preschool was in the Perthshire area, while the other two pilot preschools were in the Greater Glasgow area; one local authority establishment and one private sector. Three findings were drawn out of the piloting experience.

1. A more explicit definition of an 'episode' was required and as a result I decided to adhere to Siraj-Blatchford *et al.*'s (2002a: 147) definition which stated that it is a "coherent learning episode with a clear beginning and end which lasted for at least one minute".
2. The research questions were too broad. These were refined by making more specific reference to the data to be collected, for example, moving away from asking 'what was

the relationship between' to 'identifying characteristics', as was the case with research question two. Thus, the meaning of the research questions remained unchanged, but their wording was altered to make them more achievable and the data required to answer the research questions more explicit.

3. The methods were appropriate to answer the research questions but interviews and social mapping processes require more structured schedules.

4.1.2 Main Study Data Collection

The main data collection was conducted in three phases taking place between October 2008 and December 2008, January 2009 and February 2009 and April 2009 and May 2009. The entire collection period for the main study was constrained to nine-months to reflect the school term and avoid collecting data between July and August when many preschools are closed.

Selecting the Educational Institutions

Current statistics show that 96% of Scottish children attend some form of preschool establishment (Scottish Government, 2010). The high attendance of children indicated that preschool settings would make an appropriate setting for this study; they not only provided a setting where children are regularly exposed to their peers but also provided, as far as possible, a representative sample of children in Scotland. Furthermore, preschool is recognised as a legitimate setting for studies of social interaction by Ladd and Price (1993) because during preschool/schooling children spend considerable time with peers providing an appropriate context for social development. When selecting preschool it was decided that:

- large preschools were preferable because they provided an opportunity to observe a higher volume of children and peers;

- local authority preschools would be targeted in order to visit centres which operate from the same basic standard and guidelines (e.g. Scottish Executive, 2003), and all staff are trained to minimum requirement providing a benchmark in provision.

Two preschools were visited for the main data collection period. One preschool was selected in the Greater Glasgow area and one preschool was based in East Dumbarton. These preschools were selected on a recommendation bases as a colleague advised me that the Head Teachers had completed an ICT Masterclass and thus the settings would provide an appropriately technology-rich setting.

Vignette 2 - Extract from Researcher's Reflections 2

Sylvester's Preschool

I received mixed responses from the members of the preschool community when I arrived. I was greeted with warm and welcome words from the Head Teacher and particularly the team leader at both preschools. They took the time to explain the workings of the playschool to me on my first day and they insisted that I feel free to open any or all cupboards to explore the facilities available in the preschool.

Other members of the staff, however, were not so welcoming. I was not officially introduced to all members of staff, although the team leader made every effort to introduce me when staff members walked by but inevitably some staff members were overlooked and they therefore did not fully understand the nature of my visit. While I was told that all staff had been briefed on my visit, it seems they failed to make the connection at times that I was the research student they were expecting. It materialised that those who had not been formally introduced to me were under the impression that I was a B.Ed student, and a lazy one at that. I perched myself in an appropriate position for observation and occasionally moved to another suitable location and took manual observations. It must have appeared to staff members that I was simply not engaging with the students and effectively was not working.

I was slowly made aware of this misrepresentation when I noticed staff members staring in my general direction with a confused look on their faces. As the day continued they would tentatively approach me and say; "Do you mind me asking? Are you a B.Ed student?". I swiftly explained my situation and I could immediately see their understanding change and they started a far more interesting and lively conversation about my research.

Both Glasgow City Council and East Dumbarton Council granted permission to conduct research in these educational establishments. Subsequently, the Head Teacher of each establishment was contacted via telephone and permission to complete the study in their institution was verbally granted. Consent/assent was also obtained; details of this can be found in Section 4.5 on page 130 A follow up email was then sent to ensure that the institutions were fully aware of the nature of the study, to suggest possible dates for the first few visits and to obtain permissions in writing. However, despite the smooth process for gaining access to institutions, Reinharz (1997) highlighted that there is gulf between obtaining formal approval to enter into the community or research establishment and actually becoming socially integrated into that community. This variance was evident in this study and is demonstrated through the following researcher's notes above.

Sylvester's Preschool and Hillfoot Nursery Class

Sylvester's Preschool was located in a traditionally working class area of Glasgow and it was within close proximity to the city centre. This preschool was the larger (in terms of child capacity) of the two that I visited, catering for 50 children and was attended by an ethnically diverse group of children including Indian, Pakistani, Chinese, White French as well as White British children. Sylvester's had a resident English as a Second Language Teacher who worked on a part-time basis and therefore ethnic minority children with English as a second language were sent to this preschool rather than any other local authority provision in the area. Children attending this school were typically living in the surrounding area.

On the other hand, Hillfoot Nursery Class was located in a suburb of Glasgow where there were many more detached and semi-detached houses. A housing estate surrounded the preschool and while many of the children walked to the nursery from the surrounding estate, some children travelled from further afield to attend this school. The residents in the area were typically young families and the children attending the establishment were predominantly White British children. The preschool was smaller, both in terms of the number of children it could cater for (40 children), and physical size.

Despite differences between preschool locations, demographics of children and space available, both preschools were typical of the range of traditional local authority provision in central Scotland.

- They catered for children from the ages of 3 to 5 years (as of the 1st December 2008, the children in my study ranged from 2.9-4.8 years at Sylvester's Preschool and from 2.9-5.0 years at Hillfoot Nursery Class).
- Sessions were typically 2.5 - 3 hours in morning or afternoon blocks and only a small proportion of children remained at preschool all day for the 'lunch club'.
- Both preschools were in a purpose-built construction within the grounds of a primary or secondary school; they occupied a permanent port-a-cabin style building with their own outdoor play area.
- They adhered to fairly standard rules and regulations which were typical of Scottish education at this age, including: good listening, good looking [at other people when they are talking to you], no running in the playroom, being careful, looking after friends, being kind to each other, turn-taking and sharing.

See Appendix 8 for more information on both of these preschools.

Choosing the Methods

The selection of methods for this project was based upon their 'usefulness' (Denscombe, 2003) or 'fitness for purpose' (Cohen *et al*., 2000), and they had to meet four demands.

- Provide a rich description to create an exploratory study.

- Take account of the fact that the theoretical frames for this study suggest a complex relationship between the interactions and the elements of context.
- Recognise that all findings are interpreted through the researcher's eyes and while children are competent to comment on their experiences, the findings will be presented from my perspective and interpretation of events.
- Be mindful that the study focuses on young children's experiences and methods should be appropriate for participants of this age.

Establishing these criteria at an early stage was vital because as Pole *et al.* (1999: 41) highlights:

> *It is important not to see research as an arbitrary array of data collection techniques but as a careful selection of methods on the basis of a particular epistemology appropriate to the object of study.*

Initial thoughts around appropriate methods suggested that ethnography, interviews with children, or video recording would provide the rich data required. However, the methodological considerations described in the previous chapter, suggested that such approaches would be inappropriate. For example, ethnography requires the researcher to successfully become an insider into the child's culture and literature has questioned the ability of adults to integrate in children's culture because the adult's cognitive function is different from the child's, so they can never truly relate to each other in a peer situation (Corsaro, 1985). The success of standard interviews with children was also questionable for three reasons.

1. The situation would be unfamiliar to children of this age, thus they may have felt intimidated or puzzled which could have hindered their ability to answer questions.
2. Children's memory recall at this age is questioned by Schaffer (2004), who indicates that children have difficulty providing unprompted responses.

3. Interviewing children would remove them from the context of the study and this study aimed to capture what they did as they did it.

Similarly, while video recording would have provided a rich data set, the ethical issues and the time consuming nature of the approach far outweighed the benefits of the data collected. For example, in preschool environments children quickly moving around the playroom which would necessitate the need for ethical approval to video record every child because it would be impossible to segregate those children who have and have not provided consent. Furthermore, the transcription process for video data would require more time than would be available to this study. Previous use of video for research in early years playrooms suggest that it is particularly difficult to capture an event due to the level of noise and movement (Plowman & Stephen, 2007b). In addition, with video recording there is a level of analysis taking place when making judgements about what to record, which is not explicit when viewing the footage (Plowman & Stephen, 2007b). Hence, alternative methods were chosen which I believe provided data about children in context, with fewer ethical complications. Furthermore, the children could contribute directly and indirectly without causing them undue confusion, uncertainty or intrusion.

Section 4.2 Describing the Methods

Figure 9 - Methods and Output

Data for this project were collected via four qualitative methods – observations, activity mapping, researcher-led games with children and interviews with practitioners. The diagram above describes the output provided by each data set.

Throughout the nine-month period, the following data was collected by each of the methods described above.

Table 4 - Data Collected

Methods	Quantity Collected
Observations	20 concentrated hours, collected over 80 hours in preschool
Activity Maps	41 completed maps
Digital Photographs	616 digital images
Researcher-led games	87 completed activities
Documented Conversations with Children	30
Interviews with Practitioners	2

4.2.1 Systematic Observations

Systematic observations were the main research method adopted throughout this study and they are described throughout the study as 'episodes'. For participants of this age observations have been identified as one of the most appropriate methods for collecting data (Mauthner, 1997). Children under five years old tend to use non-verbal forms of communication to articulate their meaning (Flewitt, 2005), thus observations were crucial to understanding their social interactions. In addition, observations form the foundation for later methods which involved children more directly in the data collection. As Clark and Moss (2005: 14) state "observation is the first step in listening to young children's views and experiences".

Informed by the pilot study and the research questions for the project, it was clear that certain data needed to be collected for each episode of observation including;

- whether there was an adult present;

- whether the activity was child-led or child-initiated;
- whether the children involved remained constant or whether new children entered the episode while others left the episode;
- the technology being used;
- start-time, end-time and date.

To ensure that this data was always collected, I constructed an observation schedule (See Appendix 3) to structure the observation process. This schedule proved useful during the first months of data collection, although it also had its limitations. The main purpose was to collect a narrative account of minute-by-minute interactions and behaviours to provide a rich description of children's experiences. However, the many checklists included on the schedule limited the flow of this narrative because it was necessary to interrupt the narrative to mark on the checklist when an adult left or joined the activity. As a result, as I was familiar enough with the schedule and could remember what data was required I preferred to record all information on blank paper in a more unstructured manner. Subsequently, the general notes were transcribed onto an observation schedule in order to standardise the data collection and improve the analysis. During this transcription phase (which took place immediately after each session), I transferred the narrative onto an observation schedule and filled in the appropriate checklists at the same time.

This method was more time consuming in the post-data collection period but it allowed for more full data collection and allowed me to collect all the vital information without missing any of the relevant details. Furthermore, the additional time spent focusing on the transcripts and transferring the information across from the general overview obtained in the preschool to the more structure observation schedule, formed an initial phase of data analysis because it provided me with the opportunity to become more familiar with the data and identify individual episodes which were noteworthy.

4.2.2 Activity Mapping

Activity mapping draws upon Kutnick *et al.*'s (2007) mapping which involved:

> *drawing a plan/map of the physical setting that showed all seating available (desks and tables) and resource areas, the observer noted and reported the location of individual male and female children, child work groupings, and adults working in the classroom (Kutnick et al., 2007: 386).*

The mapping method in this study is referred to in throughout the results as mapping snapshots and it had to be tailored to suit the needs of this study because it was being used in different circumstances to Kutnick *et al.* (2007). As an alternative to mapping adult-directed activities, when all the children were stationary and engaged in a predefined task, this project used mapping during free-play activities where children readily moved around the playroom, changed locations and alternated activities. Thus, two particular issues needed to be accounted for when planning this method:

1. minimising the risk of double counting and ensuring accurate representations of the children involved;
2. taking minimal time to complete the maps so to minimise the amount of time children had to move around.

It was decided that still digital images would be most appropriate method to address both of these issues. Digital images allowed me to capture children and practitioners' locations in the playroom and to maximise the amount of data I was able to collect in the short space of time. Furthermore, digital images increased the reliability of this data because they alleviate the pressure of having to name the child correctly instantaneously. For these reasons, it was decided to take snapshots of the classroom and then transfer the location of all children onto the graphical map (See Appendix 5 for an example of a completed map). This method was endorsed by Peter Kutnick who advised me that I should:

> *Draw your physical map and then (if you can get permission of the preschool) photograph the play scene. From the photo(s), you can complete the map for a particular time. Then, depending on your plans, you can make multiple maps within any time frame, or use the technique to observe patterns over time (over a term or longer) (Personal Communication with Peter Kutnick).*

A step-by-step process for transferring data from photographs to maps was also developed to ensure consistency of data obtained across maps (see Figure 10).

Figure 10 - Activity Mapping Process

Activity Mapping Process

1. **Document the location of all desks and chairs available within the playroom**
2. **Document the location of all technology related and non-technology related activities available within the playroom.**
3. **Show the location of all children within the playroom by writing their name in the appropriate place on the map.**
4. **Unless inferable from the name, document the gender of each child.**
5. **Show child working groupings by placing a large circle around groups.**
6. **Show subgroups within a larger cluster with a dotted-line circle.**
7. **Document practitioner's location in the playroom.**
8. **Rate group or child as behaving in solitary, parallel or reciprocal way.**

This research is concerned with identifying patterns of interaction as well as understanding how the preschool context and technologies contributed to these interactions. The purpose of the activity mapping was to provide an opportunity to document those patterns in a more explicit way than would be achieved through observations. Thus, mapping contained similar information to that obtained in observations but from a synchronic rather than diachronic perspective. The following aspects are evident in observations but were also easily documented using this visual method and as a result these were the main areas which could be explored for patterns.

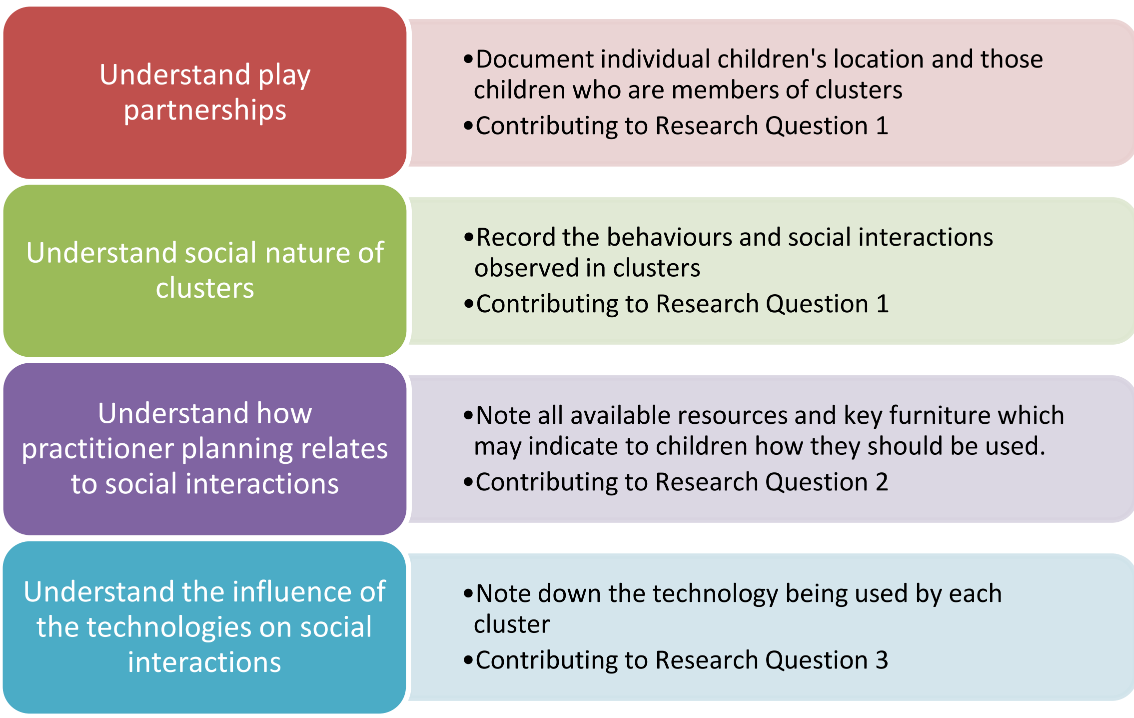
- Clusters.
- Preschool layout and resources.
- The social nature of play (Parten's categories of social participation) inferred through body language and children's positioning.

Other aspects of the observation data, bulleted below, could not be easily inferred from digital images and therefore could not be graphically represented as part of the maps, constricting the patterns that could be identified in these areas.

- Children's understanding and use of rules and regulations.
- Many of the complex reciprocal behaviours which were clear in extended observations.

As a result, mapping was able to contribute to answering the research questions in four ways as demonstrated in Figure 11.

Figure 11 - The Contribution of Mapping Data to Research Questions



4.2.3 *Researcher-led Games with Children*

The observations and mapping provided an understanding of children's interactions around technologies from the researcher's perspective. In order to provide extra depth to the interpretation of observations and mapping data it was important to develop an understanding of the child's perspective. This was achieved through a series of structured games. It has been suggested that methods to use with children are more effective when they make sense to children because it is in these situations where they reveal their true competences (Woodhead & Faulkner, 2008). I considered this when developing my methods and I used characters which would make sense to children. For example in the storyboard activity the central character is a rabbit. This rabbit was an animated character similar to other characters that children were familiar with from books and games.

Children took part in four different structured games – sorting activities, categorising activities, storyboard activities and scenario activities. The process for each these activities is summarised in Figure 12. These games were completed in the third phase of the data collection and therefore the topics being explored were in response to particular interests from initial observation episodes and activity mapping. They were designed to provide an understanding of children's perspectives of the social nature of technologies; children's preferred resources; the process children go through when they have difficulty completing an activity involving technology; and how certain scenarios make children and practitioners feel.

In order to facilitate activities a series of pictures and stickers were used which were designed to aid the child's communication and provide an appropriate way for them to respond which had the added value of making the activity more familiar to children because they resembled the kinds of activities that children of this age would normally take part.

Figure 12 - Structured Activity Process

Sorting

1. Four labels were placed on the table; 1 can play, 2 can play, 3 can play and 4 can play

2. Children were provided with photos of technologies available in their preschool

3. Children were asked how many people they thought could use each technology together

4. Children placed the picture of the technology onto a number label to signify how many people they believed could use that resource.

5. This process was repeated until all technologies were sorted into piles

Categorising

1. Children were provided with stickers of technologies available in their preschool

2. Children were asked to select their favourite technology and describe the sticker - to ensure they knew what technology they are selecting and stick it to a piece of paper

3. Children were provided with stickers of the 1, 2, 3 and 4 can play pictures

4. Children were asked to place the chosen 'how many can play' sticker next to the technology sticker on the paper

5. Children's comments are annotated on the paper to explain their choice

6. The process is repeated until children have selected all technologies or they no longer wish to play

Storyboards

1. Children are provided with a storyboard of a rabbit who is having difficulty using the computer

2. They were told that the rabbit is having difficulty using the computer and they were asked "what do you think he should do -

Ask a teacher for help?

Ask a friend for help?

Play a new game?"

Stickers were available with pictures for each of these options and they placed their chosen sticker on the storyboard

3. If children said they would ask for help, they were asked to describe how teachers and peers offer help. They were asked to select the appropriate picture sticker, either:

The person demostrates what to do

The person takes the game from me and does it for me

Scenarios

1. Children are provided with one of four scenarios : A child playing with a remote control car alone, Two children with mobile phones, A child using the computer alone, Three children using the computer

2. Children were asked how they would feel if they were in that situation

3. With happy or sad stickers children indicated their feelings

4. Children were asked how the practitioners would feel if they saw children in that scenario

4. Children used happy and sad stickers to indicate how practitioners would respond

5. Their comments were annotated on the scenario paper

Figure 13 – 'Toy sticker' - Toy Washing Machine Available in Sylvester's Preschool

Figure 14 – Emotions, 'Helping' and 'Explaining' Stickers

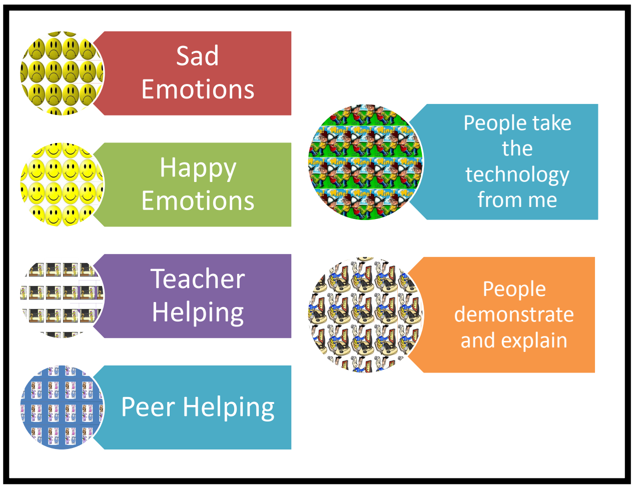


Figure 15 – 'How many can play?' Pictures

The pictures (depicted left in Figure 13, Figure 14 and Figure 15) included representations of:

- group sizes and how many people typically used a technology;
- emotions;
- who helped children during activities and in what way that person offers help;
- the technologies which children often had access to in the playroom.

A large number of pictures and stickers were used throughout activities and only a small sample is presented here. The full collection of stickers is presented in Appendix 7 and examples of completed activities can be found in Appendix 6.

Impromptu Activities

In addition to the planned activities with children, a series of impromptu opportunities emerged throughout the data collection period including opportunistic conversations with children which were audio- or manually- recorded; drawing activities initiated by children; question and answer sessions initiated by children in order to use the audio-recorder and child -initiated and -led photography. The unstructured nature of these activities results in some data which proved unrelated to the project, however some of this data provided insights into children's preferences and perspectives which contributed to the researcher's understanding of events. This data was not a main source but provided opportunities to support inferences made from other data sources.

4.2.4 Interviews with Practitioners

Interviews were conducted with the team leader of each preschool to verify my understanding of rules, regulations and playroom practices. Interview questions related to practitioner planning and playroom management only and were thus a small part of the data collection process. The interview schedule can be found in Appendix 4. Interviews typically lasted 30 minutes and were conducted within the preschool, at a time suitable to practitioners. Where possible I attempted to schedule interviews during practitioner preparation time so that they were not distracted by children who needed support in the playroom. Interviews were audio-recorded.

It should be noted that as interviews were a validation tool to better inform my understanding of the playroom and confirm what I had inferred from observations, their presence in the results chapters is minimal. This is intentional as the purpose of the interviews was to better understand the preschool environment, rather than provide an in-depth account of practitioners' perspectives (of which there is already a wealth of literature).

Section 4.3 Unit of Analysis: Clusters around Activities

Throughout the previous chapters, two clear elements of preschool cultural stood out as a central focus for data collection; the prevalence of 'activities' in children's preschool day (See Section 2.2 6and Section 3.1) and as a component of context (See Section 2.4.2) and the frequency of children playing with resources as part of a group or 'cluster' (See 1.2.2). As a result, these elements became the central unit of analysis for this study.

Focusing on 'activities' positioned this study within the cultural-historical activity theory for which an activity is the core unit of analysis (Bang, 2009), as well as the eco-cultural perspective and focused on a situation which is 'meaningful' for children (2002). However, clusters provided a platform to observe these activities and subsequently children's interactions with each other. If the unit of analysis had been the technology, this would have created data about how children *use technology* rather than how children *interact with their peers* as they engage with technology, which was not the aim of the study. Similarly, if the unit of analysis had been an individual child (or a series of focal children) it would only document one side of reciprocal interactions – the focal child's interactions. By focusing on the overall clusters around activities, it was possible to examine multiple children's interactions.

4.3.1 Defining an Activity

Activities describe the direct experiences, behaviours and interactions of children using specific technologies in the preschool playroom and it describes the social play taking place around these resources. In the preschool setting, several different activities take place simultaneously as different children used different resources alongside each other. Both observations and maps documented these activities, but these two methods provided different kinds of data.

- Observation episodes provided a diachronic description, i.e. they described activities over an *extended period*.
- Mapping snapshots on the other hand provided synchronic data because they captured multiple activities at a *specific point in time*.

Activity Type

Throughout this study, the activities which I documented were categorised as:

- Cognitive;
- Musical;
- Pretend Play;
- Using Adult World Resources; and
- Construction.

When establishing these categories I initially drew on the areas of the preschool (the learning centres) that were available in both establishments and housed some of the resources. For example, both preschools had a ‘pretend play area’, and a ‘construction area’ and the resources in these categories could be found in these spaces. This was supported by my knowledge of preschool playrooms from prior reading as it has been suggested that preschools are typically arranged into ‘centres’ like pretend-play, dressing up, puzzles and wet resources, to name a few (Fleer, 2003; Pellegrini, 1984; Petrakos & Howe, 1996; Sahu, 2004). The resources within these areas were typically used in the intended way (for pretend play or construction) and as such it was logical to categories these technologies in a manner that aligned with the learning centres.

Subsequently, for other resources I was required to make inferences about the kinds of tasks the children typically completed when using these resources. This was based on my knowledge of the resource, observations of children’s use of the resources in this study, and prior reading about the typical use of these resources in a preschool setting. The following reasoning was adhered to:

- Cognitive - In general, the computer and other similar resources was used for mental tasks such as learning numbers, shapes and colours etc. Cognition is defined as “the mental act or process by which knowledge is acquired” (Collins English Dictionary) and for the most part this describes the nature of these tasks.
- Musical – This was a logical description based on societal conventions and my knowledge of preschool resources about what constitutes a musical artefact.
- Adult world resources – A small number of technologies were not resources designed for children but instead were adult world resources and were designed for adult use, for example the preschool had a full size digital camera rather than a specially designed camera made for children. As they were not specially designed for children’s activities in preschool, they did not neatly align with any of the other categories or represent the general kinds of activities that children would typically undertake. Thus, these resources were categorised as adult world resources, rather than trying to inappropriately assign them to a learning centre or any other category.

The five categories addressed in this study do not indicate all activities taking place in the preschool; rather it documented activities that took place around technologies. Hence, wet and messy activities never occurred as technological resources were not compatible with this type of activity.

Categorising Technologies by Activity Type

Throughout the study children were documented using a vast range of technologies as well as non-technological resources. Table 5 provides a list of the technological resources and non-technological resources available across both preschools that children used during observations episodes or mapping snapshots. It should be noted that not all resources were available in both preschool, this is an amalgamated list, but both preschools did have a computer, SMART board, telephone and till.

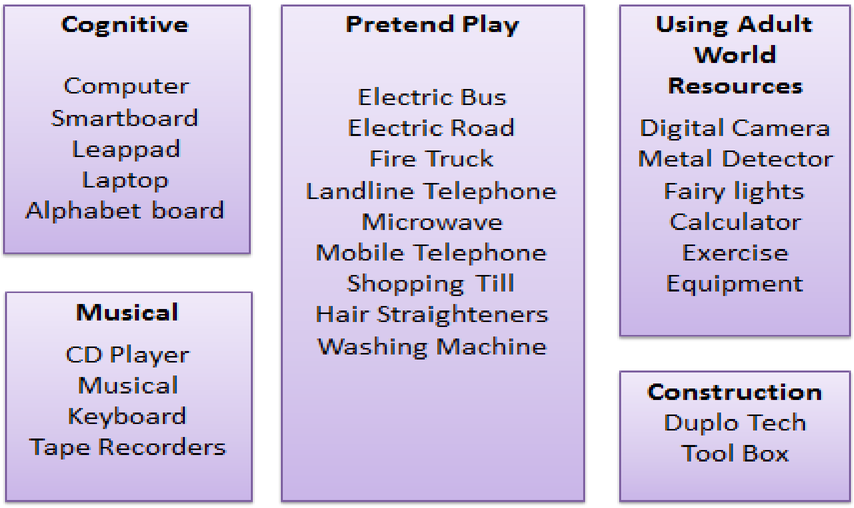
Table 5 - Preschool Resources available across Sylvester's Preschool and Hillfoot Nursery Class

Technological Resources		Non-Technological Resources	
Laptop	CD players	Wooden Blocks of varies	Music
Camera	Duplo Techs	sizes	Painting
Computer	Musical	Art Board	Planting seeds used
Electronic Bus	Keyboards	Buttons and Strings	indoors and grown in pots
Exercise	Mobile	Cards	Play dough
Equipment	Telephones	Climbing Frame	Reading
Fire Truck	Christmas Fairy	Construction e.g. bridges	Roadmap and Indoor
Landline	lights	and roads or Duplo	scooters
Telephone	Toolbox	Dinosaurs	Sand
Leappad	Electric Roads	Doll's House	Scatter head doll
Microwave	Hair Straighteners	Drawing	Scissors and paper
SMART board	Metal Detectors	Dressing up	Snack
Tape Recorder	Alphabet Board	Pretend Play	Sorting e.g. beads,
Till	Calculators	Jigsaw	coloured cards etc.
Washing	Hairdryers	Lego	Dried and cooked
Machines		Maths resources, counting	spaghetti to learn textures
		tiles, pins etc.	Writing Materials
		Mushroom House	Water
		complete with figurines.	Etchasketch

This table is not an exhaustive list of all resources available to children in these playrooms, it only indicates the resources which were observed being used by children; a considerable number of other resources were available in cupboards but were not used during the observation period. In addition, a full description of technologies listed in the table is available in Appendix 9.

During further analysis of the data, technological resources were categorised according to activity types detailed in the previous section. The categorisation of resources according to activity type represents the *typical* activities that children conducted with these resources, however children did on occasion use these resources for other activities, but these instances were rare. For example, the microwave was once used in a cognitive activity but in most cases, it was used for pretend play. Figure 16 illustrates how technologies were categorised.

Figure 16 – Technologies Categorised by Activity



4.3.2 Clusters

In line with the longstanding approach to early years education in Scotland, children in this study were given the freedom to choose which resources they wished to use during their visits to preschool. This meant that demand for resources varied each day; some days the telephone was in high demand while other days children ignored the telephone in favour of other resources that were available. When there was high demand or interest in a resource, children formed 'clusters' around that resource. This study defines clusters as *multiple children attempting to take part in the activity, even if they were not physically controlling the technology.* Clusters had five key characteristics.

1. Children focused their attention on *either* the technology or other children involved in the activity, or both.
2. Typically, cluster members were in close proximity to each other and in close proximity to the technology.
3. Membership was not static and clusters could change over time.

4. There was no upper limit as to how many children could form a cluster; anything upwards of two children was treated as a cluster.
5. Clusters could consist of a series of sub-clusters (children who engage with each other but ignore other members of the larger cluster) as demonstrated in Vignette 3.

Vignette 3 – Playing Shop

Seven children are playing around the shopping till (cash register); Manish, Jacob and Pamela all controlled the shopping till for a short time at some point, mutually exclusively, while other children are involved in offering objects to buy. These other children are not physically engaging with the technology but they are still involved in the activity and often they form smaller clusters of 'shoppers'. For example, Elle and Pat shop together, while separately John and Jeremy shop together. These two sub-clusters are not engaged with each other but when taken together they form a larger general cluster and are connected through the shopping till (cash register) and the theme of running a shop.

(Summary of Observation E39s, Sylvester's Preschool, Till)

4.3.3 Selection Process for Clusters Around Activities

In order to select clusters I positioned myself at four different locations within the preschool on each visit. Thereafter clusters were selected based on technological activities that were in the closest proximity to my location. This was essential because it was not appropriate to follow children around as they used technology, rather it was less intrusive to position myself in a reasonable location and let clusters form around me.

The only major stipulation to which I adhered was that I centred my observations on technologies that were not the computer. The computer has been extensively investigated (e.g. Brooker & Siraj-Blatchford, 2002; Chen & Chang, 2006; Ljung-Djarf, 2008; Orleans & Laney, 2000; Plowman & Stephen, 2005; Wang & Ching, 2003) and therefore I was more interested in exploring other resources in order to contribute original knowledge about children's social interactions. As a result, I only observed the computer being used when no other resources were being used around the preschool.

Section 4.4 Analysis Procedure

This section provides an overview of the analysis procedures used throughout this study in order to identify patterns and draw relevant conclusions. The process followed during the data collection and analysis for this project was that described by Pollard and Filer (1996: 302).

> *Listen, observe, talk and ask, then describe and try to understand. Finally, one must search for patterns and attempt to generate a more abstract, yet validly grounded, analysis.*

In order to achieve this, two key analytical processes were utilised throughout this study: Descriptive Summarising and Thematic Analysis. The descriptive data involved summarising observations, mapping and a games to establish a general overview of the data in terms of trends and patterns. These were generally established by counting occurrences of each kind of participation, play partnership and technology use etc. Creswell (2007) describes this as an holistic perspective. Subsequently I turned to an analysis of key themes in line with Creswell's explanation.

> *Following description, the researcher analyzes the data for specific themes, aggregating information into large clusters of ideas and providing details that support the themes (Creswell, 2007:244).*

Table 6 shows how each of the data sets for this study were analysed.

Table 6 – Analysis Techniques by Data Collection Method

Data	Descriptive Summarising	Thematic Analysis	Supporting Analysis
Observations	✓	✓	
Structured Games with Children	✓	✓	✓
Interviews with Practitioners			✓
Activity Mapping	✓		

This table describes the analysis of all methods in this study, including interviews with practitioners. The following section provides further detail about each of the processes. This method was primarily used to support inferences made from the other methods and therefore was not technically subject to descriptive or thematic analysis in the same degree as the other method.

4.4.1 Descriptive Summarising

As a means of developing an holistic understanding of the data as a starting point to inform the rest of the analysis, I began by attending to the descriptive data to obtain a broad picture of context or to scope the data set. The descriptive data provided an overview of commonly occurring situations in preschool and allowed me to illustrate a typical day in preschool which directly addresses each of the research questions. This process was similar to content analysis but it was not restricted to analysing text. Instead, I analysed the data to obtain a general summary of the children's experiences including identifying the following patterns:

- the frequency of each technology being used;
- the standard cluster size;
- the length of observations;
- the ratio of adult-child versus child-child observations;
- patterns in the children's perceptions of how many children should use each resource;
- how often children made the same comment when describing their choices.

This involved a degree of reductionism for the data which is necessary to present meaningful findings as Qvortrup (2008: 67) points out:

> *It was never the task of the researcher to tell everything they know; on the contrary, the task was always to sort out the most important features and findings and one critical criterion was to meet the demands of the commonality*

4.4.2 Thematic Analysis

Qualitative research is a ‘dynamic, intuitive and creative process of inductive reasoning, theorising and thinking’ (Basit, 2003: 143). The analysis procedure for observation data followed four steps.

1. Transcribe observation scripts and become familiar with data collected.
2. Re-read observation transcripts while simultaneously coding sections in an iterative fashion in conjunction with an inter-rater.
3. Group codes according to overarching themes.
4. Identify links and associations between themes.

Point one above has already been described as part of the discussion on systematic observations, however explaining how points two and three were carried is particularly pertinent to the results discussed in the next few chapters and will be described further below. Point four, generally relates to the conclusions drawn throughout this study and will therefore become evident throughout the results chapters.

Coding

Coding has been described as “noticing relevant phenomena; collecting examples of those phenomena; and analysing those phenomena in order to find commonalities, differences, patterns and structures” (Basit, 2003: 144), which helps to identify the emergent themes. Thus qualitative data analysis should not be viewed as a reductionist approach where the important parts are filtered out; instead it is considered the process of ‘distilling’ the data through organisation (Tesch, 1990). It must however be recognised that coding is not cut off or detached from context, but instead the researcher brings with them their experiences, worldview and training which will impact upon the direction of the coding process. They may for example, use terms and categories already established within their discipline.

Basit (2003) summarises two alternative coding methods recognised in qualitative research; the 'start-list' or the 'grounded' approach. The former utilises a predefined list of codes and the researcher attempts to find these categories in the data (for example see Miles & Huberman, 1994), while the latter is inductive and the codes emerge from the data (Creswell, 2007). Both approaches were attempted in this study; Broadhead's Social Play Continuum actions and behaviours (See Appendix 1) were originally adopted in a 'start-list' fashion, but the list was added to in order to account for:

- Behaviours that were not already present in the continuum but were clear in my observations.
- The components of context which contributed to interactions.

Thus, the coding structure was primarily grounded in the data but Broadhead's framework provided an understanding of the kind of codes to look for. This approach was most appropriate for an exploratory study because the initial start list provided added confidence and reliability to the data but the ability to develop additional codes from the data was required to account for any unexpected results. Broadhead's framework was only used for her descriptions of actions and behaviours and not for her hierarchically of sociability in the form of domains. This was because it was not the aim of the study; I aimed to describe behaviours and interactions rather than cast judgement about sociability.

In addition, documenting interactions on activity mapping was aided by Parten's categories of social participation as a 'start-list'. Unlike Broadhead's approach which was designed to explore extended periods of play, Parten offers a solution for recording interactions at a specific period of time and therefore was perfect for use with activity mapping.

In a similar approach, the coding of context, practitioner planning, the physical environment and the role of the technology was aided by my previous knowledge of the literature. Unlike with social interactions, no one overarching framework provided a start list for coding, but drawing on concepts like guided interaction (Plowman & Stephen, 2007a), Brooker's (2002) description of preschool rules, theoretical perspectives on key components of context (Bronfenbrenner, 1979; Engestrom *et al*., 1999) etc. all provided a basic understanding of what to look for and this was supplemented with codes that were grounded in the data.

Inter-Rater Reliability

In order to insure the validity of the data analysis process, a colleague was asked to blind code two-day's worth of observation data from each preschool. She was provided with the codes which I had previously used and asked to code each episode line-by-line. The two sets of coding were then thoroughly inspected in two ways; initially the inter-rater functionality was used in NVivo to compare the two data sets and secondly manual comparison of each code was carried out. While NVivo's coding comparison queries showed very high levels of agreement between the inter-rater and me, the reliability of the results was questioned. After careful inspection of the way the coding comparison was conducted, it appeared to only count the number of words coded under each heading by both parties and if the number of words coded was equal it would return a 100% agreement. This method did not account for when the same codes had been used but to code different words within the episode. For this reason, manual comparisons between codes were also carried out.

After manual comparisons were carried out the inter-rater reliability fell and the level of agreement was lower, although still reasonable (approx. 79%). Nevertheless in an attempt to improve inter-rater reliability to a 90% agreement benchmark, careful consideration of differences resulted in some minor amendments to the coding system. The following issues were addressed:

- The inter-rater and I having varied familiarity with the codes. For example using the offering and receiving object code when a child requests help putting on a jacket, rather than using the requesting help code. This sometimes happened because offering and receiving help preceded requesting help on the long list of codes provided to the inter-rater. Greater familiarity with the list allowed me to remember when other more appropriate codes were available elsewhere on the list. These discrepancies in coding were discussed and a consensus was settled on for each instance of disagreement.

- At times, the inter-rater coded a section multiple times while I only used a single code and vice versa. This was resolved by coming to an agreement over when sections could be coded using single or multiple codes to better reflect the context of the observation.

- At times, codes appeared similar or interlinked and the inter-rater had a different understanding of these codes than me. This was solved by developing more definitive definitions for codes that appeared to overlap, and coming to a consensus over when it was appropriate to use each code.

After the coding went through a round of inter-rater reliability the coding was amended where appropriate to reflect the new perspectives that emerged from discussions with the inter-rater.

Identifying Themes

The second stage of the process was to utilise the coded data and begin sense-making by organising the coded data into higher-level themes and sub-themes. Informed by previously discussed literature and theoretical perspectives (See Chapter 1 and Chapter 2, and particularly the conclusions drawn on page 71), throughout this stage I was mindful to draw on five overarching themes, including:

- observable behaviours and actions, sociability and participation and overall interactions;
- the physical layout of the preschool and related behaviours, interactions and participation;
- role of technological artefacts in shaping behaviours, interactions and participation;
- children's own influence and agency in directing behaviours, interactions and participation;
- children's relationships with peers;
- social/cultural nature of the preschool linked to interactions and behaviours.

These themes influenced the development of the research questions and as such it was essential to arrange data according to these areas. The first bullet point related to the social interactions directly and thus formed a considerable part of the analysis but the other themes were explored under the banner of *context* which influenced actions, behaviours and interactions.

Subsequently, it was clear that within these overarching themes there were various sub-themes. For example, within the theme of the physical preschool environment *access to resources* emerged as a key influence over how children interacted. The actual process involved creating flash cards of codes (established in the previous stage), overarching themes (established from previous reading of the literature) and sub-themes (which emerged from the data) and manually arranging them into related piles. Subsequently, logical links between codes, sub-themes and themes were added to the map. This was completed on paper to visualise the links as demonstrated In Figure 17 below. This grouping or categorisation process was based on key inferences that I made based on my experience and knowledge of the episodes from being immersed in the research context, and from previously reading related literature.

Figure 17 - Example of One Stage in the Thematic Analysis (this was not the final version)

The final themes and a detailed breakdown of the sub-themes are described in considerable depth across Chapter 5 and; the former deals with the observable actions/behaviours, sociability and participation and social interactions in general, while the latter chapter address all those components of context which were influential to social interactions.

Qualitative Computer Software for Coding and Storing Data

NVivo 8 was used as an organisation and data management tool but the actual analysis was still conducted by me as I was still required to create all coding categories, decide which sections and lines of the observation transcript should be coded and which codes to retrieve and focus upon when drawing conclusions (Basit, 2003). NVivo 8 offered a system to store the coded data electronically which provided three main advantages.

1. Ease of retrieval through search and filtering facilities.
2. Reduced paper and provided a secured (password protected) location for data storage.
3. The opportunity to back-up data on an online server which may be accessed from multiple locations which is both practical, but also minimises the risk of data loss.

NVivo 8 also offered mapping functions to produce maps similar to that presented in Figure 23. The limitation of this process however was that the size of the map is limited to the size of the computer screen which can make things difficult to visualise because the text has to remain small in order to see the whole map. Thus, creating the links was done manually on paper because, for me, it aided my ability to see the links.

4.4.3 Validity Checking and Assuring Authenticity

Validity has been thought of as a questioning process about the authenticity of the data, that is, questioning whether the data as presented reflects the voices of the participants (Hughes, 2001). Two concerns have been raised about the validity of data with children. Firstly, there are concerns that children say what they think the researchers want to hear because they are used to being controlled by adults (Punch, 2002). In addition, data from children have been criticised because some researchers are unwilling to believe children's responses in research situations because of their impressionable nature and the extent to which they are highly 'susceptible to suggestion' (Scott, 2008). This questioning of children's responses has been rebutted however because evidence has shown that children can give reliable responses about events which are meaningful to them (Scott, 2008). Moreover, there is no evidence to suggest that adults always tell the truth in research either and so this is an issue which needs to be addressed in all research not just that involving children. As with research with adults, it has been suggested that triangulation is an appropriate method to establish that my interpretation of what children say is indeed what they are attempting to say.

In order to maintain the validity of this study, I decided to adhere to Hammersley *et al.*'s (1994) and Creswell's (2007) strategy of using:

- unobtrusive methods;
- using respondent validation; and
- triangulating my methods.

It has already been established that the data in this study is presented from the researcher's interpretation of events thus the process of allowing the respondents to read the transcripts for accuracy was unnecessary. However, respondent validation in this study was provided by the structured games with children and the interviews with practitioners. The information gained from these methods enhanced my interpretation and minimised the need to present only a description of what was observed.

For this project, the findings pertain to certain parameters due to the context-specific nature of data (Hughes, 2001); i.e. the two Scottish preschools within which the study was completed. The findings do not represent the situation for all preschools in the UK; instead, this study provides the first glimpse of children's social interactions around technologies and must be expanded upon to create more generalisable findings. In essence, this study was informed by MacNaughton *et al.*'s (2001) principles of 'good' research which is: ethical, purposeful, well-designed, transparent, contextualised, credible, careful, imaginative, equitable (MacNaughton *et al.*, 2001).

Section 4.5 The Ethical Issues

The ethical considerations in this project were steered by SERA ethical guidelines (SERA, 2005) which provide a comprehensive overview of the responsibilities of the researcher. In addition, the study is guided by the understanding that researchers should (Denscombe, 2003: 141):

- *respect the rights and dignity of those who are participating in the research project;*
- *avoid any harm to the participants arising from their involvement in the research;*
- *operate with honesty and integrity.*

The overriding concern throughout this project was ensuring the care and welfare of the participants involved. This was imperative and was always the first concern; even beyond ensuring that viable or relevant data were collected. Considerations specific to research with children were addressed because children are believed to be vulnerable research participants (MacNaughton *et al*., 2001). An awareness of these perspectives allows researchers to alter their approaches accordingly and to ensure children are treated fairly, with care and consideration for their own feelings.

Strict ethical guidelines were followed which were aimed at making the research process comfortable and understandable for the young participants. The entire project was overseen by the Stirling Institute of Education Ethics Committee and independent approval was granted by both the Glasgow City Council and the East Dumbarton Council to conduct the research in institutions within their district. The Stirling Institute of Education Research Committee provided on-going support and guided the study on issues which were particularly pertinent to this study including: informing participants, offers of confidentiality, the participants right to withdraw, data storage, data output and the use of photographs. As the intention was to create a project which was responsive to the data, this necessitated a staged ethical approval process, as shown in Table 7.

Table 7 - Staged Ethics Application Process

	Cover for ethical approval	Awarding Body	Methods Approved
Apr 2008	Approval granted for phase one of piloting	The Stirling Institute of Education Ethics Committee	Non-participant observations Interviews
Aug 2008	Approval granted for phase two of piloting and approval granted for phase one of the main study	The Stirling Institute of Education Ethics Committee	• Non-participant observations with manual notes • Kutnick's social mapping • Interviews with practitioners
Aug 2008	Approval granted to begin phase 1 research in Sylvester's Preschool	Glasgow City Council	Entry into the preschool and focus on observations
Sept 2008	Approval granted to begin phase 1 research in Hillfoot Nursery	East Dumbarton Council, Department of Early Years and Childcare	Entry into the preschool and focus on observations
Dec 2008	Approval amended for phase two of main study	The Stirling Institute of Education Ethics Committee	Use of still digital images for cluster mapping
Dec 2008	Approval to use still digital cameras at Sylvester's Preschool	Sylvester's Preschool	Permission to use digital images under the preschool parental consent obtained by the institution at the beginning of the year
Dec 2008	Approval to use still digital cameras at Hillfoot Nursery	Hillfoot Nursery	Permission to take images within the preschool Permission to use digital images in sketch form for publication purposes

SERA voluntary informed consent guidelines directed the approach used in this study. The guidelines indicate that participants must be fully informed about the nature of the study and be voluntarily willing to take part, based on this information. Of importance to this study is the latter description which states that it may, at times, be unworkable to obtain informed consent from all parties:

> *There are circumstances, where it may be impracticable or unduly restrictive to obtain informed consent from all participants, for example, in observational studies where the observed activity, such as playground games, is non-specific to individuals (SERA, 2005).*

Based on these guidelines, the systematic observations of the preschool playrooms did not require consent from all children, instead 'assent' was inferred, which is common in early years research (Morrow & Richards, 1996). It is debated whether children are truly able to provide informed consent (Birbeck & Drummond, 2007). In light of this, assent is sometimes used which is when children were not required to sign a written consent form, but their consent is inferred from their body language. The researcher has a responsibility to observe and consider this body language in order to ensure that only willing children take part. Children's assent was inferred, however if any children appeared uncomfortable with me observing their behaviour I used my own discretion and stopped immediately. Children were observed in the main playroom so that they could withdraw from the observation at any time by moving to another part of the playroom. They did not have to ask to leave the observation. Similarly, if any of the children were vocal and asked me to stop observing their behaviour I was prepared to adhere to their wishes and observed other children instead. No children requested that I stop observing them.

For one-to-one structured games, children were self-selecting for which the Stirling Institution Ethics Committee did not highlight any ethical issues. I remained seated at an empty table with the resources for any participatory activities laid out on the table. After children approached me and asked me what I was doing, I explained the situation and the children were then asked if they wished to help me write my story by taking part in some activities. No children were approached to ask them to take part in the study.

It has been suggested that researchers can explain their presence to a child by indicating that they are 'someone who is trying to find out about things' (Mauthner, 1997), but I felt that this was misinforming the children because it lacked a description of what happens in the research process after the researcher 'finds out' about something. I therefore felt it more appropriate to describe my agenda by stating that I was "trying to write a story about how children use technology with friends" and asked children if they would like to help me understand how children did this. This indicates to children that the information they provide will be used in some way – in this case in the 'story' (the PhD thesis).

Parents were informed about the nature of the study, the methods proposed and how all results were to be disseminated (i.e. in this doctoral thesis and potentially in academic journals and at conferences), in a combined information leaflet and consent form (full forms are shown in Appendix 2). Leaflets were given out to parents via the preschool team leader and the signed portion was posted back to me at the University of Stirling in a self-addressed prepaid envelope.

Practitioners were informed about the nature of the study by the Head Teacher in each establishment. Practitioners who were interviewed also signed a consent form which acknowledged that they were advised and consented to their interviews being audio-recorded and transcribed for analysis. Within the consent forms it was made clear that specific children, practitioners and educational establishments are not identifiable from the study or in any future publication derived from the study. This was achieved through the use of pseudonyms for all children, practitioners and the names of the educational establishments involved in the study. Identifying factors, e.g. times and place names, which are not essential for the interpretation and dissemination of results, were excluded where possible. Where photographs and screen shots were used for illustrative purposes, these images were converted to sketches using the software Akvis Sketch in order to protect anonymity in publications. Further security was ensured because all data was stored in accordance with the Data Protection Act (1998). All electronic media was stored on a password-protected computer and all paper data was stored in a locked office. Consent forms also detailed the parent/carers and practitioners right to withdraw at any time.

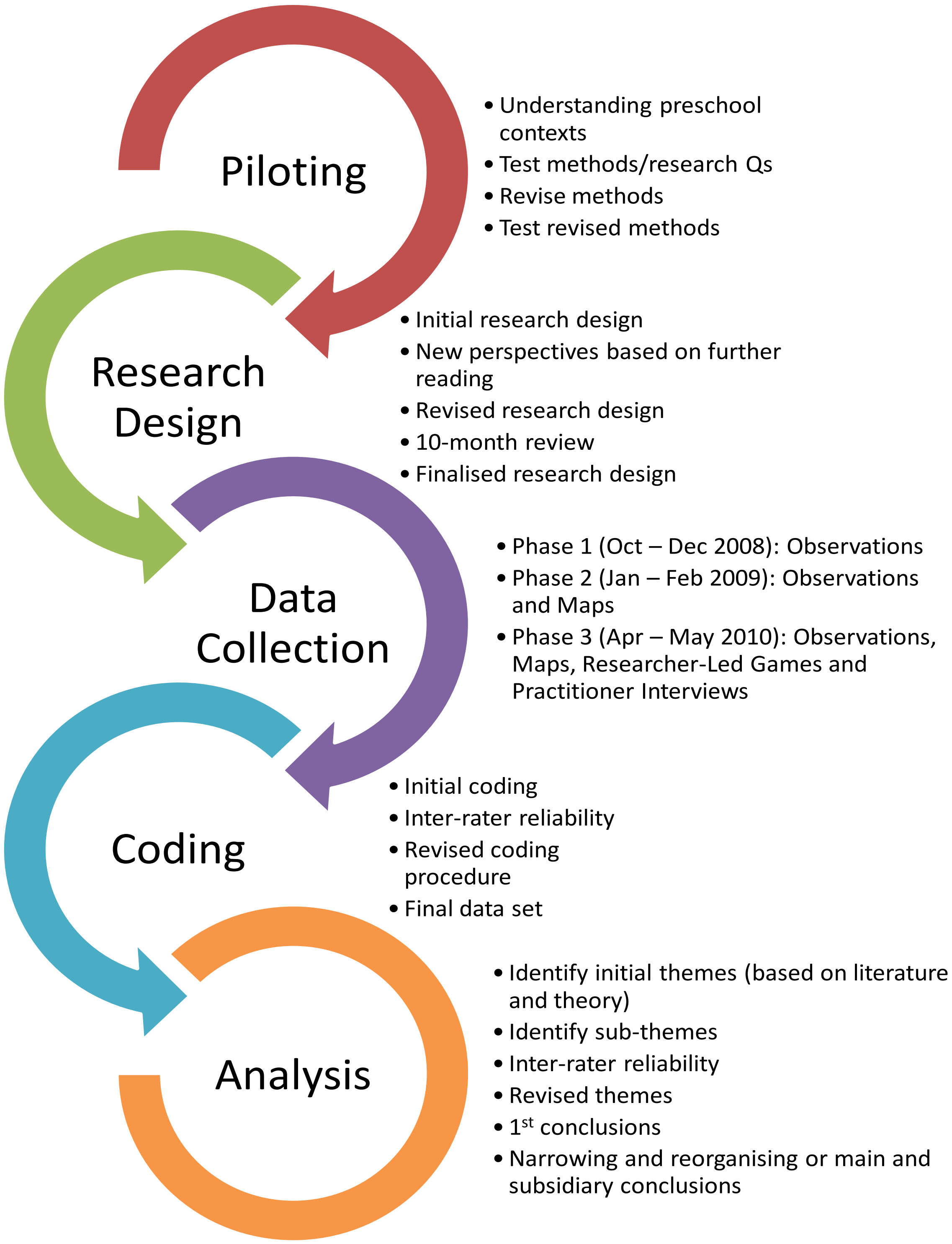
Additional ethical issues are apparent throughout this study because the taking of photographs of young children is particularly sensitive. While it has already been explained that children's 'assent' was assumed in conjunction with parents' informed consent on their child's behalf's, Flewitt (2006) argues that such terminology is inappropriate and the use of 'provisional consent' which is continually confirmed is more fitting. Here the level of consent is only valid within the predefined framework parents are made aware of. With this in mind, additional consent forms were sent to parents, which documented the change in methods and decision to use still digital cameras. Consent was sought in the same manner as before after this new information had been made available.

With visual data the issue of protecting the children's identity is heightened. Photographic images were used to present a graphic map of the playroom but they also provided useful illustrative data which could be useful in the dissemination of results. In line with the information presented on the consent form, photographs used for publication were converted into a sketch using the software Akvis Sketch. This flexible software allows for considerable manipulation of the photograph by offering the opposition of increasing the density of sketch lines that the photo does not appear life like. Similarly, it provides an opportunity to blur out faces and other identifying factors in the photographs. Sketches are particularly useful for portraying facial gaze and body position which are essential when exploring social interaction (Flewitt, 2006) without disclosing identities.

Section 4.6 Summarising the Decision Making and Analysis Process

Throughout this chapter, I have demonstrated that the data collection for this study was methodical and well considered, yet flexible enough to account for changes or unexpected issues throughout the processes. Similarly, the analysis was iterative to attempt to improve validity of the data and ensure that conclusions were logical. The general process is summarised in Figure 18, below.

Figure 18 - Data Collection, Analysis Process



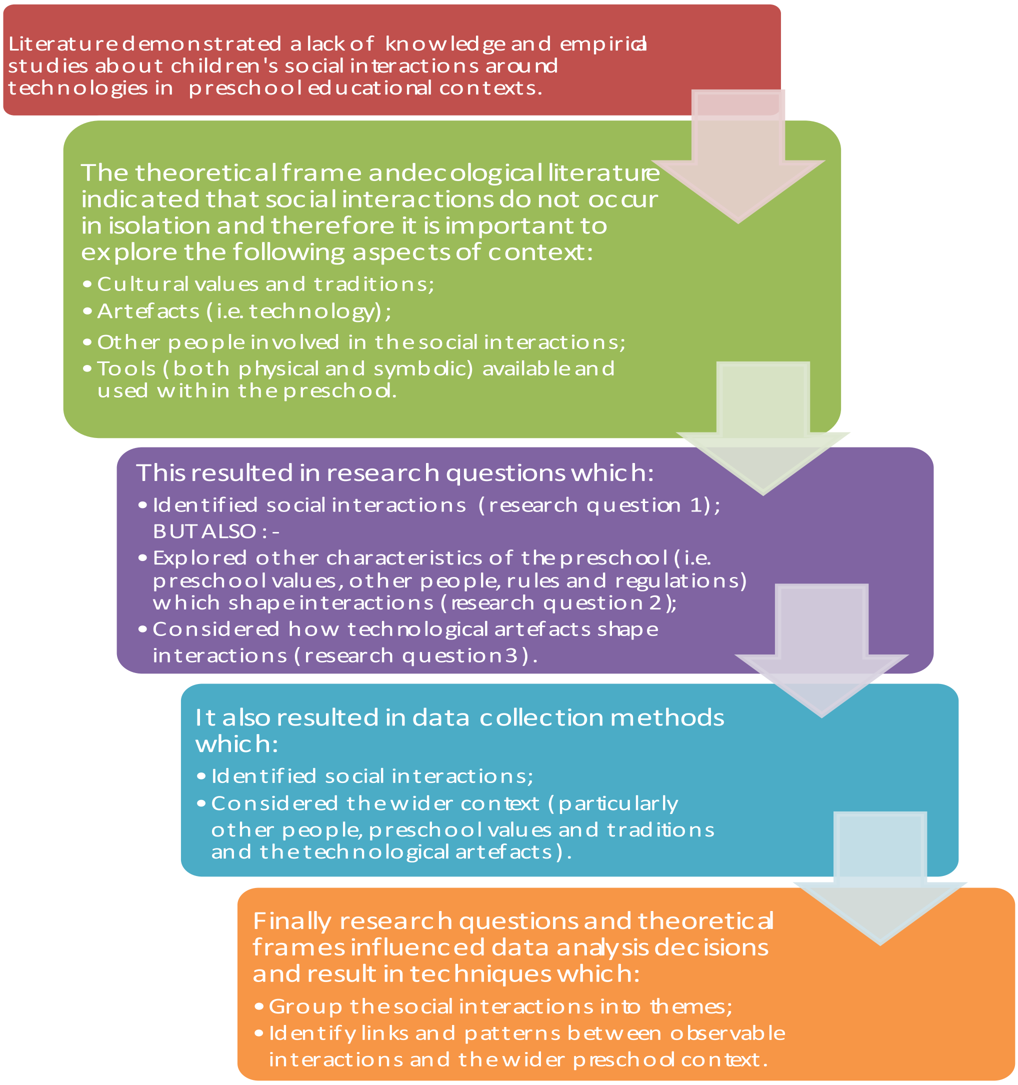
PART 3. RESULTS

CHAPTER 5
Social Interactions and Participation in Clusters

Section 5.1 Introducing the Data

The previous chapters described the underdeveloped areas in the literature and the theoretical frame that informed this study. The flowchart in Figure 19 summarises the information presented thus far, which has significantly contributed to the results that follow.

Figure 19 - The Process of Arriving at the Data



The remainder of this thesis presents the results and key findings from this study. The current chapter addresses the first research question, which called for an understanding of children's interactions as they engage with technology in preschool playrooms. In order to obtain data to address this question, during observations episodes and mapping snapshots I focused on clusters as described in Section 4.3.2. Chapter 6 then explores the key components of the preschool context, which influenced these interactions and presents the data related to research questions two and three.

Section 5.2 Distinguishing between Interactions and Behaviours

In line with the literature that described how to observe and define interactions (See Introduction Defining Social Interaction and Chapter 1 Section 1.2.1), it was clear to me (and to Miell and Dallos (1996) and Driscoll and Carter (2004)) that interactions involved engagement between two or more people, but during this engagement children individually exhibited behaviours. For example, when children engage in helping interactions they exhibited a range of observable behaviours such as pointing and demonstrating, verbally directing and physically following instructions. The process of continual reciprocal behaviours resulted in a specific form of interaction. The key distinctions between interactions and behaviours could be summarised by indicating that:

- behaviours were *individual processes* which a child may exhibit. They were typically observable forms of action;
- interactions were a series of reciprocal behaviours and actions *between individuals*.

Based on the three ways of observing interaction (in the form of behaviours/actions, sociability/participation or relationships) presented in Chapter 1, the current chapter primarily addresses the observable actions and behaviours taking place around technology because it was this area which was so lacking in the current literature. However, the other approaches to observing interaction are not overlooked. Sociability/participation is addressed through the discussion of Parten's forms of participation which were used to code the mapping snapshots and this provided an opportunity for exploring patterns of interactions. Peer relationships are addressed in the next chapter as they form part of the context which contributed to interactions.

Section 5.3 Behaviours and Interactions in Clusters

This section provides an overview of the wide repertoire of interactions and behaviours that children exhibited. Multiple iterations of thematic analysis (see Chapter 4) identified three overarching forms of engagement within which interactions and behaviours could be categorised and discussed. Across these three forms of engagement, eight forms of interactions were documented and 27 different behaviours/actions were observed. In essence, this study much like Broadhead (2001), offers a multi-tier approach whereby behaviours and actions were categorised according to various higher-level forms of interactions and engagement. However, these are not arranged along a continuum, nor are they positioned according to varying degrees of sociability; rather they just offer a mechanism for describing the kinds of behaviours and interactions observed in a transparent manner. Figure 20 provides a summary of these behaviours, interactions and categories of engagement.

5.3.1 Pro-Social (Peer-Driven) Engagement

For this study, pro-social engagement describes those situations where children were focused predominantly around being involved with other children during the activity and observably contributed to the cluster.

Figure 20 - Children's Behaviours and Interactions

Pro-social (Peer Driven) Engagement

Sociable Interactions
- Extended verbal exchange
- Standing/sitting in close proximity to peers
- Acknowledging or noticing other children by smiling or nodding
- Verbally making their presence known
- Verbal Invitation

Sharing Interactions
- Allowing others to control the technology (reqlinquishing control)
- Offering and receiving objects

Supportive Interactions
- Receiving approval or praise from a peer
- Offering approval or praise to a peer
- Seeking praise or attention

Anti-social Engagement

Unsociable Interactions
- Ignoring others
- Verbally rejecting invitations or help
- Walking away

Hostile Interactions
- Verbal abuse
- Arguing
- Misleading/'tricking' peers
- Pushing

Possessive Interactions
- Taking objects followed by an altercation
- Hiding/covering technology

Task- Driven Engagement

Helping Interactions
- Demonstrating
- Physically Helping
- Verbally directing
- Listening to peers

Exploratory/ Investigatory Interactions
- Verbally Requesting Help
- Q&A
- Explaining
- Observing task

Pro-social engagements included:

Sociable Interactions - The child attempts to have an extended interaction with other cluster members and may favour interaction with peers rather than with the technological resource.

Sharing Interactions - The child allows their peers to use resources alongside them or instead of themselves.

Supportive Interactions - The child offers, receives or seek encouragement, urging the activity to continue.

Each individual behaviour/action in this section is presented in Table 15 in Appendix 10 along with examples from observations, in order to add clarity to the discussion.

Sociable Interactions

Sociable interactions were characterised by a desire to be, and engage, with other people and the resources around which these interactions occur were peripheral to the child and the cluster. The most explicit form of sociable interactions was to verbally invite another child to play, as shown in Vignette 4 below.

Vignette 4 – Verbal Invitation
Harvey appears again "Do you want to play transformers? Do you want to play transformers?"

(E27h, Harvey and Steven ages 4.3 and 3, Computer)

However, these *verbal* invitations were rare (other forms of invitation, such as implicit invitations through pretend play, were often observed as will be described throughout the remainder of the chapter but explicit *verbal* invitations were infrequent) and the more frequent form of sociable interactions was a form of 'extended verbal exchange'. At times, children engaged in lengthy conversations during activities and these could be either activity-related, non-activity-related, or both. During activity-related conversations children discussed the technology they were using and the game they were playing. Either they discussed how the theme should develop or they conversed about aspects of the game, which they found fun or enjoyable as shown in Vignette 5.

Vignette 5 - Activity Related Discussion

Tracey: "let's do this" to Russ.
Then Tracey says "look" to Russ and giggles.
Russ turns back to the computer – smiles and giggles too.
Russ says "Hehe, look at the wee mouse"
Tracey continues to control the mouse.
Russ starts to offer suggestions or instructions "go get CBeebies, go get CBeebies"
Tracey does not respond. Jasper appears and hovers behind silently.
Russ comments on the game and giggles. Tracey then giggles too.
Jasper joins in "oh no, hahaha!" Jasper starts to count the numbers on the screen while pointing at the screen. Russ smiles.
. . .
Harvey jumps in "7, it's 7"
Tracey giggles and shouts "that's cool"
Harvey gets excited and smiles and laughs.
Russ leaves.
Jasper stares at the screen. Tracey counts "1, 2, 3 ears" and looks at Jasper and smiles.
Jasper points at the screen and says "10 eyes"
Tracey clicks what he suggests and laughs.
Harvey sits back down and Andrew observes.
Tracey says [to Jasper] "tell me when to stop"
Jasper waits a minute and then says "STOP, STOP, STOP"
Jasper comments on the game shouting "Stop, Stop"
They all cheer.
Tracey says "It has no legs"
Jasper confirms "yes no legs"
(E37h,Tracey, Harvey, Russ and Jasper ages 4.08,4.33, 3.16 and 4.5, Computer)

Non-activity related verbal exchanges occurred when children appeared to ignore the game and took part in their own conversation with little connection to the technology being used, as shown in the Vignette 6.

Vignette 6 - Non-activity Related Conversations

Lisa starts a conversation Naomi close by "I'm taller than you!"
Nina "I'm four" as if to explain the height difference.
(E32h, Lisa and Nina ages 3.9 and 4.6, Computer)

These verbal exchanges generally took place between children who were not controlling the technology. For example, one conversation took place while a practitioner was repairing the technology and the children had to wait to regain access to it and in this case the conversation filled the time while they could not use the resource. The conversation continued when the computer was fixed and the children could use the resource again, but at this point the conversation reverted to being activity related.

Sociable interactions did not occur spontaneously and at times children had to 'make their presence known' and they were required to speak out to the rest of the cluster in order to be social. Children were confident at doing this when required, sometimes by openly commenting to anyone who would listen, for example stating, "Talk to me!" as Kelis did in E23s, or by adopting more suggestive expressions. For example, in Vignette 7 Kamya seemed bored with the activity that was taking place, indicated by her tendency to observe the rest of the playroom. Kamya attempted to voice her dissatisfaction, and make her presence known implicitly by threatening to leave. Rather than leaving unannounced she actively made Shalini aware of her intentions and it appeared that she hoped that Shalini would follow her or involve her more in the activity.

Vignette 7 - Encouraging Attention

Kamya is about to leave but Shalini doesn't notice. She returns and taps Shalini on the shoulder and says, "I'm leaving now"
Shalini nods and keeps playing.
Kamya reappears and sits watching.

(E34s, Kamya and Shalini ages 4.4 and 4.6, Computer)

This vignette also doubles as an example of how children 'sit in close proximity to a peer' in an attempt to be social, despite having no interest in the task. This was observed throughout the data collection several times. The above episode concluded with Kamya remaining at the activity to be with her friend and in other episodes this happened too; children remained with a specific technology because other children were there, despite previously showing signs of wanting to leave. This is further demonstrated in Vignette 8.

Vignette 8 - Loyal Companions
Jude still remains silent and stares around the room.
Donna: "Jude!" and taps the seat at the same time indicating for him to sit still and stop fidgeting.
Donna then turns the computer off, they both stand.
Jude reaches for Donna's hand and they both walk away.

(E20s, Jude and Donna ages 4.2 and 4.6, Computer)

In this example, Jude showed no interest in the activity or the technology as he stared around the room. He remained at this activity, sitting in close proximity to Donna and exhibited sociable interactions. In this episode, Donna also acted in a pro-social manner because she recognised Jude's disinterest in the game indicated by her gesture for him to sit stationary on the seat and the decision to go to another activity. In this situation, Jude had remained at an activity that he did not like for Donna and Donna left an activity she did like for Jude.

This episode shows more mutual recognition for the other child as both Jude and Donna sacrifice their own desires in favour of their peer. Yet Vignette 7 provides a different perspective where one child is dominant in the cluster and children must adhere to their desires rather than their own. This was clear throughout the data collection period and is expanded upon in Section 6.2.2: New Technological Positions Foster Negotiation and Collaboration.

There were also several other instances where children were seen leaving an activity in favour of being in close proximity to a peer. For example, Vignette 9 shows Chris sacrificing his access to Duplo Techs in favour of playing with Harvey. Chris's main concern was playing with people irrespective of the game and after he received a hostile reception from Glen he did not attempt to continue using the technology, instead he found someone else he wants to play with.

> **Vignette 9 – Staying Close to Peers**
> *Glen shouts "HEY! That's my igloo!" Glen then pulls the igloo away from Chris' car and turns his back to Chris and mutters to me as he sits closer to me (almost sitting on top of my feet). Chris sees Harvey walking past and shouts "Harvey, Harvey" and goes to play with him by the climbing frame.*
>
> (E17h, Glen and Harvey ages 4.9 and 4.3, Duplo Techs)

These sociable interactions are all mediated by the condition that peers 'acknowledge or notice other children and is achieved by exhibiting one of the bulleted behaviours below:

- briefly turning their head to recognise that they had arrived;
- smiling or briefly verbalising a response by saying 'hello' or 'cool';
- accepting objects that they had to offer. No words needed to be exchanged, but the act of accepting the object signified their acknowledgement;
- following any advice that was offered. They did not need to respond verbally; instead, they just acted on the advice being offered.

This signalled to the children that they are welcome to engage pro-socially and in a task-driven manner.

Sharing Interactions

Technologies were a valuable commodity in preschool, partly due to their limited availability which may result from the fact that most practitioners, and therefore preschool institutions, still think of ICT in terms of the computer (Plowman & Stephen, 2007b) and therefore do not often have that many resources available for use. As such, children were most often seen attempting to gain access and were seldom seen relinquishing their access in favour of another child. However, there were a few noticeable cases where children clearly considered their peer's wishes and were forthcoming in offering technology to their peers or 'allowing others to control the technology'.

This can be seen in Vignette 10 below where Kenny had been a member of a cluster for some time and had been waiting patiently for a 'turn' at using the technology, yet Bruce was unhappy that the technology was not available so when it became vacant Kenny offered the seat to Bruce over himself. In doing so, Kenny forfeited his own right to use the technology before Bruce and he acted in a manner that helped Bruce achieve his goal.

Vignette 10 - Listening to Peers

A large group of children are crowded around the computer and have been waiting for quite a while why Jason controls the game. The children in the cluster mainly offered advice and suggestions and Bruce appears and stands next to Dominic who is a member of the cluster but not controlling the technology. Bruce voices his desire to access the technology and says, "I want a shot!" to which he gets no verbal reply from Jason. Throughout this play episode the children have been instructed to use an egg timer to manage turn-taking and when the timer finishes Jason relinquishes control without any fuss and leaves the play area. At this point, Kenny who has been a member of the cluster for some time immediately offers the seat to Bruce "You, look sit here" he says while looking at Bruce but pointing to the seat in front of the computer. Kenny offers this seat despite Bruce joining the cluster later than others and not technically being the next in line to use the technology.

(E12s, Kenny and Dominic age unknown, Computer)

On the other hand, when technologies were readily available and there were plenty of resources to be used by all children, I frequently observed children 'offering and receiving objects', particularly as the year progressed. This was a standard process, especially when technologies consisted of multiple parts, like the Duplo Tech example presented in Vignette 11. In those situations, children could continually use different parts of the technology and pass other parts to each other.

Vignette 11 – Sharing: Offering and Receiving Objects
Harvey: I'm looking for one of these (pointing at Alistair's Duplo)
Alistair: I'll find it! (Alistair looks in the box).

(E17, Harvey and Alistair ages 4.3 and 4.6, Duplo Techs)

It is important to note however, that when technology was widely available the social nature of these interactions must be questioned. At times offering and receiving objects appeared to be an arbitrary task and it is unclear whether it is a purposefully sociable interaction. This automated giving and receiving of objects is demonstrated in Vignette 12.

Vignette 12 - Arbitrary Offering and Receiving Objects
Alfie places the phone receiver down and calls Lee and gives him a cupcake. Elisabeth appears and starts giving Alfie food as he sits at the dining table. Lee sits down with his cupcake that Alfie had previously given him and picks up the receiver on the phone and starts to make a call. He holds the receiver to his ear but replaces it quickly. Lee gets up from the table where Alfie is still sitting receiving food from Elisabeth and brings cooking from the stove to Alfie. Alfie accepts the food and pretends to eat it. Elisabeth now sits down next to Alfie at the dining table, silent, while Lee starts serving food.

(E16s, Alfie and Lee, ages unknown and Elisabeth age 3.6, Landline Telephone)

Supportive Interactions

Supportive behaviours were those actions which signified encouragement and achievement to the other children, such as cheering and 'egging' them on. In the majority of episodes, supporting behaviours took place between adults and children rather than during child-child interactions, although there was evidence of children supporting their peers on some occasions. This was linked to the fact that children were more likely to *seek* praise from adult than from peers. There were several instances where children would actively take their work to a nearby practitioner or would stop a practitioner when they walked past to show them their progress as shown in Vignette 13. There were fewer instances where children actively took their work to a peer for the same level of praise.

Vignette 13 - Seeking Praise from Practitioners
Miss Taylor appears and says to Chris that his Duplo construction is fantastic. Glen hears this and immediately stands up and says "This is fantastic too!" holding up Thom [his Duplo tech vehicle].
Harvey them copies and says "This is fantastic too!" holding up his Duplo".

(E17h, Harvey age 4.3, Duplo Techs)

In this episode, Harvey was keen to receive praise from an adult just as Glen did but he did not make the same presentation to the other children involved in the activity. This may be interpreted as children valuing practitioner's perspectives more than their peers' perspectives, potentially because children recognise practitioner's authority.

In addition, the kind of supporting behaviours offered by adults were more explicit than children's supporting behaviours; children incorporated their supporting comments into more extended periods of interaction as they formed a cluster around the play, while adults offered short sentences of encouragement while moving around the room. At times, children were seen reiterating comments that you may expect adults to say to a child or actions you may associate with pets, such as patting a peer's head as they managed to complete a game at the computer or they were heard saying, "what a clever boy you are!" (E26h). Thus children reproduce the adult world (Corsaro, 1992).

However, more typically, I observed children cheering and verbalising encouragement towards the child who was controlling the technology and they were most often observed around activities other than pretend play. For example, I observed children creating a supportive cluster around some cognitive resources, especially the computer and SMART board and around some musical resources, particularly the musical keyboard. The rest of the children then took part in the activity by watching the game and often commenting on the task. During this process children often positively reinforced the activity by incorporating encouraging or motivational comments into their cheering.

Vignette 14 - Cheering as a Form of Support
Chris shouts "green, green, green" she selects green.
Chris "yey you got it right".

(E49h, Tracey and Chris both age 4, SMART Board)

Table 8 summarises the key findings demonstrated throughout this section.

Summarising Pro-Social Engagements

Throughout this section, I have demonstrated that children can engage pro-socially by exhibiting sociable interactions, sharing interactions and supportive interactions. The overarching theme throughout this section is that the child's interaction with peers is most important and for the most part the technology is considered secondary in the process. In addition, children showed the ability to:

- consider their peers' needs ahead of their own;
- demonstrated confidence in standing out from the crowd and making their presence known;
- offered support, albeit in a more implicitly manner than practitioners.

When children did offer explicit support they often did so by assimilating practitioner's supporting style and reiterating the language which they used.

Table 8 - Summary of Pro-social Engagements

	Description	Interaction	Technology	Approaches/Mechanisms Used by Children	Frequency	Areas of Interest
Sociable	❖ Children engaged in extended exchange with other cluster members.	❖ High Interaction. ❖ Children were lively, with clear body language, demonstrating an interest in each other rather than an interest in the technology.	❖ Interacting with peers was the child's central focus. ❖ Physical access to the technology was not necessary.	❖ Taking part in an activity which isn't their key concern, in order to be close to peers.	❖ Relatively infrequent, in comparison to other interactions.	❖ Children are able to recognise when peers are interested in interaction rather than the resources.
Sharing	❖ Children negotiate access to resources and support their peers in gaining access.	❖ Mixed interactions depending upon the degree of sharing. At times children could play silently but respond to requests for resources while at other times sharing revolved around a lively theme which required much collaboration.	❖ The technology was the child's central focus but they still recognise the presence of other children in the cluster.	❖ Insufficient resources creates more need for sharing. ❖ The presence of some common technologies which can be used alongside the independent project may aid interaction through passing objects.	❖ Fully relinquishing control was infrequent and typically prompted by practitioners or turn-taking rules. ❖ General passing of objectives (provided there are enough pieces of technology to be used by all cluster members) was common place.	❖ At times children recognised their peers' needs and forfeited their own access to resources to help their peer.
Supportive	❖ Children work in collaboration with other children towards a shared goal. They offer encouragement with the view to continuing or extending the play.	❖ High interaction. ❖ Children were largely involved in the activity by offering advice and support. ❖ They usually take part in lively conversations and the body language was engaged with most children exchanging glances and all children facing towards each other or other cluster members.	❖ Task completion around a specific technology was child's central focus.	❖ Clusters formed and children were often seen supporting children through cheering. This created a lively cluster, which in turn often attracted new members, causing the cluster to expand. ❖ Children generally valued support and praise from practitioners. ❖ Practitioners were more likely than their peers to offer support.	❖ Generally exhibited by practitioners rather than peers. More indirect support was frequently observed.	❖ Children tended to mimic practitioners and occasionally offered support that you would expect an adult to say to a child such as "you clever boy".

5.3.2 Task-driven Engagement

Task-driven engagements focused on completing the task, which may include reaching the end of a level in a computer game, taking part in role-play with technologies or building a completed and functioning remote controlled car using Duplo Techs. The important thing, which distinguishes these interactions from others, was that task completion was the goal, irrespective of whether children were controlling the technology. In these situations, children were often satisfied to take part and offer advice to complete the task while they waited for their turn with the technology. This aligns with the work of Morgan and Siraj-Blatchford (2009) who found that with role-play technologies children appeared quite happy to take part in the activity even if they were not physically controlling the resource.

When children were driven towards completing a task, they tended to exhibit:

Helping Interactions	-	children demonstrated or directed the child how to complete the task
Exploratory/Investigatory Interactions	-	attempts to obtain knowledge

These interactions are documented in Table 16 in Appendix 10 along with examples from the data.

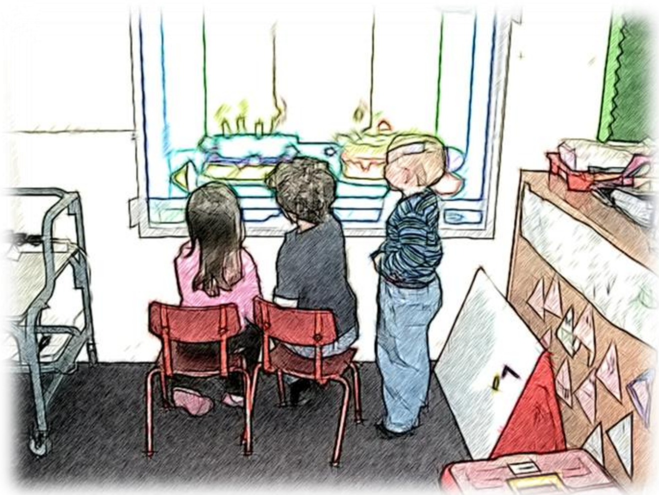
Helping

Helping behaviours revolved around scaffolding and guiding a peer through how to use a resource or complete a task. In many cases, children were free to conduct their own activities and the practitioners intervened when help was required, but children also demonstrated their own ability to help their peers. In 62% of episodes that included helping interactions, other children rather than practitioners offered help. Children's ability to help emerged in the middle of the data collection period and I less often observed children offering verbal help or demonstrating before this time. They also appeared to require less help late in the summer term as instances of helping interactions began to lessen as the school year continued.

In the majority of cases, children were able to help by 'verbally directing' their peers, which was normally coupled with considerable gesturing to allow the person controlling the technology to understand what was required. In some of these cases, the person controlling became the vessel to control the resource while the person explaining was actually the one completing the activity, as was the case with Chris helping Grace in Vignette 15.

Vignette 15 - Helping

Chris is using the SMART board and is instructed by a practitioner to give someone else a turn at which point he gives the pen which is used to control the SMART board to Grace. As she begins to use the SMART board, he begins to use his finger to point at the screen to illustrate which selection she should choose as he verbally directs. Chris continues this process for each step of the way and Grace obeys. Then, when the game reaches a section where Grace does not need to make a selection and she needs to wait, he holds up his hand and says, "now wait". During this period of inactivity, they take a seat in front of the SMART board and watch a video and listen to a song while sitting side by side. Chris says "the next one is funny" but Grace doesn't say anything. The song ends and Chris again points at all the instructions she should click on as shown in the image below.



Grace controls the pen and Chris says "click that, drag it to here" while simultaneously motioning what to do with his finger. They complete the level and Chris says "the next one is fast, it's harder".

(E50h Chris and Becky both age 4, SMART Board)

When allowed, children would often try to demonstrate to their peers how to complete the task, but this was not often well received. It was often perceived as an attempt to gain access to the technology and therefore offers were rarely accepted. On a select few occasions children did accept these invitations as demonstrated in below Vignette 16, but the original child who was controlling the technology was quick to ask for the technology back after the demonstration was complete.

Vignette 16 - Demonstrating
Shalini – "Can I show you?" to Kamya.
Kamya – "yes".
Shalini now controls the computer from the spectator seat.
They both stare at the screen.

(E4s Shalini and Kamya ages 4.6 and 4.4, Computer)

Demonstrating differed from physical help in the sense that the former was a mechanism for showing others how to complete a task, while the latter may be simply holding a piece of a toy in place while a peer goes and collects more supplies, as shown in Vignette 17. Physical help appeared quite automatic and brief and children rarely questioned why they were holding something for a peer for example, they simply provided physical help before quickly continuing with the own activity.

Vignette 17 - Physical Help
The Christmas tree has fallen over in the role play corner.
Lorraine: "oh no, that's falled! [sic]"
Chris holds the base and Lorraine lets go as she was previously holding it up.
Chris struggles to straighten the tree and he is only holding the tree in one hand and has Duplo in the other.
Chris: "Please help Lorraine, hold the top!"
Lorraine pulls the tree straight and Chris holds the base.
Lorraine tucks the treetop behind the lights so it stays up.
Chris: "there we go".

(E7h Chris and Lorraine both aged 4,Fairylights and Duplo)

Alternatively, in a very limited number of episodes children showed evidence of listening to their peers' needs or requests and helped their peers achieve their goal. In these episodes children appeared to be acting in a completely selfless manner and Vignette 18 demonstrates children's capacity to support their peers. These behaviours were seldom observed, but when they were observed, they were well reciprocated and children smiled and seemed grateful.

Vignette 18 - Listening and facilitating peers

Glen, Harvey and Alistair play with the Duplo sitting in a circle.
Harvey: I need a big red bit.
Alistair: Look at mine, it's good!
Harvey: I'm looking for one of these (pointing at Alistair's Duplo
Alistair: I'll find it!

(E17h, Glen, Harvey and Alistair ages 4.9, 4.3 and 4.6, Duplo Techs)

Exploratory/Investigatory Interactions

For the most part, children had to initiate exploratory interactions themselves when they required additional knowledge or understanding about a resource. They could develop this understanding in four ways:

- by asking questions and receiving answers;
- by requesting some form of help to complete a task, which enabled them to create a model to follow in future;
- they sought an explanation of some sort;
- they observed the activity.

Children's question and answer sessions where quite often directed towards practitioners. They were short conversations that allowed the child to clarify their understanding and a lot of the time it appeared to be a sequence of repeated questions by the child followed by a short answer from the practitioner. The questions were not always phrased as a direct question but rather a statement signifying the child's confusion to the practitioner as shown in Vignette 19.

Vignette 19 - Q&A

Alfie holds the hairdryer to Mrs Adam's head and presses a button – nothing happens and she does not respond.
He looks at the hairdryer and asks, "this should work, it's not a toy, it's a real one".
Mrs Adam: "yes, it is a real one but the wire is broken – look!" she points to the wire that has been cut off.
Alfie: "Oh. Yes." Alfie places the hairdryer down and continues to play with the shopping.

(E9s, Alfie age unknown, Hairdryer)

These questions were distinguished from helping interactions because a lot of the time questions were not about how to complete a task but instead focused on understanding why something was not working, such as fairy lights or the hairdryer in the example above.

After children had established their desired understanding, they generally returned to their activity and play. In a similar sense 'explaining' was disjointed from helping because it didn't involve directing how to complete a task, rather offering a reason why, for example, a toy wasn't working as Mrs Adam provided in the Vignette 19, or in E36 where Harvey tried to explain to Catherine that the battery powered drill from the toolbox isn't working because the battery pack is missing.

As part of exploratory interactions children were well aware of the proactive role they had to play in requesting help and at times it appeared that asking for help was, for them, the obvious choice. Although these question and answer sessions were infrequent some children also appeared quite comfortable asking questions. When asking children during informal conversations and during researcher-led game what they would do if they were having difficulty or were 'stuck', most children were quite confident that if they were stuck they simply ask for help. This was quickly brushed passed by children and expressed in a matter of fact way and children rarely felt the need to elaborate. Instead, they quickly moved on to another topic as shown in Vignette 20.

Vignette 20 - Researcher conversation about being stuck
Researcher: So what I wanted to ask you about, what happens when you are stuck? If you're playing a game and you don't know how to do it, what do you do?
Eva: You just ask another children who know how to do it.

(Audio SD2E, conversation with Eva, age 4.75)

By far the most frequently observed behaviour which children appeared to exhibit when seeking knowledge was 'observing' the activity which was being completed. Children were often seen standing around the perimeter of the cluster fixated on the task being completed. As their interest grew they tended to move closer to the front and eventually, when confident to do so, they may begin exhibiting task-driven or pro-social engagements and may for example begin to start a conversation or offer suggestion for task completion.

Summary of Task-Driven Engagements

Task-driven interactions were observed reasonably frequently throughout the data collection process. For example, helping interactions were observed in just under half of all episodes while providing knowledge was observed in around a third of episodes. In the middle of the preschool year children were most often observed offering help and they were confident in doing so but as the year progressed children became more skilled in using resources, indicating that they no longer required help. Children also recognised that gaining knowledge required them to proactively find out information. The findings from this section are further summarised in Table 9.

Table 9 - Summarising Task-Driven Interactions

	Description	Interaction	Technology	Approaches/Mechanisms Used by Children	Frequency	Areas of Interest
Helping	❖ Children's helping could be categorised in two ways. Their help appeared either altruistic or self-orientated (because they believe that if they offer help it will allow them access to technology even when it was not their 'turn').	❖ Mixed interaction. At times children negotiate and discuss how to complete a task, while at other times one child becomes the vessel to control the technology, while the tutor directs without explaining or discussion.	❖ The technology is central to helping interactions as both children have to be focused on the resource to navigate through the task.	❖ Children generally offered help through verbal direction and gesturing. ❖ Demonstrating was only accepted when children were confident that they could regain control of the resource	❖ Most helping behaviours were observed in the middle of the preschool year when children were confident enough to offer help but not an expert and thus still required help at times.	❖ Helping was accepted providing children didn't attempt to take control of the resource. ❖ At times children were altruistic and facilitated peers' needs.
Exploratory/ Investigatory	❖ These interactions occurred where children attempted to further their understanding about daily practices or resources. They were generally not task related but revolved around preschool toys, rules or everyday life.	❖ High interaction, involved conscious involvement from all parties.	❖ The technology is not relevant to many of these resources; rather the focus remained on understanding practices.	❖ Children generally made a request for knowledge. ❖ Children were aware that the way to obtain knowledge was to ask verbally.	❖ Relatively frequently yet sporadic throughout the preschool year.	❖ Children proactively sought help. ❖ The most often observed exploratory interaction was observing the task for an extended period.

5.3.3 Anti-Social Engagement

Anti-social engagements describe those situations where children were focused on interacting as little as possible with peers and at times actively rejected any interactions. For this study, Anti-social engagements included:

Unsociable Interactions - The child actively discards attempts by peers to interact in any form.

Hostile Interactions - The child is violent and angry either verbally, physically or both.

Possessive Interactions - The child is reluctant to share the resource and makes every effort to be in sole control of the technology.

Empirical examples from observations for all behaviours/actions in this section are presented in Appendix 10.

Unsociable Interactions

Children were quite explicit in their attempts to be unsociable. The approaches were not always confrontational but children were clear about what activities they wanted to complete and in which clusters they wish to become a member. If an invitation to play did not fit with their agenda they were comfortable 'verbally rejecting' this invitation by saying things like "Stop. Go play with someone else" (E12h). Similar comments were also recorded when children were offered help that they did not want or require and they could explicitly refuse to follow it as shown in Vignette 21.

Vignette 21 - Verbally Rejecting Help
Lola starts to shout "press on it, press on it"
Jasper shouts "NO!"

(E30h, Lola and Jasper ages 4.5, Computer)

As times attempts to engage were persistent and if peers continued to offer unwanted help for extended periods, the person controlling the technology ended up being even more explicit by saying something like "Shhh – Don't talk" (E24h) or "I don't need your help" (E32h). This approach often resulted in a debate, with each child thinking they had superior knowledge about completing the task, as shown in Vignette 22 and Vignette 23.

Vignette 22 - Perceived greater knowledge
Chris asks Carole "Do you want me to do it for you?"
Carole replies immediately "No I can do it myself"
Chris and Harvey both continue to shout at the screen "No, no, no. There. There."

(E32h, Carole, Chris and Harvey ages 4, 4 and 4.3, Computer)

Vignette 23 - Highlighting Mistakes
Tracey controls the SMART Board. Chris and Russ sit at the computer and shout instructions to Tracey at the SMART Board. Chris shouts "click yellow" Tracey doesn't listen and Russ shouts "Tracey, you're gonna get it wrong again".

(E49h, Tracey, Chris and Russ ages 4, 4 and 3.1, SMART Board and Computer)

Without a more participatory method, it was not possible to determine why children would allow some peers to provide help and not others. However, during the researcher-led games, children expressed mixed opinions about how practitioners and peers offered help. In almost all cases children indicated that practitioners would sit beside them and show them what to do through explanation. Alternatively, in relation to peer help, some children indicated that peers sit beside them and explain how to complete the task while others stole the technology and took possession of the resource when trying to demonstrate what needed to be done to complete the task. Carole, for example, indicated that when you ask friends for help they took the technology from you but practitioners sat next to you and showed you what to do (Storyboard, CMIG3193 15/05/2011 Hillfoot). It is possible that children made their choices about accepting help based on their perceptions of how their friends will offer help and it could be inferred that rejecting help from peers was, to some extent, linked to fears of losing control/access to the resource.

Although children seemed comfortable in rejecting interactions in this way they were not always so vocal. They also tended to purposefully 'ignore' a direct question to signify that they were not interested in answering it. This was an approached used to both reject interactions and deny access to resources or clusters. It should be noted that ignoring peers was not always purposeful. Instead, at times children appeared as if they were ignoring other children but in actual fact they were not paying attention. In this situation they are not being anti-social but rather just not interacting. Purposefully ignoring behaviour was identifiable over extended periods because as the unsociable interactions continued it was more obvious that they were purposefully being ignored and that it was not that the child had misheard them. For example, in Vignette 24 a group of boys had developed a play theme around construction tools and the toolbox and Glen clearly did not want to interact with Isabelle.

Vignette 24 - Purposefully Ignoring

The boys are thoroughly immersed in the play and Glen appears to be the clear leader in the cluster, directing the other boys in the group about their duties and how the play should evolve. Isabelle tries to talk to Glen but he ignores her at which point Isabelle says, "Glen are you listening to me? You are so annoying" but Glen continues to ignore her and progresses on with the construction game. Isabelle attempts again to make her presence known by repeating, "Glen, are you listening to me?" However, Glen continues to ignore her.

(E36h, Glen and Isabelle ages 4.9 and unknown, Tool Box)

In this episode, Glen purposefully ignored Isabelle, but she repeatedly attempted to get a response from him by asking a direct question which he cannot avoid without consciously ignoring her and appearing dismissive. She expressed her dissatisfaction with his lack of response by stating that he was annoying her, and then repeated the question again in case Glen responded after hearing that he was being annoying. She directed this question at Glen and she made this clear by using his name at the beginning of the question.

However, on other occasions children were often persistent in their stance. If a child wished to interact and another child did not, as was the case with Glen and Isabelle, both children tended to continue in their efforts several times. When persistent attempts failed and children were not acknowledged, or alternatively when children attempted to help continually without relenting and the help was unwanted, children were often seen leaving the play area. Sometimes children left unannounced, but at other times children re-verbalised their dissatisfaction before moving on as Charlotte did in the continuation of Vignette 22 where Charlotte said "I've had enough of this" and leaves.

Possessive Interactions

As demonstrated through researcher-led games, rejecting help was often linked to the child's desire to maintain access to technologies. At times, it appeared that children felt threatened by others offering help for fear that they may try to take control of the resource. I frequently observed children queuing to use a resource, in particular there was always a queue for the computers, and at times children had to use an egg-timer as a mechanism to fairly distribute their time with resources. On some occasions, this process resulted in a dispute because those children waiting in the queue felt that they were being unfairly treated. This was demonstrated in Vignette 25.

Vignette 25 - Whose Turn is it to Use the Computer?

Bruce is standing to the left of Kenny. Dominic starts playing computer 3, which he was previously sitting in front of but was observing Nemo. He quickly reverts back to staring at Nemo. He clicks on the mouse of computer three, which he has placed on the left of the keyboard instead of the right (but is still controlling it with his right hand) and clicks on his own mouse while watching Nemo, clearly thinking he can control Nemo with his own mouse. Bruce gets confused and thinks that Dominic is playing. He shouts, "Hey, Hey, timer isn't up", and looks at me and says "He won't give me a shot" pointing at Dominic who isn't really playing but Bruce thinks he's taken his shot.

(E13s, Bruce and Dominic ages 4.25 and unknown, Computer)

Often these conflicts arose from a misunderstanding, as was the case in the episode above and Bruce had not realised that Dominic was not using the resource. Nevertheless, I did often observe children purposefully manipulating the system to maintain their access to resources. This is discussed further in the Discussion Chapter; however, the important thing to note is that children were often aware when their peers were using the situation to their advantage. They were vocal in their dissatisfaction and they were not afraid to voice their concern to close by cluster members and practitioners.

Most confrontations occurred around children illegitimately ‘taking an object’. Children were quite protective over resources, which they perceived to be theirs at that time, and taking an object without prior authorisation was often met with hostile interactions. Either the toy would be snatched back quickly to indicate that it was not available or the child who believed it to be theirs quickly voiced their dissatisfaction. When confrontations of this kind occurred, children were quite comfortable ‘fighting their corner’ and did not necessarily back down quickly. If a confrontation occurred, they were not always seen submitting to the other child’s wishes. They would each state their case and come to a new arrangement or they would engage in another activity.

When all of the above approaches were unsuccessful children could be seen resorting to ‘covering the technology’, such as the computer keyboard, with their arms so other children could not operate the technology or they cover the screen so that the new children could not see what was happening. This approach was not always necessary and as a result it was observed infrequently.

Hostile Interactions

In a small proportion of episodes (13%), disputes escalated to hostile interactions. In general these were rarely in the form of ‘verbal abuse’ or ‘pushing’. While there were tantrums at times, they were typically isolated to one child and did not lead to a severe confrontation. Instead, they were minor disputes which were swiftly resolved, either by the practitioners stepping in or by children simply leaving the activity and taking the argument no further. In addition I only saw one explicit 'misuse of trust' and the recipient whose trust was being abused was quick to recognise this hostile behaviour towards him. This example is demonstrated in Vignette 26. After Jacob realised Jeremy's intentions were not honourable he did not allow Jeremy to act in that manner again, although Jeremy did try but Jacob refused his advances and kept the till drawer shut.

Vignette 26 - Misuse of Trust

Jeremy appears and takes the money out of the open till and runs away. Jacob looks to Jade and blows a raspberry then returns to counting the remaining money. Jake appears and collects money from the floor then stands close by. Jeremy returns and continues to take money out of the open till so Jacob closes the till. Jeremy [to Jacob]: "I'll give you your money back if you open the till" Jacob sits for a few seconds then opens the till. Jeremy steals the money and runs away.

(E39s, Jeremy, Jade, Jacob & Jake ages unknown, 3.9, & both 3.6, Till)

Summarising Anti-Social Engagements

In essence, the majority of these anti-social engagements were uncharacteristic of the play. The most notable behaviours in this area where rejecting help and taking objects leading to an altercation which were relatively frequent but were born out of the child's perceived fear of losing access to the resource. Another point of note was that boys were more likely than girls to exhibit pushing behaviours (see this discussion in Appendix 11) but this reiterates the perspective available in non-technological studies and is not a new finding (e.g. Ostrov & Keating, 2004).

These findings are summarised in Table 10.

Table 10 - Summary of Anti-Social Interactions

	Description	Interaction	Technology	Approaches/Mechanisms Used by Children	Frequency	Areas of Interest
Unsociable	❖ Explicit indications that children do not want any interaction.	❖ Low interaction. ❖ Children appear to prefer to work alone without input from others.	❖ The technology was often central to the interaction and for example when rejecting help children indicated that they were worried that peers would attempt to take control of the technology.	❖ Typically verbal and direct expressions of dissatisfaction.	❖ Mixed frequency and contingent on other factors in the preschool.	❖ Ignoring interactions could be both unsocial or simply a lack of attention.
Hostile	❖ Physical and verbal altercations which appear aggressive.	❖ Low interaction. ❖ Short-lived aggressive interactions which are usually quickly resolved.	❖ The hostile interactions often appeared unrelated to the cluster or the technology but rather are spontaneous interactions which seemed uncharacteristic of the play.	❖ Short and direct forms of abuse ❖ Misuse of trust was the only behaviour which evolved over time.	❖ Very infrequent and typically short lived.	❖ Children were able to trick their peers to suit their own needs but those being tricked were quick to recognise the mistrust and did not allow it to be repeated. ❖ Boys were more likely than girls to push children
Possessive	❖ Explicit attempts to maintain access and control of the technology.	❖ Low interaction. ❖ Interactions are usually sudden reflexes to children's attempts to take the technology. Thus they are usually short sharp forms of interactions which are just enough to demonstrate their discomfort with attempt to take control of the technology.	❖ Children were particularly territorial about resources and were keen to maintain access to resources as much as possible. Thus, technology was the central focus.	❖ Children challenge their peers if they feel they are being treated unjustly and the technology is being taken away from them prematurely.	❖ Commonplace, particularly in the beginning of the preschool year.	❖ Conflicts often resulted from a misunderstanding that peers were attempting to take their technology from them.

5.3.1 Contingent Behaviours and Interactions

The behaviours and interactions which have been presented thus far give a particularly linear illustration of the findings. The grouping of interactions as *pro-social*, *anti-social* and *task-driven* makes them appear structured and 'tidy', however this categorising should be interpreted as mechanism of describing, in a transparent way, the interactions observed rather than an overview of how interactions occurred. In reality, children's interactions were particularly complex and throughout the longevity of an episode, interactions were not confined to one category of engagement or interaction; they often spanned multiple categories and at times they even appeared contradictory in nature.

Although the diagram presented in Figure 20 demonstrated only three overarching themes of engagement (pro-social, anti-social and task-driven), within these three themes children exhibited 27 different behaviours. The volume of behaviours exhibited by children made it particularly difficult to identify patterns of interactions or to predict how behaviours would be reciprocated. Take, for example, requesting help. This interaction was reciprocated in each of the ways listed in Figure 21 one or more times throughout the data collection period.

This diagram demonstrated that, from only one initial behaviour, there was already a multiplicity of possible outcomes. Presenting this analysis for all other 26 behaviours becomes unmanageable to map in this kind of diagram, but this is helpful to highlight that children's interactions were unpredictable and no discernible pattern could be identified.

Figure 21 - Multiple Reciprocal Behaviours

Another particularly useful example for describing the complexity, and often contradictory nature, of children's behaviours and interactions is to demonstrate where behaviours and interactions have had varied consequences. This was quite clear for 'ignoring' which could take on two forms.

- Lack of attention – children who were already a member of a cluster did not respond to attempts by another child to join the cluster, but at the same time, they did not purposefully attempt to deny access to the new member.

- Purposefully ignoring – children were specifically attempting to inhibit interactions, involvement or engagement with other children. For example, children would explicitly ignore questions, which were clearly directed at them.

Acknowledging another's behaviours was generally a positive indication that children were welcome to join the cluster, but when children ignored interactions, this could be both a positive or negative indicator that the play and engagement could continue. While 'ignoring' could be interpreted as a negative interaction, in fact children ignored others through a lack of attention which was actually a neutral interaction because they were not attempting to stop outsiders from joining the cluster. Instead, they appeared not to care whether other children joined the play. If established members of a cluster did not actively acknowledge children's attempts to become involved or engaged and instead outsiders were passively allowed to join the cluster, no reciprocal behaviours would be observed. The new children were allowed to play alongside other members but not engage with other children. This is later referred to as parallel play (see Social Play and Participation in Clusters on p167). Alternatively, if children did purposefully ignore people attempting to join play they were signalling to the child trying to join the play that they were not welcome.

Thus, interactions and behaviours were highly contingent upon the children involved, the context within which they occurred (discussed at length in the next chapter) as well as how the behaviours are reciprocated by other children involved, supporting the suggestion that child-child interactions are characterised as 'reciprocal' (Turner, 1991).

Section 5.4 Social Play and Participation in Clusters

Thus far, behaviours have been described from an individualistic perspective where children exhibit behaviours that may be reciprocated. By drawing upon a well-established model of social participation, it was possible to describe the clusters more holistically. When exploring clusters overall, it was also possible to demonstrate a pattern in children's social play.

Often combinations of social participation were observed within an individual observation episode. For example, children may first play associatively but later in the observation episode children become cooperative. Furthermore, sub-clusters may form within recorded observation episodes, with some children playing cooperatively together while other members play in parallel to each other.

Table 11 - Parten's Categories in this Study

	% of episodes where the category of participation was observed at some point	Sustainability
solitary	51%	Fleeting
Parallel	22%	Sustained
Associative	22%	Sustained
cooperative	40%	Contingent

In general, all four categories were observed throughout the data collection period with varying frequency. The key pattern that emerged was in relation to how often the social participation occurred and the longevity of participation. Solitary play occurred frequently but only lasted for short periods, while parallel and associative play were observed less frequently but when it was observed it typically lasted for a more sustained period. Cooperative play occurred some of the time but this was most often contingent on external factors, for example the receptiveness of other group members. Table 11 provides an overview of Parten's categories of social participation as used in this study. Each of these forms of social participation will now be described in greater depth in relation to the data for this study.

5.4.1 Solitary Participation

In the same sense that children could unintentionally ignore and purposefully ignore their peers as an observable behaviour there was also two forms of solitary play identified in the data:

1. Traditional solitary play - children working alone with no other children around them in the activity;
2. Purposefully excluding solitary play - Children being outwardly solitary despite other children being in close proximity and attempting to converse or interact.

While the first form of solitary play cannot fully be described as a ‘cluster’ because children were on their own, it is important to highlight the nature of solitary participation because the occurrences and length of this kind of play varied considerably compared to purposefully excluding solitary play. Traditional solitary play was observed across all categories of technologies. Children rarely sustained this kind of social participation and the instances of pure solitary play were fleeting, typically lasting less than 5 minutes and in the majority of cases under 1 minute. In fact, many instances were observed during periods of transition where children have left the cluster and no one else had joined the cluster.

However, purposefully excluding solitary play was exhibited by some children when controlling the technology, despite other children standing close by in the cluster. The child controlling the technology appeared to be engrossed in using the resource and either did not recognise that other children were attempting to interact, or they actively chose to ignore other children. This could not be described as parallel play because those children in the cluster were not using their own resources simultaneously. Instead, the child controlling the technology did so in a solitary manner as if they were alone and the other children often fell silent because their comments were not well received.

The other difference between traditional solitary play and purposefully excluding solitary play was the level of verbal commenting in the cluster. With purposefully excluding solitary play children within the cluster tended not to comment and were often silent throughout the activity, but during traditional solitary play (where no other children were in close proximity), children were more often see talking to themselves about the task. See, for example, Vignette 27 and Vignette 28 below of Steven engaging in pure solitary play compared to Erin engaging in purposefully excluding solitary play while others were around.

Vignette 27 - Self talk in Traditional solitary Play
Steven has built an aeroplane out of Duplo Techs and is now sitting alone looking at his creation. "I've got an aeroplane" he says while holding the construction in the air. He then starts to pretend to fly the plane and says "stop this is the police" but there are no other children around and he is not directing his comment to anyone passing by. He then continues to play on his own by landing the plane in a house and starts removing people from the plane.

(E11h, Steven age 3.25, Duplo Techs)

Vignette 28 - Silence in Purposefully Excluding solitary Play
Erin is using the computer alone with no one else around. She is deciding what game to play and she says out loud "eh, I know, that!" then selects a game on the screen. Hugo appears and attempts to speak to Erin but she quickly falls silent and does not respond to his questions. As Erin continues to use the computer silently Grace arrives and asks "How did you get that? to which Erin does not reply. Grace asks again "How did you get Dora Explorer?" but again his question is not acknowledged and Erin remains completely silent... After some time a practitioner arrives and asks Erin if she is getting on OK but Erin only nods while remaining fixed on the screen so the practitioner leaves again and Erin continues to focus on the screen while Grace fidgets close by. Grace asks again "you on CBeebies?" and this time Erin replies "No, Nickjunior" before falling silent once more as she continues to play the game...

(E38h, Erin age 4.25, Computer)

Purposefully Excluding solitary Play also lasted longer than traditional solitary play. The example of Erin presented above illustrates this point. This episode lasted 95 minutes in total and Erin controlled and played the game independently for approximately three quarters of this time, and she only stopped to tell other children to stop attempting to use the technology or to tell them that she was not interested in their help or suggestions. This compares to the traditional solitary play which typically lasted less than five minutes. They did not for example engage in solitary play around one particular resource for my whole visit instead they used a range of resources for short periods on their own.

5.4.2 Parallel and Associative Participation

Parallel play and associative play are discussed together because they are closely linked. Parallel play was typically separated by short spells of interactions (associative play), such as asking for a screwdriver to be passed over to them, thus children typically moved in and out of parallel and associative play several times within an episode. As a result, both parallel play and associative play was observed at some point in 22% of episodes and while using the majority of technologies (the only exception was *adult resources*, which were never observed being used in a parallel manner).

During parallel play, there were few interactions between members and all children typically played independently. Often children sat with their backs to each other or they play with their heads down looking at the technology but during associative play lively conversations were often observed with children passing objects between each other. During this time children were not only seen engaging in extended conversations but also seen commenting on the play. These episodes did not become cooperative because the discussions did not focus on goal-orientated tasks.

5.4.3 Cooperative Participation

Cooperative play was observed in 40% of episodes and across all technological activities. Of particular focus were cognitive activities and the use of adult resources because these two categories demonstrated greater instances of cooperative play than solitary play. Among the kinds of social participation described thus far, cooperative participation appeared the most ad hoc. It could not be attributed to specific technologies, times of day or clusters of children. Instead, it appeared contingent upon the combination of all these factors as well as children's own personal motives, preferences and mood at that particular time in an episode. Vignette 29 below demonstrates a typical interaction process for multiple children in an activity. Children go through periods of interacting and offering advice before stepping back and allowing other children to become involved. Here we see Harvey offering suggestions at the beginning before observing other children's suggestions and involvement later in the episode. This does not mean that Harvey has become disinterested or inactive; instead, he steps back and allows other people to take part in the activity before offering further suggestions later on.

Vignette 29 - Cooperative Play
Harvey jumps in "7, it's 7"
Tracey giggles and shouts "that's cool"
Harvey gets excited and smiles and laughs.
Russ leaves.
Jasper stares at the screen. Tracey counts "1, 2, 3 ears" and looks at Jasper and smiles.
Jasper remains silent. Jasper observes silently standing behind.
Jasper points at the screen and says "10 eyes"
Tracey clicks what he suggests and laughs.
Harvey sits back down and Alistair observes.
Tracey says [to Jasper] "tell me when to stop"
Jasper waits a minute and then says "STOP, STOP, STOP"

(E37h, Harvey age 4.3, Computer)

5.4.4 Summarising Social Participation

In essence, individual children did not consistently demonstrate specific forms of social participation; instead, each child exhibited a huge variation in participation. Furthermore, within episodes the levels of social participation varied and very often multiple kinds of participation were documented within a single observation episode. Parten's research used predominantly time-series data, whereby she documented participation over a series of snapshot intervals, but when applying her categories to extended observations it was possible see just how multifaceted and changeable children's participations were.

The forms of social participation varied considerably, not just across technologies but also within technologies and for specific children. For example, on some occasions a specific child was very cooperative while on other occasions the same child using similar technology engaged in solitary play and rejected interactions. In the two examples below, Glen was sociable in the first yet rejects interactions in the second.

Vignette 30 - Social Play with small world construction figures, Duplo Techs, Lego and Power Tools.
Calvin brings toy fish to Glen "here are some fishes"
Glen: "Oh yeah, bring them to me". Malcolm sees fish "fishes? Oh yeah lets go and put them in the flower shop" Malcolm goes away to pick up a piece of the road. Glen instructs Calvin about the new play theme "pretend you're the giver truck and you give me things – you can be this guy" [handing Calvin a toy man]

(E26h, Glen, Calvin and Malcolm age 4.9, 4 and 3.25, Duplo Techs and Tool Kit)

Vignette 31 - Rejecting Play with small construction figures and Duplo Techs.
Chris then appears again and sits next to Glen holding the plane that Harvey left with. He says to Glen "Glen, look. Neaw" Holding the plane [Duplo and Lego construction] in front of Glens face pretending to fly it and making flying noises. Glen ignores him and continues playing alone.

(E17h, Glen, Chris and Harvey age 4.9, 4 and 4.3, Duplo Techs)

Thus, evidence did not indicate that typical participation patterns could be identified beyond the understanding that some parallel and associative play was generally sustained for longer periods of time, traditional solitary play was particularly fleeting and cooperative play was contingent upon many external factors. Table 12 below provides a general overview of the kinds of social participation observed for this study and summarises the key differences.

Section 5.5 Summarising Social Interaction and Participation in Clusters

For this study, exploring children's interactions was broken down into two parts:

- identifying *whether* children interact around technologies (in light of assertions that technology could be socially detrimental);
- describing *how* children interact.

The identification of interactions in observation episodes and mapping snapshots showed that children do interact when using technology because, as I demonstrated throughout this chapter (and as I will build on throughout the next chapter), I most often observed children engaging with peers rather than working alone. The exploration of behaviours that took place in clusters provided the understanding of *how* children interact. It should be noted that the research questions were concerned with observable interactions and behaviour in line with the aim of this exploratory study. Thus, discussions of learning outcomes or conditions for learning, e.g. Sustained Shared Thinking (Sylva *et al*., 2004) or the Zone of Proximal Development (Vygotsky, 1978) are not discussed here but would be provide a useful focus for future analysis.

Table 12 - Summary of Social Participation

	Description	Interaction	Technology	Appropriate Conditions
solitary	• Children work independently with technologies, typically alone but sometimes while other cluster members were present but these cluster members do not have access to their own technology to result in parallel play.	• No or little interaction except to tell other members of the cluster to be quiet or to regulate turn-taking.	• The technology was the child's central focus and there was little interest in other children.	• Children must have access to their own piece of technology.
Parallel	• Children work independently on their own projects using their own piece of technology simultaneously as part of a cluster.	• Little interaction. • Children were typically silent with little eye contact and they display an independent body language.	• The technology was the child's central focus and there was little interest in other children.	• Children must have access to their own piece of technology but there may be multiple parts to the technology so other children can use the technology independently.
Associative	• Children work independently on their own projects using their own piece of technology simultaneously as part of a cluster but they may also offer suggestions on play themes which each member may or may not choose to adopt.	• Medium to high interaction. • Children were typically involved in the cluster with lively conversation and sharing of objects but the use of technology was decided upon independently.	• The technology was the child's central focus but they still recognise the presence of other children in the cluster.	• Children must have access to their own piece of technology but there must be multiple parts to the technology so other children can form a cluster and use the technology independently. • The presence of some common technologies which can be used alongside the independent project may aid interaction through passing objects.
cooperative	• Children work in collaboration with other children towards a shared goal. The goal may be co-constructed by all members or it may be developed by a leader, who then describes the aim of the task to the other cluster members.	• High Interaction. • Children were largely involved in the activity by offering advice and support. • They usually take part in lively conversations and the body language was engaged with most children exchanging glances and all children facing towards each other or other cluster members.	• Task completion around a specific technology was child's central focus. • Physical access to the technology was not necessary. • Children were aware of the presence of other children in the cluster.	• Children may have their own piece of technology or instead they can share one technology and use it collectively. • There must be a focus on allowing multiple children to engage with the one technology – restrictive rules which limit the number of children involved may hinder involvement.

In relation to observable interactions, typically children attempted to establish interactions and their experiences were predominantly pro-social. They frequently exhibited helping behaviours and scaffolded their peer's learning with technology. Children rarely exhibited anti-social interactions and when negative interactions were observed they usually revolved around children's desire to establish or maintain access to the technological resources. The limited availability of resources fostered interactions as children were forced to establish clusters, share the resource and help their peers, as well as encouraging negative interactions as some children fought to gain access to the resource.

This chapter described 27 different types of behaviours and their corresponding interactions, which children exhibited throughout the observations. As a result, I have described how these interactions occurred during children's experiences in clusters. Similarly, the chapter has touched upon the complexity of these interactions and behaviours and has demonstrated that multiple behaviours and interactions were observed within one episode as the clusters evolved and changed. Importantly for answering research question 1, I have demonstrated that children do frequently interact around technologies and that these interactions were mostly positive, with anti-social interactions seldom being observed.

This chapter has also demonstrated that clusters tended to be either: solitary; parallel; associative; cooperative. Observations of participation in clusters were also multifaceted and I often observed multiple forms of participation with observation episodes and on mapping snapshots. Solitary play was particularly fleeting and cooperative play was contingent upon many of the contextual factors and parallel and associative play was sustained for extended periods.

These interactions were complex and multifaceted and few discernible trends could be identified without addressing the components of context, which may influence interactions.

Thus, this chapter has provided an overview of the types of interactions which children exhibited during observation but little has been documented about what potential influences have contributed to the construction of these interactions. Yet, data from this study demonstrated that interactions varied according to many other mediating factors, such as social relationships and playroom characteristics and the roles and positions of children as well their personal drive towards gaining access. These components of context will now be fully described in the next chapter.

CHAPTER 6
The Preschool Context: Implications for Clusters and Interactions

Section 6.1 Introducing the Preschool Context

Throughout this project, it always made sense to me to divide the study into two sections: firstly an exploration of interactions and behaviours (addressing research question one) and secondly establishing an understanding of the components of context, which may contribute to those interactions (addressing research questions two and three). The results part of the thesis maintains this approach. Having already presented, in the previous chapter, an overview of the interactions and behaviours that were evident in the data, the current chapter turns to the preschool context and introduces the components of context which contributed to those interactions previously discussed.

The analysis of the data applicable to this chapter was largely influenced by the theoretical frame for this study (described in Section 3.1) and the range of literature about context (described in Chapter 2). These perspectives allowed me to identify three key components of context on which to focus:

- the children involved in the interactions, including the clusters within which children generally completed activities;
- the artefacts (i.e. the technologies) in preschool;
- other physical and cultural components of preschool.

It should be noted that these components of the preschool are presented in this chapter as *potential* influences on social interactions rather than direct effects of context. They are context specific and not necessarily generalisable to every preschool. Furthermore, this is not an exhaustive list but instead is an overview of the components which, informed by previous literature and theory, appeared influential for this study.

Section 6.2 Technologies

Throughout this study I observed children interacting around 25 different technologies (listed in Categorising Technologies by Activity Type on page 116). These resources were central to this study, particularly to research question 3, which called for an exploration of how the properties of the technological resources influenced children's interactions. In order to address this question, the following section demonstrates that technological artefacts did have a role to play in shaping social behaviours and interactions. However, crucially to the conclusions drawn from this study, this section does not demonstrate that technologies in isolation influence interactions; rather that technologies influence interactions as part of a complex matrix of contextual factors.

6.2.1 Physical Properties, Social Participation and Interaction

For this study, technologies offered varied opportunities for engagement between children and it was evident in the data that some physical properties of the technology contributed to the ways children interacted[2]. These physical properties include:

- the size of the screen and touch screen functionality (for screen-based media);
- technology type and user interface;
- the number of controls which could be used simultaneously;
- portability of resources.

[2] Data from this study also provided interesting findings about children's frequency of technology use and how the availability of resources, portability of resources, adaptability of resources and children's preferences contributed to children's technology use. However, these findings do not directly relate to children's interactions and as such further information on these issues can be found in Appendix 12.

Screen Size and Cooperative Participation and Task-Driven Engagement

For screen-based resources (including computer, laptop, SMART board, calculator and cash register), the size of the screen contributed to children's social interactions because technologies with large screens provided the required conditions for task-driven interactions. The touch screen provided a further advantage of allowing children to work together during an activity. Take for example Vignette 32 where, because of the touch screen and the ample screen area, children were able to control various aspects of the resource simultaneously.

Vignette 32 - Joint Owner with SMART board.

Glen instructs Jasper as Jasper controls the SMART board. They both try to do it at the same time. Jasper jokes and says "Oh Glen look at what you've done to the bathroom" [the bathroom picture is covered in pink slime] and they don't seem to complain or mind that they are both pressing the screen. Glen cheers. Jasper says "I'll do smalls, you do big" and they continue to play the game with Jasper controlling the bottom of the screen and Glen controlling the top. Glen is taller. Their individual moves cancel out the other's moves but they don't seem to notice or mind.

(E53h, Glen and Jasper ages 4.9 and 4.5, SMART Board)

Figure 22 - Challenge of small screen

In comparison to the SMART board, the digital camera and the laptop[3] had relatively small screens which were for viewing only and children had to be extremely close to the resource to be able to observe what was happening. Figure 22 demonstrates how only one

[3] These laptops were children's play laptops, which were powered and allowed children to play electronic games. These play laptops had a very small screen which only measured about 5cm and the screen was a dark grey with black writing. The screen was therefore very difficult to see even for the person controlling the technology and also for other people who were not sitting immediately in front of the laptop

person can see the screen at a time as Shalini had to purposefully direct the screen to a practitioner for feedback, at which point she obstructs her own view.

Cooperative play around these resources was more challenging because even though many children were able to stand around the resources, as more children arrived the more their view of the screen was restricted. In order to become involved in these activities children must be able to see the screen because this was the central focus of the task and by restricting the review with a small screen, the technology had limited opportunities for cooperative play and task-driven interactions. As a result, during these kinds of activities, the interactions often turned to 'making their presence known', highlighting that they could not see the screen, or remaining a silent member of the cluster.

Technology Type, User Interface and Helping Interactions

Data from this study indicated that task-driven engagements and, in particular, helping interactions were closely linked to categories of technological activities. In general, helping behaviours were observed most often in episodes which involved the computer, followed by the SMART board, then the digital camera, CD player, and the laptop. Thus, for the most part helping interactions were more likely to occur around activities involving cognitive or adult world resources rather than any other activities (such as construction, pretend play, musical activities). The problem solving nature of the activities encouraged children to collaborate and seek help (Muller & Perlmutter, 1985). From this it could be inferred that some resources may trigger the need for help, including:

- resources which were not designed for child use (such as the digital camera or the CD player);
- activities which had the possibility of being outwith the child's Zone of Proximal Development (such as some cognitive computer games);

- activities which had a specified end point to the task (the SMART board, computer or laptop games).

In addition, the receptiveness of children to receive help varied according to technology. For example, there were more instances of children rejecting help around the SMART board than requesting help. While at the computer, there were more requests than rejections of help. Examples are these instances are presented below:

Vignette 33- Rejecting Help at Smartboard
Tracey controls the SMART board. Chris and Russ sit at the computer and shout instructions to Tracey at the SMART board. Chris shouts "click yellow", Tracey doesn't listen and Robbie shouts "Tracey, you're gonna get it wrong again".

(E49h, Tracey, Chris and Russ ages 4, 4 and 3.1, SMART Board)

Vignette 34 - Requesting help around the computer
Erin says "what am I supposed to do now?" and looks to Grace and Tracey. Neither girls respond.
She repeats "What I supposed to do now?"
Tracey begins to point at the screen to demonstrate what to do.

(E39h, Erin, Grace and Tracey ages 4.25, 4.1 and 4, Computer)

Based on my experience in the classroom and my knowledge of the data, it could be inferred that the user interface for these resources could influence the need for helping interactions. For example, the computer is primarily an adult resource and the desktop was overrun with small icons which require skilful manoeuvring of the mouse to use it. This requires a connection between the mouse and the curser on the screen and previous research suggests that children have difficulty with these tasks, not because of the size of the mouse but because of the unstable nature of the curser (Crook, 1992). This was evident in some episodes in this study as children struggled with the mouse as shown below. As such, children may have felt that these tasks are more challenging and required physical help to operate the resource.

Vignette 35 - Difficulty controlling technology

Domini clicks on the mouse of computer three, which he has placed on the left of the keyboard instead of the right (but is still controlling with his right hand) and clicks on his own mouse while watching Nemo, clearly thinking he can control Nemo with his own mouse. He does not realise that his mouse is not connected to the other computer and seems to think that he can move the mouse to any computer and control it.

(E19s, Dominic age unknown, Computer)

However, the SMART board had a user interface which not only used larger icons but also did not require the use of a mouse to make selections; instead, children could click on the appropriate icon with their hand or a pen which is considerably easier for children of this age, negating the need for as much help. However, this finding contrasts with the work of Morgan (2010) who suggested that young children did have difficulty using interactive whiteboards and as a result it could be argued that you would expect in these circumstances that additional help would be required. She cited the height of the board and children being unpractised with the resource as the reason for the difficulty which may account for the differences in data. In Hillfoot Nursery Class, the SMART boards were mounted low down the wall alleviating height difficulties and it was often the same children who frequently used the resource and as such, they were familiar with the techniques required to move objects around the screen with the pen or their hand.

This may indicate why the kinds of helping behaviours differed according to the technological resources involved. For example observations around the SMART board showed evidence of children 'verbally explaining' what to do but no evidence of children 'physically demonstrating', potentially because of the easier user interface on the SMART board. Alternatively, children were seen offering physical help at the computer (as was the case in Vignette 17 on page 153), illustrating children's need for help when controlling the mouse.

Multiple Controls, Parallel Participation and Sharing and Possessive Interactions

The number of controls which were inherent in the design of technologies was considered significant to the way the technology was used and by whom. The design of the technology determined how many children may physically control the resource which was linked to varied forms of social participation as well increased occurrences of sharing or possessive interactions. The computer, for example, could only be controlled by the keyboard or mouse mutually exclusively and so only one child could control the technology at a time, otherwise there would be a conflict in the commands being given to the computer. In conjunction, in the majority of cases I observed only one child physically controlling the computer as these properties induced the need for a queuing system and children understood that they had to 'wait their turn'. This provided a platform for children to exhibit sharing interactions or possessive interactions. Take for example Vignette 36 below where the digital camera can only be used one child but neither child wants to relinquish access to the technology resulting in possessive interactions.

Vignette 36 - Single Controls and Possessive Interactions

Shalini approaches me and asks "Excuse me, I have photo?" and holds out her hand. I have a digital camera hanging off my wrist and I hand it to her. Kamya is standing close by and Shalini says "Kamya photo" Kamya poses for a photo and I explain to Shalini to press the green button to see the photo. She shows Kamya the photo and they both smile. Kamya then takes the photo from Shalini's hands without any protest and Shalini immediately poses for a photo. Kamya takes a photo of Shalini and as Shalini approaches to see the photo Shalini starts to walk through to the other room to take more photos. Kamya follows her and continually asks for the camera but Shalini keeps walking. Kamya follows shouting, "you're not my friend, I hate you".

(E62s, Shalini and Kamya ages 4.5 and 4.4, Digital Camera)

There were some technologies, however, which could be used by multiple children. These were typically resources with multiple functions or parts, which allowed several children to control their own section without affecting other children's play. One such resource was Duplo Techs - construction resources that can be used to build a vehicle which can then be driven using a remote control. They were similar to normal Duplo but they were battery powered so that children can build a remote controlled vehicle. The selection of materials in shown in Figure 23.

Figure 23 - Duplo Techs - Multiple Parts

As shown in the diagram, Duplo Techs had four screwdrivers and a variety of building parts, potentially allowing four children to build their own vehicle simultaneously. Indeed, children cited this as a reason for stating that four people could use Duplo Techs in researcher-led games. In terms of social interactions, the ability to use the multiple parts of technology simultaneously meant that children had no urgent need to negotiate access or share the resources and as such it was often the case that children engaged in parallel play. Although children were likely to engage in sharing interactions and pass objects between each other, there often appeared to be fewer task-driven interactions around these resources as each child played independently. This was also possible when children used two different technologies together but social participation still tended to be parallel as shown in Vignette 37.

Vignette 37 - parallel play

Two girls and a boy were all working independently on their own technologies (laptops and CD players) pressing buttons and Libby kept opening and closing the lid of her laptop. After some time playing in this manner, the girls decided to leave and go to another location. John took his laptop to the same table and sat with the girls. They reverted back to independently using their own technologies. They continued to move around the room to new locations following each other working independently in parallel play with different technologies.

(E43s Kelly and John age 4 and 4.5, Tape Recorder and Laptop)

Portability, Sharing Interactions and Possessive Interactions

The portability of the technology was significant to children's social participation, as well as the interactions during these activities. Although most technologies had a general 'home' (i.e. they had a predefined location in the preschool) practitioners were more than happy for children to move technologies around the playroom in accordance with their play. As a result, portable technologies could be:

- moved to a position where their peers were, as a means of inviting others to play;
- taken out of reach of children attempting to join the cluster;

However, portability of resources had both benefits and drawbacks. The ability to move resources provided greater opportunities for children to invite their peers to play a game and simultaneously show them what the game was. Children were more likely to accept invitations if they could see the resource involved than accept an invitation from a peer that had no resource to offer (this is described in greater depth in Section 6.3.2). While the ability to shelter the resource from others gives children a mechanism to exhibit possessive interactions and engage anti-socially as shown in Vignette 38.

Vignette 38 - Portability and anti-social engagement
Kelly and Libby each have a laptop and John is attempting to join in with the activity and use one of the laptops. As he reaches for Kelly's laptop she reminds him that the laptop is hers and they do not have a 'boys' one. The girls leave the play area and take their laptops to another table away from John.

(E43s Kelly and John age 4 and 4.5, Laptop)

6.2.2 New Technological Positions Foster Negotiation and Collaboration

The last section demonstrated that the physical properties of the technologies provided various opportunities for interactions. However, central to this study was the finding that the properties of technologies alone did not determine interactions. Rather, it was evident in the data that children's social participation and interactions were influenced by the way children utilised the properties of the technology. To some extent, this was associated with how children positioned themselves in relation to the resource and also how children mediated their peers' positions.

Technological positions were conceptualised by Ljung-Djarf (2008) who indicated that when children form spontaneous groups around the computer the children were described in terms of:

- owner (the child controlling the technology);
- participant (a child who was not controlling the technology but offers suggestions about how to complete the task);
- spectator (an observer of the task).

Data from the current study supported and reiterated Ljung-Djarf's findings, however, because the current study moved beyond explorations of the computer and addressed technologies with varied properties (described in Section 6.2.1), I observed some additional positions which were unique to my data as shown below.

Parallel owner	-	Multiple children controlling their own independent part of a technological resource, or similar technology, as part of a cluster
Mutual owner	-	multiple children using a single resource simultaneously

I will not describe Ljung-Djarf's positions in great depth as summaries of these positions can be found in the section *Ljung-Djarf's Technological Positions* on page 33 and information about how Ljung-Djarf's positions were observed in this study is provided in Appendix 13. Instead, I will describe the positions which are new to this study and demonstrate how these new positions provide a greater insight into how children engage with a range of technologies. Furthermore, I will illustrate that children mediate their peers' positions by drawing on the interactions and behaviours addressed in the previous chapter.

The positions of parallel owner and mutual owner are distinguished by the way that the technologies can be used and related to the properties of the technologies. Parallel owners were evident around technologies like Duplo Techs which provided opportunities for multiple children to control the technology, while mutual owners emerged around resources like the SMART board which offered opportunities for children to use the technology together. Based on the findings that have already been presented regarding the physical properties of the technologies (see Section 6.2.1), the position of parallel owner was linked to increased opportunities for parallel play or anti-social engagement, while, the position of mutual owner was linked to increased opportunities for cooperative play and sociable or task- driven engagement.

The important thing to note here is the reference to *opportunities.* Although the technologies created the conditions for these positions, the likelihood of them developing as well as the expected interactions and forms of participation occurring around these resources, rested in the children's decision-making and mediation of peers. For example, in relation to mutual owners, in order for behaviours to be reciprocated sociably and for children to show pro-social or task-driven engagement, both children must recognise the value of being able to control the technology simultaneously for a common goal; a concept described by Rogoff as *intersubjectivity* (Rogoff, 1990). When both children understand and have a desire to work together they were skilfully able to make a task which can be difficult to complete alone, easier by completing it together. Take for example Vignette 39 where two boys complete a game by one of them driving the space ship from the computer and the other operates the special powers on the SMART board.

Vignette 39 - Mutual Control for a Common Goal

Chris is now driving the space ship (from the computer) and Frank is waiting for the bars at the bottom of the screen to fill up. When the bars are full he presses the icon which makes the ship have a special power. He keeps pressing it all the time and Russ explains that he has to wait until the icon is full. They watch as the icon increases then Russ says "press it". Frank presses it and they both cheer. Chris shouts "Frank I'm controlling the blue [space ship] for you" Frank says "OK" and continues to watch the bars fill up and then presses it.

(E49h Chris, Frank and Russ ages 4, 3 and 3.1, Computer and SMART Board)

These interactions were observed around a limited number of resources and in particular around the SMART board far more than any other technology. These interactions were observed more frequently towards the end of the data collection period but even then, interactions were observed far less than the instances where one child used the resource with peers offering advice and support as a participant rather than a joint owner. It was evident that in order for children to maintain mutual control for a common goal, they had to have clear inter-subjectivity and recognise that they were working together rather than simply attempting to gain control of the resource.

However, when children did not recognise the benefit of using the technology in this way, or they were concerned with maintaining sole control of the resource, interactions became possessive and often hostile as shown in Vignette 40.

Vignette 40 - Possessive Interactions Hinder Mutual Owners

Alistair is controlling the SMART board but Jasper is also controlling from the computer. Alistair complains again and Jasper says "I'm trying to help you" and Alistair says "I'm trying to do something". Jasper continues to press something and Alistair says "Jasper leave it" Jasper replies "I'm trying to help". Alistair watches for a few seconds as Jasper controls at the computer. Alistair tries to use the Smartboard but Jasper says "Alistair stop pressing it" They both continue to control at the same time and both say
"Jasper!"
"Alistair you're doing it! Stop it"
"Jasper Stop"

(E52h, Alistair and Jasper, ages 4.6 and 4.5, SMART Board and Computer)

Hence, despite the technologies creating the conditions for cooperative play (i.e. the technology could be physically controlled by both children simultaneously and provided an opportunity for both children see the screen without any restricted view), this opportunity was not always exercised. Sometimes mutual owners appeared oblivious to their play partner simultaneously controlling the technology and without this understanding the participation became parallel. Thus, it could be inferred that it was the children's understanding of the game and the context which was more influential than the properties of the resources alone.

In addition, while it could be seen that some technologies offer opportunities for parallel owners to emerge which you may expect to result in parallel play or possessive interactions, there were occasions where parallel owners exhibited pro-social and task driven engagement around these resources. Take for example Vignette 41 where two boys build their own individual vehicle using Duplo Techs but they then use their respective constructions to create a play theme and to act out a pretend play situation. This situation developed because parallel owners proactively initiated pro-social and task-driven engagements.

Vignette 41 - Pro-social Interaction between Parallel Owners

Three boys are playing with Duplo. They are all building something. Campbell uses the screwdriver and immediately as he is finished with the screwdriver Glen takes it. They all build silently. Glen leaves. Parallel play continues and there is no eye contact between Campbell and Chris. Campbell glances over at what Chris is doing then continues with his own work. Chris says to Campbell "look at my cool thingy" "What is it?" Chris: "Aeroplane". Glen returns and approaches and Chris holds up his aeroplane in front of him and says to Campbell "Look". Glen says "Cool"

(E1h Campbell, Chris and Glen ages 4, 4 and 4.9, Duplo Techs)

As a result, the development of these positions and whether the activity resulted in task-driven or pro-social engagement rather than anti-social engagement was highly dependent upon how initial behaviours are reciprocated and does not rest solely with the properties of the technology and the opportunities they create for technological positions. In addition, while the position of parallel owner was frequently observed around the technologies which create the optimal conditions for them, the position of mutual owner was less often observed (18% of episodes). As children are generally interested in gaining access to the resource (described in greater depth in Section 6.4.2), combined with the fact they were often unaware that the resource can be controlled simultaneously, the children themselves most often construct the positions of owner, parallel owner, participant and spectator and were less likely to position themselves as a mutual owners.

6.2.3 Summarising Technologies

This section has highlighted the importance of exploring technologies as differentiated kinds of resources rather than as an overarching category of children's toy because different technologies offer different opportunities for play, cluster size and membership development. As the computer can only be controlled mutually exclusively by the mouse or keyboard it does not offer the same opportunities for parallel owners or mutual owners. Thus, in these cases, the properties of the technology to some extent do indeed influence how children interact around the technology.

Furthermore, this section has provided a fundamental finding for this study and provides original knowledge to inform the technology debate. In particular this section has demonstrated that, although the properties of the technologies have some bearing on children's interactions, providing varied opportunities for cooperative play or varied forms of engagement, these are only opportunities. How these opportunities are realised through children's own agency in the way they reciprocate behaviours, is central. The remainder of this chapter demonstrates those other aspects of the preschool that, along with technological artefacts, contributed to children's social interactions.

Section 6.3 Clusters

Throughout the data it was clear that clusters provided the foundation for children to interact. They were the most consistent aspect of children's interactions in preschool and more than that, they were a key fixture of the preschool environment. When looking around the playroom, particularly from the bird's eye view provided by the mapping snapshots (see Appendix 5) the environment was always scattered with several different clusters. As a result, clusters became the central medium for exploring children's interactions. Yet, while clusters were commonplace in the playroom, their construction and development was not consistent or static. Instead, clusters varied greatly in terms of size, membership and the overall kind of interactions observed and in order to understand interactions fully, I must start by describing the clusters that children developed.

6.3.1 Continually Evolving and Changing Clusters

Children most often completed activities in clusters of two or more children (56% in mapping snapshots and 84% observation episodes) rather than on their own, reiterating previous literature by Wang and Ching (2003), Muller and Perlmutter (1985) and O'Hara (2008), and further diluting claims that technology can create social isolation. Furthermore, children typically played with a range of different partners as data from the observation episodes and mapping snapshots indicated that, for the most part, children only played with the same partner twice throughout the data collection period.

There were a few children who were observed together more regularly for example, Shalini and Kamya or Harvey and Glen, but these reoccurring partnerships were rare. In some situations, it became apparent that children formed play partners and then decided on resources to use together, while at other times it appeared that play partnerships formed because children often used the same resources. Shalini and Kamya for example were frequently seen together and often followed each other around the playroom irrespective of the resources being used. Alternatively, Glen and Harvey frequently chose to use the computer and SMART board and so they appeared to be together a lot of the time but this developed out of their continued interest in a specific technological resource. Nevertheless, with these exceptions, in general, children interacted with a variety of others throughout the data collection period.

The variation in play partners was linked to the dynamic membership and size of clusters. Cluster sizes ranged from one to ten children and varied based on the activity types observed in this project (for an explanation of activity types see Section 4.3 Unit of Analysis: Clusters around Activities) as shown in Table 13. Children's presence within a cluster was varied and many children moved continuously from one activity or technological resource to the next. Some children would remain at a specific technological activity for an extended period before moving on while others would only briefly become a member of the cluster and move on much more quickly. In only 28% of episodes was there no fluctuation in cluster size at all, with the same children remaining for the entire episode and no new children entering. Furthermore, 80% of these episodes lasted for five minutes or fewer, demonstrating that over the longevity of an episode clusters, as well as interactions, are likely to change.

Table 13 - Cluster Sizes by Type of Activity

Activity Type	Range in cluster size (children)
Cognitive activities	1-10
Pretend play	1-7
Construction	1-6
Musical activities	1-5
Using Adult World Resources	1-3

The triangulation of methods used in this study helped to further demonstrate the complexity of clusters, particularly in relation to the social nature of clusters. Mapping snapshots indicated that children were often seen playing alone suggesting a high degree of unsociable interactions around technology. However, observation episodes made it clear that the instances of isolated individual play were short lived. For example, when exploring specific time intervals (mapping snapshots), children were seen playing alone 44% of the time but when exploring extended play (observation episodes) children rarely played alone for the entire time. In most cases, they were working alone during periods of transition when their previous play partners have left to go to another activity and they had not yet been joined by another child. I observed children playing alone for an entire episode in only 16% of observation episodes and these episodes typically lasted for one to three minutes, with only two episodes lasting for more than three minutes. There was no evidence of individual children playing alone with a technological resource for a sustained episode of over 15 minutes.

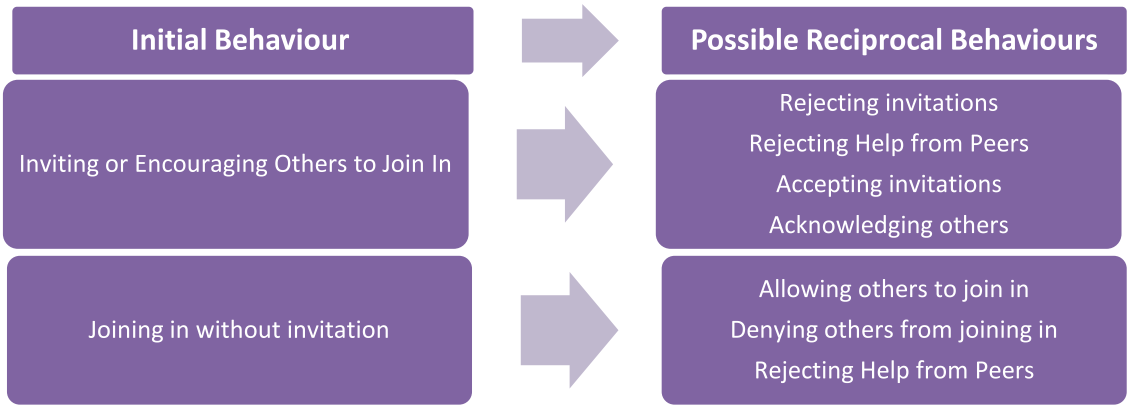
Thus, the nature of mapping snapshots indicates a high proportion of children playing alone with technology - which is accurate because children did frequently play alone – but this should not be interpreted as children spending lengthy periods by themselves, instead it should be considered a reflection of children's fleeting behaviours and continual movement between activities. This may be one possible influence on observed interactions and may account for the contingent and complex nature of behaviours and interactions exhibited. Thus, it goes some way to explaining why there is such a high variation in interactions.

6.3.2 Proactively Initiating/Encouraging Interaction

As a result of children's fleeting attendance in clusters, the clusters continually evolved and changed and as part of this process children had to continually initiate interactions with new play partners. I observed children attempting to initiate interactions in almost all episodes throughout the data collection process and contrary to speculation in the toxic childhood debate that children had limited interactions around technology (See Section 1.1), data from this study indicated that children proactively sought out and initiated interactions. Furthermore, these attempts to initiate interactions were more often accepted rather than rejected (with 60% of invitations being accepted).

Children initiated interactions by either inviting or encouraging others to join in or joining in without invitation and these attempts were reciprocated either positively or negatively as demonstrated in Figure 24.

Figure 24 – Initiating Interactions and Reciprocal Responses



Children achieved this by utilising the behaviours described in the previous chapter. For example children may join in without an invitation by 'observing the task' or starting an 'extended verbal exchange' with established cluster members, while rejecting invitations may be achieved by 'ignoring others' or 'verbally rejecting' the invitation. This section describes in more depth how children utilised the behaviours presented in the previous chapter to proactively encourage interactions.

It was commonplace in preschool (observed in approximately half of episodes) for children to attempt to join a cluster without having to ask or by using veiled attempts to integrate themselves, labelled as 'joining in without invitation' in Figure 24. Children attempted to 'blend in' in this manner by exhibiting behaviours which I have categorised in the previous chapter as:

- extended verbal exchange;
- observing the task.

It was typical for children to start an extended verbal exchange with the person controlling the technology as demonstrated by Dominic and Bailey in Vignette 42.

Vignette 42 - Conversational Initiations
Bailey is using the computer and there are no other children around. He is playing on his own in a solitary manner.

Dominic walks past and slows as he looks at the screen. He immediately asks Bailey "what are you doing?" while staring at the screen. Bailey is quick to reply and says "Playing Nemo [Finding Nemo PC Rom game] – Look!" and Bailey gestures to the screen indicating to Dominic to look at it. At this point Dominic moves closer and perches himself on the edge of Bailey's chair. In less than a minute Dominic offers instructions about how to complete the task. "Click on that" he says to Bailey as he points at the screen and Bailey obeys his instructions.

(E28s, Dominic age unknown, Computer)

In this vignette, Dominic tested Bailey's willingness to have a play partner by asking a question. In this instance, Bailey openly replied and extended his response by saying "Look", signalling to Dominic that he could become more involved in the activity. Dominic accepted this invitation and began to offer suggestions to Bailey about how to proceed. Bailey returned Dominic's uninvited attempt to join the group by acknowledging his request.

However, standing close by and observing the task was by far the most used mechanism for children to join a cluster uninvited. It is unclear whether children purposefully used this as a skilful tactic or because they just happened to become interested in the cluster and 'hovered' close by while they decided if they were interested in being involved further. Subsequently, when their interest grew, they progressively became a more central part of the cluster. Nevertheless, this approach was the most non-interactive mechanism for joining a cluster.

Similarly 'allowing others to join in' was frequently achieved in a non-interactive way. For example, it did not automatically result in a verbal or physical response, instead at times, children remained silent and 'allowing others to join in' was tantamount to not obstructing others from becoming a member of the cluster. Indeed 'ignoring' was often used as an acceptance of children's attempts to join the cluster because as described in Section 5.3.1, children could exhibit ignoring behaviours in the form of 'lack of attention'. They were not ignoring in a hostile sense but in this situation they used ignoring as an indicator that they were neither happy nor dissatisfied with the children joining the cluster; they did not acknowledge their entry into the group but they did not question it either. As a result, children were free to join the activity.

In a more interactive approach, children were observed explicitly inviting others to play. Children were typically innovative in their invitations and while they were occasionally seen explicitly inviting children to play by saying things like 'do you want to play transformers' as in Vignette 4 on page 141, they were more often seen asking a question would signified to the other child that they were welcome to join in the activity as shown in Vignette 43.

Vignette 43 - Invitations in the form of a Question

Jasper "What should we go on now?"
Steven: "CBeebies, CBeebies, CBeebies" and Steven points at the Internet icon.

(E30h, Jasper and Steven ages 4.5 and 3.3, Computer)

Prior to this question, little interaction had taken place between Jasper and Steven, but Jasper was able to involve Steven by asking an inviting question. Line one of this vignette shows how Jasper used the question as an attempt to foster interaction. The question did not explicitly ask Steven to play but the nature of the question was such that it invited suggestions about the task by Steven. It was an indirect or implicit invitation to join in the activity.

Alternatively, children incorporated an invitation into a pretend play scene. For example, in

Vignette 44, Alfie was able to include Lee into the activity without explicitly asking him if he wanted to take part. Lee chose to accept Alfie's invitation but it was unclear whether he really wanted to take part or whether he accepted the invitation because Alfie was quite forceful in his tone. Nevertheless, by using pretend play, children did not have to verbally ask others to take part but they incorporated it into their role. In both these examples, it may be inferred that by indirectly inviting their peers to play they were shielding themselves from rejection because the invitee does not need to explicitly reject the invitation; they simply do not play along if they were uninterested.

Vignette 44 - Pretend play invitations

Alfie is playing in the imaginative play area of the playroom, which is currently arranged as a kitchen. There is an old landline telephone placed on the dining room table and there are several other children standing around but they are hovering and don't seem to use any of the resources. Alfie simulates the 'phone ringing "ring, ring" and he looks to Lee who is standing aimlessly in the corner and says "gonae answer that please?". Lee simply stares are Alfie for a few minutes but he does not answer the 'phone. Alfie repeats his request to Lee "gonae answer that!" and Lee moves towards the 'phone, picks up the receiver, places it to his ear, mutters a few words then replaces the receiver. Lee immediately joins Alfie who is searching through a cupboard of pretend food cans and fruits and starts to help him search.

(E16s, Alfie and Lee ages unknown, Landline Telephone)

Although children were more unlikely to reject interactions or deny children from joining the clusters, there were some occasions when they did reject invitations. However, the methods used for rejecting interactions were more explicitly linked to the anti-social interactions and behaviours documented in the section on Unsociable Interactions, rather than using any sort of veiled attempts. For example, in order to deny children from joining in, children may cause an altercation after a child attempted to take a piece of technology for their own possession or they may 'purposefully ignore peers', signifying to them that they are unwelcome to take part. As such these processes do not require further detail here except to say that children reject invitations, reject help from peers and deny others from joining in by utilising the anti-social behaviours documented in previous chapter (on page 139).

It is important to note that the process of initiating interactions and the positive or negative reciprocal responses were highly dependent upon the other children involved. If a child attempted to join a cluster, or attempted to initiate interactions, the outcome of this interaction was dependent upon the receptiveness of those already a member of the cluster. If established members are not receptive, the child attempting to initiate interactions may be fruitless. Similarly, if an established member invites an 'outsider' to join the cluster, the choice to join rests with the outsider and whether they wish to become part of a cluster. In essence, children have a degree of agency in directing not only their own behaviours and interactions but the behaviours and interactions of peers through the way they reciprocate behaviours. Children's agency allowed them to determine whether attempts to initiate interactions will be positively or negatively received which had a knock-on effect for the recipient's behaviours and interactions. In essence, children's behaviours were reciprocally linked and dependent upon each other.

6.3.3 Roles and Status Liberate or Constrain Children's Agency for Interacting

The reciprocity of other children involved in the cluster was central to the interactions observed, however data from this study indicated that the way that behaviours were reciprocated was linked to children's roles within clusters. The analysis identified three social roles that children assumed within clusters:

- leader;
- interacting member;
- non-interacting member.

These roles were in addition to Ljung-Djarf's technological positions and this study distinguishes between technological positions and social status roles in the two ways.

- **Technological Positions** – as conceptualised by Ljung-Djarf's model, describe how children interact with technology. The data for this study reaffirms Ljung-Djarf's original positions (owner, participant and spectator) but also introduces two new positions (parallel owner and mutual owner) which were evident when children used different technologies other than the computer.

- **Social Status Roles** – Emerging in the data from this study, and describe how children interact with other cluster members, irrespective of the technology involved in the activity.

The Leader

The leader was the child who actively managed the rest of the cluster and as such was central to the cluster's progression and development because they influenced other children's involvement a great deal. The following bullets highlight the general characteristics of a leader.

1. It could be one child or multiple children working collectively to maintain order and direct the progression of play and the involvement of other children.
2. The leader used explicit behaviours to direct interaction and the activity in general.
3. The child(ren) in this role was viewed as a person of authority whom other group members look to for direction, confirmation or approval and who was able to make decisions without prior consent from other cluster members.
4. The leader made decisions about play themes and organising other cluster members.
5. This child need not be the one who is controlling the technology, but it often was.
6. Typically, the leader was the child who appeared to be an expert or had superior knowledge of the activity, for example, they may indicate they know the best mechanism for the play's progression or completion and this justifies why they should lead.

7. Leadership was not gender specific and in fact both boys and girls were seen to be the leader in individual cases.

Descriptions of social status roles identified in this study, particularly the leader, resonate with previous work in the field. Shin (2004: 306) for example described childhood leaders as:

> *dynamic, outgoing, and charismatic personalities that made them stand out in a group. First, they shared playful, creative, and humorous characteristics.*

Children's charismatic personalities, their confidence and their extensive knowledge of the technological activities, combined with their related technological position afforded them greater power and control of the rest of the cluster. These roles however were fluid and changing. Children's roles were dynamic and did not reside within the individual but were co-constructed in line with the complex matrix of contextual factors which contributed to children's interactions and behaviours.

Leaders were not present in all observations; rather they were relatively infrequent and occurred in only 30% of episodes. Leadership roles emerged when the conditions were optimally aligned and in particular, leaders occurred when the cluster consisted of a combination of older and younger children or where some children in the cluster were shy and less confident. The leader was therefore able to 'appear' more confident and knowledgeable and the younger or less confident children accept this guidance.

The practitioners in the room did not typically predefine the leader; instead, their leadership emerged independently as their confidence, directing tone and authoritative body language allowed them to take control. Leaders were less likely to emerge when practitioners were involved in the activity because the practitioner themselves assumed this role. For example, in

Vignette 45 Eric has more freedom to exercise a leadership role after the practitioner leaves but when present the practitioner immediately took charge. It should be noted that this process of practitioners stifling role development was a unique case and was only observed when a temporary practitioner was visiting Hillfoot Nursery Class. This was not the usual approach provided by practitioners who permanently worked in this preschool.

Vignette 45 - Practitioner's Influence Role Formation
Children have been crowding around the computer for some time while individuals are taking turns to control the game. A practitioner sat in the seat next to the child using the computer and the rest of the children were watching and offering suggestions from nearby. Nina appears and approaches Eric who is controlling the computer and says "I have a shot after you" but Nina's attempts are halted as the practitioner says "no, this girl is next" while she points at Grace who is standing close by.

(E31h, Nina, Eric and Grace ages 4.6, 3.1 and 4.25, Computer)

Leaders were observed in clusters across all technological activities (cognitive, construction, pretend-play, musical and adult resources). There was a territorial aspect, where children who regularly use certain resources were treated as the leaders because they were always present. However, in general some children were observed in leadership positions only once while others were quite frequently seen taking charge. Glen, Harvey, Shalini, Jacob, Chris, Jasper and Tracey stood out for their confidence and continual attempts to direct the play around technological resources.

Interacting Members

In the majority of clusters (60%) interacting members were present and again were observed across all technological activities. These were the children who were intently involved in the activity but were not considered the leader of the cluster or play. The following bullets demonstrate the general characteristics of an interacting member.

1. Interacting members may be one child but in many cases it can be a series of children all becoming involved as the cluster grows.
2. The interacting member was not restricted to the person controlling the technology in any way.
3. Interacting members participated fully in the activity but usually by following someone else's lead rather than directing the play theme themselves. They looked to them for approval and confirmation and were unable to make and execute decisions without consent from the cluster leader.
4. Interacting members were typically open in their suggestions and comments.
5. They may appear to offer suggestions but it was unclear to whom the comments were directed and they typically accept a response from any cluster member wishing to respond.
6. In most cases, children accepted the leader as the one in control and they happily maintained their position as interacting member although they may occasionally retaliate against their decisions.

There was more scope for the interacting members to develop than there was for a leader to develop because their involvement typically does not impact upon other children's involvement in the way that the leader's position does. Each child can take part and become involved irrespective of how many other children were interacting because their behaviours and involvement were not necessarily regulatory.

For the most part interacting members would engage in an activity through some form of explicit communication such as cheering, explaining or engaging in some form of 'extended verbal exchange'. However, this was not the only means of communication and during pretend play periods, for example, observations showed children fully engaging with the other cluster members and taking part in the play by simply offering objects or going through the motions, such as simulating washing clothes in the washing machine, but they did so silently. The other cluster members were aware of their involvement and accepted them as if they were communicating verbally and so they still became interacting members, but their mechanism for interaction was non-verbal.

This was illustrated through Episode 19s where Dominic physically demonstrated to Elisabeth how to turn on the monitor of the computer without any form of verbal interaction. Elisabeth did not verbally request help, rather Dominic noticed her struggling and offered help in an unprompted manner. Alternatively, in Episode 16s Abigail silently brings Manish food as he sits at the dining table. Manish continues to accept these objects each time Abigail appears at the table and he incorporates them into his simulation of eating dinner. These children were interacting members of a larger play cluster, despite the interactions taking place in a non-verbal manner.

With pretend play technological resources, the interacting member's role became quite central to the play as the leader was able to bring their play theme and vision to life through the involvement of the interacting members. Interacting members may not have a role in directing the play theme but without their involvement and interaction the leader would be conducting a fantasy play situation, but with other willing interacting members they can physically act out the scene.

Non-Interacting Members

Non-interacting members were observed less often than interacting members (47% of episodes) but again non-interacting members were observed across all technological activities. The non-interacting member was the child who seems focused on the activity but appears to offer no active involvement with the other cluster members. This role aligns with Ljung-Djarf's 'Spectator' position (see Section Ljung-Djarf's Technological Positions). Although they are distinguished by the focus on technology and peers; non-interactive members may use technology but do not interact with peers, while spectators will not use the resource but could interact with peers on a non-task based issue. The following bullets demonstrate the general characteristics of a non-interacting member.

1. This child's gaze typically remains fixed on the activity, the technology or the other group members but they do not offer suggestions or actively participate in any way.
2. The non-interacting member could be the child controlling the technology (if they were playing without interacting with any peers) or other children not controlling the technology.

Figure 25 - Non-Interacting Member

Figure 25 illustrates three non-interacting members as all children are silently engaged in the activity. There is no connection between the children at all.

Roles and Children's Agency in Behaviours and Interactions

The roles themselves influence children's agency over the way they themselves and others are able to behave. In particular, when a leader was present they had the greatest agency over their interactions and the interactions of others. The leader's authority, which is recognised by the rest of the cluster, enabled them to influence their peers' involvement in the activity and this could be utilised in a positive or negative way. For example, the leader may signify to another member that their manners, involvement or play tactics were unsatisfactory. Essentially, they made their feelings known as was the case when Harvey, identified as the leader, was dissatisfied with Steven's involvement in Vignette 46.

> **Vignette 46 - The Leader**
> *Three boys have formed a cluster around the computer. Chris is controlling the computer by using the mouse. Harvey is seated next to him in front of the computer and Steven is hovering close by. Harvey offers encouragement to Chris, "You got 10!" he shouts with an excited expression. Steven becomes more and more excited with this activity and begins to show it by bouncing up and down while he stands next to the computer and he begins to cheer at which point Harvey turns to Steven and sharply says "Shhh – Don't do that!". Steven falls silent and observes quietly.*
>
> (E24h, Harvey aged 4, Computer)

It was clear that other cluster members could create non-interacting members if they purposefully stifle interactions. For example, children may attempt to be interacting members but their efforts could be thwarted by other cluster members as shown in the example above. At other times, interacting members and leaders were selective about whom they interact with which resulted in some children becoming non-interacting members. Similarly, at times children recognised their power and on a few rare occasions treated cluster members unfavourably. In Vignette 47 the leader in the group did not want to welcome a new member, but as his attempts persisted the leader gave him a degrading role of the burglar.

> **Vignette 47 - Degrading Through Power**
> *Eva is quite clearly in control of a storyline in this play and of the technological resources in the role-play corner. There are 8 children involved in the activity and she is inclusive with all these cluster members, always making sure that everyone had a role, yet when Jason attempts to join the play she is very dismissive of his efforts telling him there are too many members in the cluster already. He becomes upset with this result and Eva recognises his disappointment.*

She therefore conceded and allowed him to join the cluster but told him he is a burglar who will attempt to rob the house, for which she is the mother of the family and the rest of the cluster are family members. Jason takes on this role cautiously and then becomes upset again, as he realises his role involves him being rejected from the house again and being turned over to the police.

(Eva and Jason ages 4.75 and 3.7, Mobile Telephones)

Alternatively, leaders were able to draw upon their imagination to help encourage children to become interacting members as shown in Vignette 48 below where Lee is observing close by but is initially a non-interacting member.

Vignette 48 - Mediating Tools to Create Invitations

Three children have formed a cluster around the landline telephone. Alfie pretends to make a phone ring and looks to Lee to engage in the play. "Ring, ring – you gonae answer that please?" Alfie asks Lee who stands silently for a few minutes. Alfie repeats his request "you gonae answer that!" Lee moves away from the cooker where he is stirring something in a pot but not talking to anyone and answers the phone. He mutters something very quietly then puts the receiver back down and joins Alfie who is searching in the kitchen cupboards.

(E16s, Alfie age unknown, Landline Telephone)

They are also able to support their peers and draw their attention back to the task when they see their friends becoming distracted or becoming non-interacting members as often happened between Shalini and Kamya. These two girls were very close friends and always together but on many occasions Shalini was the one who used the technology while Kamya watched and offered support and suggestions and if Kamya appeared to lose interest Shalini was quick to draw her attention back the task by saying "look". At this point Shalini and Kamya typically started to giggle over the screen and engage in an extended verbal exchange.

While interacting members may have less input in the direction of the play or task because a leader often had the final decision, they do have considerable influence over how they themselves interact. On a number of occasions interacting members made decisions about who they would interact with and who to avoid and within one episode they may choose to interact with a few of the cluster members but actively ignore others. Similarly, across episodes children were seen interacting with specific peers during one activity yet they were observed ignoring them in another activity. The choice to ignore certain peers often contributed to the development of non-interacting members and at times led them to take part in a more unsociable way.

Furthermore, children may assume certain roles but they were not bound to remain in that role for the entire activity or future activities and it does not necessarily have to be sustained once constructed. The leader for example assumes the role when required in an episode but may step back within the same episode and leave the maintenance of the cluster and the play to someone else or no-one at all. Take for example the episode previously discussed in

Vignette 46. In this episode, Harvey was the dominant leader for the majority of the time while Chris is using the computer. For the most part Chris operated as a non-interacting member but as the cluster became noisy and children engaged in extended verbal exchange, Chris promoted himself to the leader of the group by demanding that his fellow cluster members behave in a certain way. “You have to be quiet!” he snapped. Chris then immediately returns to his previous state of non-interacting member as he focuses intently on the task of using the computer and does not engage with any other members. During this time, Harvey resumes the role of leader and silences Steven almost immediately after Chris’ instructions.

The leader was therefore a proactive position demonstrated by the individual child who assumed the role when they desired and they demote themselves to either interacting member or non-interacting member at times of their choosing. Fundamentally, children recognised that they were able to influence their peers' behaviours through their own behaviours and roles. By speaking out in an authoritative tone and 'making their presence known', children could both silence their peers or encourage their friends to become interactive.

Hence, in line with previous findings which demonstrate that interactions were contingent on how behaviours were reciprocated, so too is the outcome of these circumstances. The progression of the play is highly dependent upon the presence of a leader in a cluster or the children's abilities to behave in their chosen manner. This agency could be constrained or aided by the combination of roles in the cluster and how children negotiate and mediate the relationships between these roles.

6.3.4 Summarising Clusters

Throughout this section, I have demonstrated that children interacted within clusters. These clusters fluctuated considerably, leading to a multitude of interactions and behaviours as children negotiated their roles with other children within the cluster. Fundamentally, throughout this section three key findings emerged in relation to research questions two and three.

1. Children most often used technologies with peers and they proactively sought interactions.
2. The roles children constructed as part of the cluster influence how they and their peers are able to interact by affording them greater or less agency in how they behave.
3. As children's agency is a key contributor to interactions, it is insufficient to suggest that technology is the only determinant of interactions.

Section 6.4 The Physical and Cultural Preschool

In the 1980s, literature about the 'ecological' environment and children's social interactions was a favoured area of study. For example, studies suggested that spatial density (Loo , 1976), and the positioning and layout of resources (Smith & Connolly, 1980) influenced children's interactions. This research was prominent in traditional preschools where technologies were not widely available and similar research in contemporary technology-rich learning environments is underdeveloped. The current section begins to contribute to this area in relation to technological preschool environments. In particular, from my data I identified five key features of the physical and cultural preschool environment that contributed to the development of both the clusters and children's interactions, including:

1. categories of activities;
2. access to resources;
3. preschool social hierarchies and the rules and regulations of the playroom;
4. the distinction between social and isolate resources based on preschool practices;
5. layout of resources.

6.4.1 Activities and Play Themes Influence Clusters and Interactions

Data indicated that the way that children organised themselves into clusters around technologies was different depending upon the category of activity (cognitive, adult world, construction, musical and pretend play) that was taking place. This related to the density of cluster – i.e. how close together the children all stood and how tightly packed the cluster appeared to be. Data indicated that dense and tightly packed clusters would often form around cognitive activities involving resources like the computer or the laptop, with children continually edging forward while attempting to see the resource and join in. In contrast, the pretend play activities, involving technologies like the mobile phones or cash register, showed much more loosely arranged clusters and children stood with a lot of space between each other. Furthermore, with the latter activities, children did not necessarily always stand in reaching distance of the technological resources; these children were still members of the activity but were distributed in a more dispersed way. The two images displayed in Figure 26 below illustrate this point.

Figure 26 - Comparing clusters by activity type

The image on the left is a picture of children using the computer (a cognitive resource) and the image on the right is of children running a shop using an electronic shopping till (pretend play resource). The cluster around the computer involved seven children and was very dense with all involved children huddled around the computer as close to the monitor as they were able to get. The photo of the pretend play activity however only shows 4 children in view when in actual fact this episode involved seven children at this point, the rest of whom were collecting objects to buy from Jacob who was role-playing as a checkout worker; this cluster was very sparsely arranged.

The very nature of cognitive activities specifically relies on involvement with the technological resources in order to complete a task. Thus, the resource was central to the activity and in order to be involved children needed to be able to view the technology and be close to it. This explains why children crowd together in close proximity to the resource. With pretend play activities however, the technological resource was a prop in a larger play theme and children were able to take part in the activity without being in close proximity to the resource, thus clusters can were more sparsely distributed. This is important to recognise because data from this study indicated that the centrality of the technology and the nature of the activity contributed to the way children interact.

It was clear in the data that densely packed cognitive activities were more likely to appear lively and eventful as many children offered advice and support within a confined space. During these clusters children exhibited supportive interactions as well as engaging in a task-driven manner. Cheering, comments and suggestions tended to be loud as children often made their voice heard over all other children involved in the activity. This also meant that children could be overshadowed and find it difficult to take part, as more dominating children capture the other cluster members' attentions. As a result children had to be confident at 'making their presence known' in order to contribute to the task. Alternatively, the clusters that were more dispersed often appeared calmer and more managed. Children did not need to raise their voices in order to be heard because at times other children were dispersed around the playroom engaging in their own sub-clusters and therefore there were fewer children to compete with at one time. Children still engaged in similar interactions but there was a lesser need to explicitly make their presence known in order to contribute to the activity. These findings resonate with previous work of Hutt and Vaizley (1996) who suggested that increased social interactions were observed in higher density areas and supports the work of Loo (1976) and Fagot (1977) who observed more self-contained interactions in low density areas.

However, just as it was highlighted in Section 6.2 that technologies only provided opportunities for technological positions, social participation and interactions and how children observably interacted and engaged in the activities was dependent upon children's own agency; the same holds true for the way that technological activities influenced cluster density and associated interactions. There were occasions where despite being classified under one activity type, the resource was actually used for a different purpose and this influenced the structure of the cluster. For example, on one occasion the microwave (a 'pretend play' resource) was used by children who had huddled around closely and created a dense cluster. Figure 27 shows children focused intently on the new microwave that had just arrived in the preschool in a tightly formed cluster with most children trying to touch the resource simultaneously. However, in this episode, children were not using the technology in a pretend play scenario. This microwave was a skilful replica of an adult's fully functioning resource, which children will have seen being used at home. It exactly matched the full scale 'real' model and was complete with a Delonghi logo and the plate in the middle of the microwave turned and the centre of the microwave lit up as would be expected of a real microwave and it 'pinged' to say that the food was ready. In this image, children were not pretending to cook food in a pretend-play the scenario. Instead, they were continually opening and closing the door and turning it on to see it light up and to hear the 'ping'. In this

Figure 27 - Small world Microwave

situation, they were concerned with exploring the workings of the technology in a cognitive manner and they were not engaged in a pretend-play activity, for which the technology was designed.

In essence, the way the technology was used and the activities that children were engaged in while using the resource (in this case as a cognitive tool rather than a pretend play tool) influences the construction of the cluster. The kind of activity within which the resource was used dictated whether the technology was central to the play or just an additional tool in the play and as such it influences how children are required to interact and engage in the task.

6.4.2 Access to Resources as a Driver for Interaction

Access to technology was a key driver for children; children often wanted to physically control the technology. While the other sections of this chapter demonstrate that children do take part in the activity even if they were not controlling the technology, this was often a queuing tactic and their long-term aim was to have a turn of the resource. This was supported by data from researcher-led games during which children indicated that they preferred to control the technology rather than observing another child using the resource.

Vignette 49 - Conversation with about toys with Jacob
Researcher: Do you like it when you get to use the mouse or do you like it when you watch?
Jacob: No, I like mouse.

(Audio SD3J, conversation with Jacob, Jacob age 3.6)

An audit of the playroom also indicated that there were insufficient technological resources for every child to use them individually and as has previously been suggested children are forced to negotiate access to the computer and other technological resources because of insufficient availability in most preschools (Heft, 2000; Wang & Ching, 2003). It was clear from the data that children wanted to use these resources, aligning with previous finding that the novelty of new and unfamiliar resources spurs the child's interest (Muller & Perlmutter, 1985).

On a few isolated occasions, children did relinquished control of technology or forfeited their turn to allow a peer to use the technology and exhibited sharing interactions, but these occurrences were more infrequent. In addition, in a small number of cases children relinquished control of a technological toy in favour of playing with a specific person who had no technological resource to offer. In Vignette 50, Isabelle specifically invited Tracey but Tracey was not sure at first whether she wanted to give up her access to technology as she continued to play with the technology for a few seconds but eventually leaves with Isabelle.

Vignette 50 - Relinquishing control and Accepting Invitations

A large group of boys and one girl, Tracey, are playing with an electric road, which has a garage, a petrol station, a car wash and cars which can be assembled in a range of ways to make a street which lights up and makes noises. Children can therefore create their own design of street and drive cars along it. During this play episode Tracey is approached by Isabelle who shouts: "Tracey, Tracey, Tracey, let's go [to play a] girl game" but Tracey does not immediately respond and she continues to play with the electric road. Isabelle therefore begins to leave but makes her absence known by shouting "bye" as she walks away. Tracey notices that she has decided to leave rather than joining the play and immediately follows her to a girls' game.

(E46h, Tracey and Isabelle ages 4 & unknown, Electric Road)

In this case, she decided she would rather be with Isabelle than playing with the electric road, but given her initial hesitation, she may have wished to play with Isabelle and the electric road, had this been an option. This example describes the wealth of interactional processes that children engage in when deciding whether to continue accessing the technology or play with friends, from attempting to initiate interactions through a verbal invitation, to making a decision about whether there is a possibility for sharing interactions before ultimately resulting in sociable interactions.

Section 6.3.2 indicated that children's invitations were more than twice as likely to be accepted instead of rejected if the acceptances typically occurred when the invitee did not already have access to another technological resource. In those instances where the invitee was using their own piece of technology, observations indicated that children either ignored the invitation all together or briefly acknowledged the invitation before quickly returning to their own technological resource. An example of this is shown in the Vignette 4 on page 141 where Steven was controlling the computer and Harvey invited him to play an imaginary Transformers game (they do not have tangible Transformer resources in the preschool). Steven rejected this offer and continued to control the computer while other children clustered around. It appeared in this case then that Steven rejected Harvey's invitation because Steven was the main owner of the computer and showed clear signs of being interested in continuing to use this resource. Harvey, however, did not have another resource to offer and if Steven had accepted his invitation, he would have relinquished control of a sought-after resource in favour of imaginary play around the theme of Transformers.

This was often the reason why helping interactions were rejected, because the child controlling the resource perceived the peer's helping interactions as an attempt to use the technology. This was because in many cases it was clear that children used helping interactions as a vehicle for obtaining access to the technology. Children who regularly offered help were those who were familiar with the resource and used it on a daily basis. For example, when these children were instructed by a practitioner to allow someone else to use the technology, they would often reluctantly relinquish control, but they would hover close by and within minutes they appeared to be instructing and 'helping' the new user, even if the child hadn't requested it. In these situations children were able to retain some involvement in the activity. When these helping behaviours were accepted and children engaged in helping interactions it was often the case that the children using the computer simply followed instructions and did not necessarily direct their activity in any way. Children seemed to be aware that this mechanism was a legitimate way of maintaining access to technology, while 'appearing' to be supporting their peers. In these circumstances, although it appears to be task-driven engagement and helping interaction, it is actually a form of possessive interaction.

Thus, in the majority of cases children were only 'allowed' to join in provided they attempted to do so unobtrusively. Attempting to take control of the technology without prior invitation caused considerable problems and was often met with insiders denying access. Children controlling technologies tended to be territorial over the technological resources they were using, usually because they themselves have had to wait in a queue to gain access and unauthorised attempts to take control were not well received and could result in possessive interactions. These engagements could turn anti-social as they exhibited 'verbal abuse'. This is demonstrated in Vignette 51.

Vignette 51 - Ownership

Two boys are in the home corner and are exploring a brand new Delonghi simulation microwave. The microwave is placed on the centre of the 'kitchen table' in the home and the chairs have been pushed back out of the way. The table is small enough for a number of different children to stand around it and physically reach and touch the microwave. John and Jake are currently standing in front of the microwave looking at it opening and closing door and the dials on the front. They each have one hand on top of the microwave and the other hand is being used to try and operate the battery-powered device. They fight over the device and disagree about how he should be allowed to operate it. Jake wants to take the food out of the microwave and put more food in but John is not happy with this and says "hey that's mine food" at which point they both grab hold of the food with one hand still remaining firmly placed on the microwave.

(E36s, John and Jake age 4 ½ and 3 ½, Microwave)

Nevertheless, it was important to recognise that instances of hostile interactions in general were rare and children were more likely to exhibit possessive interactions or utilise a skilful mechanism of drawing on predefined rules and regulations and turning to those members of the preschool who held greater authority of the peers in order to manage access to resources.

6.4.3 Preschool Social Hierarchies, Rules and Regulations and Interactions

Throughout observation episodes, it was clear that children recognised a particular social hierarchy in the playroom. That is to say, the children understood that the adults in the playroom had superior authority over children. I observed this in the data as children often turned to practitioners to mediate interactions, knowing that their peers would respond to the practitioners. See for example Vignette 52 and Vignette 53 below.

Vignette 52 - Children ask Practitioners to Mediate Turn-Taking

Jacob continues to protest and shields the till with his arms while watching Aaron.
Aaron screams for Mrs Jones and she appears and explains that Jacob can only play for a couple more minutes and then he needs to give Aaron a shot.
Jacob says to Aaron "want to have it?"

(E39s, Jacob and Aaron ages 3.6 and 3.5, Till)

Vignette 53 - Children ask Practitioners to Mediate Sharing and Confrontation

Both Jeremy and Eva now just continue to hold their phones.
Eva gives her phone to Jeremy so Jacob snatches Jeremy's pink phone. Jacob holds it behind his back as Eva approaches to take it back.
Eva says to Mrs Garner "Jacob snatched the pink telephone from Jeremy so I gave Jeremy my telephone but Jacob won't give me the pink telephone"
Mrs Garner intervenes and explains about sharing. Jacob gives Jeremy the green phone and Jeremy gives Jacob the pink phone.

(E54s, Jeremy, Jacob and Eva ages unknown, 3.6 and 4.75,
Mobile Telephone)

In both these examples, and many more throughout the data collection period, children responded to practitioners' instructions, despite refusing their peers' requests. As a result, practitioners were in a position to explicitly direct children's behaviours and interactions and children readily accepted these instructions. Children were more likely to challenge their peers' behaviours because they do not perceive them to have the same level of authority in preschool as practitioners.

Thus, this social hierarchy was embedded in the preschool culture and children not only accepted it but also recreated and reconstructed it by drawing on practitioners' authority when they required support in their interactions. This allows adults to create rules about behaviour. Children then respond to these instructions based on their perception that the adults enforcing them were in a position of power.

Rules and regulations were a standard part of children's experiences in preschool. The aim of these rules was to regulate children's experiences and, in particular, practitioners enforced rules in order to teach children acceptable behaviours. Thus, evidence from my data demonstrated that rules were a key contributor to children's interactions and while at times they explicitly directed children's behaviours, at other times the rules provided a framework for children to interpret and adapted where applicable. The way that children interpreted and utilised these rules resulted in the behaviours and interactions that I observed throughout the data collection period.

The most common rules which children appeared to draw on referred to turn-taking and sharing processes.

- **Turn-taking** was defined as children each using the resource independently one after another. Children waited in a queue to use the resource until the first child had completed their allotted time and subsequently the resource was passed to the next child in the queue.

- **Sharing** refers to children jointly and simultaneously using a resource.

It quickly became clear that children were aware of the preschool regulations in place. In one episode children indicate their understanding of 'one child at a time' using a resource as shown in Vignette 54. Similarly in researcher-led games children indicated their understanding of turn-taking as Lillian indicated that only one person can play with the telephone as "you have to line up and then one gets a turn then another one gets a turn".

Vignette 54 - Reciting rules

Jason and Abigail are playing Scatterhead close by neither of them reply to Jacob's outbursts.
Kieran appears and says, "Can I play this?"
Jacob moves the laptop away.
Jacob: "Only one person can play – do you want to watch?" but before he gets chance to finish his sentence Kieran steels the laptop.
Jacob shouts louder "ONLY ONE PERSON CAN PLAY IT!"

(E38s, Jason and Abigail ages 3.7 and 4, Laptop)

Once children were introduced to the rules, they generally managed their own turn-taking and sharing in line with practitioners' guidelines. At Sylvester's preschool when demand for a resource was high, children were instructed to use an egg timer to regulate their access. The success of turn-taking management using the egg timer was varied but in most cases children wished to maintain access to the resource for as long as possible or gain access to the technology as quickly as possible. Thus, the way that these rules were adopted differed depending upon whether the child was the person who was attempting to gain access or the person who was already the owner of the technology and was required to relinquish control. Those attempting to gain access were usually quite direct in their attempts to use technology and persisted until such times as they achieved their goal by verbally making their presence known. While there were times when the current owner quite amicably passed on control as soon as a request was made and engage in sharing interactions, in many cases the child attempting to use the resource had to repeat their requests several times because the owner refused to pass on ownership and exhibited possessive interactions. If after several requests, the owner had not relinquished control the child attempting to access the technology had to resort to innovative tactics to gain control. These include:

- justifying their right to use the technology, usually in line with the well-established rules of turn-taking in the preschool;
- edging closer and closer to the technology so that their proximity to the technology reiterates the fact that they are next in line; or
- understanding the preschool rules and using them to their own advantage, typically recognizing when they have the right to use the technology and therefore making their case to a practitioner.

In those times where children attempted to state their case to the current owner and justify their right to have a 'turn' of the technology, there often developed a confrontation around the fairness of technology use. Children reiterated that resources were not owned by specific children, as was the case with Elisabeth and Pamela below.

Vignette 55 - Fairness of access to technology
Elisabeth presses buttons on the keyboard. Pamela attempts to press buttons too but Elisabeth shouts, "No, I'm playing it". Pamela replies – "It's not yours!" and tries to take the keyboard.

(E52s, Elisabeth and Pamela ages 3.6 and 3.9, Musical Keyboard)

Alternatively, they indicated that the resource was intended for use by certain people and that the current owner does not meet these criteria. This happened when Elle indicated that Jacob should not have been using the resource because it was for girls and he was a boy and similarly Kelly indicated that John cannot play because they do not have a 'boy's one'.

Vignette 56 - The Girl's Till
Jacob is using the till. Elle points at the box and says, "it's for girls see" [there is a picture of a girl on the box].
Jacob continues to use the till alone and does not let Elle have it.

(E39s, Jacob and Elle ages 3.6 and 4.5, Till)

Vignette 57 - The girl's laptop
Libby and Elisabeth have matching laptops and Kelly brings a Leappad reader for Elisabeth to use.
John tries to use Kelly's laptop and Kelly takes it back from him and says "I'm playing this, we don't have a boy one"

(E43s, Kelly and John ages 4 and 4.5, Laptop)

In these instances children's understanding of rules for technology use develop from observing aspects of the playroom and inferring their meaning or noticing cultural stereotypes within the playroom. In the first case, Elle makes her case because the picture of the child on the box using the resource was a girl and therefore she believes it to be a girl's resource. Similarly, the laptop that Kelly indicated was not a boy's one was pink in colour and shaped like a flower leading her to believe that it was inappropriate for boys to use it.

When the more verbally direct approach did not appear to deliver results, children were seen focusing on their own physical position within a cluster. Children aimed to move towards the front of the cluster signifying their place in the queue. In most cases, children were unwilling to leave the technology because they recognised that they would lose their place in the queue. If they did decide to occupy themselves with an alternative activity or resource until their desired resource became available, they were careful to pick an activity which was close by so that they can continue to maintain and regulate their position in the queue. If new children arrived in the cluster for example and attempted to gain access, they were close enough to inform those new children that they were in fact next in line.

Thus, children typically used the preschool regulation of turn-taking in a manner that suited their needs. If a child could not gain access to a technology they would invoke the turn-taking rule and call a practitioner to allow them access, while children who had access would manipulate the turn-taking rules to extend their play. Children recognised the power structure within the preschool and understood that practitioners held the most authority. Thus, if the person currently using the technology did not respect the egg timer or general turn-taking rules, the child attempting to gain access would move further up the power structure and call a practitioner to allow them access.

Children who had access, however, were also clear on the rules and would manipulate the turn-taking rules to extend their play. In these cases, interactions were business-like in an attempt to gain access, rather than an attempt to be cooperative. For example, children would turn the egg-timer over again when they thought their peers were not looking to extend their play. Alternatively, at times children were also able to bend the rules in a cooperative manner. While at Hillfoot Nursery Class explicit rules were in place that children must use the SMART board individually, some children recognised that the SMART board was linked to the computer close by and used this machine to help control the activity on the SMART board. This was demonstrated in

Vignette 39 on page 189 and a similar episode is illustrated in Figure 28.

These children were technically operating within the preschool rules because only one boy was using the SMART board but they had managed to find a loophole which provided opportunities for interaction and cooperative play. At times however, this could cause conflict when children attempted to control the computer without invitation.

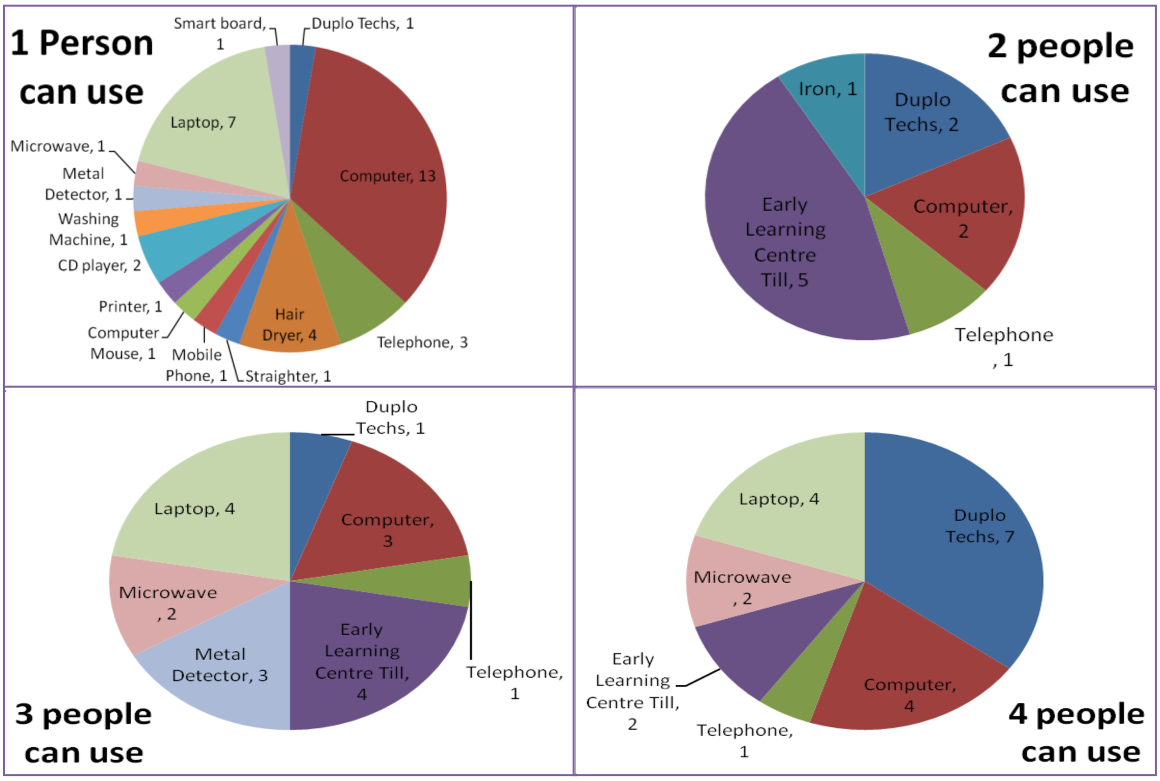
Figure 28 - Children controlling computer and SMART board simultaneously

Turn-taking rules could explicitly directed behaviours at times, but on other occasions it was used as a foundation for children's behaviours. How children interacted was dependent upon how children interpret the turn-taking framework.

6.4.4 *Social or Isolate Resources: Determined by Preschool Practices*

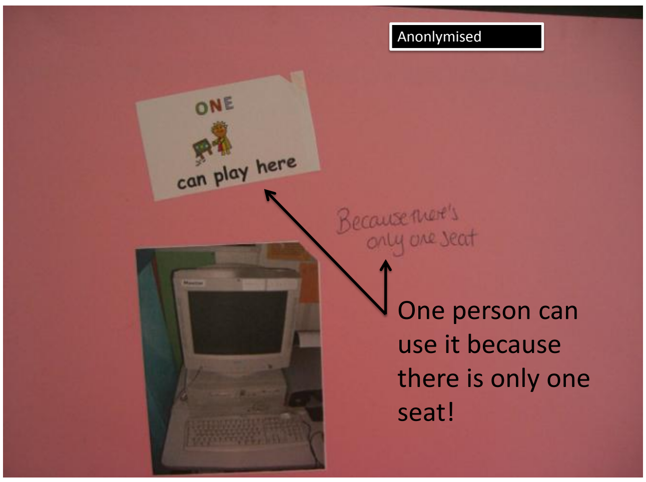
Rules and regulations, such as the understanding that only one child can use the SMART board, not only directed children's behaviours and interactions, but also the wider preschool culture (of which these rules form a considerable part) influenced children's perceptions of how children used resources, in a social or solitary manner. Drawing upon both the layout of the preschool as well as the rules and regulations that children learned from practitioners, researcher-led games demonstrated that children had their own perceptions about whether a technological resource should be used by one or multiple children. I showed children pictures of resources, and after I confirmed that the children knew what the picture represented, I asked them how many people they believed could use that resource. Figure 29 demonstrates children's responses.

Figure 29 - The number of children who stated that technologies could be used by 1, 2, 3 or 4 people



Typically, children had mixed responses but they often justified their choice by making reference to the layout of the playroom or the rules in place. For example, at the beginning of each day, three out of four of the computers in Sylvester's preschool always had one seat set out in front of them. This may have signified to children that one person could use that resource, given that the majority of children felt the computer was a one-person resource. Certainly, children referenced the single seat as a reason for stating that one person could use the resource during researcher led activities as shown in Figure 30. Alternatively, the early learning centre

Figure 30 - Children's reason for choosing the one can play sticker



till was always set up in the pretend play area, which was a large open plan area without designated seating and as indicated in all cases children believed that more than two children would use this resource.

On the other hand, there was little evidence to show that this contributed to actual cluster size because as was shown in the previous chapter, clusters were largest around the computer, where one seat was provided. The larger cluster sizes related to the explicit rules, or lack of rules in the playroom. In general, practitioners did not have explicit rules for the use of technological resources compared to non-technological resources. The only exception was that at Hillfoot Nursery Class Mrs Laing said during the practitioner interview, that some technologies were ‘one-person devices’ and the SMART board was one of these resources because this device was new and seen as ‘precious’ and expensive. I was advised that if it was broken it would not be replaced and therefore children were only allowed to use it individually. Mrs Laing indicated during her interview that while only one person could use it at a time, a large ‘gang’ of children observing the activity and taking part in other ways was acceptable. Similarly, Mrs Main at Sylvester’s indicated that while they had in the past had a limit to the number of children who used traditional resources, such explicit rules were not necessary for technologies.

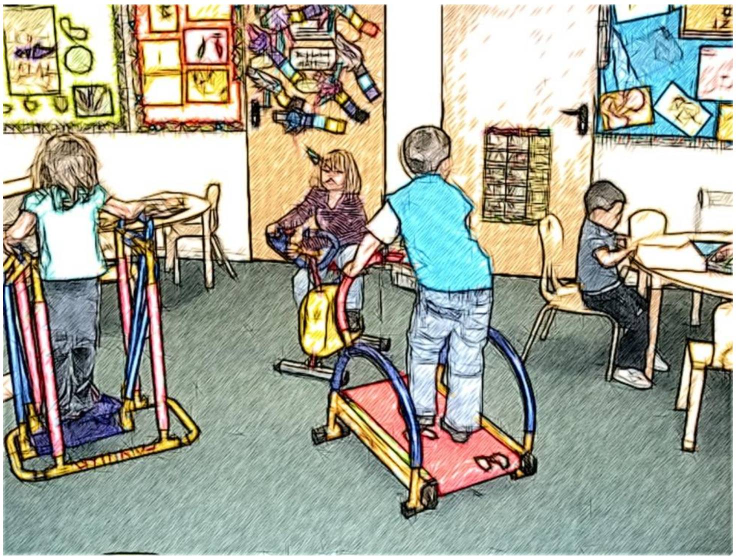
Children’s response to researcher lead game indicated they were allowed to develop larger clusters because children indicated that ‘the ladies’ [practitioners] would be happy if there were multiple children crowded around a resource and that they want children to have someone to play with as shown in Figure 31.

Figure 31 - Researcher led activity - children's perceptions of practitioners

Importantly, there was little consistency in children's understanding of how many children should use a resource. Individual children established their own perceptions about whether technologies were social or isolate resources. They picked up on subtle directions in the playroom, such as the computer only having one seat, as an indicator for how the resource should be used or they focused on the lack of restrictions on cluster size for some resource to justify their decisions. This provides an insight into how clusters were constructed. Crucially, these findings demonstrate that social interactions always reside in the children's perceptions. While the preschool environment (or indeed the technologies or other children in clusters) may contribute to this, they are not causal effects.

For portable activities, the preschool culture and practitioner planning also contributed to the social interactions which emerged. For example the exercise equipment had been positioned in a circle by practitioners, as shown in Figure 32 so children were all facing each other when using the technology but they could use them independently, and the way that one child used one piece of equipment does not impinge upon other children in the cluster.

Figure 32 - Digital Image, Sylvester's Preschool, May 7th 2009



Thus, while they are all independent resources, by positioning them in a circle practitioner are encouraging interactions, although there is no causal link. Nevertheless, this approach provides greater opportunities for interactions than would have been possible if the equipment was spread out around the playroom.

6.4.5 Summary of the Physical and Cultural Preschool

This section has highlighted that children were driven by access to resources and much of the time their behaviours and interactions were focused on maintaining access. That is not to say that interactions were always possessive, rather children utilised other forms of interaction such as helping interactions, as a means of maintaining involvement in the activity and access to the resources.

Fundamentally, this section has demonstrated that preschool environments are a social construction which contributes to interactions, as the structures in place (e.g. the rules and regulations, the way that practitioners arrange the playroom into various activities) provide a framework which children then interpret and use to guide their interactions.

Section 6.5 Summary

This chapter has provided an overview of the preschool context in which this study took place. Furthermore, it has identified and reviewed some specific influences on children's interactions including:

- the overall cluster in which children interactions;
- the technologies artefacts;
- the preschool layout and culture.

In general, this chapter demonstrated that all three components of the preschool context listed above played some part in children's social interactions and engagements. However, importantly for our current understanding of technology, this chapter provided empirical evidence to demonstrate that while technologies do contribute to interactions, they do not influence interactions in isolation. Instead, the three components of context are all interlinked and mediated via the children and the agency that children have in preschool makes the children the overarching influence on their interactions. For example, the outcome of interactions is dependent upon children's interpretation of the preschool context.

In addition, this chapter provided the several subsidiary findings which contribute to the technology debate.

- Children proactively encourage interactions around technology.
- Children interpret their physical environment, as well as the rules embedded in the culture, to establish the best ways to act and form clusters around technologies.
- While rules should explicitly direct behaviours, in reality they provide a framework to guide interactions. The actual behaviours observed however were highly dependent upon how the framework was manipulated.
- The physical properties of the technology contribute to cluster development and the kinds of social participation observed in clusters.
- The other children in the cluster were a significant influence on interactions, particularly depending upon each child's status and role within the cluster.

- Children appeared keen to maintain ownership of technology and they shaped their interactions to achieve this goal.
- Technologies offering mutual owners provide considerable opportunities for both collaborative use as well as confrontation depending on how children negotiated the varied roles.

In essence, this chapter has briefly described how a large number of factors within the preschool begin to contribute to children's interactions.

PART 4. FINAL CONSIDERATIONS

CHAPTER 7
Discussion, Frameworks and Conclusions

The previous two chapters have presented two key sets of results for this study.

- Chapter 5 provided a synopsis of the social interactions and behaviours which were exhibited by children.
- Chapter 6 presented an overview of some of the components of preschool context (including technologies) which may influence children's interactions.

The first of these chapters provided findings to answer research question one (identifying child-child interactions), while the findings presented in the latter chapter tackled research questions two (identifying proximal and distal characteristics of preschool playrooms that contribute to observed interactions) and research question 3 (how the affordances of the technology contribute to interactions).

The purpose of these chapters (and to some extent the purpose of the whole project) was to provide an introduction into this underexplored area. The introductory and exploratory nature of this project was purposeful as it was planned to be manageable by only one individual researcher and followed MacNaughton *et al.'s (2001: 21)* guidance about developing original knowledge.

> *Many beginning researchers are far too ambitious about their research questions, usually because they want their research to make a major impact in terms of its conclusions . . . Two considerations may be helpful here. One is to realise that very few studies, in and of themselves, provide major answers to major question. Research is not like that. Even well-funded research projects are made up of a series of smaller studies planned in a programmatic way . . . Knowledge is thus slowly and*

systematically built up, and it is the sum total of all the studies, and usually the studies of many others as well, that eventually lead to major breakthroughs. As a researcher, one learns to be content with making small but meaningful contribution.

However, despite this focus, throughout the data collection it was also possible to present some higher-level findings which moved beyond the initial exploratory aim and which offer links to previous theory and literature. These higher-level inferences are now presented in this chapter and are discussed as they relate to each of the research questions. The thesis is then brought to a close by describing a model which summarises children's social experiences with technology and is grounded in the data from this study.

Section 7.1 Research Question 1: Identifying Child-Child Interactions in Technology-Rich Preschools

The first research question for this study asked: *what forms of interactions can be observed when children engage with their peers around technology in preschool playrooms.* The key findings which helped to address this question highlighted that:

- Children took part in three categories of engagement (pro-social, anti-social and task-driven), during which nine forms of social interactions and 27 behaviours/actions were observed;
- The social play within the clusters were categorised according to Parten's forms of social participation. Children's solitary play was fleeting, associative and parallel play could be sustained for an extended period, while cooperative play was highly contingent on the context.
- The interactions and behaviours were unpredictable and no discernible patterns could be established because they were highly dependent upon: the way other children

reciprocated interactions, the technology involved and the preschool culture and environment.

In terms of expanding upon these claims further, and understanding how the findings from this study contribute to the current debate about technology, it was clear that children had varied social experiences around technology and it was not sufficient to describe children's interactions in generalised terms. Instead, it was important to understand that children not only actively sought out interactions, contrasting with assertions in the technological literature, but were proactively involved in a negotiation process with the other children in the cluster, which contributed to the interactions observed. In addition, from a particularly educational perspective, it was essential to further explore the prominence of children's helping interactions around technology as a means of informing pedagogic practices in preschool.

7.1.1 Children Have Varied Social Experiences

Children's experiences within early years education focus on free-play opportunities (Plowman & Stephen, 2007a) and because they have free choice, their experiences are wide-ranging and diverse. In particular, previous research has indicated that children often played with a multitude of different children (Haight *et al*., 1999). This was supported by data from this study which indicated that only a select few children frequently played together and, in general, children played with the same peer only one or two times over the nine-month data collection period. Similarly, with the exception of daily use of the computer, the frequency which other technologies were used was wide-ranging (See Appendix 12). Furthermore, clusters varied as the longevity of an episode ranged from under one minute to 95 minutes, cluster sizes spanned one to ten children and in 84% of episodes the membership of clusters fluctuated. This suggests that children continually move around the playroom meeting new peers and using different resources.

Based on the changing nature of clusters and play partnerships, children's interactions could not be simply patterned because interactions were so divergent between and across episodes. At best, it was possible to indicate a pattern for social participation which could be either: fleeting, sustained or contingent on context and in order to understand the dynamic nature of clusters it is possible to draw on the contextualist theoretical frame (Tudge, 2008). From this perspective the multiplicity, and often contradictory nature, of interactions and behaviours was partly informed by the different ecological factors which contributed to children's experience (Smith & Connolly, 1980). Findings from the study support this perspective as children's interactions were shown to be influenced by the technologies (relating to Gibson's theory of affordance (Gibson, 1986)); the rules of the playroom (aligning with Bernstein's Pedagogic Discourse (Bernstein, 1990)); the layout of resources (linking with ecological studies of social interaction) as well as cultural traditions in preschool, e.g. the macrosystem (reiterating the work of Bronfenbrenner (1979) and the new social studies of childhood (James *et al*., 1998)). These influences are explored further in Section 7.2 and Section 7.3 but for this section, the varied nature of children's interactions is better described from a socio-cultural perspective.

According to socio-cultural theory children continually reconstruct their environment as they engage with it (Stacey, 1999). That is to say that children draw on the cultural norms and practices which are embedded in the preschool and interpret and reinterpret them as they are faced with new knowledge and experience (Webb & Mastergeorge, 2003). Therefore, even if all aspects of the ecological context were identical (i.e. with the same children and the same technology) across all episodes, the play and the social interactions within that episode would still not be the same. This is because in the time between episodes children would have gained more experience of the environment, including their interpretation of the rules and regulations of the preschool and how the resources should be used. Thus, in later episodes, they would have a more developed understanding of the environment which would influence their perspectives on how best to negotiate their involvement in clusters, as well as how to use the resource. This perspective was particularly informed by the findings presented in Section 6.4.3 where it was highlighted that while rules and regulations may attempt to provide a mechanism for explicitly direct behaviour; in reality they provide a framework for behaviours which is open to interpretation.

These findings suggest that children's experiences with technological resources cannot be generalised for all children or all technologies. The process of constructing and reconstructing their environments, combined with the influence of the overall preschool culture and layout, suggest that children's technology use, as well as their interactions around technologies, are not standardised, offsetting claims that technologies are linked to specific forms of interactions and social development (Cordes & Miller, 2000). This finding aligns with previous research which has indicated that technologies offer diverse and varied opportunities for children, not only for learning but also for social interactions, in preschool education.

7.1.2 Children Actively Seek Interaction around Technology

In the introduction to this thesis I demonstrated that technologies were considered, by some, to hinder social interaction and encourage social isolation (Cordes & Miller, 2000). This was compared to traditional play resources which were believed to foster social development (Rubin, 1977; Shure, 1963). I also explained that these arguments often lacked foundation because they were generally not evidence-based (Brooker & Siraj-Blatchford, 2002; Plowman

& Stephen, 2005) and as a result the aim of this study was not to refute these claims, but to investigate them and provide an empirical platform for the discussion.

Throughout this study it was clear that children actively sought interaction with peers when they used technologies and I so there was no evidence to suggest that technologies actively promote social isolation. The results demonstrated that children:

- consistently formed clusters around technologies;
- were more often observed playing in clusters than alone;
- were most often seen attempting to initiate involvement and engagement with peers;
- were more likely to accept than reject invitations to join with others;
- at times, sacrificed their access to technology in favour of interacting with their peers;
- rarely engaged in hostile interactions.

As is clear from these findings, data from this study supports the work of O'Hara (2008) by suggesting that technologies showed no real signs of promoting social isolation. While Duplo Techs may have created the conditions for parallel play, this was still conducted as part of a cluster and therefore children rarely used these resources in pure isolation. Indeed, there was clear evidence to align this study with the work of Jackson (1990) and Orleans and Laney (2000) who indicated that technologies could promote group interaction and cooperation. For example, when mutual owners were present and there was inter-subjectivity (Rogoff, 1990) between peers to recognise the need to work together towards a common goal, they demonstrated cooperative participation and task driven engagement around the SMART board. This study builds on the small body of literature which has begun to highlight the potential positive correlation between pro-social or task-driven engagements and technology (Brooker & Siraj-Blatchford, 2002; Clements, 1994; Clements & Natasai, 1992; Haugland & Wright, 1997). That is not to say that technology always ends in pro-social engagement, as data from this study did demonstrate some anti-social engagement and indeed children, at times, did use the technology alone even if only for a short period of time, suggesting that just as Mikropoulos (1994) highlighted interactions around technologies can be both positive or negative depending on the circumstances but in general children seek out partners with whom to use the resource.

It may be argued that practitioners planned children's groups to afford collaboration and interaction and to alleviate the pressure on the limited number of resources (Webb & Mastergeorge, 2003), implying that children's social play was not by their own choosing. However, this study, and the work of Wang and Ching (2003), found that practitioners did not purposefully form groups (although practitioners did, at times, position resources in an attempt to increase interaction as was the case with the exercise equipment). Instead, children actively and independently formed their own groups without prompting from adults, contrasting with Ladd and Price (1993) who suggested that in the later years, classroom children are not always allowed to choose play partners. For this study it was abundantly clear that children aged between three and five in local authority provision did have considerable agency in choosing play partners. Thus, children were constructing their own social experiences as would be expected from the contemporary approach to preschool practice informed by the new social studies of childhood (James *et al*., 1998) and for the most part these experiences tended to be sociable.

7.1.1 Children Manipulate Roles and Positions

Thus far I have demonstrated that in contemporary preschools children have considerable control over their daily experiences and are provided with many opportunities to direct their own experiences, aligning with the work of (Stephen *et al*., 2008). As such they hold some agency over their daily lives in preschool. Although there is no overarching definition of agency, it has been suggested that one perspective of it, is something that can be attributed to individuals (Grunbaum, 2009). Bandura describes human agency as the "the capabil[ity] of intentionally influencing their own functioning and life circumstances" (Hutchison, 2010: 28) and as such this agency will then contribute to how they are able to act.

The varied degrees of agency that children hold in preschool, as part of clusters and in relation to technology, contributed to the interactions they exhibited. This was demonstrated through the example of helping interactions where it was clear that children exercised their agency by being selective about who they allowed to help. For example, it was possible to see children accepting help from some peers but simultaneously rejecting help from others. Similarly, children accepted help from a specific child on some occasions but at other times that child was not welcomed to offer help. Yet, individual agency tells only one part of the story as Schaffer (1996) indicated that all actions are embedded in social relations. Indeed evidence from this study suggests that one of the fundamental aspects of their interactions was the need to negotiate with, and mediate, the other children in the clusters. Children's agency in interactions was therefore constrained by the other children and as such children's social interactions were shaped by the way children mediate peer relations.

Understanding this meditational process is one of the ways that this study is able to make a contribution to knowledge regarding technologies in preschool. In this study, social relations are related to agency afforded by:

- the child's position in relation to technology (See Section 6.2.2);
- the child's role within a cluster (See Section 6.3.3).

Influenced by the work of Ljung-Djarf (2008) and Positioning Theory (Howe and Peters 1996) Section 6.2.2 of the previous chapter demonstrated that children assumed a range of technological positions in clusters including owner, spectator, parallel owners and mutual owners. These technological positions contributed to how they *interacted with the computer*. Furthermore, the data analysis was also influenced by literature on peer leadership (Parten, 1932a; Shin *et al*., 2004; e.g. Woodrow & Busch, 2008) and from that it was possible to see that in addition to technological positions, children also assumed social status roles including leader, interacting member and non-interacting member. These roles therefore contributed to how children *interacted with peers around technology.* Fundamentally, my data indicated that children assumed both positions and roles simultaneously and when combined, they created a degree of agency in relation to interactions for the child either in relation to the rest of the cluster or to the technology, or both, depending upon the combination adopted. The various combinations of roles and positions are illustrated in Figure 33.

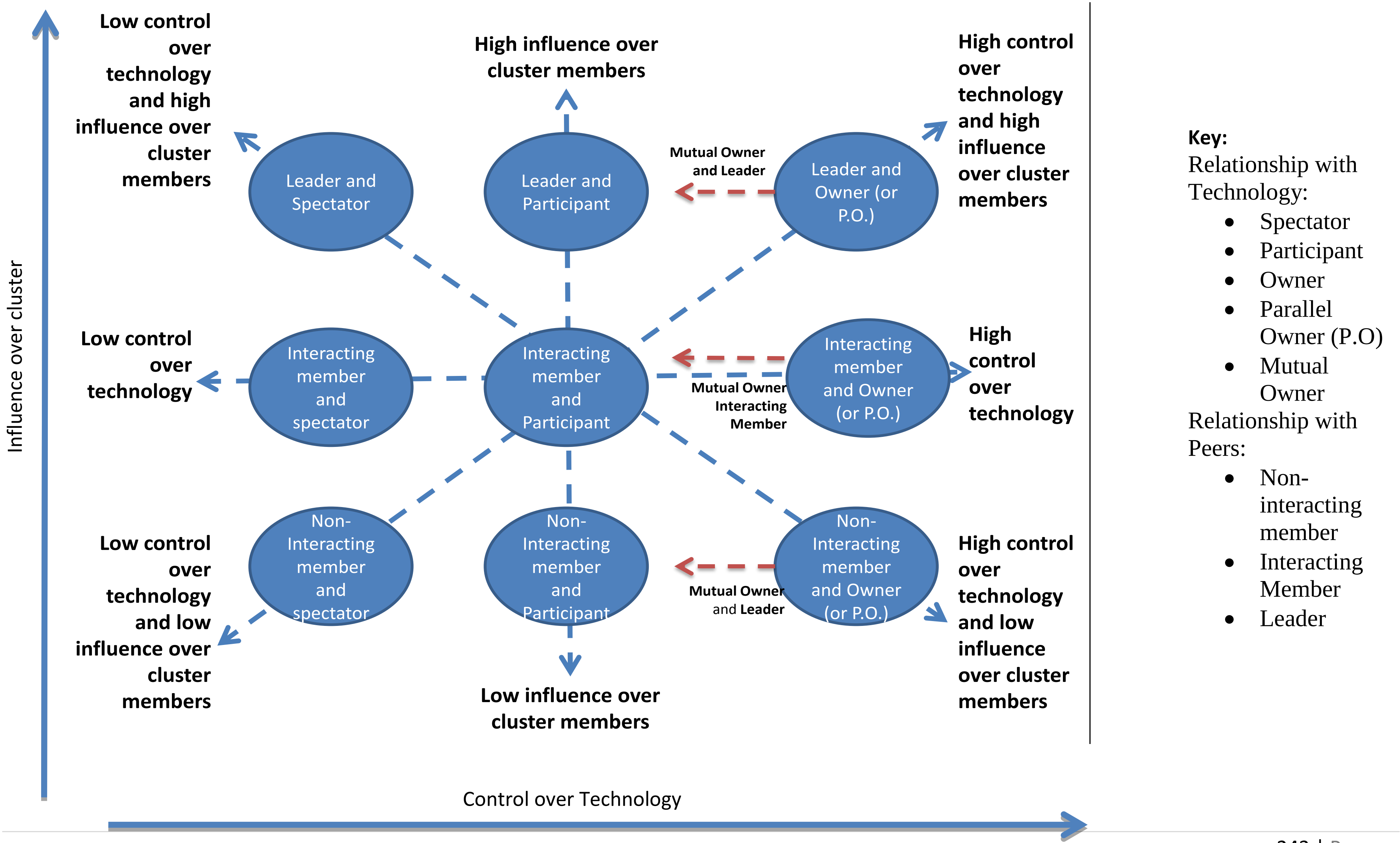
The top right of the diagram indicates that children with this combined role and position have considerable control over both the technology and the cluster allowing them considerable agency in directing the play. Similarly, the lower left corner shows the combination of social status roles and technological positions with the least control over both the cluster and the technology, and as such they are more constrained in directing the play. It should be noted that when a child shares a role – for example in the case of mutual owners - their individual degree of agency diminishes slightly in relation to the particular shared role or position because they have to negotiate with their peers how to manage that situation. In the case of mutual owners, their agency over technology use diminishes slightly as they negotiate how to use the resource, but their agency in relation to interactions with peers does not, unless they also share this role.

It is essential to recognise that as each child makes a choice about their position and role, the cluster will consist of a variety of roles and positions simultaneously, and children have to negotiate interactions across all these different positions and roles. Cannella (1993) refers to these 'negotiation strategies' as the 'nature of social interaction'.

By establishing these positions and status roles within the cluster, children are co-constructing their own social processes or conventions. Saracho & Spodek (2007: 36) define these processes as "children's placement in the social structure, social dominance hierarchies, and key societal roles". Social processes and conventions are therefore something greater than the habitual behaviours or actions of the child. They are the structural factors which influence and impact upon behaviour and contribute to the interactions and participation observed. A child's individual placement within the cluster influences the social processes and in doing so the child becomes a co-constructor of the mechanism. In these situations it is these social processes, technological positions and social roles that govern interactions more so than technological artefacts.

Peer culture has been characterised by children's persistent attempts to gain control over their lives, which is achieved through the co-construction of social activities with peers (Corsaro, 1985). From this perspective, the matrix presented in Figure 33 is one mechanism that children utilised to 'strive for control' and it represents the agency that children have in shaping their interactions and behaviours because, as part of the activities, children make decisions about their play and the 'social connections' they make (Canning, 2007). In particular, this matrix brings together two known ways that children are able maintain control: either by assuming ownership of a resource (which endows them with ownership rights) (Laupa, 1994) or through leadership (Parten, 1932a).

Figure 33 – Relationships to peers and technology



This matrix is particularly important for early years education because up until now literature has either: addressed how children interact with technology, as shown through Ljung-Djarf's (2008) Model and indeed through the work of Brooker and Siraj Blatchford (2002) or how children interact with each other irrespective of the resource (Driscoll & Carter, 2004; Rubin, 1977). The matrix of roles and positions in this study describes how children do both, which extends our understanding of children's social interactions in technology-rich preschool environments. Furthermore by focusing on clusters in this way and identifying the agency afforded by different positions and roles it is also possible to understand how peers, when free from adult intervention, *form their own identity where they have choices in what they bring to the play space (*Canning 2007 231). Each child makes their own choices about their identity – by assuming a technological position and social status role – and their subsequent interactions are related to their agency to act in relation to their peers.

7.1.2 Children Engage in Scaffolding and Guided Interaction

This study provides an overview of a vast range of behaviours, interactions and engagements in relation to technology and of note for an educational study was that helping interactions which were frequently observed. Socio-cultural perspectives about learning are well established and in particular, references are frequently made to Vygotsky's (1978) Zone of Proximal Development and Wood *et al.'s* (1976) description of Scaffolding. These models demonstrate how a more capable partner can aid another individual in completing a task. Knowledge of the ZPD and the social nature of learning has led socio-cultural theorists to focus on the crucial role of others as mediators of learning (Chen & Chang, 2006; Stephen, 2006b) particularly in relation to adult-child interactions (Barbuto *et al.* 2003) and several frameworks have conceptualised the adult's role in supporting learning, including: guided participation (Rogoff *et al*., 1989); assisted performance (Tharp & Gallimore, 1988); legitimate peripheral participation (Lave & Wenger, 1991) and guided interaction (Plowman & Stephen, 2007a). As a result, a practitioner's ability to support children is widely known in both non-technological and technological resources.

However, this study provides an alternative understanding about child-child interactions and supports the perspective that children are also willing to scaffold their peers' learning (Freeman & Somerindyke, 2001). The research shows children readily offered help and support to peers when using technologies and contrasts with previous findings which indicated that helping behaviours were minimal (Muller & Perlmutter, 1985; Plowman & Stephen, 2005; Webb, 1987). In particular, this study demonstrated that helping behaviours occurred often, around the computer, SMART board, CD player, and the laptop.

These helping interactions occurred particularly in the middle of the school year which may be explained by Kutnick and Kington (2005) who argue that tasks have to be sufficiently difficult to encourage collaboration but not too difficult to discourage participation. For the children in this study it appeared that during the middle of the school year the task may still hold enough challenge to force a request for help, yet not be too difficult for all children in the preschool and therefore some peers were knowledgeable enough to provide support. At the beginning of the school year most children were not knowledgeable enough to provide support and at the end of the school year more children had mastered the task and no longer required help. In essence, during the middle of the year the spread of children's ZPDs (in Vygotsky's terminology) was optimal for both tutor and tutee to offer and receive help. Indeed, literature is available which suggests that peers can provide scaffolding because they understand how to explain the concept to their friends and at the right level (Webb & Mastergeorge, 2003). If this is the case then it may be inferred that if the more knowledgeable companion is a peer then they are better positioned to increase and extend the child's ZPD without operating outside it and causing greater confusion.

These resources may provide greater opportunities for scaffolding because they provide greater challenge to the children. This brings in to question those concerns that technologies are too advanced for children and in Piagetian terms, and that children are not developmentally ready to use these resources (Attewell *et al*., 2003; Cordes & Miller, 2000) Rather, Bers and Horn (2010) indicate that as long as children are made aware of and understand the task, they are typically capable of using the resources. This study suggests that the difficulty associated with these cognitive activities, combined with the ability to form clusters provided opportunities for helping and collaboration and seems likely to present conditions that will support learning.

Section 7.2 Research Question 2: Preschool Context Influences Interactions

The second research question for this study asked: *What are the distal and proximal characteristics of the playroom that make a difference to interactions observed around technology in preschool playrooms?* Chapter 6 addressed this research question and demonstrated that:

- Practitioners (i.e. how they constructed certain activity centres e.g. pretend play, construction or musical, their decision making in relation to which technology would be on display and their promotion of turn-taking and sharing rules) contributed to children's interactions. See Sections 6.4.1, 6.4.2 and 6.4.3 for greater information on this.
- Children were driven by access to resources and the inadequate availability of resources resulted in clusters.
- Preschool culture is made up of an explicit social hierarchy as well as rules and regulations which guide behaviours.

- Children's interpretation of the preschool contributed to their understanding of whether technologies should be used in a social or isolate manner.

These findings were significant to the current debate about technology in preschools because the majority of technological studies neglect the wider preschool environment as part of their studies. Thus, data to answer this research question has a noteworthy contribution to make in terms of understanding social interactions around technology. In particular, this study is able to contribute to the technology debate by demonstrating that preschool is a social construction, of which technologies form one part, and the cultural nature of preschool is particularly influential to children's interactions.

7.2.1 Unstructured Technological Experiences, 'Playing Around' and Helping Interactions

In addition to demonstrating that children appeared comfortable in offering help, the data from this study is also useful for informing our understanding of preschool practices and pedagogical approaches. It has been suggested that in primary school children often use ICT under adult direction in a step-by-step manner which may imply to the child they are not capable of learning with the resource autonomously (Kennewell & Morgan, 2006). However in preschool, children's experiences were unstructured (with the exception of the general preschool schedule described in Appendix 8) and with technology in particular, most often children were left to use resources without adult intervention.

By allowing children the freedom to form clusters and giving children the freedom to explore technologies, preschools are providing greater opportunities for the possibility of interactions. For example throughout these clusters peers offered help consistently, even if it was not initially requested, and they consistently made attempts to initiate some form of interaction. From this, it could be inferred that another function of clusters is to reduce the need to explicit request help. Children may often offer help without it being requested because they are already a member of the cluster and want to become involved. As indicated in the previous chapter, it is unclear where children help for altruistic reasons or for self-orientated reason, but nevertheless they use clusters as the foundation to offer help at various points in the episode. Similarly, clusters provide a greater opportunity for supportive interactions as they are incorporated into play rather than relying on the reactive praise of practitioners. In addition, from an educational perspective, this unstructured approach and allowing children to 'play around' with a resource is considered an effective way of learning how to manipulate and operate the resource (Kennewell & Morgan, 2006). These findings all suggest that free choice and the unstructured nature of technology use in preschool all contribute to a greater social and educational experience for children.

7.2.2 Preschool as a Constructed and Planned Environment for Interactions

Thus far, I have argued that children in both Hillfoot Nursery Class and Sylvester's Preschool had a considerable amount of freedom to direct their play experiences because they were allowed to choose the activities they wished to undertake and with whom they wished to play. However, I have also alluded to the fact that while they have agency in their daily experiences, their agency is shaped and constrained by external factors, as was demonstrated in Section 7.1.1 where other children's positions and roles contributed how their peers could interact. From a similar perspective children's agency is also constrained by practitioner planning and the preschool environment which is constructed for them, which brings me back to the suggestion that the preschool is a co-educator (Visscher & Bouverne-De, 2008) and that children's perceptions of the environment contribute to their behaviours and interactions.

Despite contemporary theoretical perspectives and views of childhood indicating that children in the 21st century are afforded agency over their lives (Anning, 2009; James & Prout, 1997), this is an ideological perspective on child-care provision in the UK, which emphasise a child-initiated and child-directed preschool experience (Plowman & Stephen, 2007a; Stephen, 2006b). Empirical literature demonstrates a paradox between current theoretical perspectives of children's agency and the real life context. Evidence (or at least theories grounded in empirical data) suggests that preschools are a system of routines, rules and regulations (Alcock, 2007; Brooker, 2002), social hierarchies, and experts and novices (Plowman & Stephen, 2007a) and Jordan (1995) argues that the child's world is a world 'presented to them ready made by adults'. Hence, while there is some freedom for children to make decisions, their agency is somewhat limited because everything about preschool is planned for children by adults. For example children may choose their own activities but they must do so from a pre-defined and pre-approved range of activities which adults deem suitable, as demonstrated by Plowman and Stephen (2006) as part of the role of practitioner in guided interaction.

In essence, children are placed in an environment which is distant from 'real' life, that is they are in an 'artificial world' designed specifically to meet their needs (Fleer, 2003). In doing so, the preschool environment demonstrates 'behavioural constraints' defined as "aspects of the environment which limit the way the space is used' (Maxwell, 2007: 231). In addition, as properties of the resources provide various opportunities for children's behaviours, they are also constrained by the choice of resources available. The empirical studies therefore portray preschool as a social place where practitioners, either implicitly or explicitly, direct children's behaviours, social interactions and how resources are used.

7.2.3 Socially Constructed Rules and the Pedagogic Discourse

Explicit direction of children's behaviours is somewhat managed through the implementation of rules and regulations in preschool. Children operate in an adult world where it is recognised that "children's lack of power relative to adults in the social world limits the extent to which their agency can be exercised" (Uprichard, 2009: 4). The same is true for preschools where children are believed to have a 'heteronymous orientation towards adult authority that is absolute and unquestioned' (Laupa *et al*., 1999: 132) as practitioners are believe to 'represent' authority (Corsaro, 2006; Ladd & Price, 1993).

The formal, adult-directed nature of children's preschool experiences creates a power imbalance between the practitioner and the child and provides the adults with the opportunity to create rules and regulations which children accept based on their perspective that adults are of superior age or size and have superior power (Laupa, 1994). As such children recognise that practitioners were the masters of the community (Lave & Wenger, 1991). Thus, practitioners generally follow the approach described by Canning below.

> *In certain situation the adult will need to set the boundaries of the play space and ensure that children understand the limits that are acceptable in terms of behavior and interaction, but once children have accepted these parameters they should be given the opportunity to explore their space without adult intervention (Canning, 2007: 231).*

Through creating a culture where adults are regarded as authoritarian, preschools purposely construct this power disparity which contributes to children's everyday experiences. However, despite this explicit power imbalance, research indicates that children continually negotiate independence and rules of order (Wang & Ching, 2003). Children, although aware of the adult rules, were able to negotiate their own culture and rules of social order by bending or adhering to social rules when it suited their agenda. For this study it was particularly the case when children turned over the egg timer to extend their play or when they offered help as a mechanism for continuing their involvement in an activity, despite being instructed to relinquish control of the resource.

In order to explain this it is useful to draw on Bernstein's Pedagogic Discourse. It became clear that inducting children into the rules and regulations of the preschool helps to create 'strong framing' through a strong 'regulative discourse' which creates a visible pedagogy for children to follow (Bernstein, 1990). Bernstein argues that with a visible pedagogy, children are aware of the criteria of the discourse. For example, in this study children were driven by access to the resource which was regulated by rules of turn-taking and sharing and when resources were scarce, children were instructed to use the egg timer to offer a fair distribution of time at the resource. Similarly, when resources could be used by multiple children they were reminded to 'share'. The visible pedagogy in this situation is that turn-taking was essential for technologies which afford an individual owner, while sharing was required for technologies which afford multiple owners. Children's understanding of turn-taking is developed from the visible pedagogy which practitioners created, where the rules of social order are made explicit.

Yet, while the visibility of this pedagogy appears quite explicit to an adult observing, data from this project indicated that the pedagogy may be more invisible from the child's perspective because it is more open to interpretation than expected. This relates to Stephen and Brown's (2004: 329) description of insiders who 'construct knowledge about the playroom as they participate in and, to some extent, shape that reality'. It appeared to me, and to practitioners, that the rules around turn-taking and sharing were explicit for children to follow i.e. turn-taking related to one individual owner while sharing related to multiple owners. However, data from the children's own perspective indicated that this criterion was not as explicit as adults believed it to be. Children appeared to find it difficult to distinguish between turn-taking and sharing as some children interpreted turn-taking as one-person at a time, while others showed evidence that they thought sharing meant one at a time. Thus, children utilised these two terms interchangeably and as a result the supposedly visible pedagogy becomes rather more ambiguous or implicit with interpretation. This questions the true visibility of these rules when they are subject to a variety of interpretations and results in a more ‘invisible pedagogy’ and weaker framing as part of the regulatory discourse as the rules of social order are more unclear.

The alternative perspective is that rather than the pedagogy being invisible, it was in fact visible with very clear rules of social order but children were skilful in manipulating and bending rules. It may not necessarily be the case that children have differing interpretations of the rules, it is simply that children are competent in making the rules fit their agenda, rather than the child having to compromise their agenda to suits the rules. Certainly Alcock (2007: 281) argued that “children re-create their own culture meaningfully by playing flexibly with the rules that surround everyday practices”. Children in this study were continually flexible with the rules, by adapting them to meet their needs and this implies that children are in fact very clear on the rules to follow, so clear in fact that they are able to identify loop holes in the system which they can use to their advantage. Furthermore, children understood that the visible pedagogy holds greater power than an invisible pedagogy and they were able to draw on the explicit rules to meet their needs.

Understanding how children interpret these rules is vital because they typically manage their own involvement in clusters and when using technology. In addition, from an educational perspective, these findings are pertinent as Kennewell and Morgan (2006) suggest that implicit rules concerning interaction with others have influences on how children learn with resources and they indicated that further study was required around this area. Literature on how children *create* rules in preschools (Cobb-Moore *et al*., 2009) and literature about turn-taking during conversational interactions (Sacks *et al*., 1974) is available but this does not relate directly to the formal rules about turn-taking to which children abide in preschool, or how these rules influence social interactions around technology use. Similarly, while there is an understanding about how children create or bend rules there is less known about how children interpret the adult-defined rules that are imposed upon them in preschools. This is important because the way that children understand rules will influence how they behave and interact during turn-taking negotiations. Thus, analysing the way children invoke or bend rules in the playroom helps to explore "the cultural resources to which members orient in order to make sense of their social worlds" (Cobb-Moore *et al*., 2009:1478).

7.2.4 Gender

The influence of gender cannot be over looked when considering social interactions but it has not featured as a major characteristic of children in this study and it appeared more appropriate to recommend this area of study for future research for four reasons.

1. This project aimed to provide an introduction to social interactions around technology, the issues to address were already broad and the decision was made to focus on the key areas laid out in the theoretical frame as a means of narrowing the study and making it more manageable.
2. Gender is a large area of study and an exploration of gendered social interaction around technology would warrant a full research project and could not be sufficiently covered as a small section of an already wide-ranging study.
3. It was felt that a gendered exploration would require an alternative theoretical perspective to guide the study and would qualitatively change the nature of the study forcing me to explore the data from an alternative worldview.
4. My knowledge of the context, the familiarity with the observations in the playroom and the initial analysis of gendered interactions did not provide any striking findings

which suggested that it was essential to explore gender further at this stage. See Appendix 11 for an overview of the initial analysis.

Section 7.3 Research Question 3: Technology and Interactions

Driscoll and Carter (2009: 280) suggest the importance of exploring the artefacts in relation to social interaction as they indicate that:

> *The type of toy that is available to preschool children is an environmental setting event may influence social interaction between children.*

As a result, research question three asked: *In what ways do the properties or the affordances of the technology relate to the child-child interactions observed?* Despite artefacts being a significant component of context, technologies were seceded from the wider context (addressed in RQ2) in this study because they were one of the key focuses and required discussion in their own right. This question was addressed in Chapter 6 and main findings indicated that:

- Affordances of technologies provided opportunities for children to interact in different ways around technologies. For example, Duplo Techs afforded parallel play because of its multiple parts.
- The physical properties of the technology provided opportunities for various technological positions to emerge.

Few theoretical perspectives were discussed in the literature about social interactions and technology, because few theories of this nature exist. However, literature was presented on assertions and concerns about technology in relation to social development. Data from this study provided an empirical foundation for this discussion and demonstrated that the situation is far more balanced than is evident in the technology debate. In particular, data from this study provided evidence to alleviate the concerns that:

- technologies are replacing more traditional activities;
- children are encouraged to use technologies as digital babysitters;
- technologies hinder social interaction and lead to more isolated play.

7.3.1 Technologies are Not Homogenous Resources

Non-technological research has suggested that different resources have been linked to different kinds of play and social behaviour (Rubin & Howe, 1985). For example dramatic play resources were linked to more cooperative play while puzzles endorsed more solitary play (Rubin, 1977). As a result, the technology debate presented in the Chapter *Introducing the Study: Exploring Young Children's Social Interactions in Technology-rich Preschool Environments* highlighted the criticisms of all technologies are often lumped together as socially detrimental (Cordes & Miller, 2000). In this debate only overarching categories of resources are compared i.e. technologies versus traditional preschool resources, yet with advances in technological resource this is no longer appropriate because now technologies are just as varied as traditional preschool resources.

As demonstrated throughout this thesis and particularly in Section 7.3.1, technologies do afford different uses and can be integrated into a range of different activities. Although the overarching focus on social interactions can only be understood by exploring the wider preschool context rather than just the technological artifact, the affordances of the resources did demonstrate that the technologies have a role to play in shaping these children's experiences. This study was able to contribute to this understanding by demonstrating that some resources (by their nature and because of what kinds of activities they afford) could be quite central to the activity (e.g. the computer or the digital camera), promoting more densely packed clusters and more lively and often attention seeking behaviours while other resources (e.g. the pretend play resources) could become quite peripheral or just a 'prop' to the play, stimulating more sparsely distributed clusters and lessens the need for children to 'make their presence known'.

In summary, like traditional resources, technologies offer a range of play opportunities. Much of the research which informs the toxic childhood focuses on computers; an individual resource which has more limited opportunities for varied play. By expanding the focus to address a larger range of technologies it is possible to see that technologies are not markedly different to other more traditional resources in terms of offering variety, being central or peripheral to the activity and allowing different kinds and sizes of clusters to forms. All of these aspects relate to the ecological context and contribute to the interactions that were observed. As a result, this study supports Clements and Samara (2003) who suggested that technologies should not be explored together as one homogenous resource.

7.3.2 Affordances Only Offer 'Opportunities' for Interactions

Gibson's theory of Affordance (Gibson, 1986), and later interpretations of this theory, was particularly informative for this study.

> *The term affordance refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used. A chair affords ("is for") support, and, therefore, affords sitting."*
>
> *(Norman, 1988: 9)*

This has been explored in early years education to some extent, yet most educational research on affordances addresses how resources (particularly technological resources) afford learning or cognitive development (Laurillard *et al*., 2000). Explorations of affordances in relation to social interaction or social processes is more limited with Carr (2000) being a noticeable exception. Nevertheless affordances were considered fundamental to explore in relation to social interactions in light of claims that 'computers' (and potentially other technologies) could promote social isolation and warranted discussion.

From the previously available studies, there is a general consensus that some resources are more social than others (Chandler *et al*., 1992; Ivory & McCollum, 1999) but the data for this study only partially supports this finding. Certainly the findings suggest, in line with previous research by Graver (1991) that technologies afford different ways of acting depending upon how the properties of the technology are perceived by the user (Gibson, 1986; Norman, 1988). However, it was the latter point which was fundamental, in that it was how the children interpreted technologies' affordances which determined interactions. Although technologies like the SMART board offer opportunities for collaboration, task-driven interactions are less likely to occur if children perceived certain technologies to be an isolate resource.

The contextualist and socio-cultural frame which guide this study argue that multiple influences simultaneously contribute to children's interactions and as a result it is not possible to say that some technologies (as segregated from the rest of the context) were directly linked to the interactions than others. Instead, it is argued in this study that the affordances of some technologies contribute to more social interactions when aligned with the other components of the preschool context, which also foster social interactions. It is the combination of the properties of the technology and practitioners allowing children to act in a certain way that resulted in the interactions observed. In essence technologies are one part of the context and they contribute to the interactions observed but do not single handedly determine them.

Thus, I must reiterate Saracho and Spodek's (2008a) suggestion that technologies are merely a tool in children's lives which do not replace [or direct] human interaction. It is important to recognise the advice offered by Plowman *et al.* (2010b) which suggests that a multitude of factors may contribute to interactions around technology and from a socio-cultural and affordance perspective, these cannot solely be attributed to the technology.

7.3.3 Technologies Supplement Traditional Preschool Activities

In the introduction to this thesis I highlighted the perpetual concern that technologies are replacing, overtaking and overshadowing more traditional resources (Alliance for Childhood, 2004; Cordes & Miller, 2000). More specifically the argument is that 'new' technologies are overtaking other resources, including old technologies (Riley *et al*., 1949; Wartella & Jennings, 2000). However evidence for this study demonstrated that the breakdown of how often resources were used was stark. It was apparent that non-technological resources were used considerably more than technological resources.

- Non-technological activities were recorded on mapping snapshots 372 times (83% of all documented activities).
- Technological activities were recorded 77 times (17% of all documented activities).

This study therefore demonstrates that, In fact, children supplemented their activities with technological resources but the majority of their activities involve 'traditional' non-technological resources and reiterates Bers (2008) who suggests that technologies 'complement' traditional resources. Furthermore, the activities documented in this study do not take into consideration outdoor activities (because this was outwith the remit of the study) therefore the true proportion of technological activities is likely to be even less. Thus, this study is able to ease worries that children's experiences are being taken in inappropriate directions because in general their experiences still focus on traditional resources.

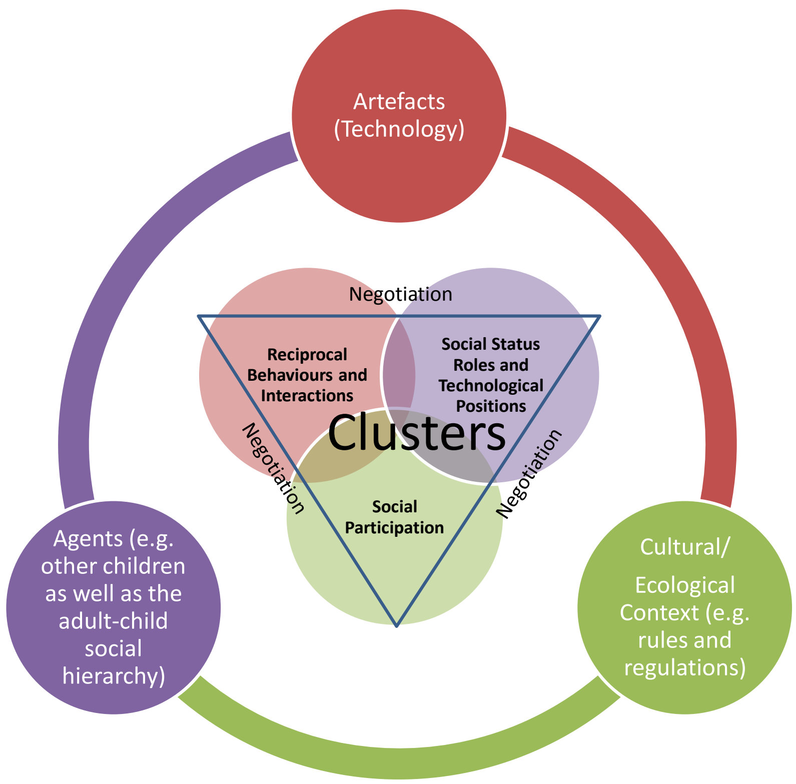
Similarly, I saw no evidence to suggest that childhood experiences around technologies were any different to my perception of experiences around traditional resource. For example, social interaction findings resonate with previous literature that children infrequently exhibited hostile behaviours weakening claims that children were becoming less docile and more angered (Buckingham, 2000; Palmer, 2007). These findings align with previous literature about children's use of resources in preschool (Innocenti *et al*., 1986; Muller & Perlmutter, 1985; Prochner *et al*., 2008; Wang & Ching, 2003; Webb, 1987). For example, Innocenti indicated that they too observed limited negative or aggressive interactions amongst peers; Wang and Ching demonstrated that children generally liked to play with peers in 'spontaneously formed groups' and Muller and Perlmutter indicated that 63% of time children spent at the computer was with a peer. These studies demonstrate that over a 25 year period children have consistently been seen playing with peers around all types of resources whether non-technological (as demonstrated by Innocenti) or technological (as shown by this study as well as the work of Wang and Ching and Muller and Perlmutter) and exhibiting varied interactions. These findings inform the technology debate by demonstrating that irrespective of whether children play with technologies or otherwise, they are unlikely to do so in isolation, positioning technological resources alongside non-technological resources in terms of completing activities in a social manner.

Section 7.4 My Framework: Adapting and Extending Previous Models.

Throughout this thesis I have demonstrated that through clusters children in preschool interacted around technologies. These clusters were at the centre of the wider preschool context were other individuals (children or adults); the artefacts (technologies) and the cultural practices (rules and regulations, availability of resources, the division of resources into activities) influence the interactions and behaviours observed. And within these clusters children exhibit reciprocal behaviours and social participation and assumed various technological positions and social status role, all of which are dependent upon a meditational or negotiation process between children. In order demonstrate this process more clearly, Figure 34 was developed.

The outer circle in the model represents the wider preschool influences that contribute to children's social interactions, while the inner Venn diagram represents the clusters that take place within preschools. These clusters are the foundation for interactions, behaviours and social participation and are constructed in conjunction with children's combined social status roles and positions. The overlapping triangle signifies the negotiation constantly takes place between children within clusters. As clusters change and evolve members have to continually modify and adapt their behaviours and interactions to new peers and therefore this negotiation is fundamental to the interaction and behaviours observed.

Figure 34 – Negotiating Interactions within Clusters and Context



This model is not a new revelation; instead it is an adaptation and extension, for this context, of work that has gone before. In particular, it resonates with the work of Bronfenbrenner's (1979) Ecological Systems Theory, Wang and Ching's (2003) Transactional Model of Social Processes , Johnston's (2010a) Techno-Microsystem as well as some of the components of the Activity Theory Triangle (Engestrom *et al*., 1999). The data analysis was informed by these contextualist and socio-cultural perspectives which were drawn upon to make sense of the data and as a result aspects of each of these frameworks can be identified in my model.

The study was confined to the preschool playroom and therefore inferences could not be made to the wider Scottish culture etc. Consequently, my model focuses on what Bronfenbrenner would describe as the Microsystem. The outer circle represents one specific microsystem in children's lives, the preschool, but it is described in terms of the key components of the microsystem relevant to this study. Similarly, the Venn has strong links to these previous theories. It relates to the 'proximal processes' that Bronfenbrenner describes and specifically it builds on the social practices and the negotiation that was described in Wang and Ching's Transactional Model of Social Process. Wang and Ching demonstrate that children's interactions are one of the components that encircle their interactions but in this study, interactions were central and occurred within clusters.

These influences shaped my analysis, but my model represents the data from my study. Thus, these frameworks provide a starting point for understanding children's social interactions in technology-rich preschool environments, but the final model was derived from the data itself. It demonstrates the complex nature of children's social interactions and the multitude of influences which contribute to these interactions. For this study it is important to note that technologies are only one influence and they are given equal weight with all the other factors. The understanding that technologies are not the sole influence on interactions represents the central finding from this study that social interactions are influenced by many components of preschool and technological artefacts are not the sole determinant of interactions. In essence, the preschools as observed in this study aligned with Ladd and Price's description of the playground.

> *"playgrounds are essentially social environments intended for social rather than academic purposes. The characteristics of playgrounds afford children the opportunity not only to determine the nature of their play activities, but also the peers who serve as partners for these activities. In addition children have the opportunity to display a wide range of social behaviors towards a sizable proportion of their classmates" (Ladd & Price, 1993: 131-132)*

Section 7.5 Contribution to Knowledge and Final Remarks

This project provides a small, but nonetheless still meaningful contribution to the body of knowledge and the current debate in society about the desirability of young children engaging with technologies. Inherent in such a small scale study are various limitations, for example the decision to focus on two complementary preschool institutions as a mechanism for obtaining a greater volume of data made it impossible to offer comparisons across researcher settings, reducing the generalizability of the data. Similarly, data about children's non-technological interactions would have been beneficial to provide a fuller understanding of the influences of technology on interactions, however, without employing additional researchers to collect and analyse this data, it would have compromised the volume and quality of technological data that it was possible to collect.

Nonetheless, while the claims of this study are modest; they contribute to the field of educational research by offering some original knowledge which demonstrated that children's social interactions were wide ranging and contingent on several aspects of the preschool context were not solely dependent on technological artefacts. In summary, based on everything that has been presented throughout this thesis, two main conclusions have been identified.

1. Children's social interactions around technologies are complex and patterns are difficult to identify. In essence, children's interactions were contingent on many factors but in general children actively sought interactions.

2. Interactions are mediated by social relationships, ecological components of the preschool, the hierarchy of power and control, and affordances of the preschool and technologies. Social interactions observed cannot be directly related to the technologies alone.

References

Alcock, S. (2007), Playing With Rules Around Routines: Children Making Mealtimes Meaningful and Enjoyable, *Early Years*, vol. 27, no. 3, pp. 281-293.

Alliance for Childhood. (2004), Tech Tonic: Towards a New Literacy of Technology

Anderson, D. R., Huston, A. C., Schmitt, K. L., Linebarger, D. L., & Wright, J. C. (2001), Early Childhood Television Viewing and Adolescent Behavior: The Recontact Study, *Monographs of the Society for Research on Child Development*, vol. 66, no. 1, pp. 1-153.

Anning, A. (2009), The Co-Construction of an Early Childhood Curriculum, in *Early Childhood Education: Society and Culture*, 2nd ed, A. Anning, J. Cullen, & M. Fleer, eds., Sage Publishers, London, pp. 67-79.

Attewell, P., Suazo-Garcia, B., & Battle, J. (2003), Computers and Young Children: Social Benefit or Social Problem?, *Social Forces*, vol. 82, no. 1, pp. 277-296.

Bandura, A. (1977), *Social Learning Theory,* Prentice Hall.

Bang, J. (2009), An Environmental Affordance Perspective on the Study of Development - Artefacts, Social Others and Self, in *Childhood studies and the impact of globalization: policies and practices at global and local levels*, M. Fleer, M. Hedegaard, & J. Tudge, eds., Taylor and Francis, p. 161.

Barbuto, L. M., Swaminathan, S., Trawick-Smith, J., & Wright, J. L. (2003),The Role of the Teacher in Scaffolding Children's Interactions in a Technological Environment: How a Technology Project is Transforming Preschool Teacher Practices in Urban Schools, ACM International Conference Proceeding Series, in *International federation for information processing working group 3.5 open conference on Young children and learning technologies*, pp. 13-20.

Barker, J. & Weller, S. (2003), Is It Fun? Developing Children Centred Research Methods, *International Journal of Sociology and Social Policy*, vol. 23, no. 1, pp. 33-57.

Barker, R. (1968), *Ecological Psychology: Concepts and Methods for Studying the Environment of Human Behavior,* Stanford University Press.

Basit, T. N. (2003), Manual or Electronic? The Role of Coding in Qualitative Data Analysis, *Educational Research*, vol. 45, no. 2, pp. 143-154.

BBC News. (2010), Online safety for five-year-olds. accessed at:http://news.bbc.co.uk/go/pr/fr/-/1/hi/education/8499356.stm, on:9/2/2010.

Beauchamp, G. & Parkinson, J. (2005), Beyond the 'Wow' Factor: Developing Interactivity With the Interactive Whiteboard, *School Science Review*, vol. 86, pp. 97-104.

Bennett, S., Maton, K., & Kervin, L. (2000), The Digital Natives Debate: A Critical Review of the Evidence, *British Journal of Educational Technology*, vol. 39, no. 5, pp. 775-786.

Bernheimer, L. P., Gallimore, R., & Weisner, T. (1990), Ecocultural Theory As a Context for the Individual Family Service Plan, *Journal of Early Intervention*, vol. 14, pp. 219-233.

Bernstein, B. (1975), Class and Pedagogy Visible and Invisible, *Studies in Learning Sciences 2*.

Bernstein, B. (1990), *The Structuring of Pedagogic Discourse,* Routledge.

Bernstein, B. (2000), *Pedagogy, Symbolic Control, and Identity,* 2nd ed, Taylor and Francis, London.

Bers, M. U. (2008), Engineers and Storytellers: Using Robotic Manipulatives to Develop Technological Fluency in Early Childhood, in *Contemporary Perspectives on Science and Technology in Early Childhood Education*, O. Saracho & B. Spodek, eds., Information Age Publishing, Charlotte, pp. 105-126.

Bers, M. U. & Horn, M. S. (2010), Tangible Programming in Early Childhood: Revisiting Developmental Assumptions Through New Technologies, in *High-Tech Tots: Childhood in a Digital World*, I. Berson & M. Berson, eds., Information Age Publishers, Charlotte, pp. 49-70.

Berson, I. & Berson, M. (2010), *High Tech Tots: Childhood in a Digital World,* Information Age Publishing, North Carolina.

Birbeck, D. J. & Drummond, M. J. N. (2007), Research With Young Children: Contemplating Methods and Ethics, *Journal of Educational Enquiry*, vol. 7, no. 2, pp. 21-31.

Blumer, H. & Hauser, P. M. (1933), *Movies, Delinquency, and Crime,* The Macmillan Company.

Broadhead, P. (2001), Investigating Sociability and Cooperation in Four and Five Year Olds in Reception Class Settings, *International Journal of Early Years Education*, vol. 9, no. 1, pp. 23-35.

Broadhead, P. (2004), *Early Years Play and Learning Developing Social Skills and Cooperation,* Routledge Falmer, London.

Broadhead, P. (2006), Developing an Understanding of Young Children's Learning Through Play: the Place of Observation, Interaction and Reflection, *British Educational Research Journal*, vol. 32, no. 2, pp. 191-207.

Brock, A., Dodds, S., & Jarvis, P. (2008), *Perspectives on Play: Learning for Life,* Pearson Education.

Bronfenbrenner, U. (1977), Towards an Experimental Ecology of Human Development, *American Psychologist* pp. 513-531.

Bronfenbrenner, U. (1979), *The Ecology of Human Development,* Harvard University Press, Cambridge.

Bronfenbrenner, U. (1986), Ecology of the Family As a Context for Human Development: Research Perspectives, *Developmental Psychology*, vol. 22, no. 6, pp. 723-742.

Bronfenbrenner, U. (1993), Ecological Models of Human Development., in *Readings on the development of children*, 2nd ed, M. Gauvain & M. Cole, eds., Freeman, New York, pp. 37-43.

Bronfenbrenner, U. (1994), Nature-Nurture Reconceptualised in Developmental Perspectives: A Bioecological Model, *Psychological Review*, vol. 101, no. 4, pp. 568-586.

Bronfenbrenner, U. (1995), Developmental Ecology Through Space and Time: A Future Perspective, in *Examining lives in context: Perspectives on the ecology of human development*, P. Moen, G. H. Elder, & K. Luscher, eds., American Psychological Association, Washington, pp. 619-647.

Brooker, L. (2002), *Starting School: Children Learning Cultures,* Open University Press, Buckingham.

Brooker, Liz. (2003), Integrating new technologies in UK classrooms: Lessons for teachers from early years practitioners. accessed at:Childhood Education.FindArticles.com, on:2/4/2010.

Brooker, L. & Siraj-Blatchford, J. (2002), 'Click on Miaow!': How Children of Three and Four Years Experience the Nursery Computer, *Contemporary Issues in Early Childhood*, vol. 3, no. 2, pp. 251-273.

Buckingham, D. (2000), *After the Death of Childhood Growing Up in the Age of Electronic Media,* Polity Press, Cambridge.

Cannella, G. S. (1993), Learning Through Social Interaction: Shared Cognitive Experience, Negotiation Strategies, and Joint Concept Construction for Young Children, *Early Childhood Research Quarterly*, vol. 8, no. 4, pp. 427-444.

Canning, N. (2007), Children's Empowerment in Play, *European Early Childhood Education Research Journal*, vol. 15, no. 2, pp. 227-236.

Carr, M. (2000), Technological Affordance, Social Practice and Learning Narratives in an Early Childhood Setting, *International Journal of Technology and Design Education*, vol. 10, no. 1, pp. 61-80.

Carr, M. (2001), Let Me Count the Ways. Analysing the Relationship Between the Learner and Everyday Technology in Early Childhood, *Research in Science Education*, vol. 31, no. 1, pp. 29-47.

Center on Media and Child Heath, C. H. (2005), The Effects of Electronic Media on Children Ages Zero to Six: A History of Research, Kaiser Family Foundation,

Chandler, L. K., Fowler, S. A., & Lubeck, R. C. (1992), An Analysis of the Effects of Multiple Setting Events in the Social Behavior of Preschool Children With Special Needs, *Journal of Applied Behavior Analysis*, vol. 25, pp. 249-263.

Charlesworth, R. & Hartup, W. W. (1967), Positive Social Reinforcement in the Nursery School Peer Group, *Child Development*.

Chen, J. & Chang, C. (2006), Using Computers in Early Childhood Classrooms: Teachers' Attitudes, Skills and Practices, *Journal of Early Childhood Research*, vol. 4, pp. 169-188.

Ching, C. C., Basham, J. D., & Jang, E. (2005), The Legacy of the Digital Divide: Gender, Socioeconomic Status, and Early Exposure As Predictors of Full-Spectrum Technology Use Among Young Adults, *Urban Education*, vol. 40, pp. 394-411.

Ching, C. C., Wang, X. C., Shih, M. L., & Kedem, Y. (2006), Digital Photography and Journals in a First-Grade Classroom: Toward Meaningful Technology Integration in Early Childhood Education, *Early Education and Development*, vol. 17, no. 3, pp. 347-371.

Christensen, P. H. (2004), Children's Participation in Ethnographic Research: Issues of Power and Representation, *Children & Society*, vol. 18, no. 2, pp. 165-176.

Christensen, P. H. & James, A. (2008), *Research With Children: Perspectives and Practices,* 2nd ed, Routledge, Oxon.

Clark, A., Kjorholt, A. T., & Moss, P. (2005), *Beyond Listening: Children's Perspectives on Early Childhood Services,* The Policy Press, Bristol.

Clark, A. & Moss, P. (2005), *Spaces to Play: More Listening to Young Children Using the Mosaic Approach,* National Children's Bureau, London.

Clements, D. H. (1994), The Uniqueness of the Computer As a Learning Tool: Insights From Research and Practice, *Young Children: Active Learners in a Technological Age*.

Clements, D. H. (1997), Effective Use of Computers With Young Children, *Opinion Papers*.

Clements, D. H. (1999), Young Children and Technology, *Dialogue on Early Childhood Science, Math and Technology Education*.

Clements, D. H. (2002), Computers in Early Childhood Mathematics, *Contemporary Issues in Early Childhood*, vol. 3, no. 2, pp. 160-181.

Clements, D. H. & Natasai, B. K. (1992), Computers and Early Childhood Education, in *Preschool and early childhood treatment directions*, M. Gettinger, S. N. Elliott, & T. R. Kratochwill, eds., Routledge, pp. 187-246.

Clements, D. H. & Sarama, J. (2003), Strip Mining for Gold: Research and Policy in Educational Technology—A Response to "Fool's Gold", *Association for the Advancement of Computing in Education (AACE) Journal*, vol. 11, no. 1, pp. 7-69.

Clements, D. H. & Sarama, J. (2008), Mathematics and Technology: Supporting Learning for Students and Teachers, in *Contemporary Perspectives on Science and Technology in Early Childhood Education*, O. Saracho & B. Spodek, eds., Information Age Publishing, Charlotte, pp. 127-148.

Clements, D. H. & Swaminathan, S. (1995), Technology and School Change: New Lamps for Old?, *Childhood Education* pp. 275-281.

Cline, V. B., Croft, R. G., & Courrier, S. (1973), Desensitization of Children to Television Violence, *Journal of Personality and Social Psychology*, vol. 27, no. 3, pp. 360-365.
Coad, Jane and Lewis, Anne. (2004), Engaging children and young people in research: Literature review for The National Evaluation of the Children's Fund. accessed at:http://www.ne-cf.org/briefing.asp?section=000100040009&profile=000100080003&id=909, on:
Cobb-Moore, C., Danby, S., & Farrell, A. (2009), Young Children As Rule Makers, *Journal of Pragmatics*, vol. 41, pp. 1477-1492.
Cobb-Moore, C., Danby, S., & Farrell, A. (2010), Locking the Unlockable: Children's Invocation of Pretence to Define and Manage Place, *Childhood*, vol. 17, pp. 376-395.
Cohen, L., Manion, L., & Morrison, K. (2000), *Research Methods in Education,* Routledge Falmer.
Cole, M., Engestrom, Y., & Vasquez, O. A. (1997), *Mind, Culture and Activity: Seminal Papers From the Laboratory of Comparative Human Cognition,* Cambridge University Press.
Cole, M. & Wertsch, J. V. (2002), Beyond the Individual-Social Antimony in Discussions of Piaget and Vygotsky, *Prometheus Research Group*.
Cook, T. & Hess, E. (2007), What the Camera Sees and From Whose Perspective: Fun Methodologies for Engaging Children in Enlightening Adults, *Childhood*, vol. 14, no. 1, pp. 29-45.
Cordes, C. & Miller, E. (2000), *Fool's Gold: A Critical at Computers in Childhood,* Alliance for Childhood, Maryland.
Corsaro, W. A. (1985), *Friendship and Peer Culture in the Early Years,* Ablex Publishing Corporation, Norwood N.J.
Corsaro, W. A. (1988a), Peer Culture in the Preschool, *Theory into Practice*, vol. 27, no. 1, pp. 19-24.
Corsaro, W. A. (1988b), Routines in the Peer Culture of American and Italian Nursery School Children, *Sociology of Education*, vol. 61, no. 1, pp. 1-14.
Corsaro, W. A. (1990), The Underlife of the Nursery School: Young Children's Social Representations of Adult Rules, in *Social representations and the development of knowledge*, G. Duveen & B. B. Lloyd, eds., Cambridge University Press, Cambridge, pp. 11-26.
Corsaro, W. A. (1992), Interpretive Reproduction in Children's Peer Cultures, *Social Psychology Quarterly*, vol. 55, no. 2, pp. 160-177.
Corsaro, W. A. (1993), Interpretive Reproduction in Children's Role Play, *Childhood*, vol. 1, pp. 64-74.
Corsaro, W. A. (1997), *The Sociology of Childhood,* Pine Forge Press, Thousand Oaks, CA; London.
Corsaro, W. A. (2006), Children's Conception and Reaction to Adult Rules: The Underlife of the Nursery School, in *Childhood Socialization*, G. Handel, ed., Transaction Publishers, pp. 179-194.
Creswell, J. W. (2007), *Qualitative Inquiry & Research Design Choosing Among Five Approaches,* 2nd ed, Sage Publications, Thousand Oaks.
Croll, J. & Kunze, K. (2010), Youth Protection Online: Joint Efforts Are Needed, in *High-Tech Tots: Childhood in a Digital World*, I. Berson & M. Berson, eds., Information Age Publishing, Charlotte, pp. 153-184.
Crook, C. (1992), Young Children's Skills in Using a Mouse to Control a Graphical Computer Interface, *Computer Education*, vol. 19, no. 3, pp. 199-207.
Crotty, M. (1998), *The Foundations of Social Research: Meaning and Perspective in the Research Process,* Sage Publications Ltd.

Damon, W. (1977), *The Social World of the Child,* Jossey-Bass Publishers.

Danby, S. & Farrell, A. (2004), Accounting for Young Children's Competence in Educational Research: New Perspectives on Research Ethics, *The Australian Educational Researcher*, vol. 31, no. 3, pp. 35-49.

Darbyshire, P., MacDougall, C., & Schiller, W. (2005), Multiple Methods in Qualitative Research With Children: More Insight or Just More?, *Qualitative Research*, vol. 5, no. 4, pp. 417-436.

Denscombe, M. (2003), *The Good Research Guide: For Small-Scale Social Research Project,* Open University Press.

Denzin, N. K. & Lincoln, Y. S. (2003), *The Landscape of Qualitative Research: Theories and Issues,* 2nd ed, Sage Publications, Thousand Oaks.

Denzin, N. K. & Lincoln, Y. S. (2008), *Strategies of Qualitative Inquiry,* Sage, Thousand Oaks, CA.

DeVries, R. (2000), Vygotsky, Piaget, and Education: a Reciprocal Assimilation of Theories and Educational Practices, *New Ideas in Psychology*, vol. 18, no. 2-3, pp. 187-213.

Dewey, J. (1938), *Experience and Education,* Touchstone, New York.

Dietrich, S. (2005), A Look at Friendships Between Preschool-Aged Children With and Without Disabilities in Two Inclusive Classrooms, *Journal of Early Childhood Research*, vol. 3, pp. 193-215.

Doctoroff, G., Greer, J., & Arnold, D. (2006), The Relationship Between Social Behavior and Emergent Literacy Among Preschool Boys and Girls, *Applied Developmental Psychology*, vol. 27, pp. 1-13.

Doctoroff, S. (2001), Adapting the Physical Environment to Meet the Needs of *All* Young Children for Play, *Early Childhood Education Journal*, vol. 29, no. 2, pp. 105-109.

Driscoll, C. & Carter, M. (2004), Spatial Density As a Setting Event for the Social Interaction of Preschool Children, *International Journal of Disability, Development and Education*, vol. 51, no. 1, pp. 7-37.

Driscoll, C. & Carter, M. (2009), The Effects of Social and Isolate Toys on the Social Interaction of Preschool Children With Disabilities, *Journal of Developmental and Physical Disabilities*, vol. 21, pp. 279-300.

Durden, T. & Dangel, J. R. (2008), Teacher-Involved Conversations With Young Children During Small Group Activity, *Early Years: An International Journal of Research and Development*, vol. 28, no. 3, pp. 251-266.

Edwards, A. (2004), Understanding Context, Understanding Practice in Early Education, *European Early Childhood Education Research Journal*, vol. 12, no. 1, pp. 85-101.

Edwards, S. (2005), Constructivism Does Not Only Happen in the Individual: Sociocultural Theory and Early Childhood Education, *Early Child Development and Care*, vol. 1, pp. 37-47.

Engestrom, Y., Miettinen, R., & Punamaki, R. (1999), *Perspectives on Activity Theory,* Cambridge University Press.

Eron, L. D., Huesmann, R., Lefkowitz, M. M., & Walder, L. O. (1972), Does Television Violence Cause Aggression, *American Psychologist* no. 253, p. 263.

Espinosa, L., Laffey, J., Whittaker, T., & Sheng, Y. (2006), Technology in the Home and the Achievement of Young Children: Findings From the Early Childhood Longitudinal Study, *Early Education and Development*, vol. 17, no. 3, pp. 421-441.

Evans, P. & Fuller, M. (1996), 'Hello. Who Am I Speaking to?' Communicating With Pre-School Children in Educational Research Settings, *Early Years*, vol. 17, no. 1, pp. 17-20.

Fagot, B. I. (1977), Variations in Density: Effect on Task and Social Behaviors of Preschool Children, *Developmental Psychology*, vol. 13, no. 2, pp. 166-167.

Fargas-Malet, M., McSherry, D., Larkin, E., & Robinson, C. (2010), Research With Children: Methodological Issues and Innovative Techniques, *Journal of Early Childhood Research*, vol. 8, p. 175.
Faulkner, D. & Miell, D. (1993), Settling into School: The Importance of Early Friendships for the Development of Children's Social Understanding and Communicative Competence, *International Journal of Early Years Education*, vol. 1, no. 1, pp. 23-46.
Fisch, S. M., Truglio, R. T., & Cole, C. F. (1999), The Impact of Sesame Street on Preschool Children: A Review and Synthesis of 30 Years' Research, *Media Psychology*, vol. 1, no. 2, pp. 165-190.
Fleer, M., Hedegaard, M., & Tudge, J. (2008), Constructing Childhood: Global-Local Policies and Practices, in *Childhood Studies and the Impact of Globalisation: Policies and Practices at Global and Local Levels*, M. Fleer, M. Hedegaard, & J. Tudge, eds., Taylor and Francis, pp. 1-20.
Fleer, M. (2003), Early Childhood Education As an Evolving 'Community of Practice' or As Lived 'Social Reproduction: Researching the 'Taken-for-Granted', *Contemporary Issues in Early Childhood*, vol. 4, no. 1, pp. 64-79.
Fleer, M., Hedegaard, M., & Tudge, J. (2009), *Childhood Studies and the Impact of Globalization: Policy and Practices at Global and Local Levels,* Taylor and Francis Ltd.
Flewitt, R. (2005), Is Every Child's Voice Heard? Researching the Different Ways 3-Year-Old Children Communicate and Make Meaning at Home and in a Pre-School Playgroup, *Early Years*, vol. 25, no. 3, pp. 207-222.
Flewitt, R. (2006), Using Video to Investigate Preschool Classroom Interaction: Education Research Assumptions and Methodological Practices, *Visual Communication*, vol. 5, no. 1, pp. 25-50.
Freeman, N. K. & Somerindyke, J. (2001), Social Play at the Computer: Preschoolers Scaffold and Support Peers' Computer Competence, *Information Technology in Childhood Education Annual* pp. 203-213.
Gabler, J. (2004),Victorian Children in a Postmodern World in *Paper presented at the American Sociological Association*.
Gibson, J. J. (1986), *The Ecological Approach to Visual Perception,* Routledge.
Glassman, M. & Wang, Y. (2004), On the Interconnected Nature of Interpreting Vygotsky: Rejoinder to Gredler and Shields Does No One Read Vygotsky's Words 2004, *Educational Researcher*, vol. 33, no. 6, pp. 19-22.
Goouch, K. (2008), Understanding Playful Pedagogies, Play Narratives and Play Spaces, *Early Years: An International Journal of Research and Development*, vol. iFirst Article, pp. 1-10.
Graver, W. (1991), Technology Affordances, *Association of Computing and Machinary*.
Great Britain. (1989), The Children's Act 1989 Chapter 41
Grenfell, M. & James, D. (1998), *Bourdieu and Education: Acts of Practical Theory,* Falmer Press, London.
Grunbaum, T. (2009), Action and Agency, in *Handbook of Phenomenology and Cognitive Science*, S. Gallagher & D. Schmicking, eds., Springer, Dordrecht.
Guralnick, M. J., Connor, R. T., Hammond, M., Gottman, J. M., & Kinnish, K. (1995), Immediate Effects of Mainstreamed Settings on the Social Interactions and Social Integration of Preschool Children, *American Journal of Mental Retardation*, vol. 100, no. 4, pp. 359-377.
Haight, W., Wang, X., Fung, H., Williams, K., & Mintz, J. (1999), Universal, Developmental, and Variable Aspects of Young Children's Pretend Play: A Cross-Cultural Comparison of Pretending at Home, *Child Development*, vol. 70, no. 6, pp. 1477-1488.

Hammersley, M., Gomm, R., & Woods, P. (1994), *MA in Education, Educational Research Methods: Study Guide,* Open University Press, Milton Keynes.

Harper, L. V. & McCluskey, K. S. (2003), Teacher-Child and Child-Child Interactions in Inclusive Preschool Settings: Do Adults Inhibit Peer Interactions?, *Early Childhood Research Quarterly*, vol. 18, pp. 163-184.

Haugland, S. W. (2000), Computers and Young Children, *ERIC Digest*.

Haugland, S. W. & Wright, J. L. (1997), *Young Children and Technology: a World of Discovery,* Ally and Bacon, Boston.

Hay, D. F. (1994), Prosocial Development, *Journal of Child Psychology and Psychiatry*, vol. 35, no. 1, pp. 29-71.

Hedegaard, M. (1999), Institutional Practices Cultural Positions, and Personal Motives: Immigrant Turkish Parents' Conceptions About Their Children's School Life, in *Activity Theory and Social Practice: Cultural-Historical Approaches*, S. Chaiklin, M. Hedegaard, & Jensen U J, eds., Aarhus University Press.

Hedegaard, M. (2009), Children's Development From a Cultural-Historical Approach: Children's Activity in Everyday Local Settings As Foundation for Their Development, *Mind, Culture, and Activity*, vol. 16, no. 1, pp. 64-82.

Heft, T. (2000), *The Effects of Computers on the Social Behavior of Young Children*.

Heft, T. & Swaminathan, S. (2002), The Effects of Computers on the Social Behavior of Preschoolers, *Journal of Research in Childhood Education*, vol. 16, no. 2, pp. 162-174.

Henry, J. (2010), Ban computers from schools until children reach age 9, says expert. accessed at:The Telegraph, on:

Hertz, R. (1997), *Reflexivity and Voice,* Sage.

Hill, M. (1997), Participatory Research With Children, *Child and Family Social Work*, vol. 2, pp. 171-183.

Holland, D. & Lachicotte, W. (2007), Vygotsky, Mead, and the New Sociocultural Studies of Identity, in *The Cambridge companion to Vygotsky*, H. Daniels, M. Cole, & J. V. Wertsch, eds., Cambridge University Press, Cambridge, pp. 101-135.

Horowitz, P. & Otto, D. (1973), The Teaching Effectiveness of an Alternative Teaching Facility, *ERIC Document Reproduction Service No.El) 083 242*.

Hughes, P. (2001), Paradigms, Methods and Knowledge, in *Doing Early Childhood Research: International Perspectives on Theory and Practice*, 1st ed, G. MacNaugton, S. A. Rolfe, & I. Siraj-Blatchford, eds., Open University Press, Maidenhead, pp. 31-55.

Hutchby, I. & Moran-Ellis, J. (1998), *Children and Social Competence: Arenas of Action,* Routledge.

Hutchby, I. & Moran-Ellis, J. (2001), *Children, Technology, and Culture: the Impacts of Technologies in Children's Everyday Lives,* Routledge/Falmer.

Hutchison, E. (2010), *Dimensions of Human Behaviour: The Changing Life Course,* Sage Publications.

Hutt, C. & Vaizey, M. J. (1996), Differential Effects of Group Density on Social Behaviour, *Nature*.

Ikegami, T, & Iizuka, H. (2007), Turn-Taking Interaction As a Cooperative and Co-Creative Process, *Infant Behavior and Development*, vol. 30, pp. 278-288.

Innocenti, M. S., Stowitschek, J. J., Rule, S., Killoran, J., Striefel, S., & Boswell, C. (1986), A Naturalistic Study of the Relation Between Preschool Setting Events and Peer Interaction in Four Activity Contexts, *Early Childhood Research Quarterly*, vol. 1, pp. 141-153.

Ivory, J. J. & McCollum, J. A. (1999), Effects of Social and Isolate Toys on Social Play in an Inclusive Setting, *The Journal of Special Education*, vol. 32, p. 238.

Jackson, A. (1990), Information Technology and the Early Years, *Early Years: An International Journal of Research and Development*, vol. 11, no. 1, pp. 23-28.

James, A. (1996), Learning to Be Friends: Methodological Lessons From Participant Observations Among English School Children, *Childhood*, vol. 3, pp. 313-330.

James, A., Jenks, C., & Prout, A. (1998), *Theorizing Childhood,* Polity Press in association with Blackwell Publishers Ltd, Cambridge.

James, A. & Prout, A. (1997), *Constructing and Reconstructing Childhood: Contemporary Issues in the Sociological Study of Childhood,* Routledge, London.

Janka, P. (2008),Using a Programmable Toy at Preschool Age: Why and How?, Workshop Proceedings for SIMPAR, in *International Conference on Simulation, Modeling and Programming for Autonomous Robots*, pp. 112-121.

John-Steiner, V. & Mahn, H. (1996), Sociocultural Approaches to Learning and Development: A Vygotskian Framework, *Educational Psychologist*, vol. 31, no. 3/4, pp. 191-206.

Johnson, G. M. (2010a), Internet Use and Child Development: The Techno-Microsystem, *Australian Journal of Educational & Developmental Psychology*, vol. 10, pp. 32-43.

Johnson, G. M. (2010b), Young Children's Internet Use at Home and School: Patterns and Profiles, *Journal of Early Childhood Research*, vol. 8, pp. 282-293.

Johnson, M. (1935), The Effect on Behavior of Variation in the Amount of Play Equipment, *Child Development*, vol. 6, no. 1, pp. 56-68.

Johnson, V., Ivan-Smith, E., Gordon, G., Pridmore, P., & Scott, P. (1998), *Stepping Forward: Children and Young People's Participation in the Development Process,* Intermediate Technology Publications, London.

Jonassen, D. & Rohrer-Murphy, L. (1999), Activity Theory As a Framework for Designing Constructivist Learning Environments, *Educational Technology Research and Development*, vol. 47, no. 1, pp. 61-79.

Jordan, E., Cowan, A., & Roberts, J. (1995), Knowing the Rules: Discursive Strategies in Young Children's Power Struggles, *Early Childhood Quarterly*, vol. 10, pp. 339-358.

Kaptelinin, V. (1995), Activity Theory: Implications for Human Computer Interactions, in *Context and Consciousness: Activity Theory and Human Computer Interaction*, B. Nardi, ed., The MIT Press, Cambridge, pp. 103-116.

Kennewell, S. (2001), Using Affordances and Constraints to Evaluate the Use of Information and Communications Techology in Teaching and Learning, *Technology, Pedagogy and Education*, vol. 10, no. 1, pp. 101-116.

Kennewell, S. & Morgan, A. (2003),Student Teachers' Experiences and Attitudes Towards Using Interactive Whiteboards in the Teaching and Learning of Young Children, Proceedings of the international federation for information processing working group 3.5 open conference on Young children and learning technologies.

Kennewell, S. & Morgan, A. (2006), Factors Influencing Learning Through Play in ICT Settings, *Computers & Education*, vol. 46, pp. 256-279.

Klein, P. & Darom, N. (2000), The Use of Computers in Kindergarten, With or Without Adult Mediation; Effects on Children's Cognitive Performance and Behavior, *Computers in Human Behaviour*, vol. 16, pp. 591-608.

Kutnick, P., Brighi, A., Avgitidou, S., Genta, M. L., Hannikainen, M., Karlsson-Lohmander, M., Ruiz, R. O., Rautamies, E., Colwell, J., Tsalagiorgou, E., Mazzanti, C., Nicoletti, S., Sansavini, A., Guarini, A., Romera, E., Monks, C., & Lofqvist, M. (2007), The Role and Practice of Interpersonal Relationships in European Early Education Settings: Sites for Enhancing Social Inclusion, Personal Growth and Learning?, *European Early Childhood Education Research Journal*, vol. 15, no. 3, pp. 379-406.

Kutnick, P. & Kington, A. (2005), Children's Friendships and Learning in School: Cognitive Enhancement Through Social Interaction?, *British Journal of Educational Psychology*, vol. 75, pp. 521-538.

Kyratzis, A. (2004), Talk and Interaction Among Children and the Co-Construction of Peer Groups and Peer Culture, *Annual Review of Anthropology*, vol. 33, pp. 625-649.

Ladd, G. W. (1999), Peer Relationships and Social Competence During Early and Middle Childhood, *Annual Review of Psychology*, vol. 50, no. 1, pp. 333-359.

Ladd, G. W. & Price, J. (1993), Playstyles of Peer-Accepted and Peer-Rejected Children on the Playground, in *Children on playgrounds: research perspectives and applications*, C. H. Hart, ed., Suny Press, pp. 130-161.

Lantolf, J. (2000), Introducing Sociocultural Theory, in *Sociocultural Theory and Second Language Learning*, J. Lantolf, ed., Oxford University Press, pp. 1-26.

Latour, B. (2005), *Reassembling the Social: An Introduction to Actor-Network-Theory,* Oxford University Press, Oxford.

Laupa, M. (1994), "Who's in Charge?" Preschool Children's Concept of Authority, *Early Childhood Research Quarterly*, vol. 9, pp. 1-17.

Laupa, M., Turiel, E., & Cowan, A. (1999), Obedience to Authority in Children and Adults, in *Morality in Everday Life: Developmental Perspectives*, M. Killen & D. Hart, eds., Cambridge University Press, Cambridge, p. 131.

Laurillard, D., Stratford, M., Luckin, R., Plowman, L., & Taylor, J. (2000), Affordances for Learning in a Non-Linear Narrative Medium, *Journal of Interactive Media in Education*, vol. 2, no. 1, p. 19.

Lave, J. & Wenger, E. (1991), *Situated Learning: Legitimate Peripheral Participation,* Cambridge University Press, Cambridge.

Learning and Teaching Scotland. (2008), Early Years Illustrations. accessed at:http://www.ltscotland.org.uk/earlyyears/resources/illustrations/index.asp, on:

Legendre, A. (1999), Interindividual Relationships in Groups of Young Children and Susceptibility to an Environmental Constraint, *Environment and Behavior*, vol. 31, p. 463.

Li, X. & Atkins, M. (2004), Early Childhood Computer Experience and Cognitive and Motor Development, *Peadiatrics Official Journal of the American Academy of Peadiatrics*, vol. 113, no. 6, pp. 1715-1722.

Licht, B., Simoni, H., & Perrig-Chiello, P. (2008), Conflict Between Peers in Infancy and Toddler Age: What Do They Fight About?, *Early Years: An International Journal of Research and Development*, vol. 28, no. 3, pp. 235-249.

Ljung-Djarf, A. (2008), The Owner, the Participant and the Spectator: Positions and Positioning in Peer Activity Around the Computer in Pre-School, *Early Years: An International Journal of Research and Development*, vol. 28, no. 1, pp. 61-72.

Loo, C. (1976),The Effects of Spatial Density on Behavour Styles of Children, Paper presented at the Annual Meeting of the American Psychological Association.

Luckin, R., Connolly, D., Plowman, L., & Airey, S. (2003), Children's Interactions With Interactive Toy Technology, *Journal of Computer Assisted Learning*, vol. 19, pp. 165-176.

Lynch, M. & Cicchettie, D. (1997), Children's Relationships With Adults and Peers: An Examination of Elementary and Junior High School Students, *Journal of School Psychology*, vol. 35, no. 1, pp. 81-99.

MacNaughton, G., Rolfe, S. A., & Siraj-Blatchford, I. (2001), *Doing Early Childhood Research: Theory and Practice,* Open University Press.

Mandell, N. (1988), The Least- Adult Role in Studying Children, *Journal of Contemporary Ethnography*, vol. 16, p. 433.

Marsh, J. (2002), Electronic Toys: Why Should We Be Concerned? A Response to Levin & Rosenquest (2001), *Contemporary Issues in Early Childhood*, vol. 3, no. 1, pp. 132-138.

Marsh, J. (2004), The Techno-Literacy Practices of Young Children, *Journal of Early Childhood Research*, vol. 2, no. 1, pp. 51-66.

Marsh, J., Brooks, G., Hughes, J., Ritchie, L., Roberts, S., & Wright, K. (2005), Digital beginnings: Young children's use of popular culture, media and new technologies, accessed at http://hdl.handle.net/2428/27212

Marshall, C. & Rossman, G. B. (1999), *Designing Qualitative Research,* 3rd ed, Sage Publications.

Mauthner, M. (1997), Methodological Aspects of Collecting Data From Children: Lessons From Three Research Projects, *Children & Society*, vol. 11, pp. 16-28.

Maxwell, L. E. (2007), Competency in Child Care Settings: The Role of the Physical Environment, *Environment and Behavior*, vol. 39, pp. 229-244.

May, P. (2007), Play and Creativity, in *The new early years professional: dilemmas and debates*, A. D. Nurse, ed., Routledge, pp. 95-110.

Mayall, B. (2008), Conversations With Children: Working With Generational Issues, in *Research with Children: Perspectives and Practices*, 2nd ed, P. H. Christensen & A. James, eds., Routledge, Oxon, pp. 109-124.

McCormick, L. (1987), Comparison of the Effects of a Microcomputer Activity and Toy Play on Social and Communication Behaviors of Young Children, *Journal of Early Intervention*, vol. 11, no. 3, pp. 195-205.

McEvoy, M., Fox, J., & Rosenberg, M. (1991), Organizing Preschool Environments: Suggestions for Enhancing the Development/Learning of Preschool Children With Handicaps, *Topics in Early Childhood Special Education*, vol. 11, no. 2, pp. 18-28.

McPake, J., Stephen, C., Plowman, L., Sime, D., & Downey, S. (2005), Already at a disadvantage? ICT in the home and children's preparation for primary school, Becta, ICT Research Bursaries,

Michalowski, R. J. (1997), Ethnography and Anxiety: Field Work and Reflexivity in the Vortex of U.S-Cuban Relations, in *Reflexivity and Voice*, 1st ed, R. Hertz, ed., Sage Publications, Thousand Oaks, pp. 45-69.

Miell, D. & Dallos, R. (1996), *Social Interaction and Personal Relationships,* Sage Publications, London.

Mikropoulos, T. A., Kassivaki, P., Katsikis, A., & Savrandes, C. (1994), Computers in Preschool Education: An Interactive Environment, *The Journal of Computing in Childhood Education*, vol. 5, no. 3/4, pp. 339-351.

Miles, M. B. & Huberman, A. M. (1994), *Qualitative Data Analysis: an Expanded Sourcebook,* Sage Publications.

Mioduser, D., Tur-Kaspa, H., & Leitner, I. (2000), The Learning Value of Computer-Based Instruction of Early Reading Skills, *Journal of Computer Assisted Learning*, vol. 16, pp. 54-63.

Moore, G. (1986), Effects of the Spatial Definition of Behaviors Settings on Children's Behavior: A Quasi-Experimental Field Study, *Journal of Environmental Psychology*, vol. 6, no. 3, pp. 205-231.

Moore, G., McCarty, A., & Jelin, G. (1995), Children's Villages: A Safe Haven for Children of Stress and Violence, *Children's Environments*, vol. 12, no. 1, pp. 1-24.

Morgan, A. (2010), Interactive Whiteboards, Interactivity and Play in the Classroom With Children Aged Three to Seven Years, *European Early Childhood Education Research Journal*, vol. 18, no. 1, pp. 93-104.

Morgan, A. & Kennewell, S. (2005), The Role of Play in the Pedagogy of ICT, *Education and Information Technologies*, vol. 10, no. 3, pp. 177-188.

Morgan, A. & Kennewell, S. (2007), Initial Teacher Education Students' Views on Play As a Medium for Learning - a Divergence of Personal Philosophy and Practice, *Technology, Pedagogy and Education*, vol. 15, no. 3, pp. 307-320.

Morgan, A. & Siraj-Blatchford, J. (2009), *Using ICT in the Early Years: Parents and Practitioners in Partnership,* Practical Pre-School Books.

Morris, E. K. (1988), Contextualism: The World View of Behavior Analysis, *Journal of Experimental Child Psychology*, vol. 46, pp. 289-323.

Morrow, V. & Richards, M. (1996), The Ethics of Social Research With Children: An Overview, *Children and Society*, vol. 10, pp. 90-105.

Muller, A. A. & Perlmutter, M. (1985), Preschool Children's Problem-Solving Interactions at Computers and Jigsaw Puzzles, *Journal of Applied Developmental Psychology*, vol. 6, pp. 173-186.

Nardi, B. (1995), *Context and Consciousness: Activity Theory and Human-Computer Interaction,* The MIT Press.

National Association for the Education of Young Children. (2009), Developmentally Appropriate Practice in Early Childhood Programs Serving Children from Birth through Age 8: A position statement of the National Association for the Education of Young Children

Norman, D. A. (1988), *The Psychology of Everyday Things,* Basic Books, New York.

Nucci, L. P. & Turiel, E. (1978), Social Interactions and the Development of Social Concepts in Preschool Children, *Child Development*, vol. 49, no. 2, pp. 400-407.

O'Hara, M. (2008), Young Children, Learning and ICT: a Case Study in the UK Maintained Sector, *Technology, Pedagogy and Education*, vol. 17, no. 1, pp. 29-40.

Oden, S. & Asher, S. (1977), Coaching Children in Social Skills for Friendship Making, *Child Development*, vol. 48, no. 2, pp. 495-506.

Onks, S. C. (2009), *Collaborative Reflective Practice of Two Early Childhood Educators: The Impact on Their Ongoing Inquiry and Professional Development,* University of Tennessee.

Orleans, M. & Laney, M. C. (2000), Children's Computer Use in the Home: Isolation or Sociation?, *Social Science Computer Review*, vol. 18, no. 1, pp. 56-72.

Ostrov, J. & Keating, C. (2004), Gender Differences in Preschool Aggression During Free Play and Structured Interactions: An Observational Study, *Social Development*, vol. 13, no. 2, pp. 255-277.

Palmer, S. (2007), *Toxic Childhood : How the Modern World Is Damaging Our Children and What We Can Do About It,* Orion, London.

Parten, M. (1932a), Leadership Among Preschool Children, *Journal of Abnormal and Social Psychology* pp. 430-440.

Parten, M. (1932b), Social-Participation Among Preschool Children, *Child Development*, vol. 3, pp. 146-158.

Pellegrini, A. D. (1984), The Social Cognitive Ecology of Preschool Classrooms: Contextual Relations Revisited, *International Journal of Behavioural Development*, vol. 7, pp. 321-332.

Pepper, S. C. (1942), *World Hypotheses: A Study in Evidence,* University of California Press, Berkley, CA.

Petrakos, H. & Howe, N. (1996), The Influence of the Physical Design of the Dramatic Play Center on Children's Play, *Early Childhood Research Quarterly*, vol. 11, pp. 63-77.

Piaget, J. (1964), *Six Psychological Studies,* University of London Press Ltd, London.

Pianta, R. C. (1997), Adult-Child Relationship Processes and Early Schooling, *Early Education and Development*, vol. 8, no. 1, pp. 11-26.

Pink, S. (2001), *Doing Visual Ethnography: Images, Media and Representation in Research,* Sage.

Plowman, L., McPake, J., & Stephen, C. (2007),Supporting young children's learning with technology at home and in pre-school, Aera 2007 SymposiumEcology Of Young Children's Technology Experience, in *American Educational Research Association*.

Plowman, L., McPake, J., & Stephen, C. (2008), Just Picking It Up? Young Children Learning With Technology at Home, *Cambridge Journal of Education*, vol. 38, no. 3, pp. 303-319.

Plowman, L., McPake, J., & Stephen, C. (2010a), The Technologisation of Childhood? Young Children and Technology in the Home, *Children and Society*, vol. 24, pp. 63-74.

Plowman, L. & Stephen, C. (2006),Technologies and Learning in Pre-school Education in *American Educational Research Association Annual Meeting, Education Research in the Public Interest*, San Franscico, CA.

Plowman, L. & Stephen, C. (2005), Children, Play, and Computers in Pre-School Education, *British Journal of Educational Technology*, vol. 36, no. 2, pp. 145-157.

Plowman, L. & Stephen, C. (2007a), Guided Interaction in Pre-School Settings, *Journal of Computer Assisted Learning*, vol. 23, pp. 14-26.

Plowman, L. & Stephen, C. (2007b), The Big Picture? Video and the Representation of Interaction, *British Educational Research Journal*.

Plowman, L., Stephen, C., Downey, S., & Sim, D. (2006), Supporting learning with ICT in pre-school settings, Teaching and Learning Research Programme,

Plowman, L., Stephen, C., & McPake, J. (2010b), *Growing Up With Technology: Young Children Learning in a Digital World,* Routledge, Oxon.

Pole, C., Mizen, P., & Bolton, A. (1999), Realising Children's Agency in Research: Partners and Participants?, *International Journal of Social Research Methodology*, vol. 2, no. 1, pp. 39-54.

Pollard, A. & Filer, A. (1996), *The Social World of Children's Learning : Case Studies of Pupils From Four to Seven,* London.

Powell, M. A. & Smith, A. B. (2009), Children's Participation Rights in Research, *Childhood*, vol. 16, no. 1, pp. 124-141.

Prochner, L., Cleghorn, A., & Green, N. (2008), Space Considerations: Material in the Learning Environment in Three Majority World Preschool Settings, *International Journal of Early Years Education*, vol. 16, no. 3, pp. 189-201.

Punch, S. (2002), Research With Children: The Same or Different From Research With Adults?, *Childhood*, vol. 9, pp. 321-341.

Quilitch, H. & Risley, T. (1973), The Effects of Play Materials on Social Play, *Journal of Applied Behavior Analysis*, vol. 6, pp. 573-578.

Qvortrup, J. (2008), Macroanalysis of Childhood, in *Research with Children: Perspectives and Practices*, 2nd ed, P. H. Christensen & A. James, eds., Routledge, Oxon, pp. 66-86.

Radley, A. (1996), Relationships in Detail: the Study of Social Interaction, in *Social Interaction and Personal Relationships*, D. Miell & R. Dallos, eds., Sage Publications Ltd, London, pp. 23-101.

Ratner, C. (2006), Contextualism Versus Positivism in Cross-Cultural Pyschology, in *Perspectives and progress in contemporary cross-cultural pyschology*, G. Zheng, K. Leung, & J. Adair, eds., China Light Industry Press, Beijing, pp. 35-48.

Raver, C. C. & Zigler, E. F. (1997), Social Competence: An Untapped Dimension in Evaluating Head Start's Success, *Early Childhood Research Quarterly*, vol. 12, pp. 363-385.
Read, M., Sugawara, A., & Brandt, J. (1999), Impact of Space and Color in the Physical Environment on Preschool Children's Cooperative Behaviour, *Environment and Behavior*, vol. 31, no. 3, pp. 413-428.
Reckwitz, A. (2002), Towards a Theory of Social Practices: A Development in Culturalist Theorizing, *European Journal of Social Theory*, vol. 5, no. 2, pp. 243-263.
Reinharz, S. (1997), Who Am I? The Need for a Variety of Selves in the Field, in *Reflexivity and Voice*, 1st ed, R. Hertz, ed., Sage Publications, Thousand Oaks, pp. 3-20.
Rideout, V., Hamel, E., & Kaiser Family Foundation. (2006), The Media Family: Electronic media in the lives of infants, toddlers, preschoolers and their parents, Henry, J. Kaiser Family Foundation, Menio Park, California,
Riley, J. W., Cantwell, F. V., & Ruttiger, K. F. (1949), Some Observations on the Social Effects of Television, *Public Opinion Quarterly*, vol. 13, no. 2, pp. 223-234.
Rivlin, L. G. & Weinstein, C. S. (1984), Educational Issues, School Settings, and Environmental Psychology, *Journal of Environmental Psychology*, vol. 4, pp. 347-364.
Rogers & Evans. (2008), *Inside Role-Play in Early Childhood Education*.
Rogoff, B. (1990), *Apprenticeship in Thinking Cognitive Development in Social Context,* Oxford University Press, New York.
Rogoff, B. (1993b), *Guided Participation in Cultural Activity by Toddlers and Caregivers,* University of Chicago, Chicago, Ill.
Rogoff, B. (1993a), *Guided Participation in Cultural Activity by Toddlers and Caregivers,* University of Chicago, Chicago, Ill.
Rogoff, B., Mosier, C., Mistry, J., & Goncu, A. (1989), Toddlers' Guided Participation in Cultural Activity, *Cultural Dynamics*, vol. 2, no. 2, pp. 209-237.
Rosen, D. & Jaruszewicz, C. (2009), Developmentally Appropriate Technology Use and Early Childhood Teacher Education, *Journal of Early Childhood Teacher Education*, vol. 30, no. 2, pp. 162-171.
Rubin, K. H. (1977), The Social and Cognitive Value of Preschool Toys and Activities, *Canadian Journal of Behavioural Science*, vol. 9, no. 4, pp. 382-385.
Rubin, K. H. & Howe, N. (1985), Toys and Play Behaviour: An Overview, *Topics in Early Childhood Special Education*, vol. 5, pp. 1-9.
Rudasill, K. M. & Rimm-Kaufman, S. E. (2009), Teacher-Child Relationship Quality: The Roles of Child Temperament and Teacher-Child Interactions, *Early Childhood Research Quarterly*.
Rutland, A., Cameron, L., Milne, A., & McGeorge, P. (2005), Social Norms and Self-Presentation: Children's Implicit and Explicit Intergroup Attitudes, *Child Development*, vol. 76, no. 2, pp. 451-466.
Sacks, H., Schegloff, E. A., & Jefferson, G. (1974), A Simplest Systematics for the Organization of Turn-Taking for Conversation, *Language*, vol. 50, no. 4, pp. 696-735.
Sahu, B. (2004), *New Educational Philosophy,* Sarup and Sons.
Saracho, O. & Spodek, B. (2007), *Contemporary Perspectives on Socialization and Social Development in Early Childhood Education,* IAP.
Saracho, O. & Spodek, B. (2008a), *Contemporary Perspectives on Science and Technology in Early Childhood Education,* Information Age Publishing, United States of America.
Saracho, O. & Spodek, B. (2008b), Scientific and Technological Literacy Research: Principles and Practice, in *Contemporary Perspectives on Science and Technology in Early Childhood Education*, O. Saracho & B. Spodek, eds., Information Age Publishing, Charlotte, pp. 1-16.

Sawyer, K. R. (2002), Unresolved Tensions in Sociocultural Theory: Analogies With Contemporary Sociological Debates, *Culture and Psychology*, vol. 8, no. 3, pp. 283-305.
Schaffer, H. R. (1984), *The Child's Entry into a Social World,* Academic Press.
Schaffer, H. R. (1996), *Social Development,* Blackwell Publishing, Oxford.
Schaffer, H. R. (2004), *Introducing Child Psychology,* Blackwell Pub. Ltd, Malden, MA.
Schramm, W., Lyle, J., & Parker, E. (1961), *Television and the Lives of Our Children,* Stanford University Press.
Schwandt, T. A. (2003), Three Epistemological Stances for Qualitative Inquiry: Interpretivism, Hermeneutics and Social Constructionism, in *The Landscape of Qualitative Research: Theories and Issues*, 2nd ed, N. K. Denzin & Y. S. Lincoln, eds., Sage Publications, pp. 292-332.
Scott, J. (2008), Children As Respondents: The Challenges for Quantitative Methods, in *Research with Children: Perspectives and Practices*, 2nd ed, P. H. Christensen & A. James, eds., Routledge, Oxon, pp. 87-108.
Scottish Executive. (1999), A Curriculum Framework for Children 3 to 5 Edinburgh,
Scottish Executive. (2003), Early Learning Forward Thinking: The Policy Framework for ICT in Early Years
Scottish Government. (2010), Preschool and Childcare Statistics 2010 1479-7569
Segers, E. & Vermeer, A. (2008), Vocabulary Learning by Computer in Kindergarten: The Possibilities of Interactive Vocabulary Books, in *Contemporary Perspectives on Science and Technology in Early Childhood Education*, O. Saracho & B. Spodek, eds., Information Age Publishing, Charlotte, pp. 149-166.
SERA. (2005), Scottish Educational Research Association Ethical Guidelines for Educational Research
Shaffer, D. R. (2008), *Social and Personality Development,* 6th ed, Cengage Learning.
Shin, M. S., Recchia, S. L., Lee, S. Y., Lee, Y. J., & Mullarkey, L. S. (2004), Understanding Early Childhood Leadership: Emerging Competencies in the Context of Relationships, *Journal of Early Childhood Research*, vol. 2, no. 3, pp. 301-316.
Shinegold, K., Hawkins, J., & Char, C. (1984), "I'm the thinkist, you're the typist": The Interaction of Technology and the Social Life of Classrooms, Center for Children and Technology, Technical report no. 27
Shure, M. B. (1963), Psychological Ecology of a Nursery School, *Child Development*, vol. 34, no. 4, pp. 979-992.
Silvern, S. B. & Williamson, P. A. (1987), The Effects of Video Game Play on Young Children's Aggression, Fantasy, and Prosocial Behavior, *Journal of Applied Developmental Psychology*, vol. 8, no. 4, pp. 453-462.
Singer, J. L. (1994), Imaginative Play and Adaptive Development, in *Toys, play, and child development*, J. H. Goldstein, ed., Cambridge University Press, Cambridge, pp. 6-26.
Siraj-Blatchford, I. & Siraj-Blatchford, J. (2006), *A Guide to Developing the ICT Curriculum for Early Childhood Education,* Trentham Books.
Siraj-Blatchford, I. & Sylva, K. (2004), Researching Pedagogy in English Pre-Schools, *British Educational Research Journal*, vol. 30, no. 5, pp. 713-730.
Siraj-Blatchford, I., Sylva, K., Muttock, S., Gilden, R., & Bell, D. (2002b), Researching Effective Pedagogy in the Early Years, Department for Education and Skills, Research Report RP 356
Siraj-Blatchford, I., Sylva, K., Muttock, S., Gilden, R., & Bell, D. (2002a), Researching Effective Pedagogy in the Early Years, Department for Education and Skills, Research Report RP 356

Siraj-Blatchford, John. (2010), Analysis: 'Computers benefit children'. accessed at:Nursery World, on:

Smith, P. K. & Connolly, K. J. (1980), *The Ecology of Preschool Behaviour,* Cambridge University Press, Cambridge.

Smith, P. K. & Green, M. (1975), Aggressive Behavior in English Nurseries and Play Groups: Sex Differences and Response of Adults, *Child Development*, vol. 46, no. 1, pp. 211-214.

Smith, P. K., Mahdavi, J., Carvalho, M., Fisher, S., Russell, S., & Tippet, N. (2008), Cyberbullying: Its Nature and Impact in Secondary School Pupils, *Journal of Child Psychology and Psychiatry*, vol. 49, no. 4, pp. 376-385.

Stacey, E. (1999), Collaborative Learning in an Online Environment, *Journal of Distance Education*, vol. 14, no. 2, pp. 14-33.

Stephen, C., Ellis, J., & Martlew, J. (2010), Taking Active Learning into the Primary School: a Matter of New Practices?, *International Journal of Early Years Education*, vol. 18, no. 4, pp. 315-329.

Stephen, C. (2006a), Early Years Education: Perspectives from a Review of the International Literature, Scottish Executive, Social Research, accessed at https://dspace.stir.ac.uk/bitstream/1893/3209/1/full%20review.pdf

Stephen, C. (2006b), Insight 28: Early Years Education: Perspectives from a review of international literature, Scottish Executive Education Department,

Stephen, C. & Brown, S. (2004), The Cultural Practice in Pre-School Provision: Outsider and Insider Perspectives, *Research Papers in Education*, vol. 19, no. 3, pp. 323-344.

Stephen, C., McPake, J., Plowman, L., & Berch-Heyman, S. (2008), Learning From the Children: Exploring Preschool Children's Encounters With ICT at Home, *Journal of Early Childhood Research*, vol. 6, pp. 99-117.

Stephen, C. & Plowman, L. (2003), Information and Communication Technologies in Pre-School Settings: a Review of the Literature, *International Journal of Early Years Education*, vol. 11, no. 3, pp. 223-234.

Stephen, C. & Plowman, L. (2007), Enhancing Learning With Information and Communication Technologies in Pre-Schools, *Early Child Development and Care*, vol. IFirst, pp. 1-18.

Subrahmanyam, K., Kraut, R., Greenfield, P., & Gross, E. (2000), The Impact of Home Computer Use on Children's Activities and Development, *The Future of Children*, vol. 10, no. 2, pp. 123-144.

Sylva, K., Melhuish, E., Sammons, P., Siraj-Blatchford, I., & Taggart, B. (2004), The Effective Provision of Pre-School (EPPE) Project: Final Report A Longituinal Study Funded by the DfEs 1997 - 2004

Tapscott, D. (1997), *Growing Up Digital: The Rise of the Net Generation,* McGraw Hill, New York.

Terreni, L. (2009), *A Case Study: How Young Children and Teachers use an Interactive Whiteboard in aNew Zealand Kindergarten Setting for Visual art Learning Experiences*.

Tesch, R. (1990), *Qualitative Research: Analysis Types and Software Tools,* Routledge.

Tharp, R. G. & Gallimore, R. (1988), *Rousing Mind to Life: Teaching, Learning and Schooling in Social Context,* Cambridge University Press, Cambridge.

Thomas, N. & O'Kane, C. (1998), The Ethics of Participatory Research With Children, *Children and Society*, vol. 12, pp. 336-348.

Thrift, N. J. (1996), *Spatial Formations,* Sage.

Trowbridge, D. & Durnin, R. (1984), Results From an Investigation of Groups Working at the Computer, *National Science Foundation*.

Tudge, J. (2008), *The Everyday Lives of Young Children: Culture, Class, and Child Rearing in Diverse Societies,* Cambridge University Press, Cambridge.

Tudge, J., Doucet, F., Odero, D., Sperb, T., Piccinini, C., & Lopes, R. (2006), A Window Into Different Cultural Worlds: Young Children's Everyday Activities in the United States, Brazil, and Kenya, *Child Development*, vol. 77, no. 5, pp. 1446-1469.

Tudge, J., Freitas, L., & Doucet, F. (2009), The Transition to School: Reflections From a Contextualist Perspective, in *The Routledge Companion to Education*, H. Daniels, H. Lauder, & J. Porter, eds., Routledge, pp. 117-13.

Turner, P. T. (1991), Relations Between Attachment, Gender, and Behavior With Peers in Preschool, *Child Development*, vol. 62, no. 6, pp. 1475-1488.

Unicef. (2008), Convention on the Rights of the Child. accessed at:http://www.unicef.org/crc/, on:5/8/2010.

Updegraff, R. & Herbst, E. (1933), An Experimental Study of Social Behavior Stimulated in Young Children by Certain Play Materials, *Pedagogical Seminary and Journal of Genetic Psychology*, vol. 42, pp. 372-391.

Uprichard, E. (2009), Questioning Research With Children: Discrepancy Between Theory and Practice?, *Children & Society*.

Villarruel, B. A., Martin, C. A., & Dickson, W. P. (1985),Using a microcomputer to create social interactions among handicapped and nonhandicapped children in a mainstream preschool., AAMD, Denver.

Visscher, S. D. & Bouverne-De, B. (2008), Recognizing Urban Public Space As a Co-Educator: Children's Socialization in Ghent, *International Journal of Urban and Regional Research*, vol. 32, no. 3, pp. 604-616.

Vygotsky, L. S. (1933), Play and Its Role in the Mental Development of the Child, *Soviet Pyschology: Play*.

Vygotsky, L. S. (1978), *Mind in Society: The Development of Higher Psychological Processes,* Harvard University Press, London.

Walmsley, D. J. & Lewis, G. J. (1993), *People and Environment: Behavioural Approaches in Human Geography,* Longman Scientific & Technical.

Wang, X. C. (2004),Game of the Moment: Constructed Game Playing in Young children's Classroom, Proceedings of the 6th international conference on Learning sciences, Santa Monica, California.

Wang, X. C., Berson, I., Jaruszewicz, C., Hartle, L., & Rosen, D. (2010), Young Children's Technology Experiences in Multiple Contexts: Bronfenbrenner's Ecological Theory Reconsidered, in *High-Tech Tots: Childhood in a Digital World*, I. Berson & M. Berson, eds., Information Age Publishing, Charlotte, pp. 23-48.

Wang, X. C. & Ching, C. C. (2003), Social Construction of Computer Experience in a First-Grade Classroom: Social Processes and Mediating Artifacts, *Early Education &Amp; Development*, vol. 14, no. 3, pp. 335-362.

Wang, X. C. & Hoot, J. L. (2006), Introduction: Information and Communication Technology in Early Childhood Education, *Early Education and Development*, vol. 17, no. 3, pp. 317-322.

Wartella, E. A. & Jennings, N. (2000), Children and Computers: New Technology - Old Concerns, *The Future of Children - Children and Computer Technology*, vol. 10, no. 2, pp. 31-43.

Wartella, E. A. & Reeves, B. (2003), Historical Trends in Research on Children and the Media: 1900 - 1960, in *The wired homestead: an MIT Press sourcebook on the Internet and the family*, A. L. K. Joseph Turow, ed., MIT Press, pp. 53-71.

Watson, D. M. (2001), Pedagogy Before Technology: Re-Thinking the Relationship Between ICT and Teaching, *Education and Information Technologies*, vol. 6, no. 4, pp. 251-266.

Webb, N. M. (1987), Peer Interaction and Learning With Computers in Small Groups, *Computers in Human Behavior*, vol. 3, pp. 193-209.

Webb, N. M. & Mastergeorge, A. (2003), Promoting Effective Helping Behavior in Peer-Directed Groups, *International Journal of Educational Research*, vol. 39, pp. 73-97.

Wegerif, R. & Mercer, N. (1997), A Dialogial Framework for Researchering Peer Talk, in *Computers and Talk in the Primary Classroom*, R. Wegerif & P. Scrimshaw, eds., pp. 49-65.

Weisner, T. (2002), Ecocultural Understanding of Children's Developmental Pathways, *Human Development*, vol. 45, pp. 275-281.

Wood, D., Bruner, J., & Ross, G. (1976), The Role of Tutoring in Problem Solving, *Journal of Child Psychology and Psychiatry*, vol. 17, no. 2, pp. 89-100.

Wood, D. & Wood, H. (1996), Vygotsky, Tutoring and Learning, *Oxford Review of Education*, vol. 22, no. 1, pp. 5-16.

Woodhead, M. & Faulkner, D. (2008), Subjects, Objects and Participants? Dilemmas of Psychological Research With Children, in *Research with Children: Perspectives and Practices*, 2nd ed, P. H. Christensen & A. James, eds., Routledge, Oxon, pp. 10-39.

Woodrow, C. & Busch, G. (2008), Repositioning Early Childhood Leadership As Action and Activism, *European Early Childhood Education Research Journal*, vol. 16, no. 1, pp. 83-93.

Wyness, M. (2011), *Children and Society,* 2nd ed, Palgrave Mcmillan.

Yelland, N. (2005), The Future Is Now: A Review of the Literature on the Use of Computers in Early Childhood Education, *Association for the Advancement of Computer in Education Journal*, vol. 13, no. 3, pp. 201-232.

Yelland, N. (2010), New Technologies, Playful Experiences, and Multimodal Learning, in *High-Tech Tots: Childhood in a Digital World*, I. Berson & M. Berson, eds., Information Age Publishing, Charlotte, pp. 5-22.

Yelland, N. & Masters, J. (2007), Rethinking Scaffolding in the Information Age, *Computers & Education*, vol. 48, no. 3, pp. 362-382.

APPENDICES

Appendix 1 – Broadhead's Social Play Continuum

TABLE I. The social play continuum

Level 1: Associative play	Level 2: Social play	Level 3: Highly social play	Level 4: Cooperative play
A: Looks towards peers	A: Laughter	RA: Offering and accepting of objects is explicit incident	RA: Children exchange smiles
A: Watches play	RA: Eye contact made	RL: Comment on own action and acknowledgement leads to discourse	RA: Offering and accepting of objects evident but incidental
A: Imitates play	RA: Object offered and received	RL: Discourse mix of activity-related and non-related	RL: Explanations/descriptions utilised
A: Object offered, not accepted	L: Play noise/play voice	RA/L: Eye contact, laughter, play noise combined as behavioural cluster	RL: Discourse activity related
A: Object taken, consent not sought	L: Instruction given/request made—no response	RL/RA: Discourse sustains role play/task	RL: Offering and accepting of verbal help
L: Self-talk	L: Approval sought—none given	RA/RL: Instructions/response, request/response, approval seeking/response and offering/accepting of objects are evident behavioural sequences	RA: Offering and accepting of physical help
A/L: Comment on action directed at peer; peer does not respond	L/RA: Comment on action directed at peer—peer looks	RL/RA: Shared ideas extend activity	RL/RA: Interaction extends/develops play
	RL: Comment on own action directed at peer—verbal response		RL/RA: Problem identified and solved
	RL: Approval sought and given		RL/RA: Shared understanding of goal orientation evident
	L/RA: Instruction given—positive response		
	RL/RA: Request made and granted		

L, language; A, action; RL, reciprocal language; RA, reciprocal action; A/L, action and language combined; RA/RL, reciprocal language and action combined.

Appendix 2 - Consent Forms

Figure 38 - Parent's Consent Form

Lorna Savage
Institute of Education
University of Stirling
Stirling
FK9 4LA

Email:
l.j.savage@stir.ac.uk

About Me

I am a PhD student at the University of Stirling, studying early years education. I previously studied economics for four years at Glasgow Caledonian University and it wasn't until I completed a Masters at the University of Glasgow, that I realised how interested I am in researching education. I now have a specific interest in social interaction and technology in early years development. Eventually I hope to become an academic researcher within a university.

UNIVERSITY OF STIRLING

Exploring Young Children's Social Interactions in Technology Rich Preschool Environments.

WHAT IS THE RESEARCH PROJECT ABOUT?

I am beginning a research project at XXX Nursery School. I am exploring young children's social interactions while engaging with technology in preschool playrooms.

WHAT WILL HAPPEN?

I will learn about children's social interactions and technology use by:

- watching children and their teachers working in the classroom
- talking to teachers about their planning and preparation surrounding technology provision
- talking to children about what they are doing
- Drawing maps of children's interactions by highlighting where children are playing in the playroom and with whom.

I will be visiting XXX until June 2009. I will only talk to the children when they are used to me being in the classroom. I will make sure that boys and girls know that they can choose whether or not to talk to me and can stop whenever they like.

WHAT WILL HAPPEN AT THE END OF THE PROJECT?

I will write the project up in the form of a doctoral thesis which will be examined by the University of Stirling to decide whether I have met the requirements to be awarded a PhD. I will talk at conferences about what I have learned from the research and will write articles for other people interested in education. I will not use the names of any children or parents in my publications. I will not tell anyone what individual children or parents say.

NEXT STEPS

I need to know if you are happy for me to talk to your child. Please fill in the form here and give it back to me in the envelope provided. I am careful to respect the privacy of parents/carers and children in my research and my plans are checked by a committee in the Institute of Education, University of Stirling. I am happy to answer any questions about the project. You can contact me at l.j.savage@stir.ac.uk or via XXX head teacher. Concerns about the project can be sent to the Head of the Institute of Education - Prof. Richard Edwards, Institute of Education, University of Stirling, Stirling, FK9 4LA

REPLY SLIP - Exploring Young Children's Social Interactions in Technology Rich Preschool Environments

My name is

My child's name is

I am happy for the researchers to talk to my child about social interactions and technology use
(Please put a circle round your answer)

YES ***NO***

Signed ....

Date..

Figure 39 - Parent Consent Digital Cameras

Lorna Savage
Institute of Education
University of Stirling
Stirling
FK9 4LA

Email:
l.j.savage@stir.ac.uk

About Me

I am a PhD student at the University of Stirling, studying early years education. I previously studied economics for four years at Glasgow Caledonian University but it wasn't until I completed a Masters at the University of Glasgow, that I realised how interested I am in researching education. I now have a specific interest in social interaction and technology in early years development. Eventually I hope to become an academic researcher within a university.

UNIVERSITY OF STIRLING

Exploring Young Children's Social Interactions in Technology Rich Preschool Environments.

Permission to use still digital Cameras

WHAT IS THE RESEARCH PROJECT ABOUT?

I am conducting a research project at XXX Nursery School. I am exploring young children's social interactions while engaging with technology in preschool playrooms.

WHAT WILL HAPPEN?

I will learn about children's social interactions and technology use by:

- watching children and their teachers working in the classroom
- talking to teachers about their planning and preparation surrounding technology provision
- talking to children about what they are doing
- Drawing maps of children's interactions by highlighting where children are playing in the playroom and with whom.

USE OF STILL PHOTOGRAPHS

I will use a digital camera to help me record where children play, who they play with and which toys they play with. The photographs will be used to understand which children play together often and which toys they most often use at different times of the day. I will be the only person able to access the photographs and they will only be seen by me and my supervisor. The photographs will be stored on a password protected computer and when the study is over all the photographs will be destroyed.

No photographs of children will appear in my thesis. I may draw a sketch of the photograph to demonstrate how children are sitting or who is using a toy but these sketches will only be line drawings and it will not be possible to identify any child or adult.

I will be visiting xxx until June 2009. I will only talk to the children when they are used to us being in the classroom. I will make sure that boys and girls know that they can choose whether or not to talk to me and can stop whenever they like.

WHAT WILL HAPPEN AT THE END OF THE PROJECT?

I will write the project up in the form of a doctoral thesis which will be examined by the University of Stirling to decide whether I have met the requirements to be awarded a PhD. I will talk at conferences about what I have learned from the research and will write articles for other people interested in education. I will not use the names of any children or parents in my publications. I will not tell anyone what individual children or parents say.

NEXT STEPS

I need to know if you are happy for me to talk to your child and/or take photographs of your child. Please fill in the form here and give it back to me in the envelope provided. I am careful to respect the privacy of parents/carers and children in my research and my plans are checked by a committee in the Institute of Education, University of Stirling. I am happy to answer any questions about the project. You can contact me at l.j.savage@stir.ac.uk or via xxx head teacher. Concerns about the project can be sent to the Head of the Institute of Education - Prof. Richard Edwards, Institute of Education, University of Stirling, Stirling, FK9 4LA

REPLY SLIP – Exploring Young Children's Social Interactions in Technology Rich Preschool Environments

If you have already returned a form explaining whether I can talk to your children please move straight to question 2.

My name is

My child's name is

1. *I am happy for the researchers to talk to my child about social interactions and technology use*
(Please put a circle round your answer)

YES *NO*

2. *I am happy for the researchers to take photographs of my child and for sketches to appear in the final document*
(Please put a circle round your answer)

YES *NO*

Signed ....

Date..

Appendix 3 - Observation Schedule

OBSERVATION SCHEDULE

UNIVERSITY OF STIRLING

Research Data Collection Phase

Date

Focal Child

Name

Gender

Activity

Type

Start Time

End Time

Max Number of boys

Min number of boys

Max number of girls

Min number of girls

☐ Adult Present

☐ Adult Present some of the time

☐Child Initiated

☐Adult Initiated

☐Child Led

☐Adult Led

☐Mixed

Child and practitioner entering and leaving checklist

Name	Enter	Exit	Time

Notes

Appendix 4 - Interview Schedule

Interview Schedule

UNIVERSITY OF STIRLING

Research Data Collection Phase	Date

Practitioner Details

Name	Position

Preamble

I am a PhD student at the University of Stirling and I am conducting research about how children interact with other people while using technology in preschool playrooms.

The purpose of this interview is to better understand the planning that takes place around children's technology use in the playroom as well as how children and practitioners interact around technology use. The questions that I ask are open ended and I welcome as much of your ideas and thoughts around the subject as possible.

If you are agreeable, I would like to audio-record this interview so that I do not miss any important points that I might not otherwise be able to capture with manual notes. All audio recordings will be securely stored on a password-protected computer and destroyed at the end of the project. Would that be OK?

Are you happy to continue with this interview?

Question 1

Can you list for me the activities which you consider to be technology related which you have available in this preschool?

Notes

N.B - provide a list of what I consider to be technology so that we are on the same wave length for the rest of the questions

Researcher: Lorna Savage
PhD student at University of Stirling

Project Title - Young Children's Social Interactions: A study of Preschool Technology Use

Question 2

Have you positioned the technology in the playroom in its current location purposefully?

If yes why did you choose to put it there?
If no, do you think it matters where the technology is located?

Notes

Question 3

Do you have an explicit technology initiative as part of your development plan within this preschool?
Has this always been in place or is it a more recent development?
Why was the technology initiative put into place?
Is this initiative at the forefront of most of your activities or something that takes place in the background?
If no – may I ask why it isn't part of the development plan for example is it because it is planned for separately, or do the parents prefer to have a technology free playroom etc?

Notes

Question 4

When are children allowed to use technology in the playroom?
Do you have any expectations for children when using technology or set procedures that they have to follow?
Are children aware of these expectations?
In what ways are children made aware of these expectations?
What action is taken if children do not follow the set procedures or meet your expectations?
At any point do children create their own procedures or rules for using technology?
Are these rules created specifically for technology use or do they follow them in all their activities?

Notes

Question 5

Why are some technologies only available on certain occasions?

Researcher: Lorna Savage
PhD student at University of Stirling
Project Title - Young Children's Social Interactions: A study of Preschool Technology Use

How do you decide when these technologies should be available and when they shouldn't?

Notes

Question 6

Do you have specific procedures relating to children using technology in groups or with friends?
Are the children aware of these procedures?
Do the children abide by these expectations regularly or do they often attempt to use the technology in other ways?
Do children have their own specific rules about working in groups or with friends?
Can you give me some examples?

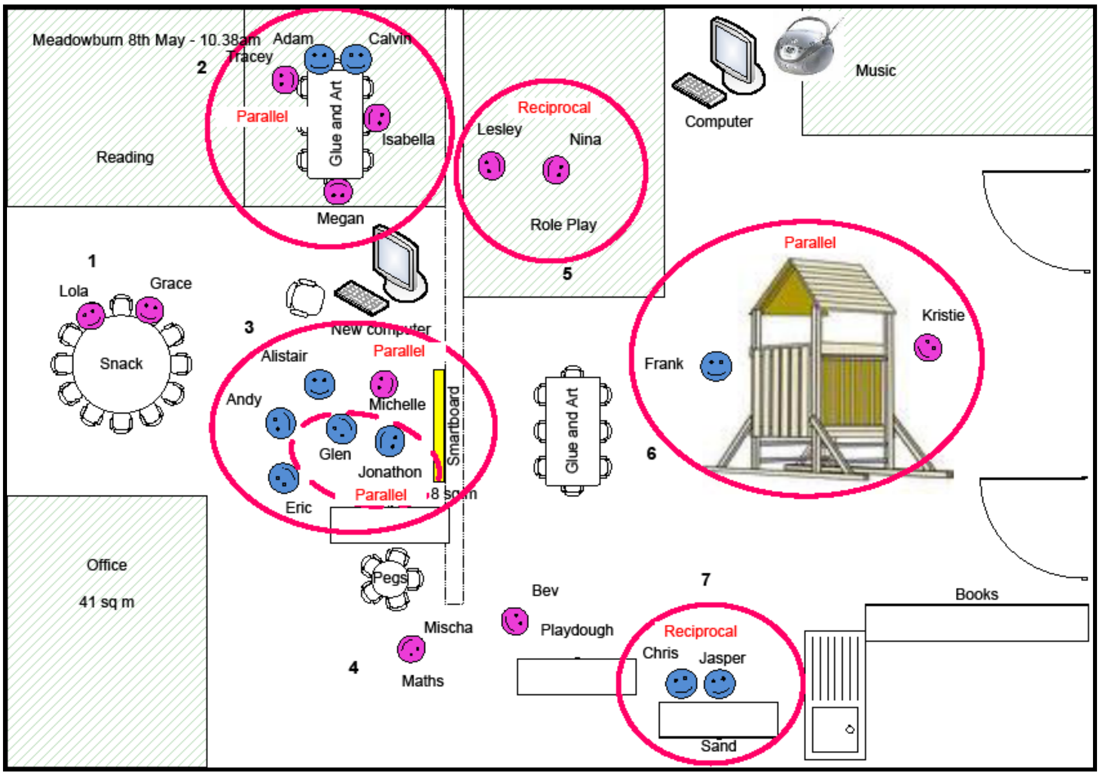
Notes

Question 7

Do you have specific procedures relating to children using technology with practitioners?
How often do practitioners use the technology with children?
When the practitioner is using the technology with the child is it to demonstrate how to carry out the task or to manage the activity?
When a practitioner uses the technology with the children is it most often a one-to-one activity or will the practitioner use the technology with a group of children?

Notes

Appendix 5 - Sample Completed Map



Appendix 6 - Examples of Completed Researcher Lead Activities

Sorting Activities

Figure 35 - Sorting Activity Hillfoot Nursery, 24th April 2009

Children were provided with a series of flash cards each of which had on it a photograph of a technological resource which was available in the preschool. Each child was asked to select a flashcard and tell the researcher what the resource was (to clarify that they understood what resource they were sorting rather than simply picking pictures which they found appealing without understanding when they'd used them in the preschool). Next they would be asked to show how many children could use the resource at any one time by placing the flashcard on the appropriate 'how many people can play picture'. At this point, the children were asked to read the card and indicate what it said, so that I was confident that they knew they were selecting one, two, three or four children.

Categorising Activities

Figure 36 - Categorising Activity, Hillfoot Nursery, 30th April

The activity was cyclical and involved the following process.

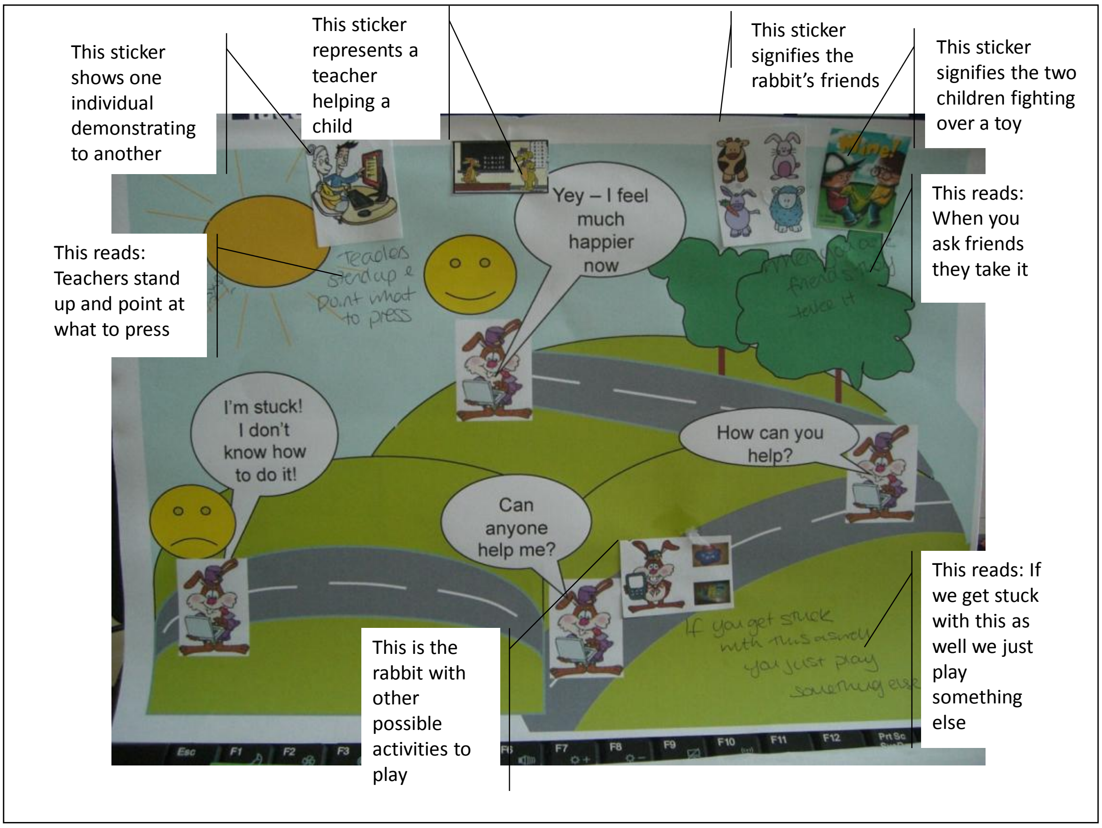
1. Children were asked to select their *favourite* activity from all the activities and stick the sticker onto their own piece of card.
2. They were asked to select a 'how many people can play' sticker which represented the number of children who could use that specific resource.
3. They were asked to comment on their choice by answering the questions.
    - "what makes it fun/good to use the [technological resource] with [number of children indicated on the 'how many people can play' sticker] people"?

- "What makes you choose [number of children indicated on the 'how many people can play' sticker] people to use the [technological resource]"?

These three steps were repeated several times until the child no longer wanted to take part or until they had commented on all the resource stickers available. Below is an example of one round of the completed activity.

Storyboards

Figure 37 - Storyboard, Hillfoot Nursery, 15th May



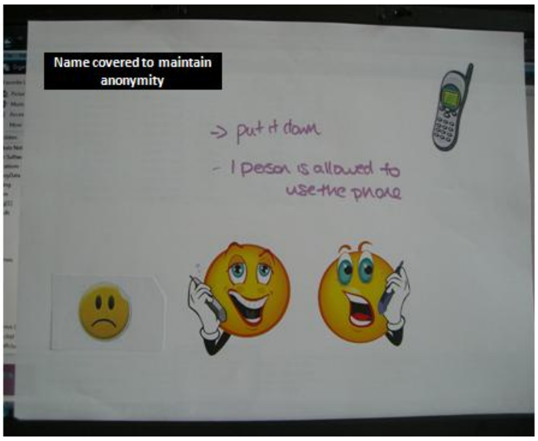
Children were provided with a template which told the story of a rabbit who was having difficulty using a laptop computer. The children were also provided with a series of stickers which illustrated a range of helping situations and when combined told a range of stories about how the rabbit could get out of difficulty. For example, the rabbit had the option of asking his friends or teachers for help or giving up and playing a different game. If the rabbit asked for help he was then able to describe whether teachers or peers were able to offer advice by demonstrating what to do or taking control of the laptop rather than showing them what to do.

The situation was explained to children and they were asked what they would do if they were the rabbit and were having difficulty using the laptop. Children were able to select from the stickers and create their own story of events.

Scenario Activity

Figure 39 - Scenario Activity, Sylvester's Preschool, 7th May (Child's feelings)

Figure 38 - Scenario Activity, Sylvester's Preschool, 7th May (Perceived practitioner's feelings)



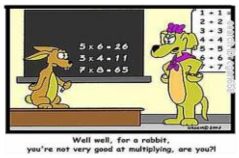
Children were provided with a blank scenario of: two children using mobile telephones together; a child using a remote control car alone; a group of three children using a computer, or an individual using the computer alone. The children were then provided with stickers of both a happy or sad face and the researcher asked "what do you think is happening in this picture". After the child explained their interpretation of the image, they were asked "and if that was you would you feel happy or sad". Reasons for their choice were documented on the activity. This is illustrated below.

Appendix 7 - Full List of Toy Stickers

Sticker	Description
 Duplo techs	Duplo Techs - Toy available in Hillfoot Nursery Class
	Metal Detector – Toy available in Hillfoot Nursery Class
	Computer – Toy available at Hillfoot Nursery Class
	Early Learning Centre Till – Toy available at Sylvester's Preschool

Sticker	**Description**
	Pretend and Play Till – Toy available at Sylvester's Preschool
	Computer – Toy available at Sylvester's Preschool
	Washing Machine – Toy available at Sylvester's Preschool
	Early Learning Centre Till – Toy available at Hillfoot Nursery Class
	BeeBot – Toy available at Sylvester's Preschool
	Telephone – Toy available at both Sylvester and Hillfoot Nursery Class

Sticker	Description
	Microwave – Toy available at Sylvester's Preschool
	Laptop – Toy available at Sylvester's Preschool
	Descriptive Sticker – Represents peer/practitioner providing help through explanation
	Descriptive Sticker – Represents peer/practitioner taking control of the technology during help
	Descriptive Sticker – Signifies multiple friends

Sticker	**Description**
	Descriptive Sticker – Signifies teacher/practitioner helping
	Descriptive Sticker – The Rabbit plays with different toys
	Descriptive Sticker – Signifies feeling sad
	Descriptive Sticker – Signifies feeling happy

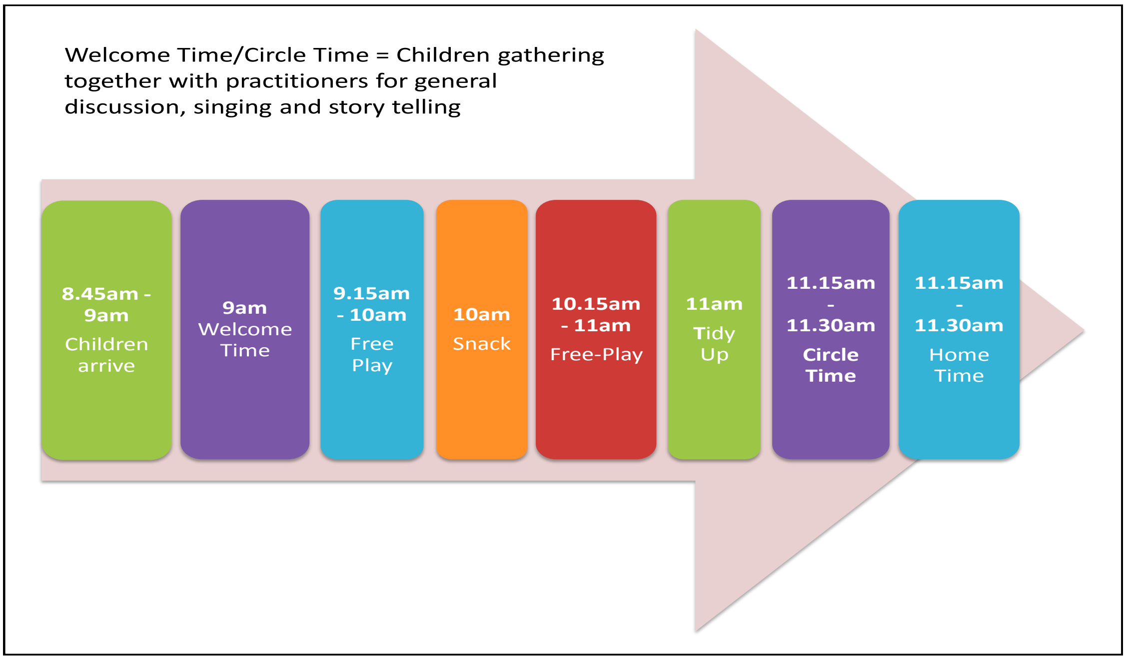
Appendix 8 – Hillfoot and Sylvester's Routines and Resources

Both preschools in this study were fairly typical of local authority provision in Scotland. They were characterised in terms of routines and available resources which are described below.

Preschool Routines

In terms of daily routines, there were very few differences between the two institutions. The general approach was to follow the sequence in Figure 40. Children would repeat this sequence in the afternoon and children who stayed over lunch would go through the same routine twice in the day but they could choose different activities during their free-play time. The key factor that was significant in this routine was that practitioners promoted agency and self-sufficiency in children's behaviour. For example, children were encouraged to sign their own name on the register when they arrived rather than their parent or guardian signing it for them and they were encouraged to tidy away their own plate and rubbish after snack time.

Figure 40 - Preschool Routines



Only two differences between the two preschools' routines were identified.

- Welcome time involved the entire class at Sylvester's Preschool while at Hillfoot Nursery Class children formed smaller groups and exhibited more intimate circle times.
- Snack time was arranged by group at Hillfoot Nursery Class and children were called to snack at specific times while snacks were always available at Sylvester's Preschool and children could choose snack at any time.

Preschools were purposefully chosen to be similar in terms of provision because the aim was to gather as much data as possible to answer the research questions. As a result, the aim was not to make continuous comparisons across preschools, rather the analysis focused on combining the data to better understand behaviours, interactions and social participation. Where data showed clear discrepancies in interactions were related to the different preschools these are highlighted, but they are infrequent.

Preschool Resources

Both preschools occupied one large room, with a semi-participation wall with no door dividing the room in two. Within this space, the preschools offered a wealth of resources and activities. Resources included: wet and messy resources like paint or water play; small world replications of domestic equipment such as cookers; dressing up and technological resources such as computers, SMART boards or remote controlled cars. The resources that practitioners promoted were laid out before the children entered the playroom. Practitioners reminded children at 'Welcome Time' of all the activities available during the day and they were then free to move around the room and the outdoor area according to the free-play agenda. Occasionally, practitioners directed children to certain resources, which they needed to complete - such as making Mother's Day cards - but overall children chose their own activities.

Hillfoot Nursery Class had to alternate their activities more regularly because space did not allow all activities to have a permanent position. Sylvester's Preschool, however, was afforded more space, which gave them the opportunity for more activities to have a permanent location; hence mostly the same activities were available each day at Sylvester's Preschool.

Appendix 9 - Glossary of Technologies

Technology	Description
Computer	Standard IBM desktop personal computer with one monitor, keyboard and mouse.
Landline	Fixed location corded telephone
SMART board	Interactive large wall mounted whiteboard
Laptop	Portable children's simulated laptop computer. Battery powered with interactive buttons and screen.
Digital Camera	Silver compact portable camera which saves photos to a memory stick which can later be transferred to the computer
Till	Children's simulated cash register with opening cash drawer, pretend money, attachable card reader and toy credit cards
CD Player	Portable music player compatible with CDs and also plays radio
Duplo Techs	Large Lego which can be assembled to construct a remote control vehicle
Exercise Equipment	Children's simulated battery powered treadmill, cross trainer, and bike.
Electric bus	Battery powered bus lights up and plays sounds
Leappad	Children's reading tool. The pack is compatible with various books and the equipment plays sounds and helps children read with the use of a special pen which reads the word aloud when placed over the word.
Mobile Phone (toy)	Children's simulated mobile telephone. Cordless handheld device which was battery powered and lit up and played sounds

Technology	Description
Musical Keyboard	Children's battery powered musical keyboard. Played notes when key were pressed and also had pre-set tunes installed.
Tool Box	Battery powered children's toolbox with simulated drill, saw, electric screwdriver and sander. When the buttons are pressed the tools played sounds and rotated.
Fairy lights	Traditional Christmas tree fairy lights
Electric Road	Traditional children's road game but the houses, street lights and cars were motorised.
Microwave	Children's simulated microwave. A battery powered device which lights up has a timer and the inner place rotates
Washing Machine	Children's simulated washing machine. A battery powered device which lights up, and has a timer.
Fire Truck	Battery powered fire truck. The light flashes on the top of the truck and it plays siren.
Tape Recorder	A children's battery powered tape recorder with attached microphone and a playback function.
Hair Straighteners	Professional hair straighteners with the plug removed as well as plastic simulated hair straighteners
Metal Detectors	Full size professional metal detector, battery powered.
Alphabet Board	Battery powered board with each letter located on the front in the form of a button. When the letter is pressed it either plays a note or reads out the letter depending on the setting
Calculators	Full size battery powered calculator
Hairdryers	Full size professional hairdryer with plug removed.

Appendix 10 - Examples of Social Behaviours from Observations

Table 14 – Anti-Social Engagement, Examples from Observations

Hostile Interactions	Example of Hostile Interactions from Observation Data	Possessive Interactions	Example of Possessive Interactions from Observation Data	Unsociable Interactions	Example of Unsociable Interactions from Observation Data
Pushes other children	Steven tries to point at the screen but Harvey pushes his hand away and says “Shhh – Don’t talk!”. E24h	Hiding Covering Technology	Shalini “Kamya can you write your name? I’ll show you” Kamya pays no attention and Shalini tries to reach the keyboard (Episode 4s)	Ignoring others	Jade appears just as Derek is off his seat picking up money that has fallen on the floor. Jade takes his seat and hands Manish some money silently. Derek sees her and says, “hey, that’s my seat!” Derek just walks around the other side towards Manish and stands behind watching as Manish presses buttons. Jade also watches. Derek tries again one more time “that’s my seat” to Jade. She remains silent, ignores him, and waits. (Episode 39s)
Arguing	Ray approaches Georgina and says, “he’s got everything”. Lloyd protests and won’t hand over the tape-recorder. Georgina tells Lloyd that when the sand runs out on the timer then he has to give Ray a turn. Lloyd takes the pretend money that is in the back of the tape player after handing tape player over. Ray protests and Lloyd says, “it’s not your money”. (E66s)	Object taken, altercation	Harvey reappears and pulls apart Glen’s Igloo and Glen notices and shouts “Hey” and grabs it off Harvey and it breaks apart even more. 12h	Verbally Rejects child's invitation	Harvey appears again “Do you want to play transformers? Do you want to play transformers” Steven: “no” (Episode 27h)
Verbal abuse	Mischa “He’s stupid! He’s stupid isn’t he?” Grace “yeah” Mischa “Harvey you are stupid” Harvey does not respond. 24h			Walking away	Charlotte said “I’ve had enough of this” and leaves (E32h)
Misleading/’tricking’ peers	Jeremy [to Jacob]: “I’ll give you your money back if you open the till” Jacob sits for a few seconds then opens the till. Jeremy steals the money and runs away. 39s				

Table 15 – Pro-Social Engagement, Examples from Observations

Sociable Interactions	Examples of sociable interactions from Observation	Sharing Interactions	Examples of sharing interactions from observations	Supportive Interactions	Examples of supportive interactions from observations
Extended Verbal Exchange	Frank appears and chats to Katrine: "Katrine, I'm three [years old] – are you three?" E30h	Allowing others to become the owner instead of themselves	Chris: "Campbell can I borrow this a wee minute?" waving the screwdriver. Campbell "Oh, mmm, yeah. I don't need it!" (E1h)	Receiving Approval or praise from or for peer and Offering Approval or Praise	Calvin and Glen play together. Calvin hands him a lamppost. Glen: "thanks, what a clever boy you are" and Glen hugs Calvin. (Episode 26h)
Verbal Invite	Nile walks over to Ryan and says, "look", squeezes them together, and says "hello" as if the straighteners are talking. (Episode 12h)				
Standing/Sitting in Close Proximity to Peers	Harvey stands up as if he's about leave and Glen appears and sits down and then Harvey sits down again too. 8h	Offering and Receiving Objects	Megan starts passing food to Lily to swipe and place in the bag. Lily accepts the toys and continues with the play theme. (E25h)	Children seek praise or attention	Shalini sees Mrs Adams and shouts "Mrs Adams, we've got 3" Mrs Adams says "yeah (E34s)
Acknowledges or notices other children	*Russ appears and sits next to her. Tracey: "let's do this" (Episode 37h)*				
Makes their presence known	Aaron: "I want a turn" (Episode 38s)				

Table 16 – Task-Driven Engagements, Examples from Observations

Exploratory/ Investigatory Interactions	Examples of Exploratory/Investigatory Interactions from Observations	Helping Interactions	Examples of helping interactions from Observations
Q&A	Calvin: "Why, why, why aren't the lights going on?" to Mrs Twill. Mrs Twill: "I don't know, we'll need to check all the wee bulbs later" (Episode 2h)	Demonstrating	Malcolm appears trying to place a tunnel in the wrong place. Glen takes the tunnel and relocates it in the right place and says, "look, see, these bumps – that's where the tunnel goes" and allows Malcolm to push it down into place after Glen has positioned it. (Episode 21h)
Explaining	Elisabeth returns and tries to use Kelly's laptop but Kelly says "it's for big girls" (Episode 43s)	Physical Help	The wheel breaks again and Alistair waits on the climbing frame for Chris to fix it (Episode 5h)
Verbally Requesting Help	Alistair tries to fix the wheel that's broken. He brings it to me: "Could you fix this please. It's very hard" I fix the wheel by playing the caterpillar track. (Episode 5h)	Verbally directing	The game finishes and Claire gets up and offers advice about what to do next "press that". Hugo doesn't respond. (Episode 45h)
Observing the task	Children stand close by to technology looking at the screen.	Listens to peers and acts to facilitate or negotiation to satisfy peer	Harvey: I'm looking for one of these (pointing at Alistair's Duplo) Alistair: I'll find it! (Alistair looks in the box briefly) I'm afraid I can't find it. (Episode 17h)

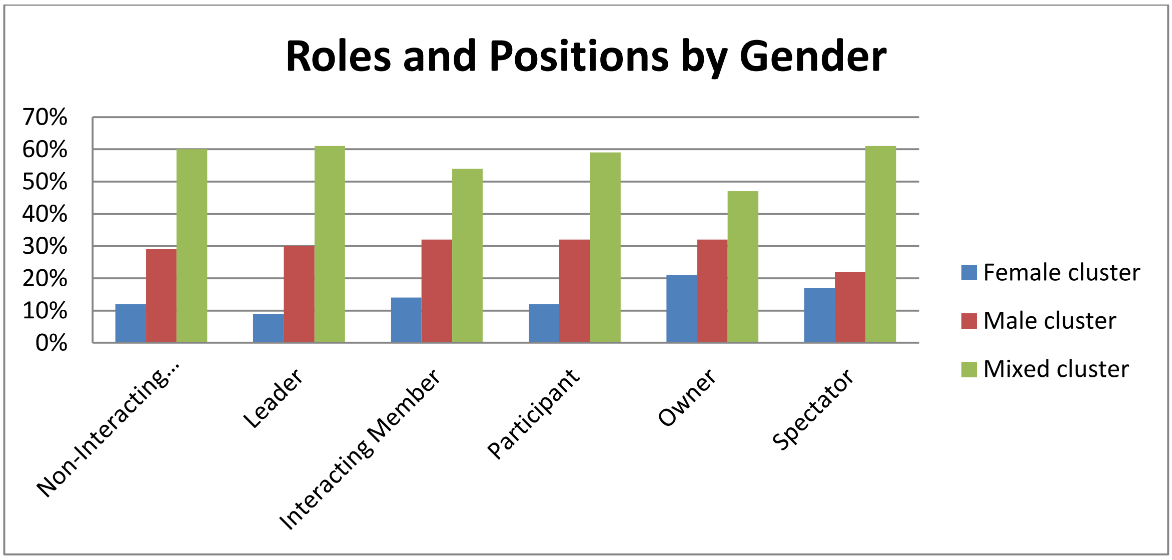
Appendix 11 - Gendered Social Interactions around Technology

In line with the rest of this study, gender was explored in terms of clusters and episodes rather than in relation to specific children. It was essential to maintain the focus on clusters as a unit of analysis. For the most part, episodes showed mixed gender involvement and there were only marginally more all-male episodes compared to all-female episodes.

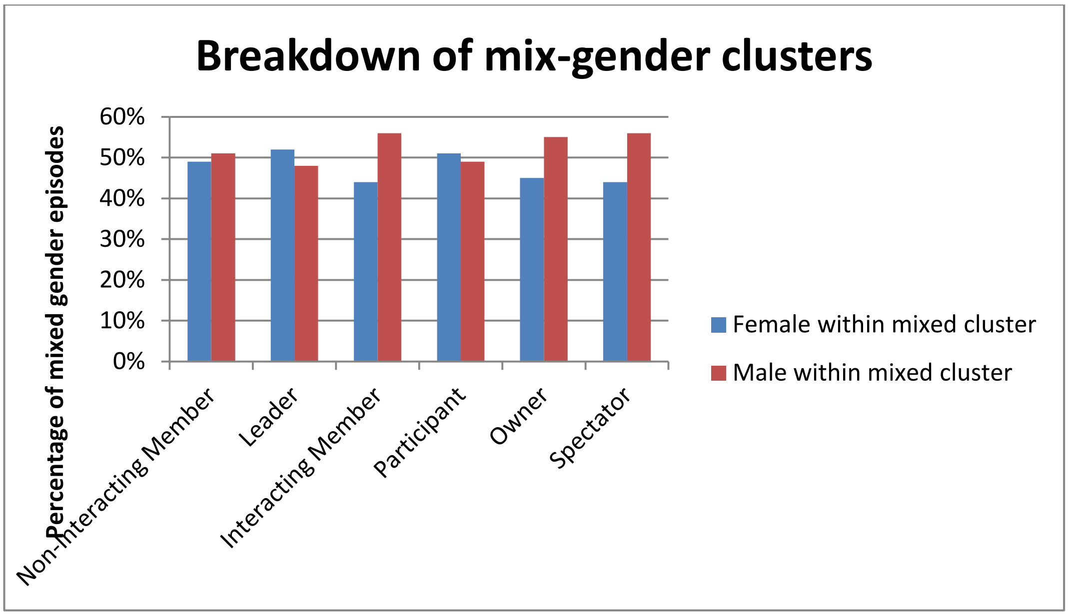
Table 17 – Gender Breakdown in Episodes

	Overall percentage of episodes
Female	21%
Male	33%
Mixed	46%

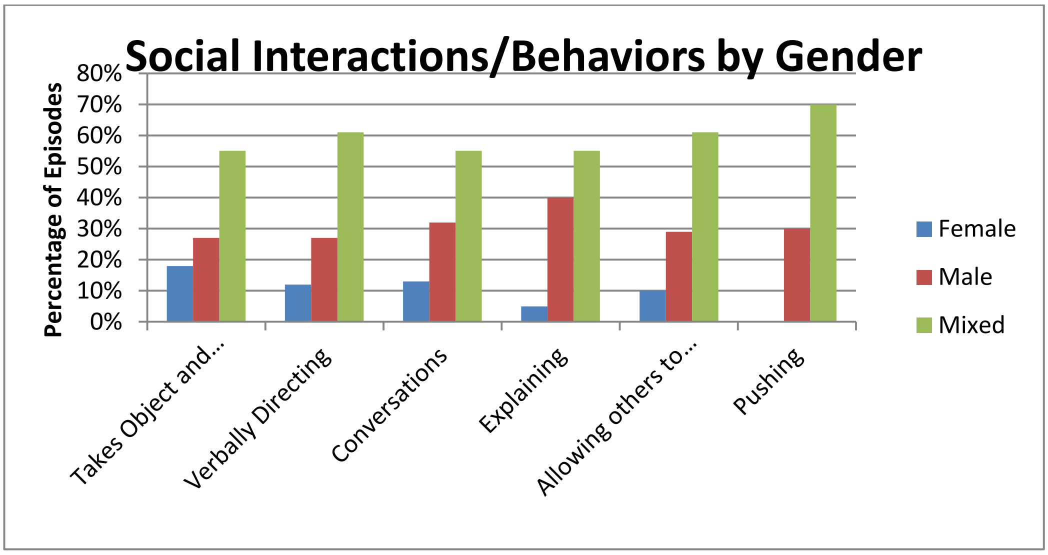
The key social status roles and technological positions were also explored in relation to gender because these roles and positions were considered to influence children's ability to make decisions about how they behave and interact. However, the data from this analysis resembles the general breakdown of episode by gender. All roles and positions were most frequently observed in mixed gender groups with marginally more all-male episodes showing these roles and positions compared to all-female episodes, as shown in the graph below.



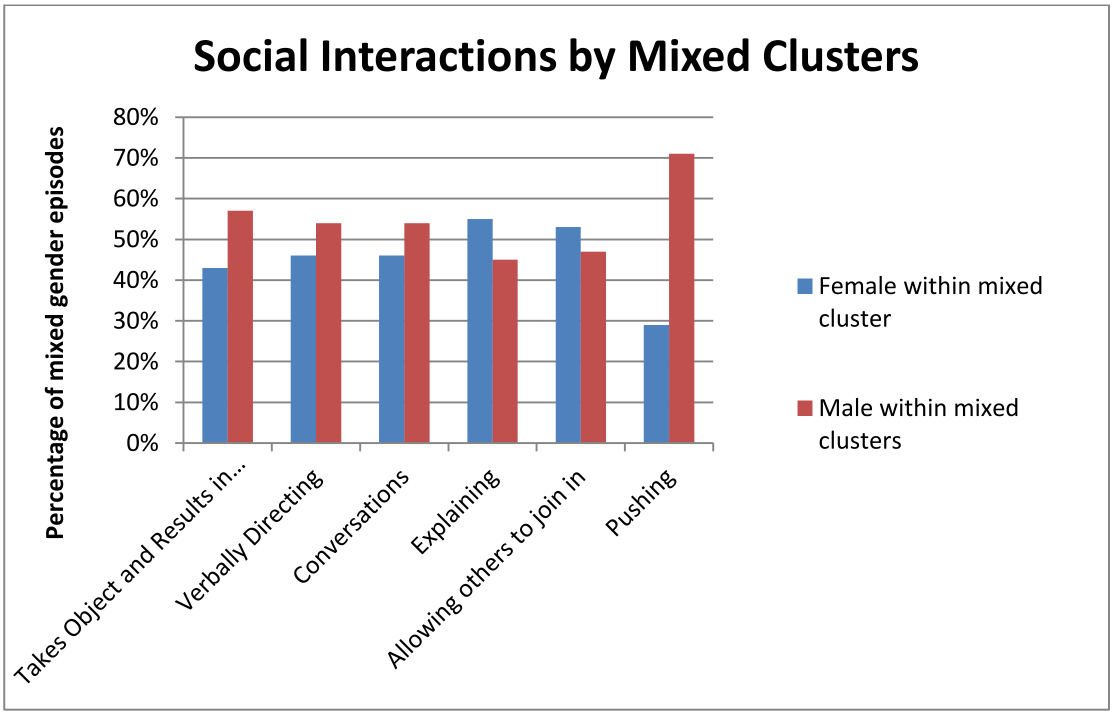
Furthermore when the mixed clusters were broken down to explore gender, the analysis showed that typically both genders assumed the varied positions equally and gendered positions and roles were not immediately obvious.



Similar analysis was applied to social behaviours and interactions and with the exception of 'pushing', the findings resembled the make-up of episodes and no dramatic results were observed. A selection of these findings is presented in the table below.



The only real behaviour of note was 'pushing' where it was absent in all-female episodes. This data however is not new and it resonates with long standing literature about gendered social interactions in preschool (Ostrov & Keating, 2004) and somewhat aligns with Kennewell and Morgan (2006) who suggested that with the exception of self-efficacy around computer games gender influences were low. This analysis was again conducted for mixed gender groups and with the exception of pushing there was typically an even split between genders.



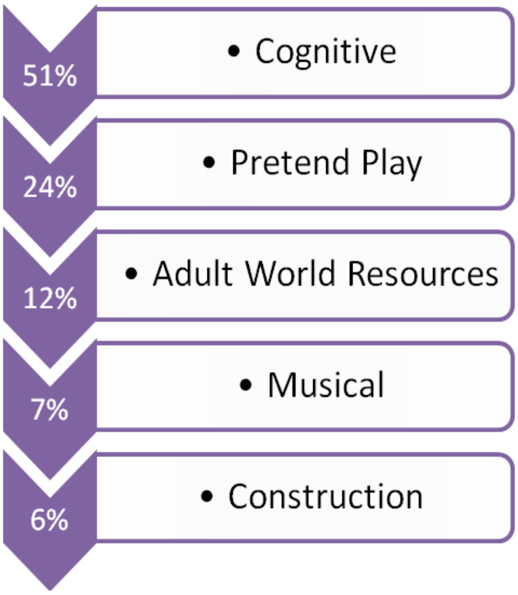
Appendix 12 - Frequency of Technology Use

Table 18 - Number of times technologies were recorded in use during activities

Technology	Total Recorded Activities
Computer	68
Landline	17
SMART board	15
Laptop	14
Digital Camera	11
Till	11
CD Player	9
Duplo	9
Exercise Equipment	8
Electric bus	6
Leappad	5
Mobile Phone (toy)	4
Musical Keyboard	4
Tool Box	4
Fairy lights	3
Electric Road	2
Microwave	2
Washing Machine	2
Fire Truck	2
Tape Recorder	2
All remaining 5 technologies	1

Of the 25 technologies which were observed being used by children during visits, only a few technologies were used repeatedly. Table 18 indicates the number of times I recorded (from mapping snapshots and observations episodes) each technology in use. Children used the computer far more frequently than any other technological resource. This was particularly of note because during the data collection process I made a conscious effort to focus on other technologies instead of the computer. Yet, despite these efforts, the computer was the most often observed technology by a large margin, highlighting its dominance over all other technologies in preschool. Children used the computer on a daily basis and it was the only resource where I recorded at least one episode during each visit. Children used some resources, such as the landline telephone or Duplo Techs, moderately from time-to-time but not during every visit and they used other resources rarely. For example, I only observed children using the tape recorder twice throughout the entire study.

Figure 41 - Frequency of activities with technology



I saw children engaging in cognitive activities in the majority of episodes and snapshots (51%). This reflects the previously presented data, which states that the computer, SMART board and laptop, were three out of the four most frequently observed technologies demonstrates the hierarchy of most observed categories of technological activities.

Four potential reasons why some technologies were used more than others could be inferred from my experience in preschool and from my understanding of the context, but this was context specific and not an exhaustive list. This included: Availability of Resources, Portability, Adaptability and Preferences.

Availability of Resources

It became clear throughout the data collection period that while children have the freedom to choose which resources to use, adult decision-making restricted these choices. Practitioners only made available the resources which they considered suitable for children of this age, thus children were selecting resources from a pre-approved assortment. As a result, adults were implicitly directing their play.

Practitioners advised me that children were able to request technologies which were in the store and children at Sylvester's preschool were able to collect technologies themselves from the ICT store cupboard. However, data from this study indicated that children made use of a wide range of resources available to them in the playroom but they typically used the resources that were laid out; children were less often seen collecting resources from the store cupboard. Data from this study certainly showed that many technologies were stored away in a technology cupboard or on open shelves which were only accessed if children requested them or had the confidence to obtain the technologies they wanted from the cupboard. For example, the preschools had new sophisticated technological resources like the Digital Blue Microscope or Beebots but I never observed them in use throughout the nine-month data collection period. Furthermore, children did not refer to these resources in any way; in fact, some children did not know what these resources were when shown a picture of them during researcher-led games. While there was evidence of children actively retrieving technologies from the technology cupboard, this was not observed until late in the second term and therefore children took some time to develop confidence in this area, which resulted in some technologies being underused. Thus, when practitioners selected which resources to display each day, and which resources to leave in storage, this influenced children's choice of technologies.

In addition, multiple units of a technology, or technologies which were in full working order, tended to attract children to use them more frequently. Each preschool had at least two computers, providing greater opportunities for use. Yet, both preschools had one SMART board but only the one at Hillfoot Nursery was in working order and those children at Sylvester's preschool showed no interest in the SMART board, shown in Vignette 58.

Vignette 58 - Extract from researcher's reflections 3

Hillfoot Nursery Class and Sylvester's Preschool, Several Visits

The SMART board in Hillfoot Nursery Class was installed late in the semester so children only began using it in May but it was in continual use from the day it was installed, explaining the high proportion of activities documented despite its late installation (the SMART board was observed 15 times in one month in one preschool alone compared to the other resources that were observed across two preschool over nine months). The SMART board at Hillfoot was permanently available for children to use allowing several activities to take place each day. However, the SMART board at Sylvester's Preschool was never turned on. Staff complained about the location of the SMART board which was installed on the end of the partition wall and therefore blocked the walkway between the two rooms. There are therefore no observations of children using the SMART board at Sylvester's Preschool and with only one exception where a child used the pens placed at the bottom of the SMART board, realised they didn't work and then left, children did not attempt to use the resources while it was turned off.

Portability

The portability of technologies had both positive and negative impacts on the frequency of use. The positive result was that portability provided more opportunities for use because the technology could be moved wherever the play was taking place. On a number of occasions, the staff at Sylvester's Preschool closed off one of the partitioned rooms if they were short staffed or guests wanted to conduct activities in one of the rooms. Those portable technologies, however, could be used irrespective of which room was open. For example, on one occasion Shalini was using the laptop in the 'computer' room and when the room was closed a few minutes later, she was asked to move to the other room she was told she could take the laptop with her and use it next door. The negative result was that portable technologies were easily tidied away, were out of sight and as a result children had to request the technology if they wanted to use it. Thus, when technologies were portable they were not necessarily available all the time, reducing their use but at others times the portability of the resource allowed it to be used when other technologies could not.

Adaptability

Technologies which could be easily integrated into a number of different activities were easier to use in a variety of situations. The preschools had some resources that were very specialised, such as Beebots, and they were not incorporated into activities without specialist planning by practitioners. For example, they decided to explore the 'theme' of Robots as a topic of learning and recognised that Beebots could be interpreted as Robots by children of this age. Children used the resource because this topic was a key part of the learning in the playroom but had this decision not been made and the theme of 'Robots' not emerged it was difficult to see when the Beebots would have been used by the children. In fact, I never observed children using Beebots at all throughout my visits to preschool and they remained stored in the cupboard.

Alternatively, due to the nature of the telephone and its prominent position within society it could be used in a number of different pretend play situations; whether the pretend play activity was the Chinese restaurant, a home or a shop, the telephone remained in the area because it had a logical position in all these settings. Similarly, the mobile telephones could be substituted as guns or lasers when fighting 'baddies' in the pretend play area because of their shape. These resources had a logical and adaptable purpose within some key areas in preschool and they were incorporated into a number of different activities increasing their use.

Figure 42 - Digital Image - Hillfoot Nursery Class, March 10th 2009

In situations where technologies were portable and also had a direct link to certain play themes, it was possible for children to incorporate technological resources with non-technological activities. In these situations the technology was a supplementary resource to a larger play theme and was not the dominant feature. This was observed when children integrated the toolbox into more general play with Lego as shown in Figure 42.

Preferences

The frequency of certain technology use was also influenced by children's preferences. Children had clear preferences for the resources they picked and therefore chose to use those technologies and ignored other technologies even if they were available. Evidence from informal conversations and researcher-led games with children indicated that children's favourite resources were the computer and the landline telephone. As previously discussed in the Methodology Chapter, in order to explore children's perspectives they were provided with a series of stickers that depicted the range of different technologies, which were available in the preschool – some which were readily available everyday like the computer and some which were only available on specific occasions like the metal detector. Children were then asked to create a picture using the stickers of the technologies they liked in the preschool and the majority of children choose the computer or the laptop first, reflecting children's interest in the computer and partially explaining why the computer was used so much. Evidence from an informal conversation with Katrine at Hillfoot Nursery Class supported the argument. She was asked what games she liked to play with friends and she replied “CBeebies” (a website – a computer activity) (Audio HD1K).

A similar informal conversation with Eva indicated that she liked to use the telephone (the second most frequently used technology in observation episodes and mapping snapshots) in Vignette 59. She decided to interview me and ask me about what I like to write. She then asks if she can tell me what she liked in the playroom and the first and only technology that she mentioned in the playroom was the telephone as shown in the extract below.

Vignette 59 - Children’s toy preferences

Eva: Do you like write about rowing machines, stuff like that?
Researcher: I like to write about... like the computer and I like the telephone and I like the laptop and the remote control cars.
Eva: Can I tell you what I like? I like, I like the telephones, the pencils, the puzzles the butterflies and the dragon’s lair.

(Audio SD1E, Conversation with Eva (age 4 3/4)

Appendix 13 - Ljung-Djarf's Technological Positions

Owners

Ljung-Djarf defined the owner as "the child who is in charge of the mouse and the keyboard" on p65. In this sense, I observed children as the owner of the computer frequently throughout my data. Where technologies only take the form of one major part like the electric bus or the computer, the owner was the child physically controlling the technology at that time. They were able to touch it and operate its functions and it was difficult for other children to simultaneously operate the technology because of the mutually exclusive nature of the controls; the keyboard for example overrides or cancels out any operation on the mouse, and vice versa, when used at the same time. The owner was therefore the *one* child who was able to physically control the technology.

Owners were observed in 94% of observation episodes and those 6% of episodes which did not show an owner or owners were typically episodes which involved conversations between peers or children and practitioners about a specific technology but where they did not physically use the technologies. This definition of owner could also be extended for other technologies in my study because I observed children as owner, participant and spectator for a wide range of technologies including: the SMART board, cash register and laptop. Moreover, there was evidence of an owner with either participant or spectator present for ten different technologies. This concept was therefore not unique to computers.

Participants

Participants were those children who were actively involved in the activity but were not physically controlling the technology. Ljung-Djarf defines the participation as:

> *The participant is the child situated nearby the owner, trying to or invited to participate in common play at the computer. The participant's right to present suggestions, help and support is central. P67.*

This definition was consistent with the positions which I observed in the data. Participants were most often observed offering advice and suggestions about how to complete the task. They acted in a manner which suggested that they considered themselves more knowledgeable and capable than the owner of the technology as they offered advice as if the owners were not aware of the process themselves. For the most part, they would offer suggestions but in some cases, participants were observed reminding the owner that they were making a mistake or doing something wrong.

The role of participant is more accessible for activities which have an end result or goal, for example, activities around the computer typically involve games which need to be completed and there was a correct or incorrect way to complete the game. Similarly, with some pretend play activities, the aim was to develop a play theme which was acted out and so there needed to be some sort of shared understanding of how the play should progress. In these situations children were then in a position to offer advice. However, activities which did not move towards some common goal made it difficult for other people to actively take part in directing the play.

Participants were not always present in an activity. They were typically present when children had to share a resource and did not have access to their own part of the technology and so they could not control the technology themselves. To become part of the activity their only option was to relay their thoughts and suggestions to the owner of the technology and wait to see if they were taken on board. When technologies had multiple parts, however, they were able to put their own decisions into practice and they were able to become the owner themselves, eradicating the need for a participant.

On occasion, there were multiple participants offering suggestions about completing the task. Sometimes these participants would offer complementary advice but at other times different participants, or even the participant and owner had differing opinions. This may result in problems or confrontations about whose advice was most worthwhile. At times children were therefore seen debating amongst themselves, trying to highlight the value of their opinion over someone else's and their justification was presented to the owner because the success of the participant's suggestion being implemented resides heavily on the owner's willingness to accept their advice. When participants could not agree the owner could decide which advice to choose. This depended upon many factors which were difficult to ascertain by observing, for example in situations where participants and owners have had disagreements, the owner may not accept the participant's suggestion as appeared to be the case with Aaron and Dominic.

Vignette 60 - Confrontations from differences in opinions

Three children are clustered around the computer where Aaron is the owner. Aaron selects a video of a dancing animal on the computer and as the video plays Aaron rises from his seat in front of the computer and mimics the animal on the screen. Dominic is sitting by Aaron's side but he is so close that Aaron is bashing into him when he dances and dissatisfied with this Dominic says "Stop it. You are pushing me!". Aaron immediately stops the video and sits down in his seat. Bailey asks "why did you do that" but Aaron does not reply and begins to search for a new game. Dominic offers the suggestion "click on that one now" and points at one of the games on the screen, but almost immediately Bailey offers a second choice, "No click that one!". Aaron chooses the game that Bailey had suggested.

(E28s, Aaron, Dominic and Bailey age 3 ½,unknown)