

**The Role of the Designer in the Facilitation of Meaningful
Play between Disabled and Non-disabled Children**

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The candidate confirms that the work submitted is her own, except where work which has formed part of jointly authored publications has been included. The contribution of the candidate and the other authors to this work has been explicitly indicated below. The candidate confirms that appropriate credit has been given within the thesis where reference has been made to the work of others. Chapters 1-2 and 4-7, make reference to jointly authored publications developed by researchers involved in the Together through Play project. Details of publications used are as follows, in order as corresponding author:

1. **Moore, A. M.**, Holt, R., and Beckett, A. (2014, September 4) The Emergent Role of the Social Designer. In Bohemia, E., Rieple, A., Liedtka, J., & Cooper, R. (Eds.), *Proceedings of the 19th DMI: Academic Design Management Conference: Design Management in an Era of Disruption*. Paper presented at the 19th DMI: Academic Design Management Conference, London College of Fashion, 2nd- 4th September (pp.1971-1987). Design Management Institute.
2. Holt, R. J., **Moore, A. -M.**, & Beckett, A. E. (2014). Together Through Play: Facilitating Inclusive Play through Participatory Design. *Inclusive Designing* (pp. 245-255). Springer International Publishing.
3. Holt, R., **Moore, A. -M.**, Beckett, A., 'Together Through Play: Facilitating Meaningful Play for Disabled & Non-Disabled Children through Participatory Design' 11th International Conference on Interaction Design and Children, Bremen, Germany (12/06/2012 - 15/06/2012). Repository URL: <http://eprints.whiterose.ac.uk/93102/>.

The candidate acted as Principal Researcher for the work contained within these publications and this thesis. She was solely responsible for the production of the first publication listed, with named authors providing support through review or modification only. She co-authored the latter two publications. Dr Raymond Holt acted as Principal Investigator for the Together through Play project and PhD Supervisor to the candidate. He was responsible for the production of the latter two publications, with named authors providing support through review or modification. Dr Angharad Beckett acted as Co-investigator for the Together through Play project and was Co-supervisor to the candidate. She provided support through review or modification on all three publications listed.

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Abstract

User-centred design seeks to respond to the needs and aspirations of the end user at each stage of the design process. Yet when attempts are made to engage children as users in the design process, the pre-existing power differentials between adults and children can lead to the silencing of children's voices. As disabled children are amongst the most marginalised of an already disempowered group, for them, this problem is further compounded. This calls for a new approach towards user-centred design with disabled and non-disabled children.

This thesis draws upon the methodological aspects of Together Through Play - a three-year, interdisciplinary research project at the University of Leeds, which sought to develop understanding of children's needs and aspirations for playing together. It reflects upon the processes that led to the emergence of rich, sociological data through this case study. How to encourage designers to truly listen to the voices of disabled children and how to effectively convey the aspirations of disabled children to product design and development teams, became key emergent issues.

With the intention of addressing the power imbalance between designers and children in the design process, the researcher employed and adapted methods of cooperative inquiry, an approach to creating new technologies for children, with children (Druin, 1999). Reflections upon the methods employed are used to inform a set of guidelines for design curricula for interaction design (IxD) with children and child computer interaction (CCI) researchers seeking to work in the area of user-centred design with disabled children in the future.

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List of Abbreviations

ATA - Applied Thematic Analysis

IxD - Interaction Design

TA - Teaching Assistant

TTP - Together through Play

Chapter 1

Introduction to the Problem

This thesis seeks to address two key problems in the area of user-centred design with children. Firstly, that disabled children are inadequately considered in the design of toys and games and secondly, that the design community tends to be ambivalent about inclusive toys and play. A number of issues contribute to this problem - primarily, misconceptions within the design community about the meaning of user-centred design, the role of the designer and the process of designing with and for children. This section addresses the commonly held assumption that toys designed for disabled children are, or should be, separate from the mainstream - i.e. a bespoke or specialist task for designers and that *adults* are best placed to determine which play activities are best for disabled children.

Misconceptions about User-centred Design

One of the commonly held misconceptions within the field of design is that the disabled people pose a *problem* for designers and that they are abnormal. Moreover, 'artefacts (...) rarely conceive of impairment, disease and illness as part of everyday habitation or being' (Imrie, 2014, p.287). Yet the International Classification of Functioning (ICF) defines disability as an ordinary part of human life (United Nations Children's Fund, 2013) and the sheer number of disabled people currently living in the UK emphasises this point. There are approximately 11.6 million disabled people in Great Britain, of whom 5.7 million are adults of working age, 5.1 million are over state pension age and 0.8 million are children (Gov.UK, 2015).

In the field of user-centred design, there is a deficit model view of disabled people (Pheiffer, 2002) through which they are perceived unable to carry out activities of daily life due to the 'deficits' they possess (Finkelstein, 2007). Disabled people are defined as 'less able-bodied users' (Wilkinson and De Angeli, 2014, p. 621) or 'users with disabilities' (Bühler, 2001) and they are labelled by categories of impairment (Brown et al., 2011). There is an assumption that disabled users require bespoke or custom-made equipment (Wilkinson and De Angeli, 2014, p. 615) rather than inclusive mainstream products. Despite the aim of Universal Design to minimise the possibilities of social ostracism by drawing attention away from people's impairment as a source or site of difference, the measurement of disability

remains predominantly medical, with an emphasis on 'specific physical and mental impairments' (United Nations Children's Fund, 2013, p.17).

Assumptions about the Role of the Designer

Designers and engineers are not solely responsible for the inclusion of disabled people in mainstream society. However, they certainly have a role to play. Arguably, design is only one part of the solution to a more inclusive world. 'But design matters' (Institute of Human Centered Design, 2011, p.1). Numerous examples may be found in the field of user-centred design of design teams having sought equal opportunities for disabled people through design (Ostroff, 2001; Kitchin, 1998; Coleman & Lebbon, 1999). Yet there has been a tendency for design teams to focus on aesthetics and style over the social responsibility of designers and the moral content of design (Owens, 2009; Keinonen, 2010). It cannot be denied that in the design of toys and games, aesthetics and style are important. However, rather than simply satisfying the adults that purchase or develop them, these qualities must be appealing and meaningful to *children* as users also.

There is an assumed 'design authority' (Cohn et al., 2010) or hierarchy of social relations within the field of design that renders designers and engineers 'experts' (Whalley, 1986) and they are entrusted with the responsibility of making design decisions (Lane and Mistrett, 2002). Although proponents of universal design claim that users are, and should be, more than passive recipients of expert opinion, there is little evidence of an end to professional designers acting as the main agents (Cohn et al., 2010). Users are presented as consumers of services - only active in the market-based testing carried out in the development of new products by large corporations (Imrie, 2014, p.292). However, it cannot be assumed that the user of inclusive products is any more expert on issues of disability than the designer.

Designers must become skilled in eliciting information relevant to the design process (Lifchez, 1986, p. 43), therefore a better understanding of the material, structural and attitudinal contexts in which disability occurs and affects the lives of disabled people is required (Warren & Manderson, 2013). In addition to environmental and bodily factors, it is meaningful for designers to assess societal concerns (United Nations Children's Fund, 2013). Environmental factors are widely considered in the area of user-centred design, yet when seeking to respond to the needs of disabled people, there is a tendency for designers to address physical accessibility over societal concerns.

Critics of universal design challenge assumptions about 'pre-known' user behaviours within design teams (Imrie, 2014, p. 293), with research in this field

doing little to reveal users' 'own interpretation of their condition' (Sayer, 2011, p.250). Moreover, an over-reliance on assumed knowledge or intuition in areas such as Graphic Design (Lehrer, 2006) warrant concern since designers represent such a narrow demographic of the UK population. Designers are typically 'able-bodied' males (Lewis et al., 2006) and less than 10 per cent represent ethnic minority groups (Design Council, 2010). As a result, designers may assume that all users possess the same cognitive and physical abilities as themselves (Wilkinson and De Angeli, 2014), limiting their ability to empathise with potential users, particularly children and disabled people.

Designing with and for Children

It has been noted that the aim of user-centred design is to include the user at all stages of the design process. Yet when it comes to children as users, the views of adults are often prioritised. There is even evidence of adultcentrism within the user-centred design literature. Adultcentrism is the exaggerated egocentrism of adults (Verhellen, 1994) or the tendency of adults to view children and their problems from a biased, adult perspective, thus creating barriers to effective practice with children. Researchers such as Marti and Bannon (2009) suggest there should be a different approach to user-centred design with children and people with learning disabilities, since context can vary significantly from that presented as the prototypical user-centred design approach. However, a different approach to user-centred design with children should not compromise the basic principles of equality and voice throughout the design process for children as users.

In the field of Interaction Design and Children (IDC), it is acknowledged that the design of computer technologies should take into account the abilities, interests, and developmental needs of children (Hourcade, 2008, p. 277). Yet in existing co-design projects with children, there is evidence of the views of parents and medical staff being prioritised over those of children. There is also evidence of design teams referencing children's drawings only at the latter stages of the development process (Mateus-berr et al., 2015 and Zande et al., 2015, p.1409) and where projects have claimed to be collaborative, collaborations have taken place between adult design partners, experts and parents without the input of children (Patrizia et al.'s, 2010). Children are regularly excluded from the design process and there is evidence to suggest that market-driven forces lead to the needs of adult consumers being prioritised over those of children.

Adults are responsible for many of the barriers faced by children in the context of play. Children face design exclusion on the grounds of gender, with toys and

being marketed specifically for girls or boys. Age restrictions are placed on many children's play products and children are often socialised into certain roles through play due to culturally specific branding and marketing. Further restrictions are put on disabled children's play; with adults (i.e. medical staff) defining their play activities and placing limits on play types and timings (Mateus-berr et al., 2015).

Designing with and for Disabled Children

By placing an emphasis on access rather than inclusion, designers are encouraged to focus upon categories of impairment. When children are defined by their diagnosis or additional needs, play is overlooked and therapy or rehabilitation is prioritised. Moreover, when attention is drawn to a person's impairment, it brings potential for stigma and social exclusion (Steinfeld, 1994). The assumption that a ramp for wheelchair users will make a space inclusive is limiting to both the designer and the user. When it comes to disabled children as users, problems are often attributed to a deficit in the behaviours of the child. Few studies reflect on the role of the designer in addressing the needs and aspirations of disabled children.

Lack of Off-the-shelf Toys and Games

Historically, there has been a lack of suitable 'off-the-shelf' toys for disabled children to play with (Lane and Mistrett, 2002). Where products have been identified as 'inclusive', they have been labelled 'educational' or 'therapeutic' rather than products that enable inclusive play in, and of, itself. Although studies within the IDC community have claimed to take an inclusive approach to working with disabled children (McElligott and van Leeuwen, 2004), there are few examples of the inclusion of disabled children in the process of designing *mainstream* toys and games. The need to create opportunities for disabled children to play with their non-disabled peers has been overlooked and there has been a failure to acknowledge that in order to be truly inclusive, toys and games developed with the needs of disabled children in mind must also appeal to their non-disabled peers.

The extent to which disabled children are engaged in the design of mainstream play products is unclear and there are few examples of disabled and non-disabled featuring side by side in mainstream research. Disabled children are often studied in isolation. Where disabled and non-disabled children have featured side by side in design research, Brederode et al. (2005) developed a game with the aim of enabling disabled children to compete with their non-disabled peers on a level playing field. Yet the very nature of competition can lead to exclusionary behaviours amongst children. Moreover, where disabled children have been consulted as "toy experts" (www.familyconnect.org, 2015), they have been recruited as toy *testers* -

brought in at the end of the design process rather than being considered an integral part of the process, in line with the aims of user-centred design. Pursuit of technological advancement currently overshadows sociocultural development within the toy and game industry. Moreover, there is a tendency for designers and engineers to detach themselves from social responsibility in toy and game design.

This thesis investigates the role of the designer in the facilitation of meaningful play between disabled and non-disabled children. It utilises and builds upon the findings of the Together through Play project, a three-year, Leverhulme Trust funded project at the University of Leeds. The purpose of the project was to gain insight to children's needs and aspirations for inclusive play. It was a piece of action research (Reason and Bradbury, 2001) that explored ways to facilitate meaningful play between disabled and non-disabled children through the process of cooperative inquiry and participatory design.

Cooperative inquiry is an established approach to research with children that involves three key elements: (1) a multidisciplinary partnership with children; (2) field research that emphasises understanding context, activities, and artefacts; and (3) iterative low-tech and high-tech prototyping (Druin, 1999). This method is used to elicit children's views. Although methods of cooperative inquiry are now over 15 years old, they provide a starting point for exploring ideas with children. They can be blended and adapted to suit different needs (Guha et al., 2013). Participatory design, on the other hand, refers more broadly to 'the involvement of end users as informants in the design of technology' (Read et al., 2014, p.105).

This collaborative project brought researchers from the fields of inclusive design (Weightman et al., 2009) and inclusive education (Beckett, 2009; Beckett and Buckner, 2012) together in the study of inclusive play. The trans-disciplinary team of engineers, sociologists and designers recognised the need to address not only issues of accessibility, but the social and emotional aspects of play that make play meaningful to children. This thesis extends this investigation further to consider the practical implications for design research, education and practice. This chapter provides an introduction to the problem. Section 1.1 presents the research context and the research question and Section 1.2 presents its Aims and Objectives. Section 1.3 focuses upon the background to the study. Section 1.4 describes the thesis structure and Section 1.5 provides a thesis overview.

1.1 Context and Research Question

This thesis responds to the question 'How might designers contribute to the facilitation of meaningful play between disabled and non-disabled children?' This is an investigation into methods of cooperative inquiry, which stems from the researcher's involvement in the Together through Play project. The aim of the project was to identify children's needs and aspirations for meaningful play. This thesis builds upon the Together through Play project by examining the methods that designers might employ when attempting to engage both disabled and non-disabled children in the process of user-centred design. Here, the Together through Play project is used as a case study, drawing upon relevant research data and supplementary data obtained or additional work completed as part of this thesis. Terms such as 'this study' or 'this research' refer to elements of the Together through Play project that fed into this thesis and research undertaken as part of this thesis. As illustrated in Figure 1.1, the Together through Play project involved a series of iterative cycles, which included the following:

1. Observations of children at participating schools;
2. Focus group discussions with children about their experience of play;
3. Co-design activities with children;
4. Developing conceptual games and lo-fidelity prototypes, for children's review;
5. Developing hi-fidelity prototypes, based on children's feedback;
6. Semi-structured interviews and focus groups with teachers, parents and carers;
7. The selection and refinement of two preferred concepts, for final evaluation

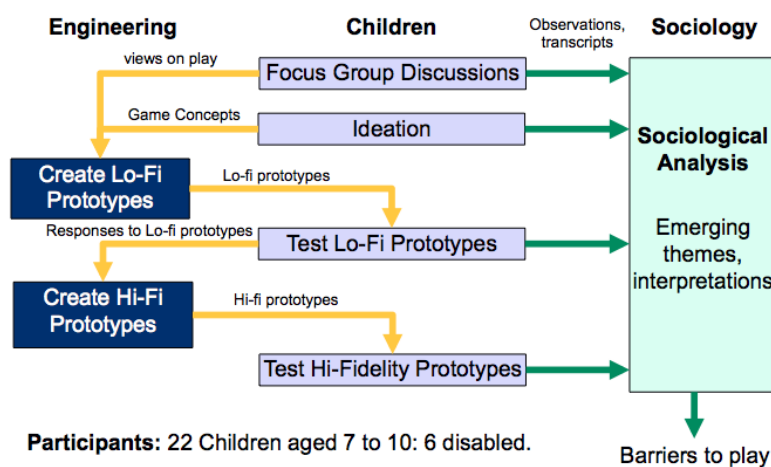


Figure 1.1 Iterative Cycles of the Together through Play project (Source: Holt et al., 2014).

As an extension of the Together through Play project, the researcher sought to examine methods employed by product design teams when attempting to engage disabled and non-disabled children in the process of user-centred design. Therefore, three further iterative cycles were undertaken as part of this thesis, as illustrated in Figure 2:

1. A second, more in-depth analysis of the qualitative data collated through the project;
2. Semi-structured interviews and focus groups with undergraduate students responsible for the development of prototype toys and games at the University of Leeds;
3. The development of new concepts and guidelines for design curricula and interaction design (IxD) teams, drawing on the rich qualitative data generated through the project.

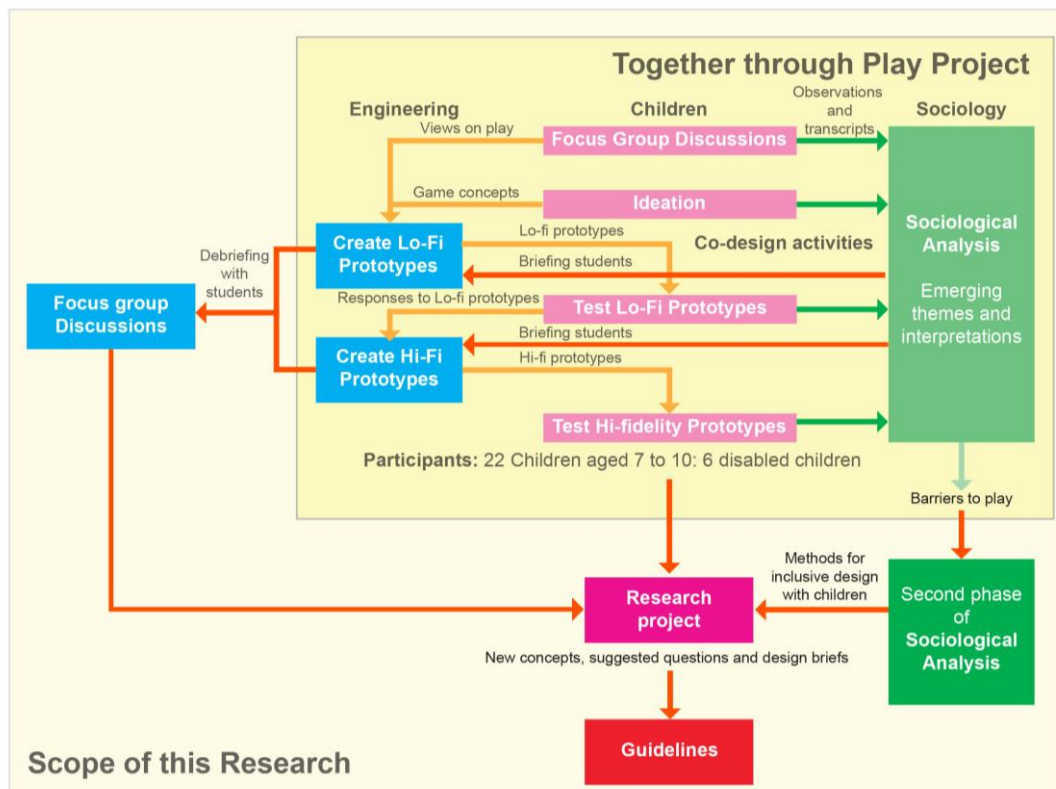


Figure 1.2 Alignment of this Thesis with the Together through Play project. (Diagram adapted from Holt et al. 2014).

1.2 Aims and Objectives

1.2.1 Research Aims

This thesis aims to investigate the role of the designer in the facilitation of meaningful play. Meaningful play is defined as:

Play that allows children to establish friendships, have positive interactions with peers and others; empowers disabled children, challenges processes that lead to internalised oppression (ableism); challenges perceptions about impairment/disability and any ableist assumptions held by non-disabled children (Holt et al., 2013, p.3).

Ableism is a form of discrimination or social prejudice against disabled people. Ableist assumptions disempower. Therefore, this thesis aims to foreground and give voice to the experiences of disabled children in design research. Children are 'the primary source of knowledge about their own views and experiences', yet in research, they are 'an under-estimated, under-used resource' (Alderson, 2001, p.9). Even within the literature from the field of disability studies, the voices of disabled children are under-represented. Much of the existing research is adult-centric, with the views of adults prioritised over those of children, particularly in areas such as inclusive education. Moreover, disabled children are less likely to be involved in the research that concerns them than non-disabled children (Priestly, 1998; Franklin and Sloper, 2006; 2009).

This thesis aims to take an approach to research with children as active participants and members of society from the beginning, in keeping with the sociology of childhood (James and Prout, 1990; James and Prout, 1997; James et al., 1998; Prout, 2005; Christensen and James, 2008). It aims to examine methods designers for engaging both disabled and non-disabled children in the process of user-centred design. Meaningful play is a difficult concept for designers to capture as meaningful human interactions involve the communication of something that is not directly expressed. Moreover, children have different perspectives to adults, particularly on the issues that concern them. Children 'have their own likes, dislikes, and needs that are not the same as adults' (Druin, et al., 1997, p.1). It is, therefore, important for designers to develop understanding of children's experiences and to cast light on the barriers encountered. It is only by 'understanding the mechanics of such a phenomena' that we can successfully challenge it (Tregaskis, 2000, p. 344).

1.2.2 Objectives

This thesis has four objectives:

1. To investigate the power imbalance between designers and children through the process of user-centred design;
2. To reflect upon the methods of cooperative inquiry employed and adapted through this research;
3. To conduct, present and analyse semi-structured focus groups and interviews with undergraduate product design and engineering students involved in the project;
4. To develop guidelines for design curricula and interaction design (IxD) teams and child computer interaction (CCI) researchers seeking to work in the area of user-centred design with children in the future.

1.3 Background to the Study

The distinction between inclusive and universal design provides the backdrop to this thesis. Ronald L. Mace used the term universal design to define the concept of:

Designing all products and the built environment to be aesthetic and usable to the greatest extent possible by everyone (The Centre for Universal Design, 2014).

Universal design is a term used to represent goods and services usable for both disabled and non-disabled people (McAdams and Kostovich, 2011). Although both spheres seek equal opportunities for disabled people, the Principles of Universal Design are contested for the constraints they place on impairment categories. The language of inclusive design is preferred in this thesis, as it is not constrained by such categorisations. Inclusive design recognises that individuals are multi-faceted and that they have different needs and aspirations. The British Standards Institute (2005) defines inclusive design as the design of mainstream, accessible services or products that are usable by as many people as reasonably possible, without the need for specialised design or adaptation.

Examples of existing inclusive play products such as *pOwerball* (Brederode, 2005); *BlindStation* (Sablé & Archambault, 2003) and *MyPAM* (Weightman et al., 2009) provide a useful source of reference for this study. They also act as a catalyst for progression in the area of inclusive toys and games. *POwerball* (Brederode, 2005), an augmented reality computer game for children aged 8-14, was designed to encourage social interactions surrounding play between disabled and non-

disabled children, with the intention of involving children in the design process (Brederode, 2005, p.32). However, in addition to issues of access, there is scope within this study for an investigation into the social barriers between disabled and non-disabled children through gameplay, which are not currently addressed. *BlindStation* (Sablé & Archambault, 2003), a game platform adapted for visually impaired children, was designed to allow universal access. Yet by assigning the game to a specific type of user, arguably, this product goes against the principles of universal design.

Weightman et al. (2009) developed *MyPAM* - a form of rehabilitative technology for children with cerebral palsy. The significance of this study was the novelty it brought to the rehabilitative process for children with cerebral palsy. However, given the therapeutic aims of this device, it risks prioritising the rehabilitation of disabled children over their need to engage in play for its intrinsic value (Goodley and Runswick-Cole, 2009). There are numerous examples of research into children's interactions with educational or therapeutic toys and games. However, the study of inclusive play products that facilitate meaningful play between disabled and non-disabled children and the role of the designer the process are underrepresented in the literature. It is this gap that this thesis seeks to address.

1.3.1 The Significance of Play

Vygotsky (1967) emphasised the importance of play and its role in the cognitive development of children. The notion of play as a catalyst for learning and development is advocated in contemporary research (Langerman and Worrall, 2005; Golinkoff et al., 2006) and ensuring that children have the opportunity to experience learning through 'well-planned and challenging play' is prioritised (CCEA, 1999, p.7). There are, however, weaknesses in this learning agenda. It fails to take into account the need for children to play for play's sake and to engage in autonomous play. Moreover, disabled children's experiences are stifled when play is used as 'a mechanism for assessment, diagnosis and therapeutic intervention for atypically developing children' (Goodley and Runswick-Cole, 2009, p.500).

Advocates for inclusive play insist that play is, and should be, a much more profound experience for children. A recent shift towards emancipating play (Goodley and Runswick-Cole, 2009) strives to give children greater ownership of their play experiences and a deeper sense of agency in the play setting. Similarly, inclusive play is considered distinct from play used solely as a vehicle for learning or fitness, despite these outcomes being useful by-products (Casey, 2010). Arguably, the concept of inclusive play is inseparable from human rights - the right

for disabled children to play and participate in society. For Casey (2010), inclusive play is also about offering all children the best play experiences possible.

Ludvigsen et al.'s (2005) definition echoes this view. They assert that inclusive play is about more than inclusion. In their view, high quality play provision and choice is of equal importance, regardless of children's needs and abilities. Hence, inclusive play advocates relate inclusive play to choice; autonomy; quality and equality. In the context of this research, inclusive play is considered mutually beneficial for, and relevant to, both disabled and non-disabled children. Although existing research into inclusive play focuses upon the inclusion of disabled children, it is worth noting that 'the principles of inclusion apply to children of all abilities, ethnic backgrounds and ages' (Scott, 2006, p.1).

Amongst the various social benefits of play, friendship formation (Casey, 2010) is of particular importance to disabled children. Arguably, the need for meaningful friendships is more profound for disabled children as they are often marginalised or overprotected (Scott, 2006). This study recognises that despite the various social benefits of play identified in the literature, the social barriers encountered by disabled children through play must not be underestimated. Social barriers range from the negative attitudes of non-disabled children towards their disabled peers, to bullying and discrimination. In order to work progressively in this field, designers must be aware of both the positive and negative aspects of play, as playtime reflects children's full experience of inclusion (Casey, 2010).

1.3.2 The Social Model of Disability

Disability studies perspectives are particularly pertinent this research, as they bring the political and ethical debates surrounding disability to the fore. Oliver (1997) urges researchers to think critically about the integrity of their research and to ask whether their work makes a contribution to the emancipatory process or whether it, in fact, serves to disempower disabled people. In an attempt to contribute to the empowerment of disabled people, this thesis employs the language of the social model of disability, which seeks to provide more empowering representations of people with physical impairments. In 1975, the UK-based Union of the Physically Impaired Against Segregation and the Disability Alliance (UPIAS) drew a distinction between impairment and disability, stating:

It is society which disables physically impaired people. Disability is something imposed on top of our impairments by the way we are unnecessarily isolated and excluded from full participation in society (UPIAS, 1975).

Building upon these ideological developments, the term 'the social model of disability' (Sapey and Oliver, 2006) was used not deny the problem of disability, but to locate the problem within society (Oliver, 1990). The social model does not attribute the problem of disability to individual limitations, but to:

Society's failure to provide appropriate services and adequately ensure the needs of disabled people are fully taken into account in its social organisation (Oliver, 1990, p.3).

The needs of disabled children in relation to the social organisation of play settings are given little consideration within the literature. The next section examines this problem from a children's rights perspective.

1.3.3 Children's Rights

The motivation for examining the way in which designers might contribute to the facilitation of meaningful play between disabled and non-disabled children stems from children's rights perspectives. According to the UN-convention on the Rights of the Child and the Evolution of Children's Play, the right to play is:

The right to belong to a society which respects the approach of children as a very typical contribution to social life and to children's own development, even if this has characteristics (playfulness) that are unusual to adults (Van Gils, 2007, p.3).

The Children Act 2004 stipulates that it is a legal duty to give children the opportunity to 'enjoy and achieve' through recreation, as part of the programme of reform of *Every Child Matters* (Every Child Matters, 2003, pp. 6-32). It is unlawful for service providers to exclude disabled children from play. Article 31 of the UN-convention on the Rights of the Child supports children's right to play, stating:

Every child is entitled to rest and play and to have the chance to join in a wide range of activities (Committee on the Rights of the Child, 2005).

Further, government policy on inclusion emphasises the importance of the right to equal access to play for disabled children. A primary aim of The Children Act (1989) is to promote equal access for children and young people to the same range of services. Inclusive play, however, is about more than accessible provision for children. It involves the social and emotional aspects of play that make play meaningful to children (Golinkoff, et al., 2006). UNCRPD also enshrines the 'right to leisure' activities for all disabled people, which traces into national policy in the form

the Disability Discrimination Act (DDA) 1995. Disability is one of several protected characteristics legally protected from discrimination by the Equality Act 2010 (Gov.UK, 2014). In the UK, it is against the law use disability as a means for discrimination in education, consumer society and public service provision.

Within the literature, there is much theorising about children's rights to inclusive education (Rieser, 2012). However, little attention is given to the right for children to engage in meaningful play. This gap in the literature is addressed in this thesis. From a structural or functional perspective, Priestley (2005) notes that schooling may be perceived as investing in children for their potential for future human capital and socialising children into accepted adult roles. Should disabled children experience oppression in schools, they may be socialised into accepting, or even reinforcing, these unequal roles as adults. This is one reason for designers to address the unequal status of disabled children in the play setting.

There are several reasons for designers to give consideration to the facilitation of meaningful play between disabled and non-disabled children. Hodkinson (2007) draws attention to a body of research evidence, indicating that negative attitudes towards disabled children are commonplace in mainstream school. Within mainstream education, disabled children are at considerable risk of increased levels of bullying and teasing (Martlew and Hodson, 1991; Gray, 2002), lower socio-metric positioning in class (Sipestein and Lettert, 1997; Jacques et al., 1998; Zic and Igri, 2001) and social distancing (Nazo and Nikoli, 1991; Weiserbs and Gottlieb, 2000; Zic and Igri, 2001; Guralnick 2002, cited in Hodkinson 2007, p.60). Disabled children have childhoods marked by exclusion. Furthermore, they have:

Traditionally been excluded from mainstream life and segregated in special schools, hospitals and specialist out-of-school services (Knight et al., 2009, p.15).

Within the literature, there is a body of evidence of play being used as a tool with which to fix disabled children (Sapon-Shevin, 2005) through education or therapy to fit into mainstream environments at the expense of the intrinsic value of play for disabled children (Goodley and Runswick-Cole, 2009).

1.3.4 The Role of Design in Play

Design has the potential to play a significant role in ensuring toys and games are relevant to children's lives. However, the challenge for designers is to develop innovative ways to engage children with the design process. Arguably, as the development of new technologies for children becomes commonplace in industry

and research, children's input into the design and development process is critical. We need to establish new development methodologies that enable us to collaborate with children of all ages (Walsh et al., 2010).

A number of efforts have been made to include children in the process of user-centred design. Two examples include *Mixing ideas*, a technique designed to enable young children to work with teams of adult researchers as Design Partners (Guha et al., 2004) and *Layered Elaboration*, a technique used to allow design teams consisting of adults and children to develop ideas through iterative processes (Walsh et al., 2010). Researchers such as Benford et al. (2000) have highlighted the benefits of collaboration between adult and child teams. For them, the nature of the activity within a setting can facilitate or act as a barrier between disabled and non-disabled children. Designers, therefore, have a key role to play. However, as highlighted by Druin (2002), despite efforts within the HCI community to demonstrate a commitment to understanding the needs of the user, it has been difficult to bring children as users into the design process. Nevertheless, design practice must become more responsive to the needs and aspirations of child users.

1.3.5 Play and its Significance for Designers

Technologies for children are evolving to become more social, mobile and distributed (Walsh et al., 2010). Yet mainstream leisure services have failed to meet the needs of disabled children and as a result, disabled children are denied access to the play opportunities that other children might take for granted (Langerman and Worrall, 2005). Arguably, public play and leisure facilities could potentially benefit from some inspiration and input from the design community. In such settings, the most significant barriers to inclusion for disabled families include access; information and outreach; funding and attitudinal barriers (Scott, 2006). These issues are of particular relevance to the design community, as design and marketing play a key role in each of these areas.

Physical barriers encountered by children with impairments in the playground, such as uneven surfaces, are easy to change. However, in order to make an accessible play space an inclusive one, social barriers such as fear, embarrassment or discriminatory attitudes must also be tackled. In its policy on inclusive design, the Design Council (2014) advises designers to make 'reasonable adjustments' to play environments and equipment, in order to make them more accessible. However, the design community must find more effective ways to embed inclusion into practice, so that 'reasonable adjustments' no longer need to be made.

The exclusion of disabled children from mainstream play prevents disabled and non-disabled children from growing together and forming bonds. This is important, as memories of play with friends were amongst the most prominent for adults involved in Sandberg and Vuorinen (2008)'s retrospective study. This suggests that children's experiences of social play can make a lasting impression through to adulthood. Shakespeare (1994) suggests that playful interactions, such as playing games, signing songs or telling jokes, can act as a catalyst for mediation between disabled and non-disabled children and that through this process, children agree norms for the physical body. Furthermore, children construct beliefs about people they see as different from themselves (Lenney and Sercombe, 2007). Such perspectives emphasise the significance of inclusive play as an area of investigation for designers.

1.3.6 The Together through Play Project

This section provides an overview of the Together through Play project, a case study used as source material in this thesis. Four UK-based mainstream Primary Schools participated in the project. One of the schools is a faith school, partially sponsored by the Catholic Church, whereas others have no religious affiliation. One of the schools also has a resourced provision known by children at the school as 'RP', with allocated places for children with learning difficulties. In order to protect the identity of participants and adhere to the University of Leeds Ethical Conduct guidelines (2013), the names of the schools and the research participants are anonymised throughout this thesis.

Participating schools shall be referred to as St Amelia's RC Primary School; Aspen Primary School; Woodlands Primary School and Willow Primary School. At the discretion of each school, twenty-two children aged 7 to 11 were recruited to participate in the study. There was no restriction on group size, however, the minimum requirement was that at least one child participant had a recognised physical impairment and at least one co-participant did not. Six disabled children and their non-disabled class peers took part in the study, with four of these children having physical impairments relating to cerebral palsy.

The scope of this project was limited to children with physical impairments. The aim was to conduct exploratory research into the views of a specific group of children, rather than conducting a systematic and representative study. Two of the schools were part of a convenience sample taken from schools previously involved in research with the University and two of the schools were recruited through contacts of the researcher. The TTP project did not attempt to include a sample

representative of all types of physical impairment experienced by children. Instead, the small sample-size was designed to provide insight to the specific play experiences of the disabled and non-disabled children.

In order to supplement research activities with the children, the researcher sought insights to adult perspectives on meaningful play for disabled children and the role of the designer in this process. Through this study, interviews with parents and carers of nine disabled families, along with four teachers from the participating schools were undertaken. In addition, Product Design and Engineering students were debriefed about their involvement in project. During semi-structured interviews with the researcher, the students reflected upon their experience of the process of user-engagement, cross-faculty studies and interdisciplinary collaborations and gave insight to their hopes for the future of inclusive and participatory design. This thesis breaks new ground, as insights from adults close to the problem have not yet been explored in existing publications derived from the project.

1.4 Thesis Structure

This chapter has given a background to this study and the overall structure of this thesis. Chapter 2 examines the nature of disabled childhoods and disabled children's experiences of meaningful play. This is important as it has a bearing on the values and attitudes of designers when responding to issues of meaningful play between disabled and non-disabled children. It draws upon terms more commonly used in the field of disability studies, such as inclusion and integration. It also examines interpretations of meaningful play relevant to this research. Many designers are familiar with accessible design and the physical barriers to inclusion. However, designing for meaningful play also involves addressing the social and emotional aspects of inclusion.

Chapter 3 examines the current literature from the areas of inclusive and participatory design. It highlights some of the issues encountered by designers when designing with and for disabled and non-disabled people and the relevance of these literatures to this study. As highlighted in Figure 1.3, Chapters 2 and 3 are both literature review chapters. Chapter 4 presents the research design and methodology, discussing the different stages of the research and their association with the research question. It examines the methods selected, the rationale and methodological considerations made. Chapters 5, 6, 7 and 8 present the research findings, as highlighted in Figure 1.3. Chapter 5 reports upon the initial observation work undertaken in participating schools, providing examples of data and analysis.

Chapter 6 presents a series of focus group studies undertaken with children. It includes examples of data and analysis. The outcomes of design sessions with participating children are presented in Chapter 7. Chapter 7 includes guidelines for CCI (child computer interaction) researchers seeking to work in the context of user-centred design with children. It also includes examples of ways in which these designs were conveyed to student designers. Chapter 8 presents the design study undertaken by undergraduate students. It concludes with guidelines for design curricula for IxD (interaction design) with children. Finally, Chapter 9 presents the discussion and conclusions. It revisits the whole process and discusses how the different areas were bridged. In addition, it presents the contribution to knowledge made in this thesis as a new approach or method for inclusive design with children.



Figure 1.3 Thesis Structure.

1.5 Summary and Conclusions

The purpose of this investigation is to examine the role of the designer in the facilitation of meaningful play between disabled and non-disabled children. This chapter emphasises the significance of this exploratory study. It has theoretical significance in its examination of the theoretical perspectives of the 'new sociology of childhood' (James et al., 1998; James and Prout, 1997), with its emphasis on children's voices and prioritising the views of users not typically given 'voice' in design research. It has methodological significance in its examination of methods for eliciting the views of disabled and non-disabled children through participatory design (Druin, 1999). It has social and political significance in its advocacy of the right for disabled children to engage in meaningful play and participate in design research. There are also pedagogical implications to this research in its investigation of inclusive working practices for IxD (Interaction Design) and practical applications, providing insights for design education, research and practice.

Chapter 2

Understanding Disabled Childhoods

This chapter examines the literature focused upon developing understanding of the nature of disabled childhoods. It draws upon research from the fields of disability studies, design studies and the sociology of childhood. Section 2.1 examines the nature of childhood and play for disabled children. Section 2.2 moves on to examine the role of disabled children in design research. It examines tensions faced by researchers in the area of user-centred design with children and the implications for this study. Section 2.3 examines the emergent role of the social designer. It investigates current debates surrounding interdisciplinary research and existing approaches to inclusive design with children. Section 2.4 then summarises key findings from the literature and the implications for this research.

2.1 Disabled Childhoods and the Nature of Play for Disabled Children

Disabled children and are among the poorest and most marginalised children in the world. The United Nations Department of Economic and Social Affairs (DESA) (2014) emphasises that issues of concern for children, such as education, healthcare and social services affect disabled children in a more complex way than their non-disabled counterparts. Discrimination and negative attitudes create barriers to education, employment and participation in community life. This thesis is a direct response to the oppression and barriers encountered by disabled children. According to Kids, the children's charity, being disabled is 'one of the most demanding experiences anyone can face' (Kids, 2014). Disabled children face countless barriers to play, leisure and social life. Furthermore, disabled families face a range of inequalities that non-disabled families do not (Dowling and Dolan, 2001). Disabled families, including families with a child with a physical impairment, are more likely to be marginalised economically for reasons ranging from access to employment, benefits and information, to additional support costs (Clarke, 2006). Failure to promote play between disabled and non-disabled children puts further pressure on parents of disabled families (Goodley and Runswick-Cole 2009).

The intensity of the barriers encountered by disabled families warrants the attention of the designer. The benefits of engaging disabled children in inclusive

play in mainstream settings can be wide reaching. Clarke (2006) notes that engagement in play and leisure activities beyond the home environment can have a significant impact on disabled children's participation in community life. Furthermore, play and leisure opportunities can be used to support psychological wellbeing, boost physical health and help facilitate positive social interactions.

The Department for Education identified the need for all children to have the opportunity to learn, play and develop alongside each other within school communities (DfES, 2004) and various studies have emphasised friendship formation as a significant function of the education process (Bishop and Jubula, 1994; Forest and Lusthaus, 1989; Hodkinson, 2007). Hodkinson (2007) also stressed the importance of the *quality* of disabled children's experiences and for them to have the opportunity to participate in mainstream school life (Hodkinson, 2007). In May 2008, inclusion became a disability rights issue, with the introduction of the Convention on the Rights of Persons with Disabilities (CRPD). Under the CRPD, all disabled people now have the right to participate in recreational activities. Given that disabled children also come under this category, designers therefore have an obligation to ensure that toys and games will enable disabled children to participate in recreational activities. The final Convention outlines that both disabled adults and children must be actively involved in decision-making processes. It is unacceptable to exclude disabled people from consultations (DESA, 2014). Why disabled children are underrepresented in research, and particularly research in the area of inclusive design, therefore, becomes an important question.

One influential factor may be that issues of inclusion are conceptually challenging for researchers, as inclusion is a process rather than a single structure (Scott, 2006). For children in particular, the term inclusion has different meanings when used in different contexts. Further compounding the complexity of this research topic, theorists from the field of childhood studies note that terms such as access and inclusion are used interchangeably within the literature, despite having different meanings. The Alliance for Inclusive Education (ALLFIE) is a useful source of reference to this study. It draws distinction between terms such as 'integration' and 'inclusion' and offers guidance on inclusive practice, providing a starting point for this study. ALLFIE (2014) describes the term integration in relation to issues of accessibility, i.e. that special adaptations and resources allow those labelled as learners with 'Special Educational Needs' to 'fit in' to mainstream education settings, with some adjustment (www.allfie.org.uk, 2014). Inclusion, on the other hand, is a term used to represent the values, attitudes and ethos of a mainstream setting. It represents a commitment to the removal of barriers to participation for all.

It strives to ensure that people are valued, treated equally and respected as individuals. Within education, this ethos is also referred to as 'Education for ALL'.

For children, the difference between having access to a mainstream environment and being included in play with peers is distinct. In a play context, Kids (2014), the disabled children's charity, sets inclusion apart from access for disabled children, stating 'access is getting in' whereas 'inclusion is wanting to stay'. Similarly, authors from the field of Inclusive Education draw a distinction between terms such as integration and inclusion, which are often used interchangeably. Riddell et al., (1994) argue that inclusion is a more 'profound' concept than integration as it includes disability as a human experience. Inclusion, therefore, has a social and emotional dimension.

Within leisure services, Kids (2014) assert that inclusion involves ensuring all children are treated with respect and that they are able to play freely and participate fully in play. Goodley and Runswick-Cole (2010) argue that for disabled children, play is far from free. They argue that play is 'pathologised' for disabled children, due to:

The normalisation of childhood; in which non-normal bodies are increasingly expected to be governed, and corrected, not only by professionals, but also by parents/carers (Goodley and Runswick-Cole, 2010, p.499).

Other barriers to the meaningful participation of disabled children are evident within the literature. For example, gender stereotypes are particularly prominent, and are intertwined with disability discrimination, resulting in disabled young women facing 'double discrimination' (DESA, 2014). Designers have a role to play, as children look to toy advertisements as a reference to gender identity (Rasmussen, 2002; O'rnstedt & Sjo'stedt, 1999, cited in Sandberg and Vuorinen, 2008). Moreover, not only are stereotypical representations of male and female roles portrayed in the media (O'rnstedt and Sjo'stedt, 1999, cited in Sandberg and Vuorinen, 2008, p.136) - disabled children lack visibility in toy advertising.

The toy business is involved in an 'intertextuality' (Rasmussen, 2002) with other texts and media targeted at children through which commercialised toys reinforce social roles. Both older and younger adults involved in Sandberg and Vuorinen's (2008) retrospective study distinctly remembered play inspired by popular media at the time. One might ask what impact this might have on disabled children if disabled characters are omitted from media inspired games. In response to gender stereotyping or gendered toys and games, companies such as 'Let Toys be Toys'

(2014) and Big Game Hunters (2014) have explored inclusive marketing for toys such as dolls houses, using gender-neutral copy and images of boys and girls in associated marketing media (Davey, 2014). However, there is little evidence within the literature of efforts being made to tackle the stereotyping of and discrimination towards disabled children.

In the marketing of inclusive events in mainstream settings, *Eureka!*, the children's museum in Halifax, UK, has recently developed a service, entitled 'Helping Hands'; a 'bookable extra pair of hands service', which provides families with a 'specially trained enabler' to support them throughout their visit (*Eureka!*, 2014). 'Helping Hands Clubs' are also provided for disabled children and their families. It is worth noting that adult assistance can create both physical and social barriers between disabled and non-disabled children, as can the provision of exclusive clubs targeted solely at disabled children.

Whilst practitioners may have children's best interests at heart in their aims to maximise learning opportunities for children through play, Goodley and Runswick-Cole (2010) challenge the way in play opportunities are used to 'correct' and 'normalise' the behaviours of disabled children. Moreover, as the helping hands service is free only to visitors with an annual pass, this may deter low-income disabled families. There is a possibility that child participants will engage in adult, rather than child-led play, which may affect their enjoyment of such activities. It is recognised that we each have different values and beliefs that influence the way in which we interpret children's play, due to our different professional and cultural backgrounds (Scott, 2006). A widely accepted definition of play is that it is 'freely chosen, personally directed, intrinsically motivated behaviour that actively engages the child' (National Playing Fields Association, Children's Play Council and Playlink, 2000). For Sandberg and Vuorinen (2008), the value of play is based on the individual's knowledge and definition of play. They found that experiences and cultural background influenced individual perceptions of play and that varying definitions and memories bring value to play.

Designers have an important role to play in enabling access to play for disabled children through the built environment as it creates many challenges that make participation in everyday activities difficult (DESA, 2014). Barriers in the built environment, such as inaccessible transport or poorly designed buildings leave disabled children unable to participate in the same mainstream play and leisure activities as their non-disabled peers. However, little research exists on the social

barriers to play between disabled and non-disabled children and the steps designers can take to mitigate these barriers.

From a commercial perspective, there are significant benefits to engaging disabled children in play with their non-disabled peers. In 2014, there were 770,00 disabled children under the age of 16 in the UK. That equates to 1 child in 20 (Disabled Living Foundation, 2014). Underrepresented and overlooked in the mainstream media connected to the toy industry, disabled children represent an untapped customer-base for the toy industry. New technology has the potential to improve the lives of disabled children - reducing barriers and creating opportunities for the participation of disabled children. ICT, for example, can aid communication between children and help to tackle social isolation. However, barriers to learning and financial barriers to technology can contribute to the social exclusion of disabled children (DESA, 2014). Inclusive practice must involve an ethos or approach (ALLFIE, 2014) that ensures disabled people are not excluded or isolated - an approach that applies to designers and other stakeholders alike.

2.2 The Role of Disabled Children in Research

The UN Convention on the Rights of the Child (2005) recognises the right for children to voice opinions on issues affecting them and to have these views heard. However, a number of studies have highlighted deficiencies in existing research with children and in particular, research with disabled children. Kay and Tisdall (2012) point out that too little research puts forward the viewpoints of children and fully values their contributions (Kay and Tisdall, 2012, p.188). Similarly, Watson (2012) highlights that as disabled children are rarely included in childhood research, they are still marginalised (Watson, 2012). For Hodgkinson (2007), the emphasis on learning disabilities within the existing literature on inclusive education is limiting. Such studies call for more meaningful research to be undertaken with disabled and non-disabled children, and in particular, children with physical impairments in mainstream educational settings. In child-centred research, Kay and Tisdall, (2012) argue that the phrase 'children's voices' has distinct disadvantages and exclusionary aspects that frequently act as a camouflage for what actually happens in research.

One concern in child-centred research is that children are considered 'vulnerable'. There is a lack of confidence in their ability to give consent and protect their own interests. According to the Royal College of Paediatrics and Child Health (RCPCH) 'childhood is a vulnerable, formative time, when harms can have serious

impact as well as be potentially long lasting' (McIntosh et al., 2000, p.178). It is understood that any degree of harm may, therefore, affect children more than it affects an adult. Hence, special protection is required. A common assumption is that children are not able to give consent to participation in research and that consent for participation must be drawn from adults. This perspective is based on the opinion that children cannot be 'fully informed'; therefore they cannot give consent (Posch and Fitzpatrick, 2012).

A different view is taken in UK medical law, through which children are protected by Gillick Competence (GC), which is used to decide whether a child is capable of consent to his or her own medical treatment, without the need for parental permission or knowledge. This respects children's ability to make decisions for themselves and take control of their lives. There are, therefore, tensions at play for adults working with children. Read et al. (2014) identified a lack of democracy in research with children, flagging up a study undertaken by Iversen and Smith (2012) as the only research of its kind to deliberately place democracy at the front of the design process with children and presenting their interests to participants ahead of the activities taking place (Read et al., 2014).

Within the literature, there are discrepancies between the role of adults and children in research. Punch (2002) attributes the distinction to adult assumptions about childhood and children's marginalised position in adult society. In the design of commercial toys and games, Sandberg and Vuorinen (2008) argue that differences lie in the hopes and aspirations of adults being prioritised over those of children, rather than children and adults being inherently different. For example, with parents in mind, the educational benefits of toys and games are often emphasised in toy commercials. However, Almqvist (1996) argues that the imagination and creativity of adults is often more limited than children's, therefore, adults may overlook the value and potential of children's ideas.

Within the literature, there has been a reliance on parents and carers for insight to children's experiences. However, it is worth noting that in research undertaken by Garth and Aroni (2003), the views of children and parents were quite different. This emphasises the need to seek children's perspectives as well as their parents. Adult perspectives on their own childhood play experiences are unreliable as perspectives on play change over time. The meaning of play for children is likely to be different to that of adults. Sandberg and Vuorinen (2008) highlight the limitations of adult perspectives on the topic of play, as memories can fade over time and thoughts and feelings attached to a play episode can change. For this reason, it is

integral that children are consulted on their experiences in design research on the topic of inclusive play. Murray (2008) emphasises the importance of listening to children and personalising their play experience as far as possible. They advise practitioners to talk to children about their play preferences to find out about their needs, and to be flexible and responsive - enabling children to take the lead.

One of the benefits of engaging children as design partners in research is the way in which they offer 'bluntly honest views of their world' (Druin, et al., 1997, p.1). Alderson (2001) lists a raft of benefits to undertaking research with children, including the way in which they provide access to other children (including those who may be protected from interactions with unfamiliar adults); the publicity their involvement attracts; the way in which they can develop skills, confidence and the determination to overcome their disadvantages; and the fact that adults value their views. Many of these reasons for including children in research, however, are adult-centric, rather than emancipatory for disabled children. Emancipatory research seeks to empower the subjects of social inquiry (Jupp, 2006) - a goal that arguably, all disability researchers should aim for (Barnes, 2002). Oliver (1992) emphasises that research cannot approach social problems, such as disability, in an objective or scientific way (Oliver, 1992). Thus, more humanistic approaches to research into childhood and disability are required. For Barnes (2002), the core principles of an emancipatory research model include:

- i. Accountability*
- ii. The social model of disability*
- iii. The problem of objectivity*
- iv. The choice of methods*
- v. The role of experience*
- vi. Practical outcomes (Barnes, 2002, pp. 7-14).*

Each of these aspects requires the researcher to be reflexive and critical about their role in the research process. In design research, particularly in the area of occupational therapy, instruments such as Bundy's (2007) Test of Playfulness (TOP), an instrument used to measure a child's playfulness, when examining the influence of virtual reality on children with cerebral palsy (Reid, 2004). Such approaches, however, are open to criticism, for failing to take into account the autonomy of the child and their capacity to both influence and be influenced by their environments as 'social actors' (Prout, 2002).

The power struggles encountered by children in school-based research have been noted Druin (2002). Young children in particular have difficulty verbalising their thoughts and existing power structures, biases and assumptions between adults and children must be overcome. For each of these reasons, children's involvement in the design of new technology has historically been minimised. More research involving disabled people is needed, particularly in relation to disabling attitudes and environments and their impact on the emotional wellbeing of disabled people (Morris, 2004).

Furthermore, critics argue that disability research in general is adult-centric. Connors and Stalker (2007) note that the social model of disability has given little consideration to disabled children, with few attempts made towards developing an adequate explanatory framework for their experiences. Critics question the quality of the research undertaken with children, particularly in relation to the representation, authenticity and diversity of children's experiences. For James (2007), current rhetoric about 'giving voice to children' masks a number of important conceptual and epistemological problems and it is argued that 'hard questions' are 'often avoided' (Badham, 2002, p.143).

Both childhood studies and disability studies have tended to ignore disabled children's experiences. Priestley (1998) identified this problem in the 1990s. Since then, attempts have been made to resolve this issue, particularly in the area of disability studies. However, more must be done to ensure the meaningful inclusion of children in disability research. This study seeks to develop more authentic and meaningful methods for engaging children in research. Challenges and potential conflicts of interest have been identified within the literature. In order to meet the ethical demands of newer perspectives on the role of children in research, 'codes of ethics, reflexivity and collective professional responsibility' are required (Christensen and Prout, 2002, p. 477). In light of the moral and ethical demands of disability research, Oliver (1992) highlights the need for theorists to contribute to improving the lives of disabled people, as, in his view, the process of research production can, and has been, alienating for both disabled people and researchers.

Developing understanding of the nature of disability for children calls for researchers to 'engage simultaneously with new approaches to disability and new approaches to childhood' as assumptions are embedded in existing approaches to childhood disability, with disabled children regarded as 'passive and dependent' (Priestley, 1998, p.207). Existing research has been preoccupied with impairment and opportunities for disabled children to participate in decision-making have been

extremely limited. Davis et al. (2005) argue that not only have the views of disabled children been excluded from existing research, so too has the analysis of their social experiences.

Kay and Tisdall (2012) argue that although children may now be considered experts of their own lives, it does not necessarily translate to expertise in *other* children's lives. Furthermore, when children are engaged in research, they risk being treated as a homogenous group or "ghettoized" into only researching a limited range of childhood issues. If children are labelled as victims or problematic participants in research, then those problems may be individualised, further compounding issues of exclusion and marginalisation. An understanding of the social model of disability is essential to those seeking to advance inclusive play as children are disabled by societal attitudes, actions and omissions from participation (Scott, 2006).

Within the field of education, the attitude of the provider is fundamental. Arguably, the barriers to inclusion can be overcome when a facilitator is welcoming and positive (Ofsted, 2005). If designers are to contribute to the facilitation of meaningful play between disabled and non-disabled children, they must adopt more inclusive attitudes themselves. The next section investigates the current debates surrounding interdisciplinary research, in search of more inclusive and enabling approaches to design research, education and practice.

2.3 The Social Designer - Changing Ways of Thinking

In education and the workplace, designers and engineers have traditionally been encouraged to specialise. Researchers such as Doblin (1987) suggest that different types of designer should be distinguished and recognised, so that they may maintain and develop competence in a particular area. Moreover, the American Society of Civil Engineers (ASCE) (2006) code of ethics stipulates that 'engineers shall perform services only in areas of their competence' (ASCE, 2006). Moving into organisational life, vocational roles become even more specialised, with different 'subcultures' emerging in workplaces with different 'knowledge-bases' and 'codes' (Michlewski 2008, pp.374-5). Specialist groups, therefore, operate with different value-sets and attitudes, ultimately creating a cultural divide.

In education, the British scientist and novelist, C. P. Snow (1959), argued that the system in England needed 're-thinking', due to what he referred to as a cultural divide in Western intellectual circles, between the sciences and the humanities. In his lecture, entitled *The Two Cultures*, he deemed this divide to be a hindrance to

the resolution of many of the world's problems. He was critical of the way in which scientists failed to display understanding of social fact, and the way in which insight to productive industry, such as engineering, was overlooked. The term 'social fact' was used to represent:

The manners of acting, thinking and feeling external to the individual, which are invested with a coercive power by virtue of which they exercise control over him (Durkheim, 1982, p.52).

Farrell and Hooker (2013) have challenged such assumptions, questioning whether design-orientated and scientific disciplines are really that different. They dispute the claim that design is demarcated from science by having wicked problems while science does not. Ultimately, they argue that issues of methodology and epistemology act to unify design and science. In order to encourage designers to embed inclusion into their working practices, this thesis argues that designers must think differently about diversity. Design has the potential to influence, and be influenced by, societal norms and trends. Many disabled children aspire to follow the norm and be seen as 'normal'. Disabled children have resisted being seen as 'different', preferring to be considered 'ordinary' instead (Asbjørnslett et al., 2013).

One step towards encouraging designers to respond more positively to diversity is to ensure that they are educated on the meaning of, and distinction between disability and impairment. Put succinctly - 'Impairment is what we have, disability is what we experience' (John and Whewey, 2004, p.5). Disability is a social, not an individual problem and arguably, social problems are constructed (Lane, 1995). Interpretations of social problems (and their meanings) determine the labels attached to particular groups, the way in which they are treated and the problems they encounter (Lane, 1995).

Examining social problems through a sociological lens provides insight to 'verstehen' or an empathic understanding of human behaviour. Sociology, therefore, has the potential to bring meaning to design. 'The Sociological Imagination' (Mills, 2000) is a term used to define a quality of mind that will help researchers to use information, develop reason and gain clarity on worldly events and themselves. Almquist & Lupton (2010) emphasise the benefits of combining social-scientific and humanistic forms of inquiry - bringing together utility and an understanding of ideology, context and significance, stating:

For many design researchers, meanings are simply subjective icing on the cake rather than shared codes baked into the object itself, connecting designer, producer, user, and the culture at large in a shared world (Almquist and Lupton, 2010, p.4).

To put this statement in the context of the design of inclusive play products, the designer's understanding of inclusive play, therefore, is embedded in the design of inclusive toys and games, which, in turn, has an impact on the user and the broader culture. All human artefacts have meaning, 'linked inescapable totality of culture, and the hidden assumptions which condition cultural priorities' (Potter, 2002, p.15). If the design of a toy or game overlooks the needs of disabled children, this conveys the message that it is acceptable for designers to overlook the needs of disabled children and that it is acceptable for others to do so. According to DESA (2014), some people disabled people, and in particular, deaf people, are denied access to their cultural heritage due to the suppression of their language. If toys and games fail to accommodate the communication needs of deaf children, ultimately, they are excluded from meaningful play with other children. Such exclusion can then lead to isolation and victimisation.

Function brings different meaning to a product. This has relevance to the designers of inclusive play products as the social and emotional aspects of play are the most significant, yet least tangible. Thus, they are the most challenging aspects for designers to address. Furthermore, children engaged in imaginative play interact socially and physically with toys and games. Crilly et al. (2004) recommend different ways of thinking about the physical and non-physical aspects of a product's function. They argue that if the non-physical aspects are recognised as a function of products, we can reduce the conceptual distance between physical and non-physical uses and as a result, get closer to some of the more inherent, social aspects to design exclusion.

2.4 Summary

This chapter examined evidence of the nature of disabled childhoods and examples of the play experiences of disabled children within the literature. It emphasises the need for designers to develop understanding of the needs and aspirations of disabled children. It draws upon the literature from the fields of disability studies, design studies and the sociology of childhood, which feed into the methodology chapters of this thesis. This body of literature suggests that existing approaches to research with disabled children are inadequate - they are adult-centric (Alderson, 2001) and preoccupied with accessibility (Dunn and Moore,

2005) rather than the meaningful inclusion of disabled children in research (Holt, 2013). Disabled children are underrepresented (Priestley, 1998), exposed to exclusion (Middleton, 1999) and segregated play provision (Parham et al., 2008).

Even within the vast body of literature from the sociology of childhood (Corsaro, 1997), which aims to bring children's voice to the fore, there is evidence of the silencing of children's voices as a result of adult-centric research processes (James, 2007). This calls for the development of new methods that will empower children through research and encourage designers to be reflexive about their role in the process. It also motivates the need for designers to make a positive contribution to advancing design practice. There are two key aspects to this investigation - methods of involving teams of disabled and non-disabled children in inclusive design research and reflections on the roles and responsibilities of the designer, which an emphasis on the empowerment of disabled children.

2.4.1 Disabled Children's Play Experiences

Within the literature on disabled childhoods, there is evidence to suggest that in their home lives, disabled children are more likely to live with low-income, deprivation, debt and poor housing (Blackburn et al., 2010) - they are among the poorest and most marginalised children in the world (DESA, 2014). There is also evidence of lack of affordable and accessible play resources and activities for disabled children (Clarke, 2006). Play activities for children with special needs are typically adult-led and the provision of leisure activities for disabled children is often segregated or separated from the mainstream, despite the inclusion in play and leisure activities being a human rights issue (Morris, 1999). Disabled children's experience of play is, therefore, far from free. Furthermore, it is governed and corrected by professionals, parents, carers and adults (Goodley and Runswick-Cole, 2010). This calls for an investigation into the facilitation of meaningful and inclusive play opportunities in the mainstream for disabled children.

2.4.2 Approaches to Research with Disabled Children

Examples have been found within the literature of researchers consulting adults about children's views and experiences rather than speaking directly to children; adults acting as proxies for 'difficult children' in research (Leroy and De Leo, 2008) and of adults drawing upon their own childhood experiences (Sandberg and Vuorinen, 2008). Such studies highlight the limitations of adult perspectives on the topic of play - memories fade, thoughts and feelings change (Sandberg and Vuorinen, 2008) and the views of children differ from those of parents (Garth and Aroni, 2003). For this reason, it is integral that children are consulted in design

research and that their views are brought to the fore. By reviewing some of the quantitative approaches to research with disabled children, the researcher learned that firstly, design researchers must search for more reliable and meaningful ways to develop understanding of the nature of disability for disabled children. Secondly, that designers need to find ways in which to empower children through the research process and thirdly; that designers need to be more transparent about children's involvement in research.

2.4.3 Roles and Responsibilities of the Designer

Within the literature, the commercial benefits of accessible products and services (Varney, 2013) are prioritised over the social, moral and ethical responsibilities of the designer, particularly in the development of children's products. Moreover, disabled children are largely underrepresented in the design of mainstream toys and games. They are hidden in the marketing of mainstream toys and games and their needs are not sufficiently accounted for in the design of mainstream play products. Few positive representations of disabled children and childhood diversity exist in the design of mainstream toys and games and the range of products aimed at children with special needs (Patrizia et al., 2009; Brodin, 1999; Piper et al., 2006).

Efforts towards addressing gender stereotyping in the design of toys and games (Davey, 2014) have provided insight to ways in which designers can make a positive contribution towards mitigating negative social attitudes and discrimination through the design of toys and games, and associated media and marketing. However, there is little evidence in existing design research of efforts being made to tackle the discrimination faced by disabled children. Since toys and games are used as a reference to children's values and identity (Rasmussen, 2002), toy and game designers must, therefore, include more positive representations of diversity in their work. There is a need for the design community to ensure children's diverse needs are accounted for and represented in design research and practice and that negative assumptions, stereotypes and disabling attitudes are addressed.

Chapter 3

Inclusive Design and Participatory Design

This chapter examines current research in the area of inclusive and participatory design. Section 3.1 focuses specifically upon inclusive design and existing user-centred approaches. Section 3.2 then addresses existing research in the area of participatory design with children, drawing upon cooperative inquiry and current research within the IDC community. Section 3.3 summarises key findings within the literature on inclusive and participatory design and the implications for this research.

3.1 Inclusive Design and User-centred Approaches

This thesis responds to the current trend towards user-centred design, with contemporary design-orientated research shifting from 'a study of things, to a study of people' and giving users more equal status in the process (Almquist & Lupton, 2010, p.3). The Design Council (2014) notes a shift in attitude in design education, from 'special needs design' for groups of 'special needs' people, to an emphasis on improved mainstream solutions for all.

Design guidelines are often used to set minimum standards on accessibility. As a result, there is a tendency for designers to seek only to comply. If designers are to move closer to inclusivity, compliance with minimum standards alone is insufficient. This thesis puts forward the case that an emphasis on learning and knowledge sharing, rather than guidelines, may be more useful to designers. Potter (2002) identified a learning and reflexive aspect to the role of the designer, which he defines as those who question what they are doing and why. This thesis investigates ways in which designers might learn from the process of working with children as users and feed this knowledge into their work.

When undertaking inclusive projects, rather than encouraging designers to gain knowledge on specific impairments, a key requirement is a willingness to seek out and remove disabling barriers. The removal of environmental barriers can help to make a play space accessible. However, making a play space inclusive also involves addressing the social barriers (Dunn et al., 2003). When it comes to participation in activities with non-disabled peers, environmental barriers create fewer problems for disabled children than negative social attitudes (DESA, 2014).

From a social model perspective, a better understanding of the diversity of disability and impairment is required if campaigns are to be fully inclusive (Crow, 1996).

A particular challenge for future design researchers is managing complexity (Borja de Mozota, 2011). It is insufficient for designers to oversimplify the problems encountered by disabled people. Instead, it may be beneficial for designers to learn to *problematise* issues of inclusion and to find alternative ways of acquiring new knowledge. At present, the commercial benefit of inclusive design has traction for designers. In 2014, Vice Chair of the Tourism for All UK Chair Accessible Tourism Stakeholders Forum suggested 'Welcoming disabled customers is good for business,' as there were '11 million disabled people in the UK (75 in Europe/75 USA), with a business value of two billion pounds' (Gardiner, 2014).

However, by focusing on the commercial value of inclusive design, designers run the risk of overlooking the ethical implications of their work. Regardless of their views on inclusion, designers must respond to diverse needs, as according to the Design Council (2014), future consumer markets will be more diverse than ever. This research seeks to examine ways in which designers might be responsive to diverse needs, and in particular, the diverse needs of disabled children.

The question that underpins this thesis is rooted in inclusive design. Whilst this chapter focuses upon existing research in the area of user-centred design with children, it is useful to first gain insights to user-centred design research more generally in the mainstream. Mainstream design is seeking a 'richer understanding' of people and is 'broadening from traditional physical ergonomics into cultural diversity and individuality' (Pullin, 2009, p.90). However, whilst seeking to respond to cultural diversity and individuality, inclusive design also 'seeks to make design accessible to everyone' (Pullin, 2009, p.2). Yet responding to individuality, while making design accessible to all, is not an easy task for designers.

Through inclusive design, designers face a dichotomy. On the one hand, people have different abilities and may be excluded by inaccessible design, and on the other hand, people have different preferences, irrespective of their needs (Pullin, 2009). It is the interplay between the two that this thesis seeks to address. Arguably, design already deals with diverse needs through market segmentation. However, market segmentation can create a divide between different users. The important consideration for designers to make is whether they are hearing and listening to the important voices.

In inclusive design, the i~design 3 research programme at the University of Cambridge sought to develop understanding of inclusion by examining design

exclusion through the *Inclusive design toolkit*, *Exclusion Calculator* and the *Vision and Hearing Impairment Simulator* (Waller, 2014). These tools were designed to develop understanding of the extent to which a small set of user trials might capture the diversity of capability evident within a national population. The aim was to enable practicing designers to improve user experience across a wider range of users. Through this participatory research, Waller set about calculating levels of product exclusion and difficulty, combining data on impairment in the population with a model of human-product interaction, and referencing environmental and social context of use. He used variable levels of impairment simulation to measure the demands of specific tasks on users, in order to enable researchers to predict corresponding levels of exclusion (Waller, 2014). Impairment simulation may be useful to designers and engineers when attempting to measure the physical aspects to design exclusion and accessibility. However, impairment simulation provides little insight to issues of social exclusion and the lived experience of disabled people, hence the limitations must not be overlooked.

Developing understanding of user needs and aspirations requires the employment of more qualitative research methods. With an emphasis on qualitative methods, Dong et al. (2005) engaged disabled people as critical users in the process of participatory design at the University of Cambridge. They reinforce Pullin's (2009) definition of inclusive design, stating that inclusive design is about 'designing more accessible products and services for the widest possible range of users' (Dong et al., 2005, p.49). They also argue that in order to achieve this goal, a better understanding of, and empathy with, users is required.

For Dong et al. (2005), traditional user research methods are limited in accommodating a wide range of users, hence there is a need to find more appropriate methods for inclusive design. They argue that Critical User Forums enable designers to develop understanding of a wider range of users through direct interaction, which in turn, helps build empathy with users. Direct interaction with the user, therefore, is key. The language employed by Dong et al. (2005) was sympathetic to medical model thinking. For example, labelling people with impairments as having 'severe disabilities'. This differs from language used by advocates of the social model of disability who argue that people have impairments but are, or become, disabled when they encounter a disabling society.

The evaluation of the effectiveness of Dong et al.'s (2005) method for inclusive design is based upon interviews with design consultants experienced in using this technique. This research method is useful to designers as it provides insight to

ways in which designers might better understand user needs. A particular issue of concern, however, is that Dong et al.'s (2005) study examines disabled people as an isolated group. Few examples within the literature investigate participatory design research with disabled and non-disabled children.

In the area of Universal Design with children, Mullick (2014) addressed this gap in the literature, through the Inclusive Indoor Play project. This project brought disabled and non-disabled children together in an investigation of play behaviour and play needs. At first glance, with the employment of comparable techniques and research subjects, the Inclusive Indoor Play project could be interpreted as similar to the research documented in this thesis. However, Mullick's (2014) study differs in purpose and context. Where Mullick's (2014) project sought to enable parents, designers and purchasers to make choices about toys and games for children to play with, this thesis aims to place children's needs and aspirations at the forefront of the research. It seeks to examine ways in which designers might develop understanding of disabled and non-disabled children's needs and aspirations for playing together and to apply this knowledge to the design of toys and games.

3.2 Participatory Design

In Human Computer Interaction (HCI), the Interaction Design and Children (IDC) community is active in bringing researchers, designers and educators together with children to explore the design of new technology and engaged learning among children (IDC, 2014). Within the IDC community, participatory design is a popular approach to user-centred research with children (Read et al., 2014). How and why children might be involved in the design process, however, is an issue of concern for this thesis, and one that will be addressed in this chapter.

Participatory design is not a new area of study. With its origins in Scandinavia in the 1980s (Bjerknes et al., 1987) and other high profile studies in the field of HCI (Julie and Andrew, 2003, Muller, 2003), it is an established area of design research. What is new, however, is the way in which our contemporaries are reflecting upon their use of participatory design methods and the value of user-centred research with children. Guha et al. (2013), for example, sought to clarify the intent of cooperative inquiry techniques since its original conception, and Read et al. (2014) raised ethical concerns regarding the transparency of the processes involved in participatory design with children. Guha et al. (2013) justify this period of reflection. Firstly, claiming that in search of quality, the pioneers of participatory design methods have demonstrated a commitment to continually revisit their method.

Secondly, that new technologies are changing the roles children can now play in the design process.

3.2.1 Cooperative Inquiry

The original intent for cooperative inquiry was the on-going inclusion of children in the process of participatory design (Guha et al., 2013). Cooperative inquiry is 'an approach to creating new technologies for children, with children' (Druin, 1999, p.1). Grounded in human-computer interaction (HCI), it has roots in the research and theories of cooperative design (Greenbaum and Kyng, 1991), situated action (Suchman, 1987), participatory design (Schuler and Namioka, 1993), contextual inquiry (Beyer and Holtzblatt, 1998) and activity theory (Nardi, 1996). It comprises a collection of techniques used concurrently with 'a philosophy of partnership and elaboration' (Guha et al., 2013, p.19).

Subtle differences in working relationships differentiate cooperative inquiry from other participatory approaches to research with children. Children have participated in HCI and IDC research in various capacities ranging from informants (Read et al., 2014) to design partners (Guha et al., 2013). The continuity of child involvement distinguishes design partnering from informant design (Scaife et al., 1997; Druin, 1999). Where informants are consulted when feedback is needed, design partners are considered equal stakeholders throughout the design process (Guha et al., 2013). When involved as software designers (Druin, 1999), children have tended to work alone or with peers (Guha et al., 2013). Design researchers must acknowledge these subtle differences when reflecting upon considerations for participatory research with children, as differing levels of child and adult involvement can have an impact on children's voice.

3.2.1.1 Mixed Methods

Cooperative inquiry techniques are designed to offer design teams flexibility. In order to meet the needs of today's children, advocates of this method search for ways of adapting existing participatory design techniques to accommodate children's different needs and preferences (Guha et al., 2013). Approaches originally intended for research with adults, such as inclusive design, participatory design, and contextual inquiry, have been blended and adapted. Various meta-methods have been developed, including co-design (Churchman, 1968) and informant design (Scaife et al., 1997). Researchers are not required to use all techniques involved in cooperative inquiry - instead they are encouraged to be selective. For example, Taxen et al. (2001) have used a 'scaled-down' model of cooperative inquiry and others have adapted the method to different contexts

including schools (Large et al., 2007; Niemi and Ovaska, 2007), museums (Roussou et al., 2007) and homes for disabled children (Hornof, 2008). Since cooperative inquiry is used in different settings, it is important to take into account context when undertaking comparative studies.

3.2.1.2 Issues of Voice

Attempts to adjust power differentials between adults and children through cooperative inquiry include adults working with children on the floor to develop prototypes (Guha et al., 2013), wearing informal clothing, and participating in adult-child group team building (Alborzi et al., 2000; Druin, 1999; Druin and Hendler, 2000; Gibson et al., 2002; Walsh et al., 2010). Building rapport between adults and children is considered an important part of the process. As discussed in Chapter 1, techniques for engaging children in the process of cooperative inquiry include *Bags of stuff*, through which large bags are filled with art supplies and used in low-tech prototyping, *Mixing Ideas* (Guha et al., 2004), through which individual team members each start with an idea and then follow a method of combining ideas into a collective plan and *Idea Elaboration* (Druin et al. 2002), through which a team member (adult or child) shares an idea with the rest of the design team and others add thoughts and new directions (Guha et al., 2013).

Through *Idea Elaboration*, there is a risk that children's ideas become contaminated with those of adults, as 'adults conceive of ideas and either teach them to children or ask for feedback' (Guha et al., 2013, p.16). It may be difficult for design researchers to give more power to children in the process. There is also little existing guidance on the management of the design process - for example, when ideas should be discarded, or when the process of elaboration should stop. Children's roles as research participants can change. In *Design Partnering*, once trained, children's views may no longer be representative of the needs and attitudes of children as users in general (Taxén, 2003). They may cross boundaries, from researched to researcher, demonstrating the same awareness of the design process as adult participants. Christensen and Prout (2002) note that although there cannot always be a symmetry of power with children, care should be taken to ensure ethical symmetry is a minimal requirement for researchers, through the participation of children is not considered any different to adults.

3.2.1.3 Adultcentricism

Some researchers have adapted existing cooperative inquiry techniques in order to support their *own* research needs. For example, in order to save time, avoid development-halting problems, and streamline processes (Guha et al., 2013).

Arguably, this provides evidence of an adultcentric approach to cooperative inquiry. Adultcentrism (Verhellen, 1994) relates to an exaggerated egocentrism of adults, based on the assumption that adult perspectives are intrinsically better than those of children. Much of the research involving methods of cooperative inquiry prioritises learning through new technologies (Guha et al., 2013). The design of technology or therapeutic devices that support child development in terms of education, communication and physical development have been prioritised in much of the research involving methods of cooperative inquiry, over the design of technology that is intrinsically fun for children to play with.

Technologies developed through the process of cooperative inquiry have ranged from storytelling robots (Druin and Hendler, 2000) to online digital libraries (Druin et al., 2009). Although there are many benefits to educational forms of play (Singer et al., 2006), Goodley and Runswick-Cole (2010) question the quality of disabled children's play experiences, when play is used as a mechanism for therapeutic or educational intervention. It is also worth noting that Guha et al. (2013) developed technologies that *they* believe were appropriate for children. However, due to the collaborative nature of design partnering with teams of adults and children, the extent to which children's needs and aspirations for play have been taken into account is unclear.

If researchers fail to define preconditions for child participation, the researcher's ability to choose design partners can be usurped by schools (Druin et al., 2007). Schools may choose to 'impress' researchers by selecting their 'best' students to participate as design partners (Kam et al., 2006). Where disabled children have been included in HCI research, they have been involved in projects targeted specifically at children with special needs (Hornof, 2008) rather than inclusive mainstream projects. Some children considered 'difficult' to work with have been excluded from existing participatory design research entirely. For example, professionals trained to work with children with autism have been included in research as proxies for the children they represent (Leroy and De Leo, 2008) and others work solely with children with special needs as an isolated group (Gibson et al., 2002; Guha et al., 2008). Plus there are still gaps in the literature in relation to methods of cooperative inquiry and ways in which they may be adapted to be inclusive of disabled and non-disabled children.

3.2.1.4 Ethics

Ethical constraints placed on research projects with children are likely to be influential in the educational or therapeutic agenda for HCI and IDC research. From

a medical perspective, Ross and Moon (2000) highlight that non-therapeutic research with children is considered unethical - an idea contested by researchers from the field of disability studies, such as Goodley and Runswick-Cole (2010). Paragraph 27 of the Declaration of Helsinki stipulates that incompetent subjects [children] should not be included in research that has no potential benefit for them individually, unless it is designed to promote the health of the population represented by the proposed research subject (Goodyear, et al., 2007).

Although the benefits of play in relation to health and wellbeing are widely recognised (Ginsburg, 2007), some of the less tangible benefits may be difficult to measure. An issue of concern for theorists in the area of participatory research with children is that projects lacking in short-term gains for children may be rich in long-term gains. It may be easier for adult researchers to measure the impact of educational or therapeutic play interventions as they can clearly demonstrate the direct benefits of the research for participants. Furthermore, other play benefits for children may be more disparate and considered less important by adults.

Read and Fredrikson (2011) have focused upon the ethics of children's participation in design research. They make a case for children being given full information about the potential use of, and funding for, the designs towards which they contribute. Read et al. (2014) challenge the way in which little research in the IDC community has been concerned with the rights and feelings of children within the context of participatory design research. Furthermore, the Children Act (1989) stipulates that children should be engaged in consultation and included in the decisions that affect them. A particular challenge for child-focused research is striking the balance between the benefits of research, while ensuring appropriate protections are in place. Within the medical profession, according to the Royal College of Paediatrics and Child Health, the attempt to protect children absolutely from the potential harms of research denies them the potential benefits (Hull, 2000). This is true not only in biomedical studies, but in social research also.

3.2.1.5 The Value of Participatory Research with Children

Members of the IDC community are currently challenging the overall effectiveness of participatory design in gathering ideas and inspirations from children. Read et al. (2014) question the nature of the underlying research processes, from the gathering of consent to design evaluation. Researchers in the HCI community have also questioned the value of time spent engaging in lengthy research projects with children (Guha et al., 2013). For example, in earlier intergenerational design partnerships, Druin et al. (1997) facilitated technology

immersion with children, in order to gain insight to children's technology use. While technology immersion is valuable, it has been described as 'time consuming', and 'less helpful than anticipated' for not contributing significantly enough to the design of new technology to justify the time required for the completion of the project (Guha et al. 2013, p.16). Why researchers are employing these methods and how they are going about their research practices are, therefore, issues of ethical concern within participatory research (Read et al., 2014).

Some HCI researchers have questioned what 'good' comes of participatory research with children and whether designs developed are any better than they may have been without their input. Despite efforts in the area of cooperative inquiry, new technology is not always developed to full fruition (Mazzone et al., 2004; Kelly et al., 2006). In the early stages, children may be less likely to offer insightful ideas in the design process. Children need time to learn the method and its techniques and to get used to the process (Guha et al., 2013). Children's roles may also change. In order to make child design partners feel valued, the University of Maryland 'pay' child design partners with small technology gifts at the end of each project (Alborzi et al., 2000). Others have involved children as equal partners in the process of grant writing and decision-making (Randolph and Eronen, 2007). However, more modestly funded projects may not be able to offer such incentives.

3.2.1.6 Researcher Reflexivity

Druin (2005) argues that large group discussions encourage teams of design partners to reflect upon their experiences. Yet within the HCI and IDC literature, there is little critical reflection on the challenges associated with large group dynamics, highlighting the need to bring a greater degree of researcher reflexivity to these fields. For example, factors such as group size Guha et al. (2013), adult-child ratio (Large et al., 2006) (Niemi; Ovaska, 2007), and time of day (Large et al., 2007), each influence group dynamics and process outcomes.

Discourse relating to issues of child participation in design research has largely taken place between researchers *outside* of the HCI community. In the past, the social sciences have made a significant contribution to philosophical debate on 'the role of the children' in the process and 'the extent to which they can participate in meaningful design activities' (Read et al., 2014, p.106). Where previous studies in participatory design have tended to focus on the philosophical arguments surrounding the involvement of children in research, Read et al. (2014) prioritise the facilitation of children's involvement and the quality of ideas or products generated during participatory design. Arguably, a degree of researcher reflexivity is required,

as little participatory research has considered ‘the fundamentals of participation’, namely ‘how children choose to participate and how their ideas are included and represented’ (Read et al., 2014, p.104).

Recent research within the IDC community has spanned the adaptation of adult resources for children (Gossen et al., 2014), the development of child agency (Avontuur, et al., 2014), interaction design for children (Kammer et al., 2014) and play in educational contexts (Colombo & Landoni, 2014; Rubegni, & Landoni, 2014). Efforts towards the design of more inclusive technologies for children have included second language learning activities (McNally et al., 2014) and an examination of the diverse physical identities for children of different ages (Emanuel and Stanton Fraser, 2014). Where research has been undertaken with disabled children, they have been examined in isolation. Bartoli et al. (2014) examined the design and evaluation of ‘touchless’ playful interactions for children with autism spectrum disorder and Malinverni, et al. (2014) investigated design strategies to enhance the creative contribution of children with special needs. However, by failing to include disabled and non-disabled children as users in research side-by-side, they overlook the social barriers to play.

There appears to be a trend towards more socially responsible games, with the development of *Games for Change* (Antle et al., 2014) and *Digital Peer Support Services* (Lindberg et al., 2014). *Games for Change* is a contemporary movement and community of practice dedicated to using digital games for social change (Antle, et al., 2014). *Digital Peer Support Services*, on the other hand, are designed to bring children of similar life experiences together through digital gameplay, in order to help with children’s adjustment to life-threatening diseases (Antle et al., 2014). There is also trend within the IDC community to investigate issues of child agency in research and the ethics surrounding issues of consent and involvement in research. Read et al. (2014), for example, are interested in how well children understand what they are consenting to when they engage in research. Such research has helped to inform the approach to participatory research with children undertaken in this thesis.

3.3 Summary

This chapter examined existing research in the area of inclusive and participatory design. It highlights the need for researchers to be reflexive about their role in the process of participatory design with children and the contribution they make to the empowerment (or disempowerment) of disabled children through the

process. Disabled children are underrepresented in inclusive design research. Within the literature, the dominant approach has been to either exclude disabled children or to work solely with children with special needs as an isolated group (Gibson et al., 2002; Guha et al., 2008; Bartoli et al., 2014, Hornof, 2008). Where disabled and non-disabled have been included in design research together, there has been an adult-centric agenda designed to empower parents and designers or to prioritise educational, therapeutic technologies (Druin et al., 2009).

Several studies have emphasised the benefits of cooperative inquiry as a suitable method for participatory design with children, for reasons including the provision of child-friendly, task-based, techniques, its potential to be flexible to the needs of design teams, and the way in which method can be adapted to accommodate children's different needs and preferences (Guha et al., 2013). Yet within the work of the advocates of this method, there is evidence of adultcentricism (Alderson, 2001) and a preoccupation with issues of accessibility (Dunn and Moore, 2005), as identified in Chapter 2. Although the removal of environmental barriers can make a play space accessible, in order to make a play space inclusive, social barriers must be addressed (Dunn et al., 2003).

In the field of inclusive design, efforts towards developing understanding of design exclusion with impairment simulation tools can be used to measure and quantify design exclusion (Waller, 2014). However, such tools provide little insight into issues of social exclusion, thus they fail to capture the full picture of the experiences of disabled people. This calls for design researchers to adapt and build upon established methods of cooperative inquiry in ways that will empower children through participatory research and encourage designers to be reflexive about their role in the process. A shift towards socially responsible design within the Interaction Design and Children community has highlighted the potential for interdisciplinary design teams to design positive social interactions *into* games (Antle et al., 2014; Lindberg et al., 2014). Furthermore, Read et al. (2014) have identified opportunities for designers to advance practice in participatory research by engaging in critical discourse across disciplines with the social sciences and employing more ethically responsible and transparent practices.

Chapter 4

Research Design and Methodology

This chapter examines the research design and methodology that underpins this thesis. Section 4.1 focuses on the methodological considerations of the research. Section 4.2 focuses on the research design and the various steps taken towards answering the research question. It provides an introduction to the research team and research participants and an in-depth description of the ethical considerations made.

The theoretical framework for this study is underpinned by methods of the social sciences. It draws upon the sociology of childhood and disability studies perspectives. This chapter provides a background and rationale for methodologies of the social sciences that may be unfamiliar to readers from a design or engineering background. Hodkinson (2007) highlights the benefits of examining issues of disability through a 'sociological lens', locating the problem of disability within societal structures, as opposed to 'isolated individual pathologies' (Garth and Aroni, 2003, p. 56). Furthermore, when attempting to develop understanding of the experiences of disabled children, Connors and Stalker (2007) suggest combining insights from the social model of disability with the sociology of childhood, in order to build upon existing work within childhood studies.

While disability studies and the sociology of childhood differ in approach and ideology, they share common themes: both seek to transform the position of children and disabled people from objects to subjects of study, and both seek to present children and disabled people as active agents, through a commitment to concepts of rights and participation (Watson, 2012). Until the early 1990s, childhood research was largely concerned with the psychological, physical and social development of the child. Children were typically prescribed a passive role in the process, seen through adult eyes (Waksler, 1991; Shakespeare & Watson, 1998) - they were considered 'adults in training' (Connors and Stalker, 2007, p.20).

Since then, Woodhead and Faulkner (2000) have charted the gradual shift in the field of developmental psychology, from children being perceived as objects of scientific experimentation, to representations of children as research subjects with the potential to be interviewed and engaged in discussion, such as the work carried out by Jean Piaget (James and James, 2012). In the field of sociology, the new paradigm within childhood studies (Prout and James, 1997) not only positioned

children as 'active in the construction and determination of their own lives, the lives of those around them and the societies in which they live' but also recognised that children could have a more direct voice in the production of sociological data.

Through the 'sociology of childhood', the idea that childhood, unlike biological immaturity, might be a social construction influenced by factors such as class, gender and ethnicity, emerged (Connors and Stalker, 2007, p.20). Brannen and O'Brien (1995) noted that listening to children's personal accounts of their experiences encouraged the recognition that children are a non-homogeneous group. Hence, they need to be studied in all their diversity. James and James (2012) argue that this shift in perspective has enabled children's views and ideas to become the central focus of research, leading to the description of research being 'child-centred' or 'child-focused'. Rather than being preoccupied with terminology, for them, the most important issue was the methods and ethical stance adopted in 'child-focused' research. They argue:

Child-focused research is not simply about doing research about children; it must adopt methods and ethical procedures that respect children as research participants in their own right and adhere to this value throughout the research process (James and James, 2012, p.10).

The social studies of childhood (Alderson, 1993; Beresford's, 1997; Watson et al., 1999 and Connors and Stalker, 2003; 2007) were influential in the design of this study as they argued for the adoption of participatory methodologies to ensure the voices of disabled children themselves were represented in the research. Through these studies, children were active research participants, presented as autonomous and active social agents. This new paradigm also addressed the social, cultural and environmental factors responsible for the exclusion of children with impairments, of which adult behaviours were a particular concern (Watson, 2012).

Contemporary researchers such as Kay and Tisdall (2012), however, argue that 'The "new" sociology of childhood is no longer so new' and that it is now timely to re-consider the core theorisations and development of research practices within childhood studies, in response to the challenges recognised in both theory and practice. Thus, questions that underpin this thesis involve children's participation and voice in research and related issues of ethical consideration.

4.1 Methodological Considerations

Insights to current design research and practice through this study led the researcher to question the suitability of current methods of designing children's products for disabled children. Networking with existing designers provided insight to *how* researchers are currently developing products for children. Richards (2011), US representative for *Imagination Playground*, noted that the designers responsible for its conception came up with ideas intuitively and children's book author, Oliver Jeffers (2011), considered what he would want to read as a child when writing and illustrating his books. Although products developed by Richards and Jeffers are designed with the intention of enhancing children's lives, these examples illustrate ways in which children are excluded from the design process, despite existing research into special methods and considerations for engaging children in the design process (Druin, 1999; Markopoulos et al., 2008). Furthermore, Holt et al. (2013) note the issue of engaging disabled children in the design process remains under-researched, despite early efforts in the domain of Human Computer Interaction (Weightman et al., 2009, Guha et al., 2008).

Focus groups have traditionally been used to engage children in the design of children's toys and games. They have tended to consist of individuals randomly selected to represent a target audience (Curtis, 2002). However, the recruitment and facilitation of focus groups has been identified as flawed in a number of existing studies. In the use of focus groups more generally, it is argued that they are costly; they are not always effective; and the point at which users are brought into the design process is often too late for them to make a meaningful contribution (Curtis, 2002). In addition to these concerns, Druin and Solomon (1996) suggest that in the development of products aimed at children, children's ideas are not always granted the same respect at those of adult users - highlighting a power imbalance between adult researchers and child users.

Where design companies have previously used focus groups with children as a means of *verifying* design solutions, this project aimed to actively engage children in the design process from conception, through focus groups and other methods of cooperative inquiry (Druin, 1999) as a means of gaining insight to their experiences and exploring their views. Rather than focusing upon the end product, feedback and interaction with prototypes was used to develop an in-depth understanding of the barriers encountered by children and their aspirations for inclusive play, as it was anticipated that this dialogue would be more insightful than straightforward interviewing alone (Holt et al., 2013).

Within the literature, it is suggested that as researchers, we must 'argue what we know based on the process by which we came to know it' (Agar, 1996, p. 13). Hence, methods of data production and analysis are of particular importance to this study. An interpretive approach was employed in this study in order to avoid any inaccurate generalisations in data analysis (Braun & Clarke, 2006). An interpretive approach has more relevance to this study than quantitative inquiry. Although critics challenge the validity of qualitative data due to evidence being largely in non-numeric form, its flexible, and inductive nature (Braun & Clarke, 2006) makes it suitable for working with children in the school setting. Inductive analyses primarily have a descriptive and exploratory orientation, which provide insight to individual experiences and allow researchers to develop understanding of emergent issues in the school environment.

4.1.1 Research by Design

This study employed a research by design (Frayling, 1993) approach. Research by design is a form of action research through which the process of designing and evaluating a product for a situation becomes a vehicle for understanding that situation. In this case, the 'situation' relates to the play experiences of disabled and non-disabled children. As the aim of this study was to develop an in-depth understanding of the needs and aspirations of a small number of disabled children and their friends, the research sample was micro-representative. It is based on 'non-probabilistic' samples of research participants, which involves the investigation of data generated by a specific, targeted group of research participants (Braun & Clarke, 2006).

A research by design approach differs from other forms of action research, through which actors seek to 'improve the phenomena of their surroundings' (Bassey, 1990, p.39). The action research approach is commendable as it enables the researcher to make a positive impact on a specific environment and if strategies prove successful, they can enhance participant experience. However, it was not the intention of this research to enter the participating children's worlds with an intervention as such, which has tended to be the focus of research into disabled childhoods in the past (Watson, 2012). Instead, its aims were to capture the 'complexity and "messiness" of a child's world' (Druin, 1999) and cast light on some of the barriers encountered by disabled children through play, which calls for a different approach.

Communities of inquiry and action within participatory action research address questions and topics that are 'significant for those who participate as co-

researchers' (Reason and Bradbury, 2008, p. 1). Kay and Tisdall (2012) note a trend, as a rights argument, towards children's participation as researchers. However, as a result, practical and conceptual problems have arisen (Kay and Tisdall, 2012, p.186). Children are still treated unequally in comparison to adult research participants. For example, at a practical level, 'any young person in the UK, under the age of 14, has difficulty being paid directly for work as a researcher' (Kay and Tisdall, 2012, p.186), whereas adult research participants are remunerated for their time.

Aspects adopted from the traditional action research method through this study are its 'cyclical' (Bassegy, 1990) approach to research and its aim to create theory 'not as an end in itself, but in order to advance practice' (Bassegy, 1990, p.39). Finally, by enabling practitioners to undertake continued research in the classroom, they are able to work progressively as a long-term goal. In order to develop a better understanding of the relationships between disabled and non-disabled children, Hodkinson (2007) argues that non-disabled children's attitudes should be researched as part of an on-going theory development (Hodkinson, 2007).

Despite the potential for positive gain from action research in schools, few studies in educational research journals appear to be presented as action research (Taber, 2007). This may be a reflection of some of the limitations of this approach. For example, as the aim of this study was to investigate a small group of children, it provides little evidence that can be generalised for national statistics. This study involved gathering data from a situation that may be unique to a specific child or group of children. Participatory action research therefore contrasts with research methods that focus on the reproducibility of findings. Further, due to the way in which interventions can be concluded with limited means of evaluation, should they succeed, it may be difficult to determine why they have succeeded. This further compounds the problem of interchanging interventions in different situations. If one does not know why something has succeeded, then how can one be sure that strategies applied in the intervention are responsible for an improvement in the children's experience?

This study is aligned with the emancipatory paradigm of the social sciences. Relationships between disabled and non-disabled children are commonly researched in the area of inclusive education and research undertaken in this field often involves emancipatory or action research methods. Oliver (1997), however, argues that such methods are 'problematic' as much action research is used by teachers to enhance their practice, rather than to confront the oppressive power

structures within it (Oliver, 1997, p.26). For Oliver (1997), if studies into the experiences of disabled children are to be truly emancipatory, then control must be placed in the hands of the researched (i.e. the disabled children) and not the researcher (Oliver, 1997, p.17). In keeping with the emancipatory paradigm of the social sciences, this thesis seeks to foreground the voice and experience of disabled participants and to be responsive to their research needs.

Skeptical of purely theoretical approaches to research with children, one theorist highlights some of the limitations to children's representation in existing studies in the area of critical disability studies (CDS), stating:

Much of what the children say (...) is subsumed in the theory and their very important testimonies lose their power as the promotion of the theory behind the analysis becomes more important than the findings generated by these data (Watson, 2012).

In contrast, a research by design approach takes a more pragmatic stance. Rather than developing and assessing design interventions, this study aimed to develop some actionable guidance for design research, education and practice. The next section describes the mixed-methods approach used to engage children in the process of cooperative inquiry (Druin, 1999).

4.1.2 Mixed-method Approach

Contemporary researchers from the field of sociology promote a mixed-methods approach to research with disabled children. Watson (2012) highlights the difficulties in attempting to develop a 'one-size-fits-all' model designed to meet these needs of disabled children as they each have different needs (Watson, 2012, p.195). Furthermore, disability itself is a 'highly complex variable'. It is 'multi-dimensional' and 'cuts across the range of political, social and cultural experiences' (Watson, 2012, p.193). For this reason, the research techniques employed were adapted to the needs of participating schools and children. Challenging the assumption that it is only disabled children that have different needs, Hart (1997) suggests that there are fundamental differences in working with children of different ages (Hart 1997) and Johnston (2008) notes that although some methods may work in some schools, they may not work in others (Johnston, 2008, p.45).

For example, some methods may only be appropriate if children attend the same school and the school is happy to help with the administration of the instrument (Johnston, 2008, p.45). Further, different methods may be relevant to certain situations, but not others. The decision to include certain methods over

others also has ethical implications, particularly if the data generated is unfruitful. It was anticipated that the suitability of the various methods would become clearer as the procedural constraints around the research were discovered.

In order to gain insight to children's experiences of different types of play, appropriate techniques must be employed. Punch (2001) notes the limitations of visual and task-based methods when attempting to address certain issues. Where task-based methods may be appropriate for one situation, they may be inappropriate for another. For example, when examining children's intra-household relationships, rather than asking children to depict issues through drawings and photographs, it may be more appropriate to undertake observations, written tasks and discussion. For this reason, observations and focus-group discussions were built into the research schedule, to supplement design and prototyping activities.

Kay and Tisdall (2012) promote the use of multiple communication methods in research with children and a range of methods with which to access, analyse and present child-centred research. They also encourage researchers to be more reflexive about the role of researcher and research participant, and to challenge assumptions surrounding competency, expertise and agency. A multi-method approach is employed in the research methodology for this study, in order to avoid focusing on voice alone. Tisdall et al. (2009) argue that the metaphor of 'voice' may reproduce understandings that marginalise children, i.e. assuming that the voice as the property of a rational, articulate, knowledgeable individual, capable of speaking for herself (Tisdall et al., 2009).

Further, Komulainen (2007) argues that focusing on voice alone favours comprehensible verbal utterances over alternative communication forms, which can potentially exclude children who communicate with few or no words through speech (Komulainen, 2007) or those who stay silent or respond to a researcher's questions with laughter (Lewis, 2010; Nairn et al., 2005). Moreover, a preoccupation with verbal communication can restrict the use of other communication methods, ranging from drawing to role-play, which are established methods for engaging with a diversity of children (Kay and Tisdall, 2012). Designers can also make good use of other sources of data, such as mind maps.

The perspectives of Kay and Tisdall (2012) have been influential in the shaping of the theoretical framework for this study, as they emphasise examining not only what children say when they participate in research, but how they say it, and how their views are interpreted, analysed and presented. It places emphasis on asking what makes 'good' research with children in a design context? For example, when

engaging in research, should children go through substantial training in research skills or have less research-rigorous standards applied to them (Kay and Tisdall, 2012, p.187)? Further amplifying the need for a mixed-method approach in design research, arguably, when researchers attempt to be child-friendly:

Being child-friendly is (...) not simply about making places safe for children or ensuring that children have specific services. It is about recognizing that children's requirements may be different - or the same - as those of adults and that the best way to assess what these are is to enable children to be involved in their design and implementation (James and James, 2012, p.14).

Critics raise concerns that research with just a few children may be 'skewed' towards the children involved in the design process (Moraveji et al., 2007). Guha et al. (2013), however, reject this view, arguing that the same could be applied to other team-based projects, not just those involving the process of cooperative inquiry (Guha et al., 2013, p.19). This research demonstrates the importance of developing understanding of the individual needs of a small group of children.

4.1.3 Mixed-method Approach to Analysis

Methods of applied thematic analysis (ATA) were used in the analysis of rich qualitative data generated through this study. Applied thematic analysis involves 'multiple analytic techniques' (Braun & Clarke, 2006, p.4) and is therefore employed for its breadth and scope. It comprises 'grounded theory, positivism, interpretivism and phenomenology—synthesised into one methodological framework' (Braun & Clarke, 2006, p.15). It borrows useful techniques from each theoretical and methodological camp and adapts them to an applied research context. However, where grounded theory is aimed at building theory, applied thematic analysis is not restricted to this purpose. Similarly, where interpretive phenomenology focuses on subjective human experience, the topic of applied thematic analysis is broader and may be extended to include social and cultural phenomena. Applied thematic analysis allows greater flexibility in relation to theoretical frameworks and, subsequently, the analytic tools it can employ (Braun & Clarke, 2006). Moreover,

The greatest strength of ATA is its pragmatic focus on using whatever tools might be appropriate to get the analytic job done in a transparent, efficient, and ethical manner (Braun & Clarke, 2006, p.18).

This approach also takes into account the challenges of working with focus group data, comparing subgroups and working within a mixed methods project.

Applied thematic analysis was employed not only for the way in which it enables researchers to draw upon on a range of appropriate theoretical and methodological perspectives, but as a means of presenting the stories and experiences of children participating in the study as accurately and comprehensively as possible. The next section describes the research design employed in an attempt to fulfil this aim.

4.2 Research Design

This section shall discuss the specific methods employed in the study and the way in which new perspectives and techniques were brought to the research, in a bid to further enhance and refine initial proposals made as part of the Together through Play project. It describes the data collection methods used and the reasons for their employment. It describes the challenges anticipated and the steps taken to mitigate the occurrence of potential problems. It also describes action that was taken when problems did arise, in order to minimise their impact.

4.2.1 Ethical Considerations

'Ethics' can be defined as a set of moral principals and codes of conduct. Research ethics, according to one author, represent the use of a system of moral principals to avoid harming or wronging others, to 'do good' and to be fair and respectful (Seiber, 1993). One of the issues of concern for design researchers is that in everyday social life, the views of adults, parents or researchers overpower those of children's and the challenge is to develop an approach to research that is respectful and fair towards children as research subjects (Morrow, 2008) and to 'do good' by them. This section addresses some of the ways in which this study is designed to be fair and respectful towards disabled and non-disabled children as research subjects. It also highlights some of the methods and techniques suitable for ethically sound design research with children in the future.

4.2.1.1 Ethical Approval

Issues of ethical approval involve matters that are not specific to this research, but to research with human participants in general. These issues include: informed consent (and in relation to children, this involves guardian/parental consent as well as child consent), participant anonymity, confidentiality and data handling and storage. Each of these aspects will be addressed in this section, in keeping with the Statement of Ethical Practice for the British Sociological Association (2002). All funded and PhD research and fieldwork involving the generation of data with human participants requires ethical approval, in line with mandatory procedures at the University of Leeds, before any data is generated. The University's Research

Ethics Committee granted ethical approval for this research under application code MEEC 11-001.

4.2.1.2 Basic Ethical Principles

This research takes into account five key ethical principles:

- Principle 1 - Minimising risk of harm;
- Principle 2 - Obtaining informed consent;
- Principle 3 - Protecting anonymity and confidentiality;
- Principle 4 - Avoiding deceptive practices;
- Principle 5 - Providing the right to withdraw.

These ethical principles emphasise the need to:

- a) Do good (known as beneficence);
- (b) Do no harm (known as non-maleficence);
- c) Protect the anonymity and confidentiality of the research participants;
- (d) Avoid using deceptive practices;
- (e) Give participants the right to withdraw from the research.

Each of these ethical principles will be addressed in more detail in the next section.

4.2.1.3 Principle 1 - Minimising Risk of Harm

On the topic of risk of harm in research conduct, one author wrote:

We need to be both mindful and active in protecting our research participants (and ourselves) from harm and undue risks, as well as affording respect for autonomy (Guillemin, 2004, p.17).

Research participants should not be put in any position of discomfort or harm. As part of this research, the following plans were in place in order to avoid potential risk of harm to participants:

- Obtaining informed consent from participants;
- Protecting the anonymity and confidentiality of participants;
- Avoiding deceptive practices in the design of the research;

- Provision of the right for participants to withdraw from the research at any time.

Such procedures were designed to ensure the psychological and emotional wellbeing of both child and adult participants involved in the research. In addition, in order to address issues of inclusion respectfully and with sensitivity, this research did not include direct questions about physical impairment - a potentially sensitive subject matter. Discussions with disabled and non-disabled children about their experiences of playing together and any barriers to their play could potentially result in the disclosure, or occurrence of, distressing incidents. For example, a child might describe their experience of bullying or there may be situations where one child voices negative assumptions about the capabilities of another. There may be risk of harm in relation to children's emotional wellbeing. Some of the measures in place to ensure the emotional wellbeing of the children included:

- a) Speaking to school staff and class teachers prior to discussions with the children, in order to identify any particularly sensitive topics and to ensure the management of these issues during focus group discussions with children. In the researcher's application for ethical review, the researcher proposed to undertake interviews with teachers, parents and carers to identify 'sensitive topics/issues' before undertaking research with the children. However, it was not feasible to do so in practice. Nevertheless, the researcher did speak to school staff informally, to flag up any potentially sensitive issues.
- b) Developing a set of 'ground rules' for discussions with children at the start of each focus group. This included addressing the need for children to be respectful of each other's views, to give each other the opportunity to speak, and to be considerate of the feelings of others whilst voicing opinions. Children were encouraged to think about the core principles that underpin their school philosophy, wherever possible, and to consider the way in which those principles might apply to their discussions in the context of the research. Ground rules were in place to ensure that the research activities were conducted in a dignified and respectful fashion, as stipulated in the University of Leeds Research Ethics guidelines (2013).
- c) Taking a proactive approach towards issues of bullying (for example, removing any children involved in infighting or bullying during research activities, in order to minimise the risk of harm and/or distress to others).

- d) Building impromptu breaks into research activities, in order to encourage more positive behaviour.
- e) Making additional school visits, should children's research time be cut short by other school activities/commitments, in order to ensure equal opportunities for all children engaged in the research.

In order to avoid the risk of harm to children when undertaking research in schools, as a safeguarding measure, Enhanced CRB clearance is required. The researcher was successfully granted Enhanced CRB clearance through the University of Leeds. The researcher followed a clear protocol in relation to the disclosure of information and child protection. In keeping with Child Protection policy, all focus group interviews with children were scheduled to be undertaken in a visible area within the school and under the observation of school staff. The researcher was also committed to ensuring the disclosure of information to the relevant authorities or school staff, on the occurrence of any child reporting any experience of abuse or bullying, in order to enable them to take the appropriate action to address these problems.

'Health and Safety' concerns must be addressed when prototype products are taken into schools and it was the intention that a number of steps would be taken to ensure the safe use of prototype toys and games. Plans were in place to ensure that the children would be under adult supervision at all times while the prototypes were in use. For this reason, the researcher intended to take responsibility for set evaluation sessions, rather than leaving the prototype games/toys with the schools. All adults and children interested in participating in the research were given the opportunity to do so, irrespective of any language barriers or additional communication needs.

It was the aim of the research to be truly inclusive. Therefore, if any additional support was required (i.e. translator, advocates, support worker, teaching assistants), it was the intention to negotiate suitable arrangements with participants at the time. Children with learning difficulties (intellectual impairments) were not involved in the project, but if any of the children did have impairments that might impede their ability to communicate, additional time would be allocated to ensuring messages were mutually understood and that both researcher and child were clear about what was being communicated. Identifying, approaching and recruiting disabled children for participation in research is a potentially sensitive subject and needs to be handled sensitively and respectfully in order to minimise the risk of

ostracising, labelling, or drawing undue attention to individuals. The way in which the recruitment of children was managed with care and sensitivity is discussed in the following section.

Identifying participants

The researcher first contacted schools that had previously collaborated in research with the University of Leeds and in projects managed by Dr Holt (the Principal Investigator). The research team was aware that children with physical impairments were in attendance at the school. It was critical to the Together through Play project for the researcher to work with established friendship groups comprising at least one disabled child and their non-disabled friends. The researcher worked with teachers in participating schools to identify suitable friendship groups.

Approaching Schools

Schools were initially approached about the study during a debriefing session undertaken by the researcher as part of her work on another research project (the K005 project at the School of Mechanical Engineering). Schools were then sent a formal letter and information sheet outlining the aims of the research and what would be involved for schools and participants. Schools willing to give initial support to the project were asked to identify relevant friendship groups of children who might be contacted about the research. Teachers who are willing to participate in the research were provided with individual information sheets and consent forms.

Once schools and child participants were identified, the researcher contacted their parents and carers by letter. This letter was designed to include a detailed information sheet outlining the aims of the research. They were asked a) whether they would be willing to consent to being interviewed themselves and b) whether they would give consent for their children to take part in the research. As part of the recruitment process, no child was approached without the prior consent of a parent and/or carer.

Once parents and carers issued their consent, child participants received 'accessible' versions of the information sheets and consent forms and informed consent was sought. Time was also built into the project plan to allow for a debriefing or discussion with the children prior to the start of the research about the project, its aims and their involvement. At this point, the researcher also explained the meaning of giving consent to the children and their rights within the research context. Children's verbal consent was sought and recorded, in addition to their

written consent. It was made clear to the children and reiterated throughout the research, that their participation would be voluntary and that they would not have to be involved or continue to be involved, if they chose not to be - even if their parents have given their consent and the school was supportive of the project.

Recruitment

Six friendship groups of children (3-5 children in each group) were recruited to participate in the project. Children were recruited from school years 3 and 4 (aged between 7 and 9) to ensure that they were at a similar stage of development, and would not move on to senior school before the end of the project. It was the requirement that each group would contain at least one child with a formal 'Statement of Educational Needs' related to a physical impairment.

Selection of Potential Participants

This project focuses upon inclusive play between children who have physical impairments and non-disabled children. This is the only 'criteria' for selection of participants. Other than ensuring that each friendship group comprises one child with a physical impairment and their non-disabled friends, no other criteria was to be employed within the sampling and no child was to be excluded from the research on the basis of any other social characteristic. It was hoped that the Together through Play project would lay the foundations for future studies to explore the experiences of inclusive (or non-inclusive) play of children with different impairments e.g. learning difficulties. This is, however, beyond the scope of this relatively small-scale study.

Prototyping activities were designed to enable the researcher to manage any health and safety 'risks'. All research activities were designed to take place under the supervision of the researcher, including children's use of prototypes. For this reason set evaluation sessions were led by the researcher, rather than leaving the prototype toys and games with the schools. Potential benefits to research participants were identified, but for the satisfaction and wellbeing of the children, it was important not to exaggerate these benefits. The researcher could not guarantee the development of all design concepts into prototype toys and games – time was built into the research schedule to clearly explain this to the children, but it was recognised that this could potentially be a source of disappointment for them. It was hoped that the main benefits to the respondents would be:

- For the children, involvement in a potentially fun and exciting process of co-design, during which their experiences and ideas would be valued and acted upon.
- For adult respondents, knowledge that their views would be valued and that they would be participating in a piece of research that seeks to influence future designers and enhance their understanding of the barriers to inclusive play and volunteering in a 'worthwhile' project with values that they support. It was the researcher's responsibility to ensure that the project was 'worthwhile' in its outcomes.

4.2.1.4 Principle 2 - Obtaining Informed Consent

Informed consent means that participants should understand that (a) they are taking part in research and (b) what the research requires of them. Therefore, through meetings with teachers and children and in the design of consent forms, the researcher explained the purpose of the research, the methods being used, the possible outcomes of the research, plus associated demands, discomforts, inconveniences and risks that the participants may face. From the start, researchers should clearly explain what participants might be asked to do during the research - this helps to achieve informed consent and minimises distress.

The researcher sent research schedules, focus-group discussion/interview questions and design and evaluation session plans into schools in advance of each activity. However, it is worth noting that much of this information was not passed onto the children. Hence, it was important to schedule time for a debriefing with the children at the start of each research activity. Informed consent was sought from *all* participants engaged in the research. Participating teachers, parents and carers were also provided with information sheets and consent forms. Their verbal consent was sought at the start of each interview and recorded. Parents and carers of all potential child respondents were contacted in writing *prior* to recruiting any child and their consent sought for the involvement of their child. Correspondence at this stage included detailed information and consent forms (see Appendix A).

Child Consent

Children's consent was sought only after their parents and carers had given consent a) for the researcher to contact their child and b) for their child to be involved in the research. Each child participating in the Together through Play project was provided with a user-friendly, 'accessible' version of the information and consent form. In addition, the researcher allocated time at the start of the research

to discuss the children's involvement in the research and likely outcomes with the children, to ensure that they had a good understanding of the aims of the project. She verbally explained 'consent' to the children and outlined the rights of all participants. She explained to the children that they would have the right not to participate, even if their teachers, parents or carers had consented to their involvement. She also explained their right to withdraw. She then sought their verbal and written consent. The general principle employed within this research is that consent is not a 'one-off event', but that it needs to be negotiated and revisited throughout the research process. For this reason, following initial written consent, verbal consent was sought from participants as part of this on-going process.

At the start of the first focus group discussion, in order to empower the children, this researcher briefed each group as her 'design team', explaining that she would be looking for their ideas and suggestions for the design of new toys and games throughout the study. The children were put in the role of 'expert'. The children were provided with information orally and in printed format and they were given the opportunity to ask any questions at any point of the research. Inspired by Read and Fredrikson's (2011) approach to the ethics of children's participation in design research - making a case for children being given full information about the potential use of, and funding for, the designs towards which they contribute (Read et al., 2014, p.106), the researcher also provided all children with an outline of the research aims and the origins of the funding for the research, in accordance with the University of Leeds Research Ethics policy (2013) guidelines on research conduct. This approach was also an attempt to ensure ethical symmetry, through which children are not considered as any different to adults in terms of participation (Christensen and Prout, 2002).

Children were asked to allow the researcher to observe them playing with their friends and to participate in no more than three focus group discussions. All discussions were designed to take place in the safe environment of the school, where it was hoped the children would feel secure and comfortable. During focus group discussions, they were asked to talk about their experiences of playing together, any barriers to their play and their aspirations for playing together. They were also asked to 'brainstorm' ideas about how to enhance play opportunities between disabled and non-disabled children. It was made clear to all child respondents that it was their right to terminate their involvement in any observation or focus group discussion at any point, irrespective of the consent being given by their parents and carers.

Adult Participants

It was the intention that parents and carers would be asked to take part in one semi-structured interview to discuss their observations and understandings of the play between children in particular friendship groups, any barriers to their play observed by parents and carers and any aspirations for playing together that they perceive the children to hold. Semi-structured interviews were designed to take approximately 1 hour, however, flexibility was built in to allow the length of the interview to be determined by the participant. It was the intention for teachers to be asked to take part in one semi-structured interview each, to discuss the same issues, but in addition, the researcher would encourage informal interviews/conversations (not to be recorded) with teachers about their observations of the children playing with the prototypes. The interviews were designed to be non-stressful and to take place at a time and place of convenience to the respondent.

As it is not deemed ethical to observe non-consenting children, in accordance with the University of Leeds Research Ethics policy (2013), only observations of the children participating in the study were reported. Any individual actions, i.e. incidents of social exclusion, were anonymised, and throughout each observation, consenting participants remained the focus of the activity, as opposed to others. All participants were given at least two weeks to decide whether or not to take part in the project, but consent was viewed as an on-going process and dialogue was maintained with participants throughout the research.

4.2.1.5 Principle 3 - Protecting Anonymity and Confidentiality

Protecting the anonymity and confidentiality of research participants is a practical component of research ethics. Participants will typically only be willing to volunteer information, especially information of a private or sensitive nature, if they are confident that such information will be kept in confidence. While it is possible that research participants may be hurt in some way if the data collection methods used are somehow insensitive, there is perhaps a greater danger that harm can be caused once data has been collected.

In order to protect the identity of participants, and in accordance with the University of Leeds Ethical Conduct guidelines (2013), the researcher sought to remove identifiers (e.g., vernacular terms, names and geographical cues, etc.). The names of the schools and the research participants were, therefore, anonymised. Data was anonymised during transcription and throughout all analyses. No respondent was named at any point in the publication of data. Numerical codes were initially assigned to schools and research participants, for example,

'Participant 1, School 2'. During the analysis of data, however, the research team found numerical codes too impersonal - assigning pseudonym names at a later date. The researcher assigned pseudonyms to participants, in order to avoid the risk of participants inadvertently selecting an alternative name that might identify them (e.g. a nickname). A record of the personal data and given pseudonym of each participant was stored securely and separately from all transcripts. Fictitious names were given to each school. No personal data was kept on file for any of the children, such as personal addresses - the researcher maintained correspondence with the schools rather than contacting the children directly.

All paper material – including printed transcripts, observation protocols, notes etc. - were stored in a locked filing cabinet located at the School of Mechanical Engineering, accessible only to the researcher, her supervisors and the administrator of the school. In order to enable the research team to identify themes in the transcription of data, the researcher designed a text-based template (see Appendix B, part B.1). Columns were divided into questions, in order to make it easier for the research team to make comparisons between discussions from different schools. Space was also included in the transcript templates for additional questions and comments.

4.2.1.6 Principle 4 - Avoiding Deceptive Practices

Research should avoid any kinds of deceptive practices. However, deception is sometimes a necessary component of covert research, which can be justified in some cases. Covert research reflects research through which (a) the identity of the observer and/or (b) the purpose of the research is not known to participants. Researchers may choose to engage in covert research when it is not feasible to let everyone in a particular research setting know what you are doing. Overt observation or knowledge of the purpose of the research may alter the particular phenomenon that is being studied.

In relation to the aims of the research, transparency was maintained throughout and in all dealings with participants. It was not feasible to let everyone in the research setting know all about the research, e.g. other children at the school. By feasibility, it is meant in this context that it was not practical to let everyone in participating schools know all of the details of the research. Where observations or a participants' knowledge of the true purpose of the research have the potential to alter the particular phenomenon of research interest, this is a major concern in terms of the quality of your findings. As discussed earlier, only consenting

participants were reported upon in the research transcripts, observation notes and the writing of this thesis and its associated reports and research papers.

In relation to the involvement of the research participants, the researcher refrained from leaving out any material information, i.e. information that the researcher felt would influence whether consent would (or would not) be granted. Another component of informed consent is the principle that participants should be volunteers, taking part without having been coerced and deceived. For example, in order to avoid disappointment, the researcher developed a briefing script designed to ensure that children would fully understand the nature of their involvement as co-designers.

4.2.1.7 Principle 5 - Providing the Right to Withdraw

Participation in this research was entirely voluntary. Participants were given the opportunity to withdraw from the study at any point up until the submission of the PhD thesis for examination. They were also given the opportunity to request for a set of their interview transcripts for review. The research team chose not to provide parents and carers with transcripts of focus groups with children. Had any child protection issue arisen, however, the researcher was dedicated to abiding by safeguarding procedures, demonstrating a commitment to disclose any issues of concern to schools. The researcher designed her information and consent forms in such a way as to inform parents at the point of giving their consent, that their children would be given permission to share their views in 'confidence' and for this agreement to be respected by the researcher.

One of the issues with the on-going, cyclical-nature of the project was that many of the children participating in the study had progressed to Secondary School by the time this thesis had been written up. It was the initial intent, however, for all respondents to be provided with a summary (a report) of the findings of the research, no less than 6 months prior to submission of the thesis, and that they would then be given a date of two months prior to submission of the thesis to withdraw from the research (in order to allow the researcher to remove any direct quotations from respondents from the final thesis and make any other necessary adjustments). Unfortunately, one ethical issue was that the researcher had no way of ensuring that she would be able to contact every participant at this point, to seek final consent from them.

During focus-group discussions and design and evaluation sessions, it was made clear at the start that participants would be given the opportunity to stop the tape recordings at any point. This was reiterated throughout. During instances of

any perceived discomfort, the researcher gave the participant time to pause and opted to ask them if they would like the researcher to move onto another topic or question. The researcher intended to work with the same children throughout the project. However, the sample size was designed to give children the opportunity to withdraw, should they so wish. The recruitment of six friendship groups was the initial goal as this number permits some flexibility, with the three desired prototypes having been deliberately kept different from the number of groups involved. The reason for this was to prevent the prototypes being specific to a particular group. It was the intention that in a worst-case scenario, new friendship groups may be recruited at the evaluation of the prototype stage to replace any children withdrawn from the research, without compromising the project.

4.2.2 Introduction to the Research Team and Participants

Figure 4.1 includes a diagram of the research team and participants involved in the Together through Play project. An overview of the research context, namely the schools and the research participants may be found in Appendix C. The researcher bridged research activities between participating schools and the University of Leeds. Four UK-based mainstream Primary Schools participated in the project. One of the schools is a faith school, partially sponsored by the Catholic Church, whereas the others have no religious affiliation. One of the schools also has a Resourced Provision known as 'RP', with allocated places for children with learning difficulties. In order to protect the identity of participants, and in accordance with the University of Leeds Ethical Conduct guidelines (2013), the names of the schools and the research participants are anonymised. Throughout the thesis, the participating schools shall be referred to as St Amelia's RC Primary School; Aspen Primary School; Woodlands Primary School and Willow Primary School.

At the discretion of each school, twenty-two children aged 7 to 11 were recruited to participate in the study. There was no restriction on group size, however, the minimum requirement was that at least one child participant had a recognised physical impairment and at least one co-participant did not. Six disabled children and their non-disabled class peers took part in the study; four of which have physical impairments relating to cerebral palsy. Three of these children, referred to as Rosie, Suzie and Flint, attended Woodlands Primary School and they were accompanied by four non-disabled classmates, Joseph, Josh, Lily and Tim.

Freddie at St Amelia's RC Primary School also has cerebral palsy and participated in the study with five of his classmates, Ophelia, Dawn, Skye, Holly and Dylan. Joanna, a participant from Willow Primary School has a hearing impairment

(deafness) and was accompanied in the study by five of her non-disabled classmates, Joel, Israel, Rio, Amber and Eve. James at Aspen Primary School has dyspraxia, and participated in the study with two friends from his school, Jasper and Luke. The scope of this project was limited to physical impairments. The aim was to conduct an exploratory study to identify the views of specific child participants, rather than to conduct a systematic and representative study. Two of the schools were part of a convenience sample taken from schools that had previously worked with the University and two of the schools were recruited through contacts of the researcher. The Together through Play project did not attempt to include a sample representative of all types of physical impairment experienced by children. Instead, the small sample-size was designed to provide insight to the specific play experiences of the disabled and non-disabled children.

In order to supplement the research with children as part of the Together through Play project, the researcher sought insights into adult perspectives on children's experiences of meaningful play and the role of design in this process. In this thesis, interviews with the parents and carers of nine disabled families, along with four teachers from participating schools were undertaken. In addition, five Product Design and Engineering students were debriefed about their involvement in the development of prototype toys and games through the study, in order to cast light on the role of the designer. During semi-structured interviews with the researcher, they reflected on their experience of the process of user-engagement, cross-faculty studies and interdisciplinary collaborations and gave insight to their hopes for the future of inclusive and participatory design.

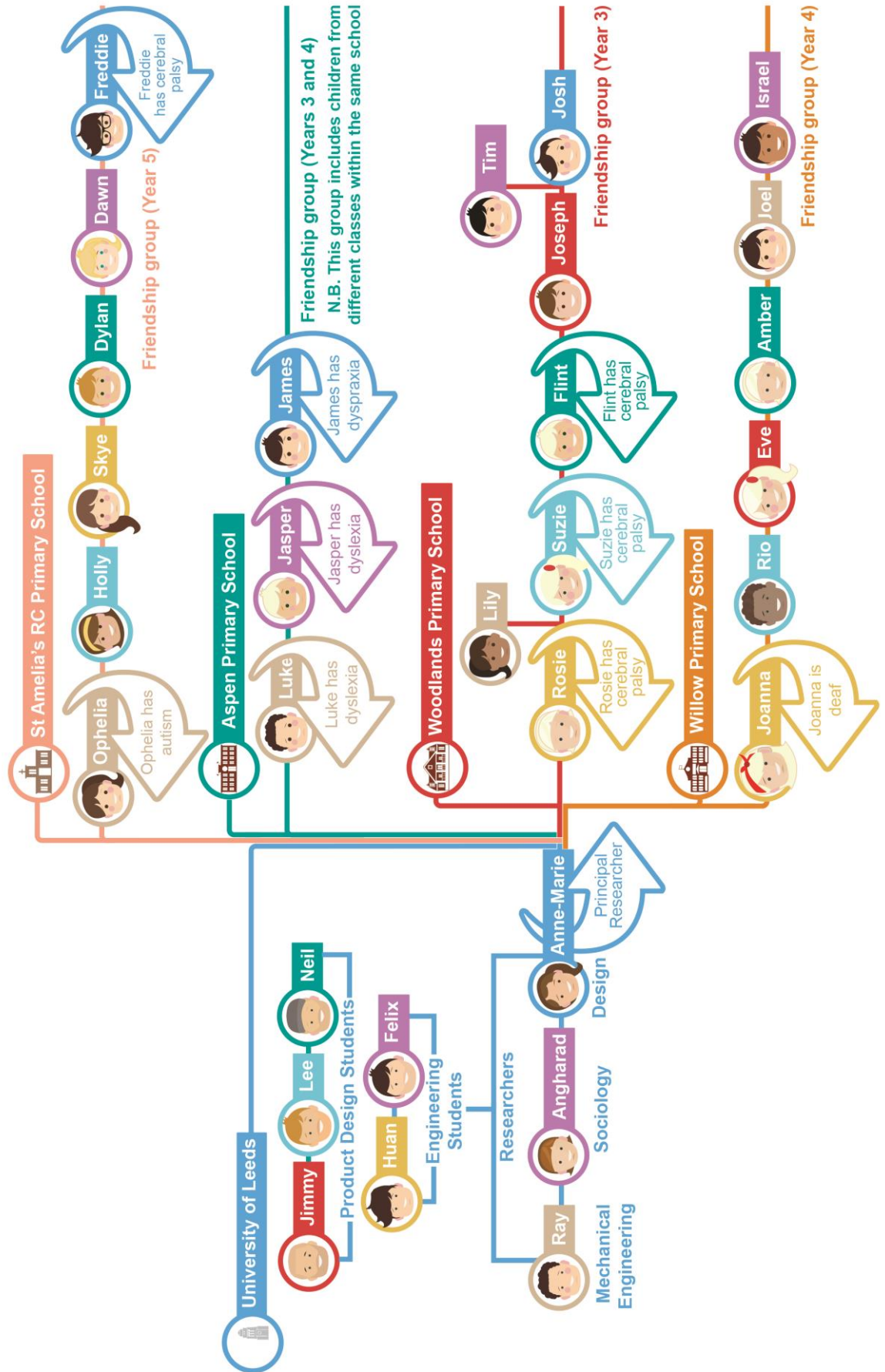


Figure 4.1 An Introduction to the Research Participants.

Chapter 5

Initial Observation Work in Schools

The previous chapter outlined the research design and methodology that underpins this study. This chapter is the first of four findings chapters that feed into Chapter 9. It focuses on the findings of the initial observational work undertaken in schools participating in the Together through Play project. This observational work was part of the second phase of the research, namely the process of contextual inquiry. As part of this process, semi-structured observations (Cohen et al, 2000) were undertaken in a bid to capture contextual information surrounding ways in which the participating friendship groups of children currently play together any observable barriers that prevent them from playing together or that impede their play. The interactions of participating groups of disabled and non-disabled children were observed in classrooms and the playground. This method was designed to help with the process of 'making sense' of focus group and interview data.

Aims

By reflecting on the initial observations undertaken in participating schools, this section aims to:

- a.) Give insight to lessons learned about meaningful play between disabled and non-disabled children;
- b.) Examine lessons learned from working with and giving voice to disabled children through observations in mainstream primary schools;
- c.) Critique ways in which lessons learned about the process of observation might be conveyed to designers.

Scope

Semi-structured rather than structured observations were selected because although maintaining some focus upon play and barriers to play, it was envisaged that the semi-structured nature of the observations would allow new or unexpected issues to emerge from the observations. It was the intention that all observations would be recorded using observation protocols to guide the observation process, whilst allowing flexibility for unexpected issues to emerge. Data arising from the

observations was used as contextual information with which to 'make sense' of the interview and focus group data through the process of contextual inquiry. The aim of the initial observations was for the researcher to observe the interactions of the children with physical impairments and their peers during a typical school day, and to use this information as scoping data with which to triangulate research findings later in the study. Children, school staff and parents and carers were asked to allow the researcher to observe the children playing with their friends. It was made clear to all child respondents, however, that it was their right to terminate their involvement in any observation at any point and irrespective of the consent being given by their parents and carers.

Where it is practicable to do so, it is good practice to obtain subjects' consent to the use of their data. However, it was not feasible to brief all of the children in the school about the aims of the observation and to seek their consent for participation in the research. Feasibility in this sense does not relate to the cost of doing research. Instead, it means that it is not practically possible to tell everyone in a particular research setting what you are doing. Arguably, doing so may have had an impact on the behaviours of those observed. Research should avoid any kinds of deceptive practices. As it is not deemed ethical to observe non-consenting children, in accordance with the University of Leeds Research Ethics policy (2013), only observations of the children participating in the study were reported. Any individual actions, i.e. incidents of social exclusion, were anonymised and throughout each observation, consenting participants remained the focus of the activity.

Limitations

In overt observation, the researcher's presence can have an impact on the behaviours of the participants. Along with the participant's knowledge of the true purpose of the research, this has the potential to alter the particular phenomenon that you are interested in. This is a major concern in terms of the quality of your findings and this must be reflected upon throughout the process. Hanna et al. (1997) highlight that while children of the elementary school age range (aged 6-10) are comfortable with being observed whilst completing tasks, there is a risk of researchers ostracising disabled children by focusing solely on individuals with specific impairments. In order to mitigate against this risk, as far as possible, the researcher sought to maintain distance from the children and to spread her attention evenly across the observed groups.

In schools, there are numerous occasions whereby children are required to leave the classroom for one-to-one lessons, appointments and unavoidable

absence from the observation due to sickness. Such situations occur more frequently for disabled children and this research must make allowances for such occurrences. Where Druin's (1999) approach to cooperative inquiry involved a *team* of researchers going to observe and analyse the user's environment, the principal researcher in this study undertook observations at schools participating in the Together through Play project independently and there are limitations to doing so. Although one of the benefits of classroom observations is that members may be observed simultaneously (Johnston, 2008, p.35), it is difficult for one researcher to account for all of the children's actions independently. By focusing on the actions of one child over another, there is the risk that the researcher may have missed key events. It is impossible for a researcher to account for every single interaction and play episode. They can only report upon what they observed at a given time.

In an independent observation, the researcher is solely responsible for interpreting the behaviours and interactions of the participants. However, perspectives on inclusion differ. Inclusion is a contentious topic and one that divides opinion within the field of education. For example, where Connors and Stalker (2007) perceive the one-to-one tuition of individuals as a positive response to difference, others argue that this may impede opportunities for children to engage in meaningful interactions with classmates. Similarly, children and adults may have different perspectives on the same issues. In addition to the researcher's opinions potentially differing from those of other researchers, her account of observed play episodes may have also differed from the children's. In order to check on the conclusions and minimise bias, analysis was undertaken by both the researcher and the Co-investigator for the project - a researcher with substantial experience in the area of qualitative data analysis.

As a responsible adult, the researcher has a duty of care to intervene if any child protection issues arise during observations. In this respect, the researcher cannot claim to be impartial at all times. The researcher found that she had moral and ethical decisions to make as an adult whilst observing the children's interactions with their peers. For example, it was not possible for the researcher to remain neutral or impartial when observing one child's distress when being socially excluded from a game. Similarly, within the literature, Guha et al. (2013) point out that adult researchers may occasionally be required to provide a caregiving role, whilst at the same time, ensuring children are treated with 'the same respect we would afford adults' (Guha et al., 2013, p.18).

Had the researcher overlooked or distanced herself from an observed incident of social exclusion, she may have denied the child dignity and respect in his engagement in the research. However, her intervention had an impact on the results of her observation. For example, she missed out on observing how the child may have behaved, had he had continued to be excluded. The next section explores some of these tensions in more detail by drawing upon the existing research surrounding observations of children in the school setting. This provides a background to this Findings Chapter and references some of the key literatures that informed initial observations undertaken in schools participating in the project.

Structure

Section 5.1 provides a background to this Findings Chapter and references some of the key literatures that informed initial observations undertaken in schools participating in the Together through Play project. Section 5.2 examines the Method of observation employed in this study. It includes two sub-sections: one on the participants involved in the research and the other on the research instruments used. Section 5.3 describes the procedure, namely a report of what happened during the process of observation. Section 5.4 presents the results of initial observations undertaken in participating schools. Section 5.5 provides an analysis and discussion of the results and Section 5.6 draws conclusions from the initial observations, to include what was learnt about meaningful play (5.6.1), working with and foregrounding the voices of children disabled children (5.6.2) and conveying this to designers (5.6.3).

5.1 Background

This background section draws upon the literature used to inform semi-structured observations undertaken in schools participating in the Together through Play project and the specific methods of analysis employed. This section also draws the reader's attention to key literatures previously discussed in the Literature Review section. Observational methods may be used to provide contextual information needed to frame the evaluation of a study and make sense of data collected using other methods. They may be used to gain insight to the participant context and this may point to issues requiring further exploration using other methods. Despite a shift towards inclusive education in mainstream schools across the UK, few observational studies have focused on the play experiences of children with physical impairments and their non-disabled peers.

The social model of disability suggests that in order to gain the full picture of disability, observations should take place in mainstream settings. The social model de-emphasises the individual and makes disability the collective responsibility of society (Llewellyn & Hogan, 2000). Social theorists argue that social circumstances can influence the level of disability witnessed during observation (Llewellyn & Hogan, 2000). This would suggest that mainstream Primary Schools are therefore a suitable environment in which to observe and develop understanding of the interactions between disabled and non-disabled children. Social theorists emphasise a significant distinction between the integration and inclusion of disabled children in mainstream schools. Inclusion is about more than ensuring disabled and non-disabled children are in close proximity to each other. Galton et al. (1980) and Bennett (1987) identified that although children in classrooms may commonly be observed sitting together in groups, their mode of working is rarely collaboration. It is typically 'working in parallel' rather than cooperation.

A researcher may give meaning to a witnessed action or interaction, but their interpretation of events may not be correct. Thus, it may be beneficial to combine observation with interview or focus group discussion (Corbin & Strauss, 2014). Quantitative researchers argue that observation is not an entirely 'reliable' data collection method since different researchers may record a different account of events (Silverman, 2006). Non-disabled researchers may be unable to identify with the different play types of disabled children. As noted by Sense (2015), 'All children play, but children with complex needs play in different ways to other children' (Sense, 2015, p.4). Moreover, disabled children are more likely to engage in informal rather than formal activities (Law et al., 2006, p.337), which again could lead to some play types being overlooked.

Mayall (2000) argues that in order to gain insight to children's social worlds (including issues of bullying, social hierarchies, friendship networks and support), researchers should observe formal and informal activities and relationships at school and engage in conversation with children in their natural settings (Mayall, 2000). In existing observational studies, there are reports of approval-seeking behaviour amongst disabled children and prior relationships between group members affecting group dynamics, which in turn may affect the validity of data collated (Morgan et al., 2002, p.15). Observational studies must therefore be supported by and checked against other forms of data collection.

Observational studies may also be used to collect information about how design solutions might be implemented, independent of participant perceptions. Yet young

children perceive objects differently to adults, in relation to themselves. For example, Piaget (1955) noted that until around seven years of age, children believe that the moon, stars and clouds follow them, and that such bodies are 'real'. As some of the children in the Together through Play project were around this age at the point of investigation, it was important for the researcher to take into account the developmental age of the children and avoid reliance upon observations or focus group discussions alone.

Layers of meaning and explanation may be hidden in focus group discussions (Michell, 1999). Moreover, some children may choose not to contribute to some discussion topics. Observational studies, on the other hand, allow researchers to learn about sensitive issues that participants may be unwilling to talk about. People's perceptions of their activities may differ from their observed activities. One research team noted 'it is not unusual for a person to say they are doing one thing, but in reality, they are doing something else' (Corbin & Strauss, 2014). Observations can provide useful insights to the behaviours and interactions of different research participants. They may also enable researchers to see aspects that are taken for granted by participants. Yet observation of an activity may affect the behaviour of those involved in it and hence what you observe. Participants may be concerned about what you are actually evaluating. Academic staff may be concerned the quality of their teaching is being evaluated and students may assume their academic performance is being assessed. Furthermore, the thinking behind the observed actions of a research participant may not be visible. Observations must, therefore, be combined with other methods that seek insight into this thinking.

This research must also take into account the environment in which children's play experiences take place. Bronfenbrenner (1989) argued that the characteristics of a person at a specific time are a joint function of the characteristics of the person and of the environment over the course of that person's life up to that point (Llewellyn & Hogan, 2000). Yet much research into the experiences of children with physical impairments is cross-sectional and based on the assumption that disabled children exist in a fixed environment, observed only at a single point in time, which is assumed to remain constant (Llewellyn & Hogan, 2000).

This research takes inspiration from a grounded theory approach to observations, through which a researcher may allow a scene to 'unfold' before them. This allows the researcher to step back and record general observations, whilst paying particular attention to interesting incidents or occurrences that may

require further investigation (Corbin & Strauss, 2014). Highly structured observations may be used to support or refute a preconceived theory and many qualitative researchers use an observational guide, but doing so is not advised in grounded theory studies as a rigid observational structure fails to foster discovery (Corbin & Strauss, 2014). Semi-structured observations are an appropriate method for this type of study as they allow for issues to emerge from the observation, whilst being loosely based upon issues considered to be relevant to the evaluation.

Finlay (2002) argues that reflexive analysis is a necessary part of an observational study as it examines the impact of the researcher and the research participants on each other and on the research. Yet Corbin and Strauss (2014) give examples of engineers speculating upon problems without closely observing and analysing the situation (Corbin & Strauss, 2014). It is critical for researchers to be reflexive about their observations of children's play experiences. Recording thoughts and feelings about their experiences and observations helps researchers to be reflexive about the way in which their presence may be influencing the behaviour of those they are observing.

Drawing upon research by Heron (1996), Traylen (1994) gave an example of an approach to co-operative inquiry through which co-researchers and co-participants engage in a reflexive dialogue about their research processes. More recent approaches to co-operative inquiry with children, such as the work of Druin (1999), could benefit from a return to this reflexive practice, as a lack of researcher reflexivity can lead to the silencing of children's voices. For example, the literature suggests that the presence of more than one researcher during an observation can affect the balance of power between adults and children engaged in the process of cooperative inquiry, yet this issue is not addressed in cooperative inquiry research.

There are both positive and negative aspects to observations undertaken independently and those undertaken by multiple researchers through the process of cooperative inquiry. In this study, the Principal Researcher recorded observations of children independently, whereas in Druin's (1999) approach to cooperative inquiry, researchers undertook observations in pairs - one recording activities and the other recording conversations. An 'interactor' was also employed to accompany the researcher and initiate discussion. From these discussions, the researchers chose to pursue areas further through participatory design prototyping. However, conversations initiated by an interactor are adult-led. Arguably, this takes the power away from children and inhibits discovery.

There are benefits to teams of researchers undertaking observations together. For example, they may have the opportunity to compare notes and observations as a team. However, an independent researcher may immerse themselves in *all* aspects of the observation process and reflect upon their role within it. This was the reasoning behind the Principal Researcher undertaking all school-based observations independently and reflecting upon her role in the process with the wider research team, in a bid to create a greater balance of power to participatory research with children. The next section describes the observational methods that were employed in a bid to fulfil this aim, focusing on the children and the research instruments used.

5.2 Method

This section includes two sub-sections - one on the research participants and the other on the research instruments used.

5.2.1 Method of Observing Research Participants

During the winter of 2012, the researcher undertook semi-structured observations at each of the schools participating in the project over a two-week period. Each observation was of a naturalistic nature and took place over the course of one day at each participating school. Timings were dictated by existing school timetables and the researcher sought to observe the children during both lesson times in the classroom and during break times in the playground. Children were not observed taking their lunch breaks, as groups became much more dispersed during this time, with some children receiving free school meals, some purchasing school meals, and others bringing their own packed lunches into school.

At the start of each observation, the class teacher introduced the researcher to the pupils. The researcher was introduced on a first-name basis in order to build a good rapport between the children and the researcher. During the observations, the researcher focused specifically on the children recruited to take part in the project. This involved observing their whole-class and break time activities. She focused primarily upon the interactions of the disabled children. However, it was felt that these children should not be observed in isolation, nor should they be made to feel that they were being observed in isolation. In order to mitigate this problem, the researcher moved around the classroom or playground, sitting with other children in the class and talking to them. She also kept some physical distance from the children she was observing, so that it was not obvious that they were being observed specifically.

The researcher was observant of both the physical and the social environment of the school, as it was felt that it was important to gain insight not only to the behaviours of the children, but the environment in which their experiences took place. Observations focused upon recording two key aspects: firstly, the descriptive and factual information, logging details of the settings and behaviours observed, and secondly, the reflective information, through which the researcher recorded emergent issues, questions and themes.

5.2.2 Research Instruments Used

In relation to the measurement tools employed in this study, field notes were recorded in order to obtain data on the topic of meaningful play between disabled and non-disabled children in participating schools (see Appendix B, items B.2-B.4). Field notes were used to supplement data collated during focus group discussions and co-design activities with children, alongside interviews with teachers and parents and carers. During school-based observations, the researcher recorded the behaviours, activities and events witnessed, in the form of field notes. Field notes were recorded by the researcher as evidence from which to develop understanding and give meaning to the culture, social situation, or phenomenon being studied - namely, disabled children's experience of meaningful play. Names of schools, children and teachers, plus dates of observations have been concealed in the text included in the Appendix, in order to anonymise the data.

In order to bring structure to her observations and to ensure consistency across schools, the researcher used various pre-determined topics as a schedule for her observations. Topics included children's play and learning preferences, existing school protocols, peer relationships, additional needs identified, and barriers to meaningful play. In addition, the researcher made note of any emergent issues observed. The researcher was able to learn from the inclusive practices at participating schools as well as some of the exclusionary practices observed, using them to inform the research and provide insight to the children's experiences.

Observations were also used as a means of building relationships with children participating in the project and observations were used in the recruitment of non-disabled children for participation in the project at one participating school, at the request of the participating school staff. Whilst recording her observation field notes, the researcher also recorded anecdotal evidence, for the purpose of triangulation. Anecdotal evidence came from teachers, teaching assistants and other members of school staff encountered during the observations. Anecdotal

evidence was recorded in the researcher's field notes, alongside her observations of the children.

Anecdotal evidence was received with caution. Comments made by school staff gave insight to their personal views and interpretation of the behaviours of the children. In the analysis of anecdotal evidence, it was recognised that some comments made by adults gave insight to their negative assumptions about the lives of disabled children. It was acknowledged that some of the actions of adults could inadvertently contribute to the social barriers encountered by the disabled children observed. For example, one Teaching Assistant spoke openly to the researcher about what one disabled child was not able to do, within earshot of that child and their peers. Thus, anecdotal evidence was referenced in context, and the voices of participating children were foregrounded.

5.3 Procedure

This section provides a detailed description of the specific steps taken to gain access to, or make contact with, research participants, to obtain their cooperation, and undertake the observations. The following steps were taken in preparation for the observations:

- a. Pre-meetings with teachers and correspondence with them;
- b. Pre-meetings with Head teachers or senior school staff for approval;
- c. Seeking consent (and ascent) from teachers, parents and carers, and children (see consent and ascent forms in Appendix A);
- d. Introductory school-based workshops designed to build relationships with participating schools (see school-based workshop observation notes in Appendix B, part B.3);
- e. Planning sessions with teachers (see notes in Appendix B, part B.4).

Observations were undertaken over the course of a typical day at each participating school by the researcher. Over a two-week period, she visited each school for one day. Observations took place in the classroom and in the playground at lunchtime and were recorded chronologically. Permission was given by the Head teacher or a senior staff member at each school and the class teacher for the observations to take place. Consent for observations to take place was sought from parents and carers and ascent was sought from the children before observations took place.

In keeping with safeguarding and child protection procedure, all correspondence between the researcher; the children; and their parents and/or carers, went via the class teacher. The researcher had previously been introduced to three out of four of the participating classes through creative workshops at the schools. At the start of each observation, the class teacher introduced the researcher to the children. She was introduced on a first name-basis and positioned herself randomly amongst the children, typically sitting in a free-space at one of the children's classroom tables.

Where the introductions differed - at two of the schools, namely, Willow and Woodlands Primary Schools, teachers highlighted to the class that the child with the physical impairment had been recruited to take part in the study. They also suggested that the observation would be a recruitment opportunity for the project, through which friends may also be identified to take part in the project with them. At Woodlands Primary School, the teacher introduced the researcher to the class as an 'observer' or 'someone that would be looking at things closely'. The teacher informed the class that Rosie and Flint had been selected to work on a 'special project' with the researcher and that they would be choosing some friends to participate in the project with them.

Although this was helpful to the researcher in enabling her to identify the children (for example, she had not met Flint before), the researcher reflected upon the implications of distinguishing the two children in such a way and some of the positive and/or negative discrimination they may receive from their classmates as a result of this labelling. It is worth noting that such claims may have influenced the behaviour of the disabled children's classmates. Teachers at Aspen and St Amelia's RC Primary School on the other hand, did not intentionally draw attention to individuals when introducing the project.

One of the unforeseen problems at Aspen Primary School was that as two friends of the disabled child were in different year groups, the researcher did not have the opportunity to observe their interactions with him. Each observation typically consisted of the researcher observing the class of the disabled child and remaining with them throughout the day. One of the benefits to this approach was that it gave the researcher insight to the experiences of the disabled children in the mainstream classroom. When the disabled children were taken out of their typical lessons, however, this approach was problematic. It had not been foreseen that the disabled children would be removed from their regular classes so frequently and that this would be such a common occurrence across the schools.

Disabled children were out of the classroom for a large proportion of the observations for one-to-one meetings, appointments, streamed lessons and comfort breaks and it did not seem appropriate for the researcher to follow individuals out of the classroom on such occasions. Hence, there are gaps in the classroom observations due to the absence of disabled children. The researcher took field notes throughout the course of each observation. When she had the opportunity to sit quietly in the background, she found it easier to make notes. When she was required to stand (for example, when observing a P.E. lesson), or when she was positioned in close proximity to the subject of her attention, it became more obvious that she was there as an observer and this may have had an impact on the behaviour of participants.

One of the limitations of her playtime observations was that unless the children were seated, she had to observe them from afar, which meant that she did not gain full insight to the conversations and interactions taking place between peers. Reflections and a report of events were written up concurrently. It is worth noting that the researcher's reflections and recording of events were separated in the analysis of her observations, in order to review the field notes in context. It was far easier to record observations in note form during lesson time than it was standing at break time. However, when in direct contact with the subject of her observation, attempts had to be made by the researcher to avoid making it too obvious that she was recording observations on them. Some children, such as Joanna, occasionally asked what the researcher was writing and they were curious about her field notes. The researcher attempted to avoid drawing attention to her field notes in order to mitigate children facing positive or negative discrimination from their classmates.

The journey home was an excellent opportunity to write up notes after the observation. It is worth noting that in order to capture the observation accurately and objectively, it is helpful to record reflections or unwritten observations as soon as possible. Field notes were then summarised and reported to the undergraduate team, Holt, and Beckett (see Appendix B). They were used to shape research questions and agendas for forthcoming focus group and design sessions with the children. The observations were not devoid of problems. Whilst trying to remain as objective as possible, the researcher was required to intervene during an incident at break time at Woodlands Primary School, through which Flint was physically excluded from a game of football by other children at the school.

Conversely, some children appeared to be on 'best behaviour' in front of the researcher, in the hope of being selected for participation in the project. As a result,

it was acknowledged that the recruitment process influenced the behaviour and interactions of some of the children. The researcher felt it was felt important to capture this in her observation notes, for the benefit of the work of future researchers. The researcher devised and used a research schedule as a guide for her school-based observations. In order to inform the recruitment of the friendship group, some observations were made of non-disabled peers in the class. However, if these children were not recruited for participation in the project or if they did not consent to take part, they were not included in the researcher's field notes. Anecdotal evidence provided by school staff was recorded in the researcher's field notes for the purpose of triangulation only. Priority was given to data generated by the children.

Regarding the development of the researcher's observation skills - with experience, the researcher became more selective in the observations recorded in her observation notes. Some issues became more important than others - i.e. what was being studied during lessons became less important, whereas children's interactions and their play preferences became more important. She also developed strategies for becoming less conspicuous as an observer, for example, moving away from the children to discretely record key observations.

5.4 Results

This section presents the results of the initial observation work undertaken in participating schools during the winter of 2012. It uses the research schedule to structure the findings of the initial observations - giving examples of existing school protocols; the children's play and learning preferences; their relationships with each other and any barriers encountered on the day. It provides evidence of lessons learnt from the inclusive practice observed in the participating schools and it references some of the anecdotal evidence provided by school staff, for the purpose of triangulation only. This section is designed to foreground the experiences of the disabled children and to focus on their needs and aspirations.

5.4.1 Existing School Protocols

At each participating school, the timetable consisted of approximately five lessons in total, with varying times for, and forms of registration. The range of subject areas covered during the observations included Literacy; Numeracy; ICT; Music and PE. Each school, with the exception of Aspen Primary School, offered some form of extra curricular activity on the day of the observation, although this dedicated time was given different names at participating schools. For example,

Woodlands Primary School offered 'story time', Willow Primary School offered 'circle time', and St Amelia's RC Primary School offered 'personalised learning'.

The researcher found that the children with physical impairments were out of the classroom much more frequently than their classmates. For example, in two out of four subject-based lessons observed at Woodlands Primary School and Willow Primary School, Rosie and Joanna were out of the classroom for one-to-one meetings with school staff and comfort breaks. Similarly, James was taken out of the class during three of the five lessons observed at Aspen Primary School.

Absence from the classroom was disruptive to the children's learning. Rosie, for example, was out of the class during 'story time', and was disappointed that she had missed the reading of her favourite book, *Horrid Henry*, with the rest of the class. She was also out of the classroom during the Numeracy lesson, resulting in her falling further behind in this subject. Absence from the classroom also had a negative impact on the children's relationships with their classmates. For example, Joanna's classmates had fun singing together in rounds whilst Joanna was absent from her Music lesson. Joanna had been taken out of class to attend a separate Literacy lesson instead. Similarly, whilst absent from the classroom, James missed the opportunity to work in pairs with a friend during ICT, one of his favourite subjects at Aspen Primary School.

5.4.2 Children's Learning Preferences

During the observations, children with physical impairments seemed most engaged in Literacy and ICT lessons. At Woodlands Primary School, Rosie particularly enjoyed reading and writing and Flint particularly enjoyed spelling. At Aspen Primary School, James expressed a specific interest in creative writing and at Willow Primary School, Joanna particularly enjoyed ICT, despite finding it hard to use the headphones provided. It is worth noting that the children may have found other subjects, activities and topics more appealing. However, the researcher was in a position to report upon only the activities observed on the day.

5.4.3 Children's Play Preferences

Observations of the children's play during break time and/or lunchtime at each of the participating schools suggested that disabled children were unable to fulfil their aspirations for playing together with other children at the school. At Aspen and Willow Primary Schools, Joanna and James engaged in infighting at playtime with other children at their respective schools and at Woodlands Primary School, Rosie's playtime activities were impeded by limited time and resources. Rosie was unable to play with her peers at break time due to the inaccessible design of the

built environment of the school and its playground. Instead, break time was used to develop her literacy skills. During the observation, Rosie stayed in the classroom to play a phonics game with a Teaching Assistant.

At Woodlands Primary School, Flint was keen to participate in a game of football at break time. However, other children physically excluded him in the playground. At St Amelia's RC Primary School, Freddie was keen to play outside with his classmates. However, his playtime was impeded by the length of time required to put on his new prostheses (which included a cast and support). This was a frustrating experience for him. Once Freddie was able to go out to play, he spent the rest of the time playing an imaginary game alone.

5.4.4 Existing Relationships between the Children

As a newcomer to Woodlands Primary School, Flint did not have an established friendship group at the school. Although he engaged in positive interactions with his classmates during class discussions, the social barriers he encountered as a result of the negative attitudes of other children in the playground made playtime an experience of social exclusion for him. Being repeatedly excluded and denied the opportunity to play football with his peers was a negative and distressing experience for Flint. Rosie, on the other hand, had an established friendship group at the school. However, she was segregated from them at break time due to the inaccessible design of the school. Nevertheless, the researcher was able to observe her social interactions with her classmates during the lunch break, as there was more time for her to access the playground in her wheelchair and sit with them at picnic tables.

At Aspen Primary School, James' relationships with his classmates were hindered by the amount of time he was out of the classroom and the level of one-to-one support assigned to him. Throughout the observation period at Aspen Primary School, James required on-going one-to-one support from his class teacher and other staff at the school. This level of support prevented him from engaging in meaningful social interactions with his peers in the classroom. In addition, James' lessons were streamed, hence his social circles were somewhat disjointed. For example, he studied Literacy with his regular class, while attending Numeracy lessons with a lower ability group. At break time, he was observed running around with his friends and engaging in infighting with them. James was physically bigger than his Year 3 classmates as he was one year older than them.

At Willow Primary School, Joanna appeared to have a good rapport with classmates Abdul and Amber. She was observed communicating with them

playfully in lessons and at break time. However, on-going problems persisted with another pupil. Archie, and a member of school staff reported that she had engaged in infighting with him in the cloakroom that day. At St Amelia's RC Primary School, Freddie appeared to have a good rapport with Dylan, Jack, Sam, George, and Miley during lesson time. However, during the observed PE lesson, Freddie was rejected by Miley when asked to work together in pairs, and at break time, he was observed playing imaginary games alone.

5.4.5 Existing Barriers to Participation in Play and Learning

Each of the children with physical impairments encountered barriers to participation in play and learning at their respective schools. In order to fully capture their day-to-day experiences in the mainstream environment of the school, this section addresses their observed experiences individually.

5.4.5.1 Observed Experiences of Rosie

Time constraints acted as a barrier to Rosie. During the observation of her Literacy lesson, she needed additional time to complete her written work. This resulted in her falling behind in the activities that followed. It is worth noting that time constraints were used more broadly to motivate the rest of the class, and most pupils responded positively to the time limits set. Rosie faced a number of physical barriers in the built environment of the school. Although she benefited from a personalised/adapted chair for use in the classroom, the seating plan had Rosie positioned in such a way that her back was to the board in the chair. This created a physical barrier for her as it meant that she was reliant upon the additional support of a Teaching Assistant. As Rosie could not see the board, the Teaching Assistant recorded the words on a dry-wipe board for her.

As previously mentioned, there were other aspects to the built environment of the school that were inaccessible to Rosie. This created further physical barriers to her access to play. The surface of the playground was incompatible with her walking frame and the stairwells had no ramps, which meant that she would have to be carried by a member of staff to the playground. As Rosie did not leave the classroom at break time, this impeded her performance during lesson time. She quickly lost concentration and had to leave the class during her Numeracy lesson, to take a comfort break. This acted as a barrier to her learning as well as her social interactions with class peers.

Background noise presented a barrier to Rosie's learning during the Numeracy lesson, having a negative impact on her confidence and concentration. In addition to the physical barriers faced, Rosie also encountered social barriers during the

Numeracy lesson, with one of her class peers positively discriminating in her favour by giving her the correct answer to a question. Although Rosie had the opportunity to join her friends at lunchtime, she continued to encounter physical barriers in the playground. Whereas other classmates had the opportunity to run around and play, Rosie was restricted to sitting at the picnic table in her wheelchair with her friends. Other class members encountered barriers to participation in one particular whole class activity due to its competitive nature. During the Primary Games 'Spin to win' activity, competitive scoring left some children socially excluded for failing to successfully complete the task. Thus, the negative attitudes of some children created barriers to learning for many of the class.

5.4.5.2 Observed Experiences of Flint

During the Literacy lesson, being a newcomer to the school acted as a barrier to learning for Flint as the school did not have information on his existing levels. Being a newcomer to the school also left Flint socially isolated, as he did not have an established friendship group at the school. During the lunch break, Flint encountered social barriers to play via the negative attitudes of other children in the playground. As discussed previously, Flint was physically excluded from a game of football due to his cerebral palsy. This experience was so distressing for him that it made him cry. During the Music lesson, Flint's lack of prior knowledge of the songs meant that he was excluded from the activity. As a newcomer to the school, he was not familiar with the song and was not given a demo or an opportunity to practice.

5.4.5.3 Observed Experiences of James

Time constraints were a particular barrier to James at Aspen Primary School. In his Numeracy class, one fellow classmate said 'Come on James, you need to do it faster', to which James replied 'I can't do it fast – I can't do it in that time frame!' This quote is an indication of the level of peer pressure experienced by James and the inability of his classmates to understand his needs. Poor positioning in the classroom affected James' interactions with his classmates. For example, James appeared quite isolated when observed sitting together on the floor, at the back of the group. James has Dyspraxia. Hence, activities that required fine motor skills, such as drawing, were particularly problematic.

It is worth noting that whilst James worked confidently on a creative writing activity during Literacy, some children were intimidated by the 'big white space' on the page. For them, the openness of this task was quite daunting. For example, some children covered up their pages with their hands, to disguise having not written very much. As previously mentioned, James is physically bigger than his

Year 3 classmates and being one year older than them made it difficult for them to play together on a level-playing field.

5.4.5.4 Observed Experiences of Joanna

Joanna at Willow Primary School was physically excluded when instructions were made inaccessible to her. As Joanna has a hearing impairment, it was difficult for her to follow the verbal instructions given to the class by the class teacher. Joanna wears hearing aids that are visible to others. She can lip read, but she does not use sign language. In ICT, Joanna found it hard to use the headphones provided, as they were incompatible with her hearing aids. Position in the class meant that Joanna was slightly isolated during group discussion, as she was not able to follow the conversation clearly. Joanna was sat at the edge, rather than in the core of the group.

5.4.5.5 Observed Experiences of Freddie

During the personalised learning activities at St Amelia's RC Primary School, Freddie encountered various physical and social barriers to learning and play. Although he benefitted from the support of a Teaching Assistant during the lesson, this prevented him from engaging fully in the group discussion with his peers. Children were asked to use dry-wipe boards as part of a Numeracy activity, which were inaccessible to Freddie. The boards were particularly difficult for him to use one-handed as this made the board slide around on the desk.

In PE, in addition to being socially rejected by one of his peers, Freddie was physically excluded from the whole class activities when he was unable to hold some of the symmetrical shapes. His new prostheses (including a cast and support) acted as a physical barrier to Freddie as they restricted him from playing with his peers, due to the length of time it took to put them on. The Plenary activity, entitled 'Crosses to Bear' inadvertently reinforced some of the social barriers encountered by Freddie and some of his classmates, as this activity encouraged the class to reflect on the hardships faced by others, drawing attention to some of the more vulnerable children in the class.

5.4.6 Examples of Inclusive Practice

During each of the observations at schools participating in the Together through Play project, numerous examples of inclusive practice were observed. The researcher felt that much could be learnt from the inclusive practices of teachers and support staff at each participating school, examples of which are included in the following section.

5.4.6.1 Woodlands Primary School

Some of the inclusive practices observed during lesson time at Woodlands Primary School included giving children visual prompts to support their learning. For example, Rosie was provided with a toy unicorn in her Literacy lesson, to support her creative writing. Various measures were also in place to ensure that the classroom was an accessible space for Rosie. For example, with the inclusion of a Teaching Assistant to support her learning and an ergonomically adapted chair, personalised for use in the classroom. Team rewards accrued via the 'Star of the Week' board and sticker charts and other team incentives such as 'team points' were other good examples of inclusive practice. In addition, the children found it particularly helpful to receive a learning Agenda and itinerary for the day.

5.4.6.2 Aspen Primary School

At Aspen Primary School, the teacher was able to gauge student understanding of, or engagement with, class activities through various call and response techniques including '3, 2, 1 – show me!' and 'Thumbs Up, Thumbs Down'. '3, 2, 1 – show me!' was an inclusive way of discretely checking for understanding whilst making it 'okay' for pupils to make mistakes. 'Thumbs Up, Thumbs Down' was an inclusive way of encouraging children to feedback on their learning to the teacher. Countdowns from 10-0 were also an effective way of setting time limits for the class. During playtime at Aspen Primary School, a range of activities were available to children in both indoor and outdoor play spaces. Equipment was loaned out to children, in order to make playtime more engaging and give them a greater sense of autonomy at break time. When tasks were broken down into smaller chunks, James was able to engage in activities more effectively. He also responded positively to praise.

5.4.6.3 Willow Primary School

At Willow Primary School, a disabled member of staff acted as a positive role model for this class. For example, Mrs. Green, the Teaching Assistant for the class is deaf and as a result, she lip-reads. Some of Joanna's friends adapted their verbal communication, in order to support her needs. For example, Archie used hand gestures to aid communication with her. The teacher also wore a microphone to communicate with her more effectively. Physical activities were built into lessons wherever possible. For example, during a counting activity, children were encouraged to move their bodies in sequence by moving their hands up and down, punching out, lifting their knees, and squatting. Similar sequences were also

introduced into Literacy activities, through which children replicated physical moves whilst reciting the months of the year.

In a similar fashion to the inclusive practice observed at Aspen Primary School, there was a call and response between teacher and class at Willow Primary School. A 'Clap, clap, clap-clap, clap' call was used to gain the attention of the class. This was a good example of inclusive practice, in that the physical action of clapping gave Joanna some visual cues. This multi-cultural group of children was encouraged to respond to the call and response of the register with a greeting taken from their first language. This approach enabled the class to celebrate their cultural diversity as a group.

5.4.6.4 St Amelia's RC Primary School

Various measures were taken at St Amelia's RC Primary School to take an inclusive approach to play and learning. During registration, the children were given the opportunity to read a book of their choice. During Personalised Learning, the whole class was divided into small groups, which were then taken out of the classroom for more personalised sessions, rather than singling out a small number of individuals. In a similar fashion to the inclusive practice observed at Woodlands Primary School, sensory prompts were used to support children with additional needs in the class. For example, Emily, a pupil with Down's syndrome, was given a toy to accompany her reading during story time. Freddie had a personalised computer to support his Literacy work, and in PE, some of the gymnastic sequences were adapted to enable him to participate.

Peer support was encouraged, and evidenced, when the teacher allocated packing up tasks to pairs and when George was commended for staying back to help Freddie put his shoes back on after class. During playtime, Freddie had the support of a Teaching Assistant and the researcher, who worked together to help him put his shoes on over his new prostheses. They also helped him to put his outdoor coat on. The opportunity to work on 'Flashback' slides was used to reward good behaviour amongst the class, and the 'Crosses to Bear' activity covered the social and emotional aspects of learning by encouraging children to express their thoughts and feelings.

5.4.6.5 Anecdotal Evidence

Various members of staff at each participating school approached the researcher with examples of anecdotal evidence relating to the children. This evidence was used for the purpose of triangulation only. At Woodlands Primary School, the class teacher gave the researcher some background information on

Flint. She informed the researcher that Flint was new to the school (by one day only), and that he was 'settling in well', but that the school had no information on his learning levels at that point. At Willow Primary School, staff on playground duty reported their concerns about Joanna's infighting with Archie in the cloakroom. At Aspen Primary School, the Teaching Assistant made some assumptions about James' needs. She noted 'James can't play football or team sports' and that he needed 'clear rules' and 'no ambiguity'. She also informed the researcher that he had a tendency to follow his 'own rigid set of rules' and that 'he expects his friends to honour them'. However, 'When they don't, he falls out with them'.

The SENCO Manager at Aspen Primary School informed the researcher that James is currently making good progress. However, the Teaching Assistant advised against giving him the opportunity to choose his own friendship group to act as co-participants in the project. She noted 'the boys he will choose, he will not work well with and their behaviour will be very hard to manage'. At St Amelia's RC Primary School, the Teacher and other school staff made time to report upon their observations of Freddie and his interactions with his peers. The teacher of his class informed the researcher that during break times, Freddie would regularly play alone in the playground and that his isolation was a particular concern. One of the Teaching Assistants informed the researcher that Freddie looked quite nervous when he first saw her, as he was anxious about missing lesson time. They illustrated this point by explaining that only the day before, he had been taken out of class for a physiotherapy appointment and that as a result, he missed the opportunity to have his photograph taken for the 'Young Voices' competition trip. The Teaching Assistant noted that he was very disappointed about this.

According to Teaching Assistants at St Amelia's RC Primary School whereas most boys in his class tended to play football, Freddie had a preference for drama and role-play. They informed the researcher that Freddie liked to act out his favourite scenes from *Dr. Who* and *Star Wars*, whereas his classmates had outgrown such games. As a result, they felt that Freddie's classmates had left him behind. Teaching Assistants informed the researcher that they were under the impression that Freddie was happy playing on his own, until he had an outburst one day. He was upset that no one wanted to play with him. According to the Teaching Assistants, Freddie's mother intended to resolve this issue by entering Freddie into a local drama group. Letters had been sent home to parents about the drama group and Freddie seemed to be very enthusiastic about this opportunity. The class teacher informed the researcher which topics the pupils would be studying in the new academic year. It is worth noting that much of the evidence provided by school

staff was based upon their personal views or assumptions, and that, as previously mentioned, it was used for the purpose of triangulation only. The next section reflects upon the reported findings in more detail, presenting the analysis and an in-depth discussion of some of the key findings.

5.5 Analysis and Discussion of Results

The semi-structured observations presented in this chapter were undertaken in a bid to capture contextual information surrounding ways in which the friendship groups of children participating in the Together through Play project currently play together and any observable barriers preventing them from playing together or impeding their play. The aim of the initial observations was for the researcher to observe the interactions of the children with physical impairments and their peers during a typical school day and to use this information as scoping data with which to triangulate research findings later in the study. By reflecting on these initial observations, this section aims to:

- a.) Examine the lessons learned about meaningful play between disabled and non-disabled children;
- b.) Examine the lessons learned from working with and giving voice to disabled children through the process of observation in schools participating in the project;
- c.) Critique the ways in which lessons learned through the process of observation were conveyed to designers.

This section is designed to encourage researchers to reflect upon the research methods and approaches that they employ through their work with children and the most appropriate ways in which to apply them, in order to minimise their limitations and maximise their benefits as:

It is important that research-based publications give details of the methods used and provide assessments and feedback about how satisfactory were particular techniques (Hill, 1997, p.180)

Much of the existing research in the area of participatory design with children has emphasised observations of children's interaction with prototypes or products (Read et al., 2002; Druin et al., 1999, Donker and Reitsma, 2004; Markopoulos et

al., 2005; Guha et al., 2004) over observations of disabled and non-disabled children's interactions with each other. Usability testing (Lange et al., p.357) may tell us about children's interactions with products, but little about their relationships.

The overall structure of the school day was similar in most of the schools. However, it is worth noting that observed play opportunities were minimal. PE lessons, which typically include playful activities, were observed in just two of the participating schools. PE lessons at Aspen Primary School and St Amelia's RC Primary School gave insight to some of the physical and social barriers encountered by James and Freddie. However, the researcher did not have the opportunity to observe Flint, Joanna or Rosie participate in PE at their respective schools, as PE did not take place on the days observed.

The way in which disabled children were out of the classrooms more regularly than their non-disabled counterparts suggests that although participating schools were referred to as inclusive, there was evidence of segregation taking place. This absence from the classroom was disruptive to the children's learning and their social interaction with peers during lesson time. Adult researchers have differing perspectives upon the challenges and limitations to adult intervention in play and learning. Connors and Stalker (2007) describe out-of-class tuition for children as a positive response to difference, especially when these routines are not made an issue. However, if one-to-one activities take place during break time, schools are impeding opportunities for children to engage in meaningful play with their peers.

Furthermore, it is not clear how typical the observed school days were for the disabled children. One way in which to find answers to this question would be for the researcher to visit the school on a number of occasions, or to even spend a number of weeks at the school. Unfortunately, time and resources did not allow for this to happen. It was also difficult for the researcher to establish whether the children were exhibiting typical behaviours in her presence. Although Markopolous et al. (2008) argue that during observations, children tend to be "unencumbered", it was evident in this study that the presence of the researcher was influential.

For example, during the observation at Willow Primary School, Joanna curiously asked the researcher what she was writing about in her field notes, which, in turn influenced behaviours. A number of researchers have argued that it is important to be mindful that the research context may affect what children will talk about (Backett-Milburn and McKie, 1999; Barker and Weller, 2003; Hill, 2006; O'Kane, 2000; Punch, 2002a; Scott, 2000). Hourcade et al. (2008) emphasise the difficulty of observing children 'in the wild' without influencing behaviour. Some of the

children may have assumed that they were being tested for educational purposes, and may have, therefore, acted differently in front of the researcher.

This approach was successful in gaining useful information in the form of scoping data for the purpose of triangulation. However, there were some gaps in the data. One of the benefits of classroom observations is that 'members may be observed simultaneously' (Johnston, 2008, p.35). However, this also meant that while observing one participant, the actions of another might have been missed. For example, when the researcher focused upon observing Flint, her observations of Rosie were neglected and vice versa. It was also difficult for the researcher to establish what some of the disabled children's aspirations for play were. She found that the children would not freely articulate their situation. She could only draw upon the literature for guidance on the meaning behind some of their behaviours. For this reason, it was essential for her to triangulate her findings against other forms of data, such as focus group discussion data. Most importantly, efforts had to be made to give children the opportunity to voice their experiences.

In the case of Freddie's imaginary play in the playground, it was difficult for the researcher to establish what his true aspirations for play were - further emphasising the need to triangulate research findings with data generated through focus group discussions with the children. Freddie's withdrawal from his peers, and James' reliance upon school staff, could each be an indication of underlying emotional problems. For example, Busby (1994) recorded observations of children with emotional problems choosing either to play alone or seek out an adult. Although a child may withdraw from a group situation in order to avoid stress, such a response could hinder their social development (Santer et al., 2007).

Regarding the children's learning preferences - the children may have found other subjects, activities and topics more appealing. However, the researcher was in a position to only report upon the activities observed on the day. Teaching style could also, therefore, be a contributory factor to the learning preferences observed. Hemmingsson et al. (1999) found that the teaching style applied in the classroom determined the working pace of the class, which, in turn, influenced the opportunities made available to students with physical impairments to actively participate. A single snapshot of a child's day fails to capture their experiences in context. For example, James and Joanna were observed being aggressors - with Joanna kicking and James fighting with his friends. However, it may typically be the other way around. These children were observed as victims of social exclusion and such outbursts could be a reflection of their frustration.

In order to find the cause of such behaviours, these observations would need to be triangulated with other forms of data, primarily, interviews or focus group discussions with children. Anecdotal evidence also lacks context. For example, teachers can only report upon what they have seen and their knowledge is largely based upon their observations in the classroom. In schools with designated Playground Supervisors, teachers are rarely in contact with the children at break time. Similarly, other factors may contribute to the social and physical exclusion of a child, yet the researcher might still interpret these concerns as disability issues. For example, the challenges faced by Flint as a newcomer at Woodlands Primary School were further compounded by children's negative assumptions about his physical impairment. This is what is referred to as 'Disability spread' - a term used to describe what happens when we extrapolate the characteristics we associate with the notion of disability to the particular individuals we meet. Insight to the views of the existing school staff suggested that the social barriers encountered by the children could have been passed down culturally from adults to children. Children's existing play preferences could also be a product of their previous play experiences, including play with brothers or sisters, and may tell us very little about their aspirations for play with other children.

5.5.1 Lessons Learned about Meaningful Play

5.5.1.1 Barriers to Meaningful Play

Through semi-structured observations in schools participating in the project, the researcher learnt that the disabled children observed were each denied the opportunity to engage in meaningful play with their non-disabled peers. Disabled children encountered numerous barriers to participation in play and learning at each of their respective schools, due to inadequacies in the physical and social environment, which are addressed in the following sections.

5.5.1.2 Social Environment

Common themes observed across the four different schools included the relevance of the social environment and the attitudes of school staff and peers. There was evidence of school staff and peers having a poor understanding of the disabled children's needs (Whitehouse et al. 1989, Westbom 1992, Lightfoot et al. 1999, Paul 1999) and expressing low expectations of the disabled children - as evidenced in classroom observations and anecdotal evidence provided by school staff. As noted in the researcher's observations at Aspen Primary School, James was hurried along by his friends - despite time pressures being a particular barrier to James' learning. Barriers created by gatekeepers were also identified in

assumptions made by the Playground Supervisor/James' Teaching Assistant. At Woodlands Primary School, the researcher observed the positive discrimination of Rosie when her peers gave her the correct answers, despite this intervention being detrimental to learning.

The disabled children had less social contact with their peers in the classroom and in the playground, which influenced learning opportunities (Blum et al. 1991; Westbom 1992; Stevens et al. 1996; Lepage et al. 1998). The researcher also found that when disabled children encountered barriers to learning, they became socially isolated from their peers. Where their classmates had the opportunity to run around and play at lunchtime, Rosie and Flint did not. Flint was socially excluded from play due to the negative attitudes of other children at the school - an experience that was particularly distressing for him. When Rosie's playtime was restricted to sitting at a picnic table in her wheelchair with friends, she was engaged in play as a spectator, rather than a participant. The infighting experienced by Joanna and James also provides evidence of the negative social environment within the children's respective schools.

Negative social attitudes affected whole classes at some of the participating schools. At Woodlands Primary School, games with competitive scoring created a blame culture, which led to some being socially excluded. Further, the plenary activity entitled 'Crosses to bear' inadvertently reinforced some of the social barriers encountered by Freddie and other classmates as it encouraged the class to reflect upon the hardships faced by others, drawing attention to some of the more vulnerable children in the class.

5.5.1.3 Physical Environment of the School

James, Rosie and Joanna shared mutual experiences and they encountered similar barriers in relation to the spatial and temporal aspects of the school environment, with an insufficient amount of time allocated to the completion of tasks and a lack of quiet or breakout space provision. In a busy classroom, background noise was a distraction for Rosie, and Joanna's hearing aids did not work well in the busy IT suite. Where time restraints were set more broadly as a source of motivation for the disabled children's classmates, they had a negative impact on the learning of Rosie, James and Joanna. In the literature, Centra (1986) noted that time limits set for examinations can have a negative impact on the performance of disabled children, attributing this factor to the lower than average results achieved by disabled children.

5.5.1.4 Established Friendships and Interactions with Peers

Relationships between the disabled and non-disabled children were constructive for most of the children during lesson time. However, break time resulted in play being a negative experience for the disabled children. As Flint did not have an established friendship group at Woodlands Primary School, although he engaged in positive interactions with peers in the classroom, the negative attitudes of others made building friendships particularly difficult in the playground. The separation of Rosie from her friends at playtime meant that she had limited opportunity to interact with peers in a social capacity, although she did engage in social interactions with classmates at lunchtime.

Limited time in the classroom and dependence on one-to-one support restricted James' interaction with peers. At Willow Primary School, although Joanna appeared to have a good rapport with classmates, her break times were tainted by infighting. Similarly, at St Amelia's RC Primary School, despite having a good rapport with classmates in most lessons, Freddie faced the rejection of classmates in subjects such as PE. For Freddie, peer-interaction was limited at playtime due to differing play preferences, which ultimately left him isolated.

5.5.2 Working with and Giving Voice to Disabled Children

Numerous examples of inclusive practice were observed during observations in participating schools. The researcher felt that much could be learnt about giving voice to disabled children from some of the inclusive strategies employed by teachers and support staff in participating schools. Inclusive practices at Woodlands Primary School and St Amelia's RC Primary School included giving children visual prompts to support their learning and team rewards to encourage cooperative working. The call and response techniques used at Aspen and Willow Primary Schools helped to gauge students' understanding of, or engagement with, activities. By breaking tasks down into smaller chunks for pupils, Aspen Primary School also gave insight to methods for working more inclusively with disabled children. Playtime activities were autonomous for all children since they were given a choice from a variety of indoor and outdoor activities and equipment to play with.

At Willow Primary School, access to a disabled member of staff gave pupils the experience of working with a disabled person, encouraging pupils to support more inclusive practices. For example, by providing visual cues for communication with a deaf child. St Amelia's RC Primary School took a particularly inclusive approach by engaging all children in personalised learning. The social and emotional aspects of learning were also addressed when children were encouraged to express their

thoughts and feelings during the observed plenary activity. Each participating school provided some form of adapted equipment for its disabled children. Equipment ranged from personalised computers to specially adapted chairs.

Strategies used to give voice to disabled children proved to be inclusive of diverse groups more generally. Such strategies may be a useful source of reference to designers, when attempting to develop more meaningful and inclusive toys and games for use in mainstream settings. According to Santer et al. (2007), adults should observe closely and develop sensitivity to children's individual needs. However, despite the examples of inclusive practice observed, there were examples within the research data of children being silenced in their play and learning, and through the research processes employed. For example, it was hard for the researcher to establish whether or not Rosie enjoyed being separated from her classmates at break-time, to play phonics games with school staff instead. Similarly, it has been noted within the literature that disabled children cannot always indicate when they are bored and why (Brodin, 1999).

The directive involvement of adults in children's play and the supposed negative impact this has on the development of creativity has been researched in the United States. Studies show that the attempts of adults to direct play towards educational ambitions was detrimental to children's direct learning processes (Beunderman, 2010, p.5). A lack of inclusive play provision can have a negative impact on social cohesion. A particular feature of inclusive play provision is a safe space to play and this becomes even more important for marginalised groups, including disabled children and children from ethnic minority groups (Beunderman, 2010, p.6).

Anecdotal evidence provided by staff in participating schools provided useful insights to working with and giving voice to disabled children. The researcher learnt about the on-going problems and barriers encountered by the children as a result of the negative attitudes of school staff and others. She was able to learn about the ways in which the experiences of the disabled children were perceived by school staff. Some teachers also helped the researcher to contextualise the children's experiences. For example, that Flint was new to Woodlands Primary School (by one day only) and that the school had no prior information on his learning levels during the observation.

A limitation of the anecdotal evidence provided by school staff was that they were exposed to just a snapshot of the children's experiences. No teachers were present to observe the children's experiences in the playground at break or lunchtime at any of the participating schools. When the class teacher assumed that

as a newcomer, Flint was settling in well, she was unaware of the exclusion he faced in the playground since his experience in the classroom appeared to be fairly positive. Ultimately, this meant that his voice was silenced by the assumptions of his class teacher. In a similar fashion, negative views expressed by the Playground Assistant at Aspen Primary School in relation to James and his interaction with peers acted to silence his views on this issue, as the children that he considered to be his friends were excluded from the research by school staff. This emphasises that despite aiming to give children voice and control through research, other stakeholders may contribute to the silencing of their voices.

The researcher learned that the prospect of missing lessons in order to engage in the research silenced some of the children. One of the teaching assistants informed the researcher that Freddie looked quite nervous when he first saw her, as he was anxious about missing lesson time. The teaching assistants also acknowledged that their own assumptions about Freddie had been wrong in the past. They informed the researcher that they had been under the impression that Freddie was happy playing on his own, until he had an outburst one day. He was upset that no one wanted to play with him. The researcher also found that she had a role to play in giving the disabled children voice in the research and that she had moral and ethical decisions to make as an observer of children's peer-interactions. For example, it was not possible for her to remain neutral or impartial when observing the physical and social exclusion of Flint in the playground and the emotional distress this caused him. She felt it her duty to 'step-in', to encourage the existing teams to include him, particularly as Flint was new to the school.

Adults are advised against premature intervention in children's play as this denies them the opportunity to make mistakes and learn from them. It also prevents them from solving problems creatively and negotiating solutions to social conflict (Hohmann and Weikart 1995). Missuna and Pollock (1991) found this is to be true particularly when working with disabled children, as when the adult solves problems and intervenes inappropriately, the child can become doubly disabled as a result of dependency and loss of power and control. The Mental Health Foundation (1999) highlights the importance of children being 'emotionally literate' by being able to play, take risks, use their initiative, make friends and deal with conflict. According to Santer et al. (2007), such play opportunities may reduce the risk of children having mental health problems in later life.

Thus, in order to enable children to develop their voice in observational studies, the adult should act as a nonparticipant in play in many cases, whilst actively

observing and noting what children are doing. If adults are directly involved in play, they may inadvertently transmit their values, rules and traditions to children. Missuna and Pollock (1991), however, note that some exceptions may need to be made when working with children with physical impairments. They make a strong case for a more structured adult role when playing with children with limited mobility or insufficient fine motor skills, in order to enable them to access objects independently (Missuna and Pollock 1991). For example, in James' case, for whom tasks that require fine motor skills are particularly challenging, adults would be encouraged to engage in modelling play with objects, or play with others, in order to enable children to develop their social skills (Thomas and Smith 2004). They would also be encouraged to help children to initiate and sustain their play (Hestenes and Carroll 2000).

Furthermore, Siraj-Blatchford (2001) argues that the adult has an active role to play in challenging in a sensitive, yet fair way, any stereotypical or inappropriate behaviour that arises in a play situation. Children's self-esteem and sense of identity are fostered through the types of interactions and relationships they have with adults and peers. Adults are role models for children. They have the power to influence values, attitudes and behaviour. For example, if an adult treats one group of children differently to another, their peers will learn to respond in the same way. A responsible adult should typically challenge discriminatory comments made by children. However, this becomes problematic when recording children's comments for observational purposes.

5.5.3 Conveying Learning to Designers

The researcher adapted Adams et al.'s (2004) interpretation of the target child method for classroom observations. The target child method of observation is a way of recording what actually happens in the life of a child throughout the observation period. This technique is used to get close to the child's eye view of classroom life. By trying to see what the child sees and hearing what they hear, the observer comes close to the child's lived experience (Adams, 2004). Although the researcher made detailed narrative notes of the children's experiences, she did not follow the precedent set by Adams et al. (2004), by recording everything the children did and said. She did, however, supplement direct observations with field notes - describing physical features of the classroom, including its layout and equipment and paying particular attention to aspects that may have relevance to her enquiry.

The researcher found it helpful to write up her field notes during, and immediately after, the observations. The aim was to capture the moment, as far as

possible (Cohen et al. 2000) and allowed her to share the information with the rest of the team. Typically, child-focused or target child approaches to observations are 'extremely rich and rewarding', however, the resulting data is typically 'complex' (Adams, 2004, p.100). School-based observations were useful as they gave insight to the participant's context. They were limited, however, in that they relied primarily upon the researcher's interpretation of events. Kellett (2005) noted that criticism is still being levelled at the tokenism, adult manipulation, unequal power-relations and adult focus of research with children. Furthermore, it is typically the adults who frame the research questions, choose the methods and control the analysis. For the most part, children are unequal partners as:

Adult interpretations can seriously distort the child perspective and risks loss of ownership by the child. Similar issues arise with dissemination and the degree to which adult support could become manipulative or agenda-driven (Kellett, 2005, pp.19-20).

It is important for the researcher to be reflexive about the way in which the results were interpreted by the researcher, disseminated to the undergraduate design team, and then interpreted by the undergraduate students as more than one meaning can be attached to play.

Like a diamond, it has many different facets, and the angle from which it is observed determines the nature of the image that is reflected. The same can be said of the perspectives of theorists, who inevitably bring with them their culture, professional heritage and underlying values and beliefs, which become the filter through which they study play (Santer et al., 2007, p.7).

The importance of reflecting on the role of the researcher is emphasised within the literature, as the internal images of childhood they hold will inform their choice of methods, ethical practice, analysis, and interpretation of data (Markopoulous et al., 2008; Christensen and Prout, 2002; Mayall, 2000; O'Kane, 2000; Punch, 2002a). Findings of the school-based observations were shared with the undergraduate team of designers during research meetings that occurred directly after the school visits. Initial observations were used to further verify a schedule for focus group discussions, with a refined series of research questions to be explored through participatory design activities. They were also used to inform a set of personas for the undergraduate students recruited to participate in the prototyping of children's design ideas.

5.6 Conclusions

As with most research, once completed, it is important to reflect upon how successfully the project achieved its aims. The basic design of the semi-structured observations of children's experiences was robust and it allowed the researcher to meet the first aim, which was to examine the lessons learned about meaningful play between disabled and non-disabled children (5.6.1). The first notable finding was that each of the disabled children faced some form of social exclusion during playtime at each of their respective schools. James and Joanna were observed engaging in infighting; Rosie's playtime was spent indoors, segregated from her friends; Flint was physically and socially excluded in the playground and Freddie was observed playing alone.

The second aim was to develop understanding about working with, and giving voice to, disabled children through the process of observation in schools participating in the project (5.6.2). During each of the observations at schools participating in the project, numerous examples of inclusive practice were observed. The researcher felt that much could be learnt about giving voice to disabled children from the inclusive strategies employed by teachers and support staff at each of the participating schools. Inclusive practices included giving children visual prompts to support their learning and rewards issued to encourage cooperative working.

Despite these positive examples of inclusive practice, there were examples in the observations of children being silenced in their play and learning and through the research. It was evident in anecdotal information provided by school staff that some of the children's needs and aspirations for play were either silenced, or not fully understood by school staff and peers. It was difficult for the researcher to establish what some of the disabled children's aspirations for play were as the children would not freely articulate their situation. For this reason, she felt it essential to triangulate her findings against other forms of data collection through techniques such as focus group discussions and most importantly, that children were given the opportunity to voice their experiences.

In relation to the third aim, conveying this learning to designers (5.6.3), school-based observations were useful as they gave insight to the participant's context. They were limited, however, in that they relied primarily upon the researcher's interpretation of events. It was important for the researcher to be reflexive about the way in which the results were interpreted by the researcher, disseminated to the undergraduate design team, and then interpreted by the undergraduate students. School-based observations provided only a single 'snapshot' of the disabled

children's experiences. Nevertheless, the resulting data provided important converging information regarding disabled children's experiences of play in a small sample of mainstream schools. The value of this approach was the individual insights gained (Wilkinson & De Angeli, 2014) over statistical evidence, such as the frequency of occurrences.

5.7 Future Directions

Observations in mainstream school environments enable researchers to gain insight to disabled children's experiences in the mainstream setting. However, as only minimal play opportunities were observed in schools participating in the Together through Play project, alternative play settings may be a consideration for future research. Druin et al. (1999) have noted the significance of the user's context when developing understanding of children's experiences. Arguably, in the analysis of observation data, 'Without explanatory power, interpretation and response by adults, observations have little meaning' (Santer et al., 2007, p.xvii). However, in order to give children voice in research, explanatory power must come from them.

Where Calder et al. (2013) used observations of children to supplement reports from parents, teachers, peers, and children, observational studies and focus group discussions with children undertaken in this research were prioritised and supplemented by anecdotal evidence provided by school staff, parents and carers. The researcher would be keen to examine ways in which to seek clarification from children about their observed behaviours and enable them to actively engage in the analysis of observation data. Conclusions reached by adults from their observations of children should be validated by discussion with the child and where possible, parents or caregivers, each of whom will contribute their own unique insights. This is the principle utilised by Vivien Gussin Paley, the American early years practitioner, who records children's stories and uses these as the focus for discussion. Such insights give voice to children and, in turn, enhance the quality of their experience (Adams, 2004, p.57).

Chapter 6

Results of Focus Group Studies in Participating Schools

This chapter is the second of four findings chapters that feed into Chapter 9. Where the first examined initial observations undertaken in schools participating in the Together through Play project, this chapter examines the supplementary focus group studies. The focus group studies were designed to develop understanding of the ways in which the participating children played together, the barriers they encountered and their aspirations for play in the future. The focus group studies were part of the second phase of the research, the process of cooperative inquiry (Heron, 1996; Druin, 1999). This involved conducting research 'with' rather than 'on' people (Heron, 1996, p.1) and 'an approach to creating new technologies for children, with children' (Druin, 1999, p. 592).

Aims

By examining the focus group studies undertaken in schools participating in the Together through Play project, this section aims to:

- a.) Reflect upon lessons learned about meaningful play between disabled and non-disabled children
- b.) Examine the process of working with and giving voice to disabled children through focus group discussion
- c.) Critique the use of focus group studies with disabled and non-disabled children and the way in which findings may be conveyed to designers

These foci are part of the body of methodological work that leads into Chapter 9.

Scope

During the summer of 2012, the researcher led two sets of focus group discussions with small groups of disabled and non-disabled children in each of the schools participating in the project. These small groups were referred to 'friendship groups'. The focus group studies were designed to generate rich discussion with children, in order to enable the researcher to develop an in-depth understanding of their needs and aspirations and to foreground the voice of the disabled children.

There was a limit to how many children and young people could participate in order gain an in-depth view of their experiences and perspectives, and for the researcher to analyse this data in detail. Therefore only friendship groups recruited for participation in the study were included in the focus groups. Whole classes were not included in the research at this stage.

Limitations

The researcher led and facilitated the focus group discussions as a means of gathering data efficiently, developing understanding of the data and encouraging the children to focus upon issues relevant to the research topics, in a safe and inclusive manner. One of the limitations to this approach, however, was that the researcher risked creating an imbalance of power (Christensen and James, 2008). Questions may have been misunderstood, children may not have had the vocabulary to express their views, and the level of literacy required for meaningful discussions with the children may have limited their engagement in discussions. Such limitations are discussed further in Section 5.2.

Some children opted to produce mind maps of their thoughts and ideas during focus group discussions, whereas others chose to not to. It is worth noting that whereas friendship groups at Willow Primary School generated multiple pages of mind-maps, others, such as the group at Woodlands Primary School, generated very few. Data included in this section, therefore, varies from school to school. Although the researcher allocated 2 hours to each school visit, some focus group discussions were cut short by staff at schools such as Woodlands Primary School, for whole class activities and assemblies requiring the children's involvement. As a result, where some focus group discussions were up to two hours long, others took 30 minutes to an hour. Such limitations are discussed further in Section 5.2.

Structure

Regarding the structure of this chapter, Section 6.1 provides a background to the focus group studies, drawing upon key additional references. Section 6.2 examines the methods employed during the focus group studies. It includes two sub-sections: one on the participants and the other on the research instruments used. Section 6.3 describes the procedure, namely a report of what happened during the focus group studies, and Section 6.4 provides the results. Section 6.5 presents the analysis and discussion and Section 6.6 draws conclusions from the focus group studies, including what was learnt about meaningful play (6.6.1), working with and foregrounding the voices of disabled children (6.6.2), and conveying this to designers (6.6.3). The next section examines the existing

research surrounding focus group discussions undertaken in the school setting. This provides a background to this findings chapter, and references some of the key literatures that informed the focus group studies undertaken in schools participating in the Together through Play project.

6.1 Background to the Focus Group Studies

The aim of this research is to foreground the experiences of disabled children in design research. Qualitative techniques are used to develop a richer understanding of the participants' experience (McVilly et al. 2005), and to enable researchers to work more effectively with them (Lowe 1992; McVilly 1995; Goodley 1996; Azmi et al. 1997; Kitchin 2000; Knox et al. 2000; Knox & Hickson 2001; Heenan 2002; Pearson et al. 2002; Brantlinger et al. 2005). Focus group studies were employed in this qualitative research project as a means of enabling the researcher to elicit insights and responses to meaningful play from the children. Focus group discussions are particularly useful during preliminary or exploratory stages of investigation (Kreuger, 1988) as they may be used either as a stand-alone method, or to check for validity through triangulation with other methods (Morgan, 1988).

Although focus group discussions may be limited in their ability to produce generalisable findings due to the small numbers of children involved, they are participatory, giving voice to the research participants and enabling research teams to learn about their lives (Davis et al. cited in Christensen and James, 2008). Participatory techniques enable a dialogue between researchers and children about abstract and complicated issues. They also give children ownership of the interpretation of their experiences (O'Kane in Christensen and James, 2008).

When addressing issues of exclusion, standardised questionnaires are insufficient in capturing the lived experience of research participants (Barnes 1992; Schwandt 1994; Rice & Ezzy 1999). Focus groups are particularly useful for stimulating discussion as they rely upon interactions within a group, on topics provided by the researcher (Gibbs, 1997), which makes this approach distinct from other forms of group interviewing. Focus group studies undertaken through this research were informed by the sociology of childhood (James and Prout, 1990; James and Prout, 1997; James et al., 1998; Prout, 2005; Christensen and James, 2008), and disability studies perspectives (Barnes and Mercer, 2010). Disability Studies is an academic discipline that examines disability as a social construct (Linton, 1998), whereas the sociology of childhood, a critical discipline within the

field of childhood studies, seeks to find more innovative ways of working with children in the research process (Christensen & James, 2008).

According to Connors and Stalker (2007), combining ideas from disability studies and the sociology of childhood may enable us to develop understanding of the diversity of disabled children's experiences. Whilst disability studies and the sociology of childhood differ in approach and ideology, they share some common themes. Both seek to turn research participants from the objects to the *subjects* of study, presenting them as active agents, and both are concerned with issues of rights and participation (Watson, 2012). Disability studies brings the political and ethical debates surrounding issues of disability to the fore, emphasising the importance of self-advocacy and enabling disabled people to speak for themselves (Rieser and Mason, 1990). This contrasts with early research into childhood disability, which had a tendency to ignore what disabled children had to say about their lives (Watson, 2012). Previously, disabled children's experiences were explored solely through the perspectives of parents, carers and professionals claiming to speak on their behalf (Christensen & James, 2008).

Where research claiming to be child-focused in the past may have 'listened' to children, Roberts (2000) draws a subtle distinction between 'listening' to children and 'hearing' what they say, noting that previously, researchers and practitioners may not have truly 'heard' what children had to say (cited in Christensen & James, 2008, p.5). Furthermore, much of the existing 'child-focused' research with adults, such as the work of John and Wheway (2004), has done little to enable us to learn from children's own perspectives on their everyday lives and experiences (Christensen & James, 2008, pp.2-3). Critics such as Ali et al. (2001) argue that the disability movement in Britain has neglected children's experiences and few studies linked to the social model of disability have focused upon *children's* perceptions and experiences of impairment and disability (Connors and Stalker, 2007).

In order to minimise the risk of potential power imbalances between adults and children, strategies employed by Shaw et al. (2011) were used to inform the focus group studies undertaken in this study. Strategies included creating a relaxed atmosphere, reassuring participants that data collection processes were not 'tests', wearing informal dress and creating seating plans that would enable the researcher to speak to the children at their level. Rather than interviewing disabled children in isolation, this research draws upon the social model view that the disablement of children is a product of a disabling society (Watson, 2012), thus emphasising the

importance of including non-disabled children in focus group studies with their disabled peers.

A number of existing studies have offered guidance on consultation and research with disabled children (e.g.: Ward 1997, Morris 1998b, Potter and Whittaker 2001, Stone, 2001, Morris 2003). Connors and Stalker (2007) argue that although research with disabled children is often no different from talking to any child, it is important to draw upon such guidance, in order to avoid the exclusion of disabled children from research. The next section reflects upon the focus group studies undertaken in participating schools and attempts made to bring a greater balance of power to participatory research with children.

6.2 Method

This section includes two sub-sections - one on the research participants and the other on the research instruments used.

6.2.1 Method of Observing Research Participants

Focus-group discussions with children were used to supplement the semi-structured observations undertaken in participating schools. Once initial observations were completed, the researcher facilitated two preliminary focus group discussions at each school, before engaging the children in design activities. The focus group studies took place during a two-month period. There were two visits to each participating school - one focusing on the topic of play and the other focusing on toys and games. The researcher dedicated two hours to each school visit - 30 minutes for a pre-session discussion and briefing, 1 hour for the focus group discussion and 30 minutes for packing up, questions and accompanying the children back to class.

There are several reasons for using focus group studies with children to investigate meaningful play between disabled and non-disabled children. Firstly, never before have focus groups been used to investigate this research topic in mainstream schools. Secondly, It is not easy for adults to gain access to this data and thirdly, children's attitudes and opinions are not easily observed. Focus group discussions lend themselves particularly well to topics of a sensitive nature and it was anticipated that sensitive issues would be discussed during the focus groups. Focus group studies also offer a method for ascertaining people's views on a specific topic. Therefore, if framed properly, they have the potential to give voice to marginalised groups.

A focus group can be defined as:

A group of individuals selected and assembled by researchers to discuss and comment on, from personal experience, the topic that is the subject of the research (Powell et al., 1996, p. 499).

A focus group is typically a small group of five to ten people led through an open discussion by a skilled moderator. The group should be large enough to generate rich discussion and provide a diversity of perceptions, but small enough to ensure that all members have the opportunity to share their views (Krueger and Casey, 2014). Friendship groups consisting of both disabled and non-disabled children were included in the focus group studies undertaken as part of the research. The number of participants per group ranged from 3 to 7. At Aspen Primary School, two children were invited to take part in the project with James, a child with dyspraxia, whereas at Woodlands Primary School, three children with physical impairments were invited to take part in the study, two of which were given the opportunity to choose friends to participate in the study with them.

Whole classes were not included in the focus group studies at participating schools for several reasons. Firstly, as focus group studies are designed to encourage group discussion and dialogue, large groups do not lend themselves to this method. Secondly, multiple conversations would be extremely difficult for an independent researcher to track and analyse. The aim of this research is to bring the voice of disabled children to the fore. In a large group consisting predominantly of non-disabled children, there is a risk that these voices might be silenced. Finally, the aim of this study is to examine research methods suitable for the study of meaningful play. It would not be possible to give the data generated by a full class of children the desired depth of analysis and level of academic rigour required.

Within the literature, terms such as organised discussion (Kitzinger, 1994), collective activity (Powell et al., 1996), social events (Goss & Leinbach, 1996) and interaction (Kitzinger, 1995) are used to describe the contribution that focus group studies can make to social research. To include class-sized groups in focus group discussions with an independent researcher would undermine the potential benefits of this method. Focus group studies took place outside of the children's regular classrooms, in meeting rooms, communal spaces and spare classrooms. Members of staff were not invited to attend the focus group discussions as it was anticipated that particularly dominant individuals could have an impact on the interaction of the group, thus potentially influencing the results (Krueger & Casey, 2014).

6.2.2 Research Instruments used During the Focus Group Studies

As part of the focus group studies, the researcher designed a semi-structured interview schedule. This was a list of questions that she would use during the focus group studies, in order to bring structure to discussion, emphasise the research questions and ensure a level of consistency. During the first visit to each participating school, the researcher asked the children a set of semi-structured questions on the topic of play (see Appendix E, part E.1). The findings of the first focus-group discussions helped to inform the semi-structured interview schedule for the second phase of focus groups: an approach employed by Hoppe et al. (1995) and Lankshear (1993).

During the second visit, the researcher asked a set of semi-structured questions, based on the topic of toys and games (see Appendix E, part E.2). The researcher provided each of the children with a printed slip containing details of this task, for them to take away (see Appendix B, part B.2.5). She also provided teachers with a copy. Questions included in the interview schedule were designed to be inclusive of both disabled and non-disabled children. They were designed to enable the children to share information about their experiences - providing insights that cannot currently be found in the literature.

Since the aim of this research was to gain insight to children's play experiences, this approach to questioning focused on the disabling or enabling nature of play, rather than the impairment of the disabled child. These questions were designed to be open-ended and to provide a clear context for the children. Zur (1990) argues that closed questions can be difficult for children of this age group to answer. In order to mitigate this problem, Johnston (2008) argues that framing questions for children can be helpful.

6.3 Procedure

In order to create a greater balance of power between and the children and her, the researcher wore informal clothing and sat with the children at their desks, in order to be at the same level as them. During the pilot study, it was identified that mind-mapping activities would be a useful discussion tool *during* the focus group studies, rather than as a separate activity, as originally intended. The researcher prepared a set of materials for the children to use in advance of each session and plans were adapted accordingly. Materials prepared for the focus group studies included flip charts and pens, mind mapping sheets, pencils and paper, 'Toy and

Game' boards and Dictaphones. Mind mapping activities were designed to allow free discussion and minimise social inhibition (Holt et al., 2013). This also gave the researcher the opportunity to take notes occasionally, in order to capture some of the non-verbal data observed. One of the aims of the second set of focus group discussions was to prepare the children for participation in the design activities.

6.3.1 Briefing

The researcher developed a guide for use as the facilitator, explaining the purpose of the focus group studies (see sample in Appendix E, parts E.3 and E.6). At the start of each focus group study, she opened the session with a briefing or pre-session discussion with the children. Each briefing included a short statement about the aims of the research project, a description of the way in which the children's data would be used, and how it might feed into her report. She also included an overview of plans for the session. The researcher used age-appropriate language throughout the briefing, the facilitation of the focus group studies and in the design of the research questions, in order to make the research accessible to the children and more inclusive of their needs. The researcher gave the children the opportunity to ask questions. She then explained to them that she would be recording their comments on two Dictaphones. One would be used as a back up, in case any errors occurred. She also built time into the game to develop a set of ground rules with each participating friendship group.

6.3.2 Ground Rules

During the first focus group discussion, the researcher asked each friendship group to agree upon a set of ground rules and she wrote their comments on flip-chart paper (see Appendix D). This approach served the purpose of giving the children ownership of the rules, reinforcing the rules set and making a physical record, for future reference. Ground-rules were set to ensure discussions were conducted in respectful fashion, as stipulated in the University of Leeds Research Ethics guidelines (2013).

6.3.3 Facilitation

In the facilitation of the focus group studies, the researcher followed her semi-structured research schedule. This provided a protocol for each session, whilst permitting discussion on relevant topics to emerge. The researcher was able to draw upon on her skills as a qualified teacher in the facilitation of the focus group studies. At some schools, focus group discussions flowed easily, whereas at others, she had to intervene by asking children questions turn-by-turn. At St Amelia's RC Primary School, for example, it made sense for questions to be opened up to the

whole group. At Willow Primary School, on the other hand, participants such as Eve and Rio, had a tendency to dominate conversations, therefore discussions were facilitated in such a way as to enable participants to take turns to respond.

Within the literature, there are examples of researchers attempting to adjust power differentials by adopting a strategy of 'not raising hands to speak' (Alborzi et al., 2000; Druin, 1999; Druin and Hendler, 2000; Gibson et al., 2002). In this research, however, it was sometimes *necessary* for the researcher to ask children to raise hands before speaking, in order to ensure a level of democracy amongst participants. Nevertheless, as far as possible, the researcher deliberately set about ensuring that her interactions differed from typical teacher-child interactions, in order to bring a greater balance of power between researcher and participant.

6.3.4 Recording Focus Group Data

Written transcripts were produced from the focus group discussions recorded via Dictaphone (see Appendix E, part E.9). One of the challenges in recording focus group data is determining who is speaking at a specific time and ensuing what everyone says is recorded, since conversations often overlap. As the researcher was able to recognise the children's voices in the recordings, she transcribed the first set of focus group discussions in full. This was then used as a template for faculty staff at the university to use as a transcription guide (see Appendix B, section B.1).

6.3.5 Analysis

An inductive approach was taken to the analysis of data collated during the focus group studies. It was originally intended that initial analyses would be supported by the use of NVIVO. However, from the initial focus group discussion, it soon became apparent that children would use their own language to describe their experiences and that it would be pertinent for the researcher to analyse the transcribed data manually. Thematic analysis of qualitative data focused upon identifying: how children currently play, how they would like to be able to play, current barriers that prevent them from achieving these aspirations, and any emergent issues.

Analysis was undertaken by the researcher and cross-verified with Dr Beckett, the Co-investigator for the project. This provided a check on the conclusions, in order to minimise bias. The next section describes the findings of the focus group studies. It includes some of the rich data gathered from participating schools through focus group discussions. It provides insight to disabled and non-disabled children's perspectives on play and the toys and games with which they play.

6.4 Results of Focus Group Studies in Participating Schools

Observing the children's dialogue and interactions during the focus group discussions gave the researcher insight to their needs and aspirations for playing together. This section presents the results of the first set of focus group discussions undertaken in participating schools, which are divided into three parts. Section 6.4.1 examines the findings of the first set of focus group discussions undertaken in participating schools, on the topic of play; Section 6.4.2 examines the findings of the mind mapping activities undertaken in participating schools during the first set of focus group studies, and Section 6.4.3 examines the second set of focus group discussions undertaken in participating schools, on the topic of toys and games.

6.4.1 Findings of Focus Group 1 on the Topic of Play

The most common themes identified in the transcripts of the first set of focus group discussions included social factors; play types; the design and content of games (especially videogames) and the additional needs of disabled children. Social factors included the desire to play with other children, to have lots of friends and to share ideas. Examples of different play types included play with rules; self-directed/autonomous play; imaginary play and exercise play. Examples of each of the themes identified shall be discussed in detail in this section.

6.4.1.1 Social Factors

Each of the child participants expressed aspirations to play with other children and to engage in positive social interactions with them. Some children, such as Rosie, expressed these aspirations directly (for example, explaining that play is 'Where you play together'), whereas other children, such as Rio, described the negative side to playing alone, stating: 'Because, erm, if we don't play with anyone, and if you play by yourself, it might not be as good.' The desire to be popular and to have lots of friends was a common theme across schools. Eve informed the researcher 'It's nice to play with each other, because then you've got yourself more friends', and when the children at Aspen Primary School were asked about their favourite play spaces, the conversation soon evolved into a competition about how many friends they each had.

This suggests that the boys (both disabled and non-disabled) were under pressure to be the most popular and to have lots of friends. Some children emphasised the role of play in enabling them to build social bonds with others. For example, Dylan explained 'Well like, it's fun for kids to like communicate to each other' and Amber noted 'it's nice to have an experience of other people and what

they like'. She also suggested that there is a caring aspect to play, stating: 'it's a good idea to play, so you can get more friends who'll look after you.'

Familiarity was a common theme across schools. Some children, including Luke, liked to play with children he was already familiar with and to play established games of mutual interest. When asked what he liked about playing with other children, he informed the researcher 'Er, that you actually just know them and you can play something that they (...) all like'. Similarly, Eve suggested 'I can play a game what we both want to play'. Some children highlighted the way in which play with other children enabled them to share ideas. For example, Joel informed the researcher 'I like the ideas to play new games, instead of just mine'. Ali echoed this sentiment by recommending ideas sharing as an improvement to the facilitation of play activities at the school in the future, which shall be discussed in more detail in section 6.4.7.

Yet during the initial observations, there was evidence of James, Freddie, Rosie and Joanna being regularly separated from their non-disabled children due to out-of-class activities. Enabling children to build social bonds; establish familiarity; find games of mutual interest and share ideas with other children becomes problematic when there are a limited number of inclusive games that disabled and non-disabled children can play together. On the topic of inclusive games, children, such as Joanna and Rosie, said that they were not aware of any inclusive games.

Furthermore, games that were initially considered to be inclusive by children at Willow and Aspen Primary Schools were, on reflection, discarded as exclusionary. For example, following his initial suggestion, James noted 'No, not *Hide and Seek Tig* because disabled people are in wheelchairs'. Further, 'we wouldn't be able to get them and they can't defend themselves and stuff'. Arguably, the exclusionary nature of this playground game was linked to the children's negative assumptions about disability. In addition, the limited number of inclusive games identified highlights that there is a gap in the area of inclusive design, in both the availability of inclusive play products for children and in raising awareness of inclusive games and play products.

6.4.1.2 Play with Rules

Play with rules was a common theme and many children expressed aspirations to engage in this type of play. Play with rules is play that involves a group of players learning and observing a set of instructions or rules, in order to achieve a given aim (Robins et al., 2010). It is argued that games with rules fulfil an important social function (Fisher, 2008). For example, teaching children how to take turns, follow

instructions, respond to winning and losing and to respect the actions and opinions of others (Robins et al. 2010, pp. 875-876). Weinberg (1978) suggests that children develop negative attitudes towards disabled people at an early age, with children as young as 4 expressing a preference for non-disabled people over disabled people. If disabled children are considered to be less desirable playmates by their non-disabled peers, then some of the children gave insight to the rituals and rules of etiquette at play in their social worlds that could potentially become social barriers for disabled children. For example, Eve informed the researcher that it is preferable to be *invited* to play by other children, rather than initiating a game, stating: 'It's better to play with children when they asked you to' as 'when you want to play with them, they might say "no", because they might be doing something else'.

However, it was evident in the initial observations that some non-disabled children were reluctant to play with their disabled peers and this was the case during playtime for Flint and during P.E. for Freddie. Thus, such social rituals could contribute to the social exclusion of disabled children. Some children expressed the desire for fair rules and an equal chance to succeed in a game - James liked to have additional 'lives' and Amber suggested games should provide learning prompts, in order to avoid children getting 'stuck'. Amber noted 'In (...) work time, have it, so, like, if someone gets stuck, don't just, (...) leave the point'.

6.4.1.3 Autonomous Play

Some children expressed aspirations for self-directed or autonomous play during the focus group studies. Play preferences ranged from imaginary play, involving play on zip wires and bouncy castles, to more complex play activities such as sketching and climbing. Autonomous and imaginary play was particular important to Freddie. He had aspirations to play on an obstacle course, where he could pretend he was 'some sort of action hero', noting cautiously 'if I can handle it'.

6.4.1.4 Complex Play

Examples of the children's more complex play activities included climbing trees on the green and participating in arts and crafts. Where the children expressed an interest in more complex play and exercise play (which shall be discussed in the next section), they also liked to excel in that particular area. For example, Ophelia noted 'I can climb to the top of my tree' and Dylan insisted 'I also like doing running and football. Coz I'm really fast'. This highlights the competitive nature of complex play activities and the pressure on children to be physically skilled in these areas.

6.4.1.5 Exercise Play

Numerous examples of the children's aspirations for exercise play, and the sheer physicality of play for the children, were found in the transcripts from each of the participating schools. Luke, for example, described play as 'running around', whilst highlighting the tension between children's aspirations for play and the physical barriers that exercise play brings. Luke felt that some exercise games might contribute to the exclusion of disabled children. For example, when asked which games might be particularly exclusionary, Luke argued 'Well, basically most running around games and jumping'. The challenges encountered by some of the children with physical impairments became apparent when the sheer physicality of play was emphasised by the children.

Four children, including three boys and one girl, expressed an interest in play fighting and shooting games. Preferences for a range of sports were listed, including tennis; football; running; gymnastics; baseball and cricket. Some children also expressed an interest in sports day events such as 'jumping races' and 'sack races'. Girls and boys expressed aspirations to play playground games, such as skipping, hula hooping, *Hide and Seek* and *Tig*. Others also expressed an interest in motorcycles and scooters. Aspirations for outdoor play included play on zip wires, trampolines, bouncy castles and climbing frames. Self-initiated games including *Dizzy Dollies*, *Dodgeball* and *Swim, Fishy, Swim*, were also listed.

Amber noted that play can be physically 'tough' for some children, making it 'hard for them to join in'. This comment highlights some of the negative assumptions about disability - for example, that disabled people are weak, along with some of the polite discrimination encountered by the disabled children, which shall be discussed in more detail in the barriers section, Section 6.4.2. Polite discrimination often manifests itself in health and safety concerns, through which the play of disabled children is restricted, in a bid to prevent them from harm. Dylan's expressed preferences described succinctly the emphasis placed on sport and physical playground games at school, stating 'Football, tennis, (...) baseball, cricket...any sport'. Luke noted it was 'good' to have a 'little run around' through play, and Skye emphasised the need for children to 'let off steam' through play, as in the classroom, 'they don't get to talk a lot because they're too busy doing work', but when they're outside, 'they get to talk and play and shout'.

Yet during the initial observations undertaken in participating schools, it was identified that children such as Rosie and James were regularly denied access to play with their non-disabled peers due to out-of-class activities. As a result, they

were denied opportunities to express themselves through play and participate in physical activities. Children such as Jasper highlighted the negative impact that such barriers could have on a child's wellbeing and quality of life, noting 'if they could get bored all the time, they actually wouldn't have a very good life'. Robins et al. (2010) further emphasise the tensions between the children's aspirations for exercise play and the barriers to participation encountered. They noted that children with motor impairments particularly enjoy movement play, yet, in their view, children with motor impairments are unable to participate in movement play, therefore, their need to use their body through play should be considered. For James, a child with dyspraxia, this exemplifies the tension between the needs and aspirations of the disabled children and the physical accessibility of the exercise-type games currently played by their peers. This also could account for some of the infighting identified.

6.4.1.6 Videogames

Children such as James and Tim spoke specifically of the design and content of videogames on consoles such as the *Xbox* and the *PS3*. Yet some of their views on videogames were contradictory. Despite James' expressed interest in playing videogames aimed at adults, both he and Jasper stressed that they did not want to see violent images in videogames, stating: 'No one would (...) want to see his guts and stuff' and 'no one would (...) want to see anything gruesome'. This highlights a tension for designers: a conflict between children aspiring to be play more advanced, adult-like games, and their need to be protected from violent imagery. It is widely reported that access to inappropriate content is potentially harmful to children of 7-11 age range (Hasebrink et al., 2009; Sharples et al., 2008; The Gallup Organisation, 2008). Despite games such as *Grand Theft Auto* and *FIFA* (a football themed game) on the *Play Station 3 (PS3)*, being described as desirable games by children such as Tim, Joseph and Flint at Woodlands Primary School, Tim felt they might also be exclusionary. They often involve one or two players, which, in a group of children, will inevitably result in at least one child being excluded. Similarly, Rosie at Woodlands Primary School noted that children might be left out when playing with devices such as the iPod, since they are designed to be operated by one person.

6.4.1.7 The Needs and Aspirations of Disabled Children

From focus group discussion data, it is clear that the disabled children shared many of the same aspirations for play as their non-disabled peers. As a disabled child, Freddie clearly articulated his desire to participate in mainstream activities for children, stating: 'It's (...) like (...) basically, anything for kids (...) that I can handle

(...) “Do it!” However, the disabled children also seemed much more aware of the barriers faced by disabled people. As highlighted by Mairs (1996), a disability gaze is imbricated in every aspect of action, perception, occurrence, and knowing. In response to the various social barriers they encountered, Freddie, Rosie, and Joanna hoped that other children might be kind, show them respect and understand their differences. Rosie noted ‘Play nicely and say “thank you” or “please.”’ Joanna advised: ‘You have to be a bit kind to people when you are playing all together’. Furthermore, Freddie noted that friendship was about ‘understand[ing], imagination, guessing our (...) similarities and differences’ and ‘co-operating’. For Freddie, ‘that’s the beauty of playing with other people’.

Although it was sometimes difficult for Joanna to articulate her views, she described ways in which visual prompts and physical interactions enabled more meaningful interactions for her. She noted that she liked to play ‘funny faces’ (facial expressions), and physical interaction (such as tickling), stating: ‘if (...) someone tickles you, (...) it make[s] you (...) laugh and stuff.’ Rosie was most interested in more complex activities such as drawing on chalkboards, stating ‘I can do almost anything when I do that’. Rosie’s statement suggests that drawing on chalkboards gave her a sense of freedom and the opportunity to succeed.

According to Ludvigsen et al. (2005) and McIntyre (2007), the nature of an activity can facilitate or act as a barrier to disabled and non-disabled children playing together. Nabors et al. (1999) found that disabled and non-disabled children were more likely to be observed doing low-demand activities together (those involving gross motor skills, for example using the playhouse, outdoor play equipment and running) than complex activities (for example the use of art materials or small manipulative toys, and water or sand play). Rosie, therefore, may have had aspirations to engage in more skilled activities through play. Rosie also expressed her need for ‘quiet space’ in which to play and engage in activities requiring more concentration. During initial observations, she was seen to be quite overwhelmed in a noisy classroom.

6.4.2 Findings of Mind Mapping Activities (Focus Groups Set 1)

During the focus group studies, some children recorded their views, ideas and comments in the form of a mind map (see Appendix F). This section examines the key themes identified. Key themes included the meaning of play for the children; their aspirations; recommendations made; barriers to meaningful play and emergent methodological issues identified, each of which are discussed in more detail in this section.

6.4.2.1 The Meaning of Play for the Children

In their mind maps, most of the children interpreted play in a positive light, as illustrated in Figure 6.1, with children describing play as 'fun', 'happy' 'enjoyable'.

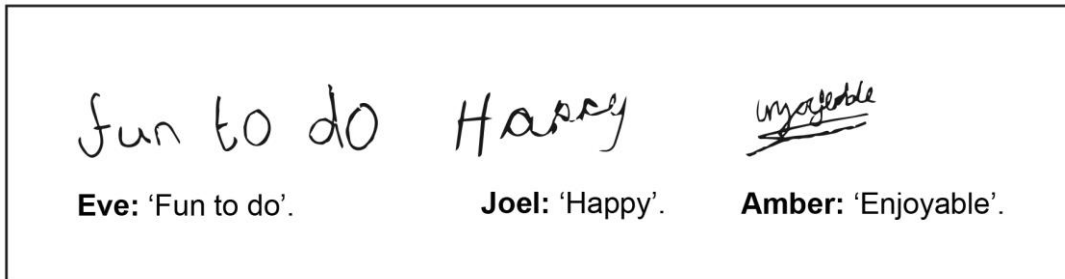


Figure 6.1 The Meaning of Play for the Children (Positive Interpretations).

The above quotes come from mind maps completed by the children during the first set of focus group discussions on the topic of play. The author and content of quotes are shown below each, respectively. This also applies to the content of Figures 6.2-6.14.

It was evident in Joanna, Skye, Dylan, and Joel's mind maps that play had social meaning for them. For example, as illustrated in Figure 6.2, Skye noted it was 'fun to communicate' and Joel suggested that play is beneficial as it enables children to build friendships. In Israel's view, play is important to a child's wellbeing, stating 'It is good to play, or you will never have a smile'.

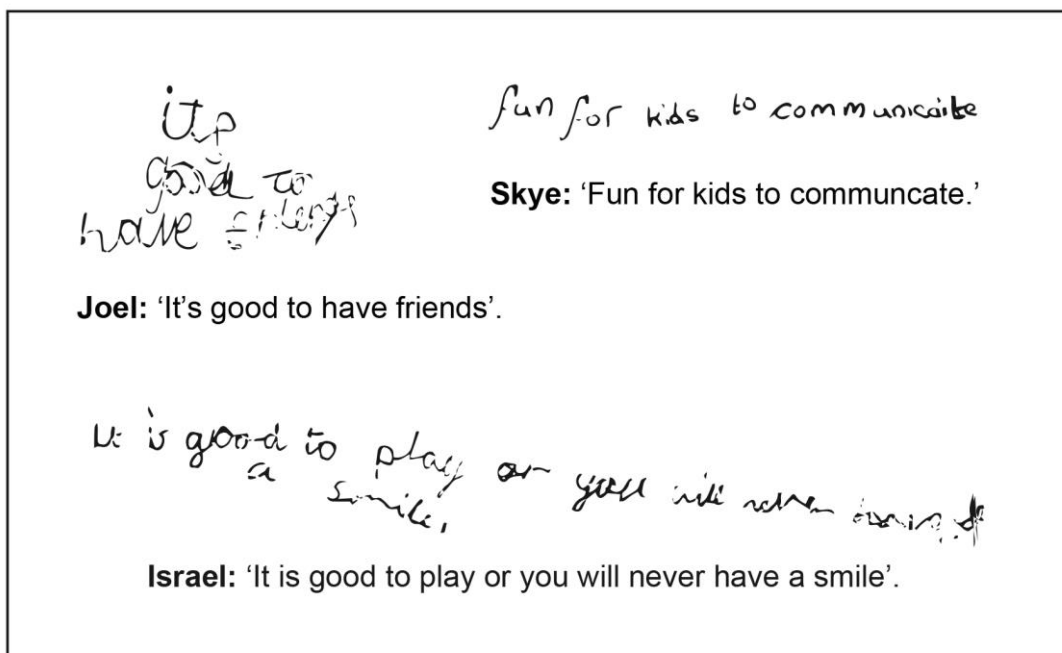


Figure 6.2 The Social Meaning of Play for the Children.

During the mind mapping activity, some children also provided insight to some of their negative experiences of play. Although Amber made some positive comments about play in her mind map, she also noted that there are good and bad sides to play, as illustrated in Figure 6.3.



Figure 6.3 Children's Mixed Interpretations of Play.

Negative themes dominated Joanna's mind map. As illustrated in Figure 6.4, she described feeling 'left out', 'lonely' and 'very bad'. Yet she did not clearly articulate these feelings during the focus group discussions. In this regard, the mind mapping activity enabled children such as Joanna and Amber to express their views on more sensitive topics - empowering them and giving them voice in the research process. Joanna's mind map also emphasised the negative impact of social exclusion on her emotionally and the way in which this was a significant issue to her.

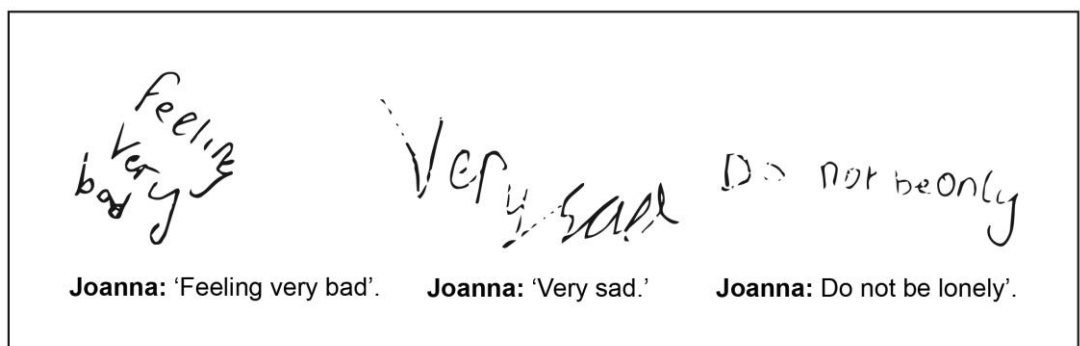


Figure 6.4 The Meaning of Play for the Children (Negative Interpretations).

6.4.2.2 Aspirations Identified in the Children's Mind Maps

The majority of the mind maps produced by children at Willow Primary School and St Amelia's RC Primary School echoed views expressed by the children during

the focus group studies. There were a number of similarities in the children's expressed interest in specific play types and the barriers identified by the children in both their mind maps and what they said during the focus group studies. Key themes identified in the children's mind maps in relation to their play preferences included play with rules, different play types, ideas sharing, multiplayer games and the desire to be popular. Evidence to support each of these key themes is included in the following section.

A Preference for Play with Rules

Children at Willow Primary School emphasised the importance of children playing fairly, and 'play[ing] by the rules', as highlighted in Figure 6.5. Children at Willow Primary School also stressed in their mind maps that play was limited to specific times and places, for example, at 'break time', and 'at festivals'.

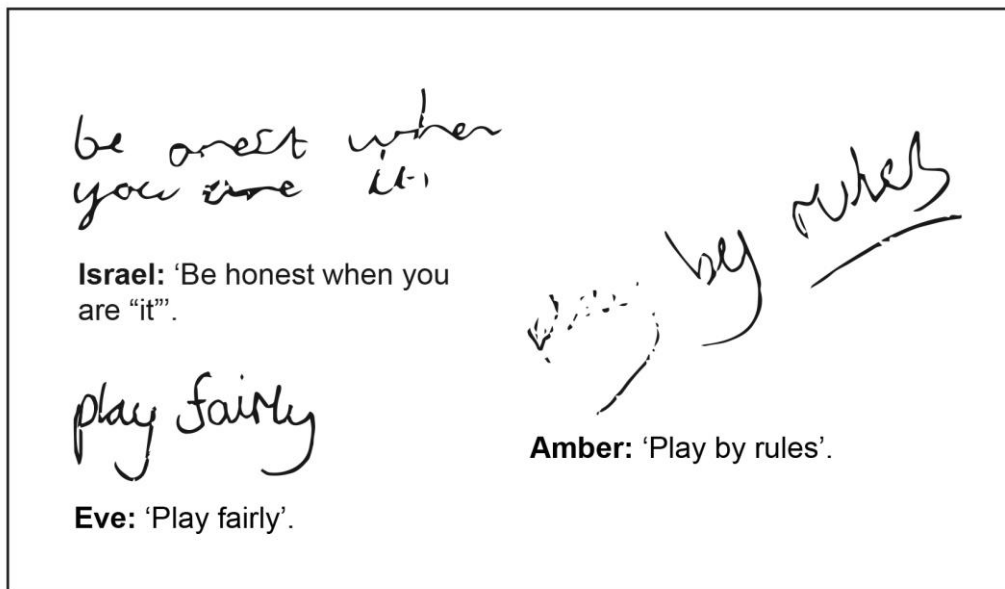


Figure 6.5 Children's Aspirations for Play with Rules.

Different Play Types

Responses at St Amelia's RC Primary School illustrated the sheer diversity of children's play types in their mind maps. As highlighted in Figure 6.6, where children such as Ophelia preferred imaginary play, others expressed an interest in sports or a choice of play activities in a range of different settings. Hence, for most of the children at St Amelia's RC Primary School, mind mapping enabled them to express their personal interests and play preferences.

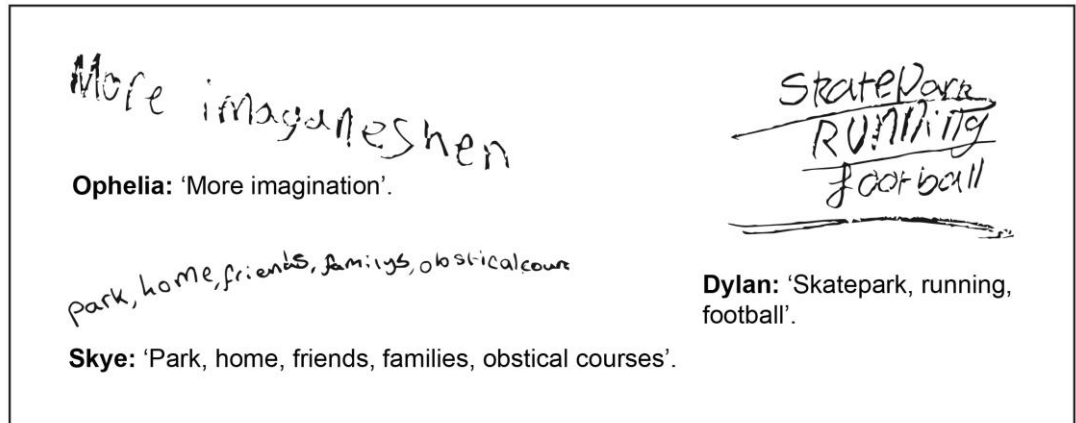


Figure 6.6 Children's Aspirations for Different Play Types.

Ideas Sharing

An interest in ideas sharing was a common theme at Willow Primary School, with children such as Joel and Eve noting that they liked to play other people's games and share ideas with friends, as illustrated in Figure 6.7.

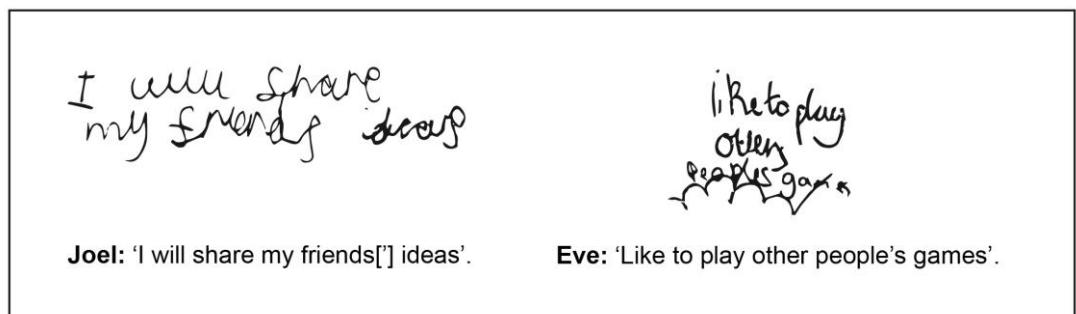


Figure 6.7 Examples of the Children's Interest in Ideas Sharing.

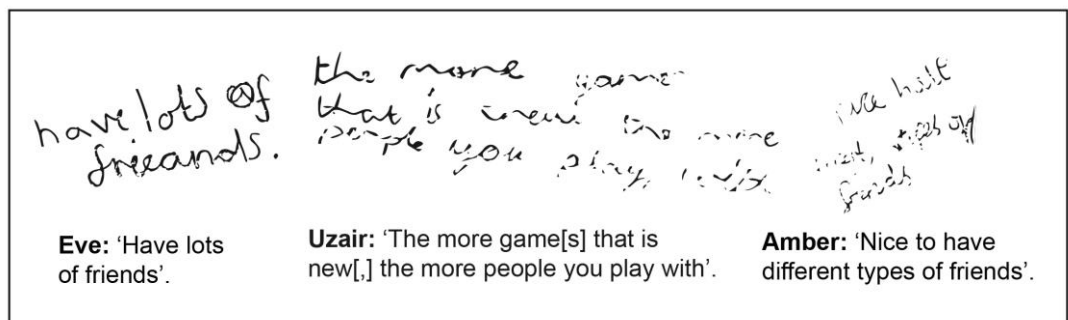


Figure 6.8 Examples of the Children's Desire to be Popular.

Popularity

As illustrated in Figure 6.8, a number of children felt it was important to be popular and to have 'lots of friends'. In Israel's view, the novelty of a new game can affect the popularity of a child and he felt this was an issue worth noting in his mind map, stating 'The more game[s] that is new[,] the more people you play with'.

Barriers Identified

Barriers identified in the children's mind maps at Willow Primary School and St Amelia's RC Primary School included psychological barriers (influenced by children's different play preferences, low mood, fear or a lack of confidence), social barriers (including bullying, negative assumption, a lack of awareness, power imbalances and infighting) and physical barriers (such as the speed of gameplay). Each of these barriers shall be discussed in more detail in the following section.

Psychological Barriers

In their mind maps, Ophelia, Joel, and Israel described some of the psychological barriers encountered by children, as highlighted in Figure 6.9. Psychological barriers identified by the children included different play preferences (or 'not liking a game'), lack of confidence, or low mood.

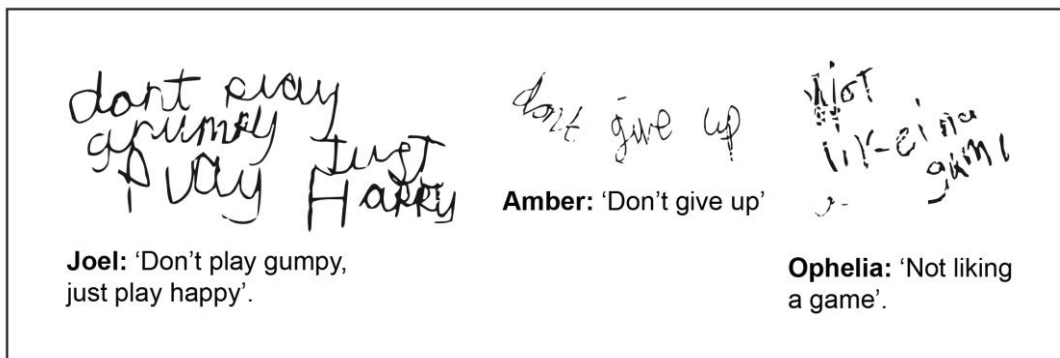


Figure 6.9 Examples of the Psychological Barriers Identified in the Children's Mind Maps.

Social Barriers

Skye and Dylan attributed the exclusion of some children to social barriers including bullying and negative assumptions, as illustrated in Figure 6.10. Examples of the social aspects to exclusion identified by the children included people 'being mean', 'calling people names', people 'picking on you', and children being 'left out'.

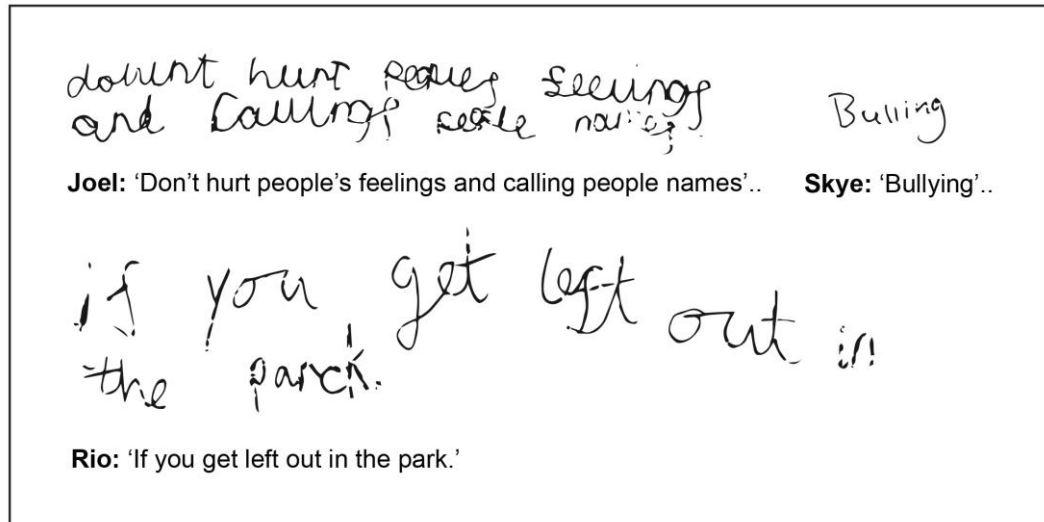


Figure 6.10 Examples of the Social Barriers Identified in the Children's Mind Maps.

Physical Barriers

Physical barriers identified by children such as Rio and Dylan included the speed of a game or infighting, as highlighted in Figure 6.11. Physical barriers were evident in the way in which Rio described someone being 'hit' for being last in a game and Dylan's description of games such as *Call of Duty* and *FIFA 12*, which, in Dylan's view, are inaccessible to disabled children.

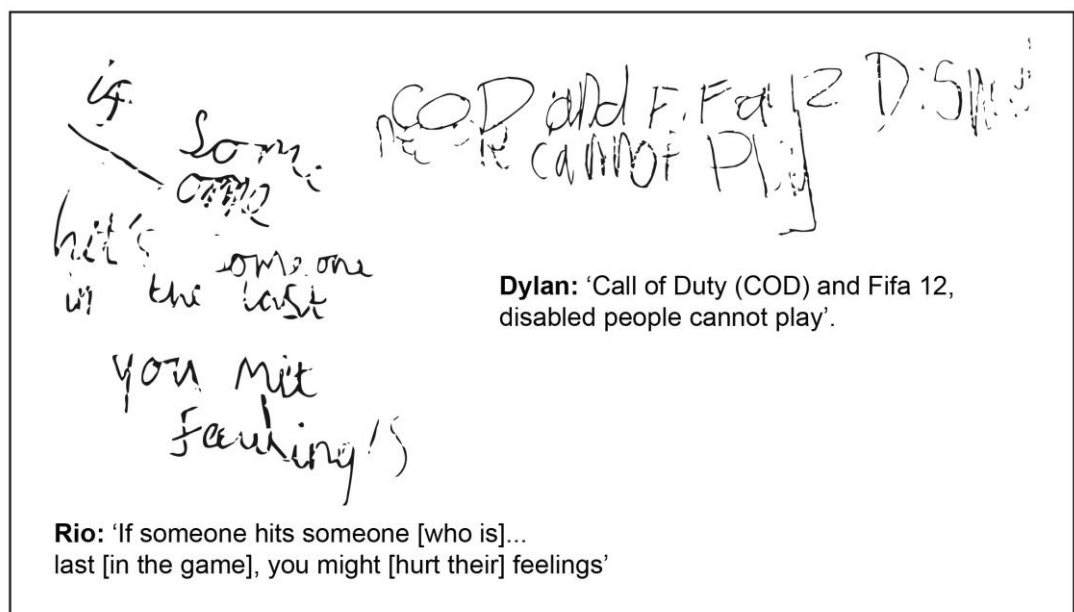


Figure 6.11 Examples of the Physical Barriers Identified in the Children's Mind Maps.

Recommendations

Some children recorded suggestions for enhancing play in their mind maps. For example, Skye noted that in order to improve play and make it more inclusive, there should be more communication, ideas sharing and longer break times, as illustrated in Figure 6.12. Skye also noted that issues of bullying should be addressed. Again, these suggestions echo recommendations made during the focus group discussion.

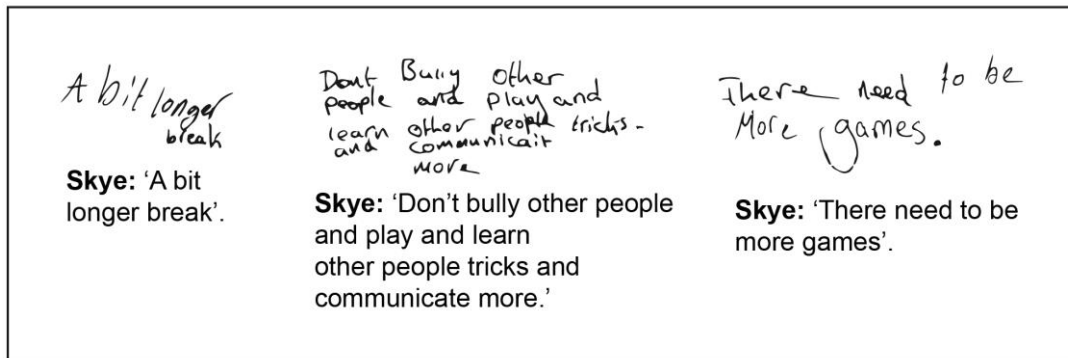


Figure 6.12 Examples of Recommendations Made in the Children's Mind Maps.

Emergent Findings

The mind mapping activity reinforced some of the positive attitudes expressed by children during the focus group studies. For example, Amber challenged negative assumptions and stereotypes about disabled children through her mind map. She expressed the view that 'everyone' can play, and that she liked to play with 'different types of people'. Dylan expressed empathy towards disabled people in his mind map, noting 'I know how it feels getting blamed' and Eve challenged her own assumptions about disabled children through her mind map, noting that despite identifying as non-disabled child, there were things that she was unable to do too.

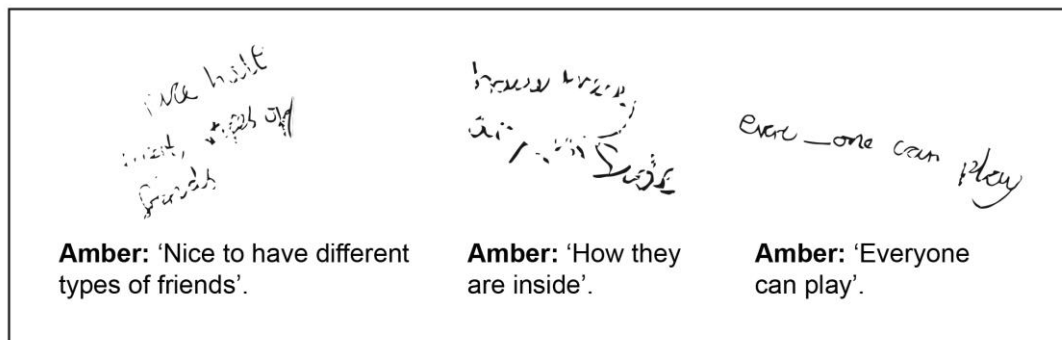


Figure 6.13 Examples of Inclusive Attitudes Identified in the Children's Mind Maps.

Methodological Issues

Some methodological issues were identified during the process of mind mapping with children. It soon became apparent that some groups were able to articulate their views more freely through mind mapping than others. Most of the children at Willow Primary School and St Amelia's RC Primary School produced detailed mind maps on the topic of play. However, there were some exceptions. There were also distinctions in the mind maps produced by disabled and non-disabled children. Whereas the non-disabled children were able to express their views on a number of topics relating to play, it was not easy for the disabled children at Willow and St Amelia's RC Primary Schools to express their aspirations for play with other children. Joanna simply suggested 'go somewhere' and Freddie chose not to complete a mind map at all, despite being able to describe what a mind map was.

All three of the children at Aspen Primary School and three out of six children at Woodlands Primary School chose not to complete mind maps during the focus group studies. For those that did engage in mind mapping at Woodlands Primary School, they fixated upon either their play aspirations or barriers, but not both. Thus, mind maps produced by the children at Woodlands Primary School did not reflect the balanced discussion that took place during the focus group studies. Whereas Joanna at Willow Primary School was unable to express her play aspirations through her mind map, disabled children at other schools used the mind mapping activity as an opportunity to express their hopes for other children to be kind, as highlighted in Figure 6.14.

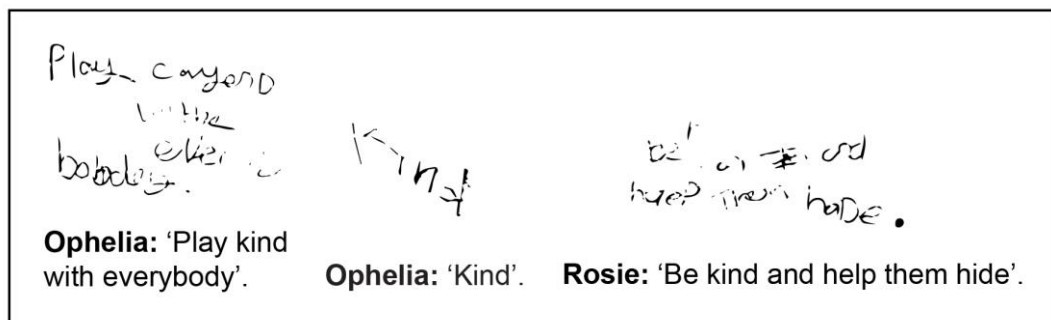


Figure 6.14 Examples of the Disabled Children's Play Aspirations in their Mind Maps.

From a methodological perspective, some of the mind maps, including those of Joanna, Israel, and Rio, were difficult to read. Some of the mind maps were

illegible, which made them difficult for the researcher to analyse. Others used incorrect vocabulary, which required some level of interpretation on the part of the researcher. For example, in Figure 6.6, Joanna described being 'only' rather than 'lonely'. Thus, the decision to analyse this data manually was justified, as such themes could potentially be missed, or overlooked, with the use of tools such as N-Vivo. Plus, by undertaking the focus group discussion and mind mapping activity side-by-side, the researcher was able to triangulate the research findings.

Regarding the authenticity of the children's voices through the mind mapping activity - the children's mind maps did not provide evidence of the negative attitudes towards disabled children during the focus group studies. Although the researcher was able to see glimpses of the negative views expressed, for example, that Rio considered some people to be 'weak' and that some games are physically too 'tough' for some people, such comments did not reflect the children's negative views towards disabled people specifically.

Furthermore, although Eve's mind map gave insight to her *own* experience of social exclusion, it did not provide evidence of her views on the exclusion of disabled people or her own assumptions about disabled people. Thus, from a methodological perspective, the children's mind maps could not be used as a complete representation of their views and experiences. It was important for the researcher to use the mind maps as a form of data with which to triangulate other forms of data, such as the focus group discussion transcripts. They provided insight to the issues of importance for some of the children. They also enabled the researcher to learn about methods suitable for communication with the children.

6.4.3 Findings of Focus Group Discussions on the Topic of Toys and Games

This section examines the findings of the second set of focus group studies undertaken one month after the first set of studies in each of the participating schools. This set of focus group studies focused on the topic of 'Toys and Games'.

6.4.3.1 Toy and Game Preferences

During the second set of focus group studies, the children's overall play preferences were identified as play with videogames on consoles such as the *Wii*, *Xbox* and *PlayStation*; play with toys (including dolls, cars, teddies, and commercial toys, such as the *Dr. Who Sonic Screwdriver*); imaginary play and exercise play, including sports such as cricket. Each of these play types are discussed in detail in this section.

Videogames

Nine of the children expressed a preference for play with videogames during the second focus group study. The majority of these children were boys, with eight boys and one girl expressing an interest in this play type. The children's computer game preferences were divided into four categories including shooting games such as *Call of Duty: Black Ops and Modern Warfare 2 and 3*, Open world or 'free roam' games such as *Skyron and Minecraft*, Sports games such as *Wii Sport and FIFA 12* and interactive/online games, such as *Xbox-Live*, and *Skylanders*. When asked why they liked videogames, reasons given included the varied levels; competitive and social aspects including interactive and multiplayer features; the physicality of play and in some cases, the violence of a game. Some children also expressed a preference for choice, autonomy and access to information or learning opportunities through play with videogames. Evidence to support these findings within the transcripts may be found in Figure 6.15.

Examples of the children's preference for varied levels:

Dylan: 'I like the different levels.'

Joel: 'I like the levels because they are really fun...'

Examples of the children's preference for competitive games:

Dawn: 'With your friends, you are competing against them.'

Dylan: 'I like going on the Xbox Live so I'm brilliant at it.'

Examples of the children's preference for interactive features:

Dawn: 'You can connect with other people.'

Joseph: 'With some people, you can play online.'

Figure 6.15 Examples of the Children's Videogame Preferences.

The social aspects to play with computer games were most attractive to the children, with seven of the children noting the social benefits to play with multiplayer or interactive games. The children also expressed the desire for a sense of ownership or control in a game by having access to information and learning, the opportunity to excel and progress through different levels and the opportunity to choose from different options. As previously mentioned, four of the boys rather worryingly expressed an interest in violent and inappropriate games, and accessing gaming sites unsuitable for their age group.

Play with Toys

Eleven of the children expressed an interest in play with toys such as dolls, teddies and cars. The majority of these children were girls, with eight girls and three boys expressing a preference for this type of play. The children's preferred toys were divided into four categories, including themed commercial toys, such as the *Dr Who Sonic Screwdriver*, dolls such as *Moxie Girlz* and *Monster High*; cars including remote controlled cars and power riding cars; and soft toys, including teddies and *Huggle Buddies*. The next section shall examine each of these categories in detail.

Themed Commercial Toys

Freddie was the only child to express an interest in play with the *Dr Who Sonic Screwdriver* - an example of one of the commercially themed toys aimed at imaginary play. When asked why he liked this particular toy, he gave reasons such as 'There are all sorts of ways you can sonic it'; 'you might have seen it in the Argos catalogue or on adverts' and 'there's only one of it', plus 'Other people can play different characters'. Freddie's expressed preference for play with this toy echoed aspirations expressed by those with an interest in play with computer games. Freddie noted the social benefits to play with this commercial toy, in that other people may play different characters. He particularly liked its versatility. He also liked the fact that this toy was unique, yet also part of children's mainstream culture.

Dolls

Three girls expressed a preference for play with dolls. Reasons for such preferences included dolls being in ample supply; to alleviate boredom or keep children occupied and for the specific multiplayer features or attributes of commercial dolls. Evidence to support these findings in the transcripts may be found in Figure 6.16. In relation to the children's favourite doll themes, the girls tended to challenge the objectification of female characters and the expectation of women to be passive. For example, Ophelia challenged stereotypical representations of girls and women by expressing her preference for dolls with 'thicker' waists, and Lily expressed her preference for the more menacing design of the *Monster High Dolls*.

Evidence of dolls being in ample supply in the home:

Ophelia: 'I have got lots at home'.

Lily: 'I go to my friends house and she's got loads of dolls'.

Evidence of dolls being used to alleviate boredom/keep children occupied:

Suzie: 'If I am grounded, my mum lets me go and play with them.'

Lily: 'When I get bored, I go upstairs to play with them.'

Evidence of the appeal of commercial dolls:

Ophelia: 'They are a bit like Bratz, except their waist is a bit thicker and their hair is a lot longer.'

Lily: 'They are dolls, but they can turn into monsters like on the adverts.'

Figure 6.16 Justification for the Children's Preferences for Play with Dolls.

Soft Toys

The majority of children with an expressed interest in soft toys were girls. Five girls and one boy chose soft toys as their toy preference. Reasons given were sentimental (i.e. attachment to a gift from family member or respected adult), multi-functional aspects and their ample supply. Evidence to support these findings may be found in Figure 6.17. Again, the social aspects were a key motivator for the children's engagement in play with soft toys. Luke, for example, prioritised his teddy over all other toys and games. He informed the researcher: 'If I had to get rid of all the other stuff, I'd like to keep the teddy...he did mean a lot to me'. The personification of soft toys and their role in the children's lives is also emphasised in Figure 6.19. Many of the children expressed an emotional attachment to their soft toys, attaching human qualities to them, and even using them as an indicator to their self-worth, for example, when Joanna noted 'She likes me very much'.

Evidence of sentimental attachment to toys:

Luke: 'Well, even though Mum said he was all ragged, (...) he did mean a lot to me.'

Amber: 'I really like her because I had a hand accident, but then Mrs Winters in Year One, she gave me this toy, Lucy, to make me feel happier, so I'm going to keep it all my life because I really like Mrs Winters.'

Evidence of the appeal of multi-functional aspects:

Rosie: 'They turn into a pillow. I've got two of them and you can wrap your pyjamas inside them.'

Evidence of the personification of soft toys:

Joanna: 'She likes me very much and she loves playing games.'

Eve: 'Because Amelia came to my party and she was my best friend like Colleen.'

Amber: 'She is really cute and really cuddly. I have a feeling sometimes that she is really alive because I love her so much.'

Figure 6.17 Justification for the Children's Preferences for Play with Soft Toys.

Cars

Two children expressed an interest in play with toy cars - one boy and one girl. Reasons given for their preference in play with cars differed. Tim found the specification of his remote control car appealing, in that it could 'do skids and drive up walls'. He also liked the way in which he could play with his cars with his friends, noting 'I have two of them, so you can control them with the other.' Joanna, on the other hand, was precious over her toy Jeep, a life-sized power-riding car. Jessica noted 'It's mine and it's not a toy and it's very real. It's not like a car, it's actually a Jeep and it's red'. This comment suggests that in Joanna's view, having ownership of this toy and its exclusivity made this particular toy most favourable.

6.4.3.2 Expressed Preferences from the Toys and Games Boards

In order to probe further into the children's play preferences and their needs and aspirations for meaningful play, the researcher presented two boards to the children, which were filled with numbered images of toys, games and play spaces, as featured in Figure 6.18. The 'Toys and Games' boards were presented to the children in a bid to stimulate group discussion. This was a successful strategy in that it encouraged the children to broaden their discussion on toys and games. The majority of the children were drawn to images of toys and games distinct from those previously discussed. In response to the 'Toys and Games' boards, they expressed aspirations for complex play/learning (including play with art kits, microscopes and chemistry sets, sand, *Play-Doh* and cookery); play with videogames (such as *Guitar Hero*, *Grand Theft Auto*, *X-box* and internet games on *Facebook*, *iPod* and *Nintendo DS*); outdoor play on obstacle courses and in adventure playgrounds; exercise play (including cycling, bouncy castles, football, dance and swimming) and board games. Each of these play types are discussed in detail in the next section.

Complex Play/Learning Play

In response to the 'Toys and Games' boards, four girls and three boys expressed an interest in more complex play activities. Reasons for their expressed interest in this play type varied. Justification for these preferences included the social aspects; alignment with career aspirations; the opportunity to relax or alleviate boredom and be creative and the motivation for challenge or rewards, as evidenced in Figure 6.19. It is worth noting that some children chose not to go into detail with the reasons behind their expressed play preference in their responses.



Figure 6.18 Toys and Games Boards.

These boards, referred to as the 'Toys and Games' boards were presented to the children in each participating school in a bid to stimulate group discussion during the second set of focus group discussions.

Social aspects/shared interests with peers:

Ophelia [regarding art kits]: 'Because you can all paint together'.

Dylan [regarding the chemistry set]: That's what I would like to play with and my friends would like to play with that'.

Alignment with career aspirations:

Ophelia: 'I want to be an art teacher when I grow up'.

Alleviating boredom:

Lily: 'Art because when you are really bored, you can do loads of pictures'.

Figure 6.19 Justification for the Children's Interest in Complex Play and Learning.

Videogames

In response to the 'Toys and Games' boards, five boys and one girl expressed an interest in play with computer games. Reasons for their expressed interest in play with computer games included the variety and choice of games available; learning opportunities; the social aspects; music interests; the versatility of the devices and access to specific games and devices. Justification for the children's preferences for play with videogames, in response to the 'Toys and Games' board may be found in Figure 6.20. In the children's feedback, the social aspects of play gave videogames the greatest appeal, with four boys and one girl emphasising the social benefits.

Evidence of the children's preference for variety and choice:

Dawn: 'There are loads of things, music singing and guitar and drums. You could all take turns and it teaches you how to play the drums'.

Evidence of the children's interest in learning opportunities:

Dawn: 'It teaches you how to play the drums'.

Evidence of the children's interest in social play:

Dawn: 'You could all take turns'.

Tim: 'If you have another one, you can connect them and play and have a race against each other. You can be on a team.'

Flint: 'Because you can play Black Ops on it with your friends'

Figure 6.20 Justification for the Children's Interest in Play with Videogames.

Imaginary Play

One child, Freddie, expressed an interest in the obstacle course and adventure playground included in the 'Toys and Games' board. Rather than describing the physical appeal of the level of exercise involved in this type of play, he explained 'It's just that those two are imaginative'. This supports anecdotal evidence provided by his class teacher to suggest that this child had specific aspirations to engage in imaginary play.

Exercise Play

The majority of children with an expressed interest in exercise play in their response to the 'Toys and Games' boards were girls. Four girls and two boys expressed an interest in this type of play. Preferred activities included cycling; play on bouncy castles; dancing and swimming. Reasons given for the children's play aspirations included denial of access and issues of accessibility. Examples of the children's preferences for exercise play may be found in Figure 6.21.

Evidence of denial of access to play resources or opportunities:

Freddie: 'That[s] because I want to learn how to ride a bike, but I don't have a bike.'

Evidence of one child's desire to be fit:

'I really like dancing and it just gets you fit'

Evidence of inclusive activities:

Amber (regarding dance): 'Everyone can join in'

Figure 6.21 Justification for the Children's Preference in Exercise Play.

As highlighted in Figure 6.21, this discussion enabled the researcher to learn not only about the children's play aspirations, but the barriers that they currently encounter. For example, the 'Toys and Games' board, prompted Freddie to express his desire to learn to ride a bike. It became evident that his desire to engage in this type of play stemmed from having been denied access to such play equipment.

6.5 Analysis and Discussion

6.5.1 Interpretation and Explanation of Results

Focus group discussions and mind mapping activities in schools participating in the Together through Play project provided evidence of the social and physical

exclusion of the disabled children from play identified in Chapter 5. Exclusion from play for each of these children was largely a product of the negative attitudes of class peers and others and failures in the organisation or facilitation of play activities on the part of school staff, parents and carers and classmates. It is worth noting that much like their non-disabled counterparts, children with physical impairments also perceived disabled people in a negative light. Negative assumptions about disabled people featured heavily in comments made by both disabled and non-disabled children. Low expectations and assumptions based on social incompetence or the dependency of disabled people (Paterson & Hughes, 1999) were evident in the focus group discussion transcripts.

These findings help to explicate and contextualise the negative self-perception of the disabled children and ways in which their on-going exposure to social and physical exclusion was internalised. For example, it was identified that Freddie felt socially excluded by other children as a result of his physical impairments - a product of 'ableist' cultures (Burstow, 2003, Campbell, 2008). The negative impact of these ableist views is also evident in the self-deprecating comments made by James and Joanna. On reflection, ableist views and negative assumptions about disabled people permeated the children's discussions in participating schools.

The approval-seeking behaviour evident in the peer-interactions of disabled children such as James and Joanna, are a reflection of their negative self-perception and internalised assumptions of inadequacy. Similarly, the approval-seeking behaviour of the non-disabled children, evident in the way in which children such as Eve made politically correct comments, or seemingly told the researcher what she assumed she might like to hear, reflects views of the personal tragedy theory of disability. The personal tragedy theory suggests that disability is 'some terrible chance event which occurs at random to unfortunate individuals' (Oliver, 1996, p.3). Furthermore, Punch (2002) noted that children often feel pressured to give the 'right' answers to research questions, and, on reflection, this problem seems to have been further compounded by the sensitivity of disability as a discussion topic for the children.

6.5.2 Response to the Research Question - the Role of the Designer

This thesis examines the role of the designer in the facilitation of meaningful play between disabled and non-disabled children. It was identified during focus group discussions and mind mapping activities in participating schools that the design of some toys and games can contribute to the social and physical exclusion

of some children through play. Exclusionary design features identified during the focus group discussions and mind mapping activities include the following:

- **Games with specific or limited player numbers**, resulting in other children being left out
- **Fragile or expensive toys and games**, resulting in children being excluded in fear of their toys or games being damaged or easily broken by others
- **Toys losing function** being a particular frustration to some children, leading to them becoming disengaged
- **Toys with small parts that are easily lost** being a particular frustration to some children and discouraging some children from playing with others
- Poor quality graphics or uninspiring designs being unsatisfactory for some children
- **Gender-specific games** leading to girls being excluded from play
- **Games with an inappropriate level of difficulty**, for example, games that are too easy or too difficult to play
- **Violent videogames** causing some children to feel distressed
- **Incompatible games/consoles** meaning that some games cannot be shared or played with together

It was also identified that some design features could be particularly inaccessible and problematic for disabled children. Examples identified are as:

- **Games that are difficult to understand, operate, or navigate.** For example, fiddly buttons on games consoles, games without a pause button, or unclear instructions
- **Toys and games that provide an inappropriate level of feedback.** For example, too little or too much feedback, repetitive technical errors, insufficient sensory prompts or games that provide sensory overload
- Games that create a **power imbalance** between players
- **Expensive toys and games** that are difficult to replace or repair should they be damaged

In addition to the challenges they create for disabled children, such design flaws may also be problematic for non-disabled children. For children with physical impairments, however, they may be more limiting and contribute further to their exclusion from play. For example, as a deaf child, Joanna, noted that games with limited visual feedback were confusing and frustrating for her to play with, and Suzie noted that her Mum, as a parent of a disabled family, simply could not afford to buy replacement parts to broken toys and games. Such barriers further compound the problems encountered by disabled children as an already marginalised group. Thus, designers have a significant role to play in enabling meaningful play between disabled and non-disabled children. There are things that designers can do help mitigate the barriers to meaningful play for disabled children and to enhance their play experiences. The challenge for designers, therefore, is to address multiple considerations including affordability; robustness; multiplayer functionality; player autonomy; ease of function/control, quality and aesthetics.

Exclusion from play had a profound effect on some of the disabled children, including Flint, Freddie and Joanna. Thus, designers have a duty to improve the play experiences for disabled children. However, it was identified during the focus group discussions that some aspects of play are out of the designer's control. For example, some children identified barriers created in the organisation and facilitation of play activities, yet designers cannot be responsible for the actions of gatekeepers or the negative attitudes of peers and others. Through this study and future research, however, designers may suggest ways of facilitating children's play activities in more meaningful ways. They can also make design decisions that challenge assumptions about disability, drawing upon disability studies perspectives and research from the sociology of childhood.

6.5.3 Justification for the Focus Group Discussions and Mind Mapping Activities

Focus group studies and mind mapping activities were employed with the intention of developing understanding of children's needs and aspirations. These methods were effective in creating a relaxed environment for the children and creating a space in which they could freely share their views with the researcher. The focus group studies were successful in generating discussion amongst the children and this is evident in the sheer length of the discussion transcripts. The impersonal approach to questioning was an ethically sound approach to take as it enabled the researcher to avoid singling-out or labelling individuals. Most of the disabled children appeared to speak from personal experience and although in

some cases, children may have been describing hypothetical situations or their observations of others, this approach gave insight to their social worlds.

One of the benefits of facilitating focus group discussions alongside mind mapping activities was that it flagged up hidden data. For example, despite a number of negative comments being expressed by the children during the focus group discussions, these views were omitted from their mind maps. Carrying out focus group discussions and mind-mapping activities side-by-side enabled the researcher to identify these gaps. Although there was evidence of some approval seeking behaviour (Morgan, 2002) taking place during the focus group studies and in some of the mind mapping activities, the children's comments still had value - they provided insight to the norms and expectations within their social worlds.

The focus group discussions encouraged the children to ask questions and to challenge ableist assumptions. Schools could potentially use similar methods in an attempt to challenge ableist assumptions and negative attitudes towards disabled people in the future. For example, by the end of the initial focus group discussions, Joanna, Eve and Amber's comments resonated those of McRuer (2002) on the notion of disabled and non-disabled bodies, which suggest that everyone is virtually disabled in the sense that able-bodied status is temporary, and that everyone one of us will embody disability, if we live long enough.

Some children even made some positive suggestions regarding the language employed in certain games. For example, rather than adapting games to be more inclusive of disabled children, Amber suggested games could be 'upgraded' to be inclusive of disabled children - a much more positive use of language. In addition to the children's more enabling perspectives, designers can learn a lot about the design of toys and games from a child's perspective. The children made some positive suggestions regarding the improved design of toys and games. The most popular suggestions included giving children greater autonomy in a game and providing interesting or more complex themes.

Suggestions in relation to game themes included avoiding stereotypes; toning down the violence in videogames, introducing more child friendly theme (as with games such as 'Simon Says') and giving children the opportunity to make things and explore. Suggestions in relation to specific game features included issuing more meaningful rewards in game play; enabling children to learn as they play; improving the longevity of games (i.e. enabling children to return to a particular point in an online game); multiplayer options and ensuring the compatibility of games consoles. Children also suggested improving the overall quality and visual

appearance of toys and games - for example, with the use of more realistic graphics and inclusion of more exclusive features, such as limited edition colours.

There is a gap in the market for inclusive toys and games. This finding was identified during the initial stages of this research. There are also limited opportunities for disabled and non-disabled children to interact socially in out-of-class activities. Enabling children to form social bonds; establish familiarity and share ideas and find games of mutual interest becomes problematic when a limited number of inclusive games or activities are provided or facilitated. Within the literature, Driscoll and Carter (2009) found that the availability of toys intended for social play increased the social interaction of disabled children in an inclusive preschool, yet the impact of toys on the social interactions of children of 7-11 age has not previously been explored.

6.5.4 Critical Evaluation of the Focus Group Discussions and Mind Mapping Activities

Although the focus group studies were successful in generating meaningful and in-depth discussions amongst the participating groups, mind mapping was not a suitable activity for everyone. Some groups, including the children at Willow Primary School, articulated their views confidently through mind mapping, whereas other groups, such as the children at Aspen and Woodlands Primary School, did not. The boys at Aspen Primary School simply disliked writing tasks, whereas the children at Woodlands Primary School were younger than the other groups, putting them at a disadvantage when faced with written task. Mind mapping was an appropriate and useful tool for discussing sensitive topics with the children, for example, the discussion of social exclusion with Joanna. Mind mapping was a suitable method of data collection for Joanna as she was able to express her feelings in writing. She did not articulate her views about her negative play experiences explicitly during the focus group studies.

There were limitations to the use of focus group studies. Some children, such as Eve, had a tendency to dominate group discussions, silencing the voices of their peers. Israel and Ophelia lost concentration during discussions and others, such as Joanna, Flint and Rosie, misunderstood some questions. As a result, some children required additional time to respond. In other cases, external influences affected the validity of the data. As previously noted, some children engaged in approval-seeking behaviour. Language barriers also prevented children such as Amber, Joanna, Freddie, James and Luke from articulating their views. Some children were uncomfortable with some of the discussion topics. For example, at St Amelia's RC

Primary School, Freddie was notably distressed by Dylan's detailed description of violent videogames. Similarly, at Woodlands Primary School, Flint was too upset to describe his play preferences. This was due to a distressing incident with his peers earlier that day.

Some children encountered barriers to participation in the focus group discussions for reasons beyond the control of the researcher. For example, James left the room on his own accord during one of the focus group discussions and was notably upset at having missed part of the conversation when he returned. This affected his interactions with the other participants and acted as a barrier to participation in the discussion. However, due to the limited time available, the researcher was unable to put the discussion on hold for this break. Other factors that may have contributed to children's lack of confidence in group discussions or mind mapping activities included the age of the child; their existing knowledge and experience; different teaching styles; time pressures; the child's language skills and communication preferences, plus their differing levels of confidence. Although the researcher should not speculate upon the reasons behind a child becoming disengaged, disinterested, or lacking in confidence in one or more of the research activities, she can conclude that a 'one size fits all' method is inappropriate for children of this age group - *all* children are inherently different and each one has different skills, knowledge, experiences, and preferences.

In her analysis of the focus group discussions, the researcher carefully read and reread the transcripts, in search of emergent themes. This involved searching for keywords, themes and trends that would help inform the analysis (Braun & Clarke, 2006, pp.7-8). Her analysis followed the 'sociological tradition' (Tesch, 1990), through which text is analysed as a proxy for experience. This approach is concerned with perceptions, feelings, knowledge, and behaviour in the text, which is often generated by the researcher's interaction with research participants (Braun & Clarke, 2006). As previously noted, it was originally the intention of the researcher to employ the use of qualitative data analysis software such as *NVivo*. However, the researcher soon identified that the *unsaid* things were revealing in the context of children's experiences, as well key words identified in the data. The children also tended to say things in 'child-speak'. For example, rather than explicitly stating 'I was excluded', the children were more likely to make statements such as 'they might pick on you', further emphasising the need for the analysis of research transcripts to be undertaken by hand. Bazeley & Jackson (2013) have also noted that data can become fractured when softwares such as *Nvivo* are used.

Some themes were intertwined in the children's mind maps and focus group discussion transcripts. For example, by asking children about barriers to play with other children, the researcher often learnt about their aspirations, and vice versa. It was insufficient for the researcher to rely solely upon her research schedule for insights to children's views as many of the children did not respond to direct questioning. There was also some ambiguity in the children's responses to the researcher's questioning during the focus group discussions. The children's answers were not always clear-cut. For example, despite describing a game that he disliked, Dylan also noted that there were aspects to the game that he enjoyed and when asked about their favourite toys and games, many of the children expressed an interest in more than one toy or game.

It is worth noting that adult researchers may not always be familiar with children's use of language. For example, Dylan mentioned children doing 'Scoosh tricks' and the researcher was unsure what was meant by this phrase. In this regard, the children were knowledge brokers (Marsh, 2012) in the research process. Marsh (2012) argues that as knowledge brokers, children have a key role in organising and passing on knowledge about their own cultural practices to adult researchers in projects focused on examining the cultures and practices of childhood. She warns, however, that it is much more difficult for adults to be as familiar with this knowledge, such as children's media texts, as children are surrounded by such media everyday, whereas adults are not. Morgan et al. (2002) also noted differences in the language used in the social worlds of children. Like Morgan et al. (2002), the researcher sought clarification on the children's views by attempting to ask carefully probing questions. However, this was not always possible. For example, if a conversation deviated to another topic, or if time was pressing for the researcher to move onto another question. In some cases, further probing was unfruitful, as the children were simply unable to expand upon their previous ideas.

From a design perspective, some of the children's suggestions would be impossible for designers to achieve. For example, Freddie expressed aspirations for play that would enable teleportation and time travel and Ophelia also expressed the need for a force field around her toys. Although it may not be possible for designers to create such resources and opportunities for children (yet), they can use the deeper meaning of the children's comments to inform their work. For example, from their comments, it can be understood that Freddie clearly wanted to escape in some way and that Ophelia simply wanted her toys to be protected and to have ownership of her playthings. Hence, designers could use children's focus

group discussion data to explore opportunities for enhancing children's play experiences in the future.

The research team had to be selective with some of the data generated through the focus group discussions. For example, some children, including Dylan, made some inappropriate suggestions for games to be made more gruesome or gory. Such play preferences present a tension for designers and a dilemma for schools. Although this issue falls beyond the scope of this study, it is widely reported that access to inappropriate content is potentially harmful to children aged 7-11 (Hasebrink et al., 2009; Sharples et al., 2008; The Gallup Organisation, 2008). This would suggest that designers do have a role to play in ensuring children's wellbeing in the gaming industry. Other suggestions made by the children simply followed technological trends in adult worlds, for example, making products bigger and lighter. It is hard to say whether such suggestions would make play more inclusive - these suggestions may just be down to children's personal preferences and a reflection of cultural and technological trends at the time. This is one of the key challenges for designers - responding to the diversity of children's preferences. Ophelia summarised this point succinctly, stating:

Most games aren't fun because some kids might not like that game and you have to think about the games that you can all play and that you will all like and that will make you all laugh and smile.

The children employed different communication methods when engaging in focus group and mind mapping activities. For example, Amber and Eve at Willow Primary School developed their own method for sorting and evaluating play types. They divided play into two categories - play with toys and gameplay, whereas others merged play with toys and gameplay together. This suggests that children should be involved in the design of research tools. Although it may have been beneficial to engage children in the research design and to cross-check the research methods employed, there simply was not the time or the resources to enable them to do so.

6.5.5 Recommendations for Practice

Potential strategies for overcoming some of the limitations of the focus group discussions and mind mapping activities included:

- **Planning research activities with teachers** - this may enable researchers to find out about the different skills, knowledge, experiences, and preferences of the children and any potential challenges
- **Engaging children as co-designers of the research process**, working with the children to develop research tools and data collection methods
- **Engaging in member-checking with children** in order to ensure that the researcher has interpreted the results correctly
- **Exploring alternative forms of data collection** - for example, exploring the use of video diaries for those who dislike, or are disengaged with, written tasks, or using imaginative writing to discuss sensitive topics
- **Including more frequent breaks for the children**, in order to mitigate against a loss of concentration and enable the children to remain focused
- **Adapting research activities to the needs of the children** - for example, simplifying language for children with communication impairments or building additional time in to research activities

6.6 Analysis and Discussion

Focus group discussions and mind mapping activities with the children on the topic of play and toys and games were worthwhile. They enabled the researcher to gain rich insights to the children's play experiences and their needs and aspirations for play. The researcher was also able to develop a deeper understanding of the factors that contribute to meaningful play between disabled and non-disabled children. This section summarises the implications of the findings of the focus group discussions and mind mapping activities. Section 6.6.1 examines what was learnt about meaningful play through the focus group discussions and mind mapping activities in participating schools. Section 6.6.2 examines what was learnt about working with and giving voice to disabled children and Section 6.6.3 examines the issue of conveying this learning to designers.

6.6.1 Meaningful Play

This section examines what was learnt about meaningful play through focus group discussions and mind mapping activities undertaken in participating schools. During focus group discussions and mind mapping activities, it was identified that both disabled and non-disabled children encounter barriers to meaningful play. The distinction for disabled children is that, as an already marginalised group, the

problems are further compounded. Play that is meaningful between disabled and non-disabled children has to be inclusive of both. Moreover, when toys and games are enhanced to be more accessible to disabled children, non-disabled children benefit too. From a theoretical perspective, it may be helpful for designers to deconstruct assumed normality (Campbell, 2008) and to avoid preoccupation with impairments.

Although many of the non-disabled children shared aspirations for meaningful play with their disabled peers, it was evident that rather than challenging the processes that lead to internalised oppression (ableism), some of them sympathised with these negative assumptions, supported segregation and viewed disability from a 'personal tragedy' (Oliver, 1996) perspective. In order for disabled children to engage in meaningful play with non-disabled children, these negative and ableist assumptions will need to be addressed, be it through the work of designers or in the culture of schools and the wider society.

6.6.2 Working with and Giving Voice to Disabled Children through Focus Group Discussions and Mind Mapping

This section summarises what was learnt about working with and giving voice to disabled children through focus group discussions and mind mapping activities. The Focus group discussions and mind mapping activities undertaken in participating schools emphasised the importance of listening to disabled and non-disabled children through the research process and unpacking some of the problems with them. In this regard, the children were clearly the experts of their play experiences. They made some good suggestions about the design of toys and games, which may be used by designers to inform their practice. They also set a positive example to designers with some of their more inclusive attitudes and views on this topic.

For disabled children, the focus group discussions and mind mapping activities were not without fault. Joanna, as a deaf child, sometimes misunderstood questions. Children with upper-limb and motor impairments, such as James and Freddie, refrained from participating in written tasks. Flint, on the other hand, found some topics too sensitive to discuss in front of the other child participants. It is worth noting that non-disabled children also encountered barriers to participation during the focus group discussions and mind mapping activities. For example, some of the children selected for participation in the friendship groups lost concentration, some had limited vocabulary and others disliked writing.

From this study, we can conclude that all children are unique. In addition to expressing individual needs, aspirations and preferences for play, the children

opted for different means of communication through the research process. It was important, therefore, for the researcher to tailor the research methods to their needs. Based on this study, a mixed-method approach is recommended for giving voice to disabled children. For example, where Joanna, was unable to describe her negative feelings during focus group discussions, she could do so freely through her mind map. Not only was it beneficial for the researcher to be responsive to the needs of the disabled children through the research process, a flexible approach was beneficial to the non-disabled children too, particularly those disinterested in writing tasks or those disengaged by the involvement of more dominant peers.

6.6.3 Conveying what was Learnt to Designers

This section discusses the issue of conveying what was learnt about working with and giving voice to disabled children through focus group discussion and mind mapping activities to designers. The researcher presented the findings of the focus group discussions and mind mapping activities to undergraduate students participating in the study in the form of short reports and written summaries (see examples included in Appendix E). In addition, weekly team meetings with the students took place during term time and research tools such as the 'Toy and Game' boards (see Figure 6.18) and anonymised data generated by the children, including mind maps and focus group discussion transcripts (see Appendix E and F), were presented to the students. The benefit of delivering a short report to the students was that it enabled the researcher to condense the vast quantities of data and present it in more digestible chunks. The limitation of this approach was that the researcher had to interpret the results and select the key points of learning. Debriefing sessions enabled the team to discuss the findings in detail and ask questions. Although the students may have benefitted from speaking to the children in person about the focus group discussions and mind mapping activities, safeguarding policies at the University of Leeds would not permit such interactions to take place.

Accessing anonymised mind maps and transcripts of focus group discussions led the undergraduate students to engage with the research data emotionally. Although student perspectives shall be examined in detail in Chapter 8, it is worth noting their overall response at this point. Anonymising the data by assigning pseudonyms names to the children dehumanised the data for the students - children were transformed into specimens or subjects of the research rather than active human beings engaged in the research process. Transcriptions and mind maps required detailed analysis. Perhaps the undergraduate students may have

benefitted from the presentation of data that had undergone multiple iterative cycles through the process of applied thematic analysis.

At the point at which the written summary/short report on the research findings was presented to the undergraduate students, one iterative cycle had been undertaken. It is possible that the students may have benefitted from the opportunity to reflect upon the research findings with her and participated in the data analysis with her. Similarly, engaging the children in this process could help to give voice to disabled children. The children made their mark on the research methods employed, in that they developed their own techniques for describing their favourite toys and games, and at times chose to deviate from the research schedule, in order to discuss topics of significance to them. In order for designers to foreground the voice of disabled children through research in the future, the possibility of including disabled children in research design and the development of suitable research methods could be explored.

Focus group discussions and mind mapping activities emphasised the importance of this research topic and conveying the experiences of disabled children to designers. The way in which issues of social and physical exclusion were internalised by the disabled children, and the negative impact this had on their self-perception, stressed the significance of this research area for designers. In this chapter, the role that designers might play in the facilitation of meaningful play has been discussed in detail. The next chapter examines the role that children might play in generating new designs and concepts for meaningful play between disabled and non-disabled children and whether or not this is an achievable goal for design teams involving children.

Chapter 7

The Children's Design Study

This chapter is the third of four findings chapters that feed into Chapter 9. Moving on from the focus group studies and mind mapping activities presented in Chapter 6, this chapter examines design concepts developed by the children and their reflections upon the designs developed, through evaluation. Design and evaluation sessions were part of the second phase of the research - the process of cooperative inquiry (Heron, 1996; Druin, 1999). This involved conducting research 'with' rather than 'on' people (Heron, 1996, p.1) and 'an approach to creating new technologies for children, with children' (Druin, 1999, p. 592).

Aims

By examining the design activities undertaken in schools participating in the Together through Play project, this section aims to:

- a.) Reflect upon the lessons learned about meaningful play between disabled and non-disabled children through participatory design
- b.) Examine the process of working with and giving voice to disabled children through participatory design
- c.) Critique the use of participatory design methods with disabled and non-disabled children and the ways in which findings may be conveyed to designers

These three foci are part of the body of methodological work that leads into Chapter 9.

Scope

During the summer of 2012, the researcher facilitated three design sessions and one evaluation session with friendship groups in each participating school. These sessions were designed to generate rich discussion with the children and foreground the voice of the disabled children, in order to enable the researcher to develop an in-depth understanding of their needs and aspirations for play. There were additions to the friendship groups recruited for participation in the study at this stage. Dawn and Holly joined the friendship group at St Amelia's RC Primary School, as their request to participate in the study had been granted by their class

teacher. Dawn and Holly were then included in research activities at the school, for the remainder of the project.

Limitations

The researcher took responsibility for the facilitation of all design and evaluation sessions in each participating school. By taking ownership of this role, it was anticipated that she would be able to gather data efficiently; develop understanding of the data; and encourage the children to focus upon toy and game design, plus any relevant research topics, in a safe and inclusive manner. Although the researcher has extensive experience as a design practitioner and teacher of design, she did not teach the children about design practice. Nor did she attempt to inspire or influence their design ideas. Rieber (1996) argued that any attempt for one group, such as teachers, to decide upon what another group, such as students, should learn is 'at best, misleading and at worst, unethical'. Hence this chapter does not examine teaching and learning in design with children - it simply reflects upon the original designs developed by the children and their evaluations of the designs developed.

Structure

Regarding the structure of this chapter, Section 7.1 provides a background to the design and evaluation sessions with children, drawing on key additional references. Section 7.2 examines the methods employed during the design and evaluation sessions in participating schools. It includes two sub-sections: one on the participants involved and the other on the research instruments used. Section 7.3 describes the procedure, namely a report of what happened during the design and evaluation sessions and Section 7.4 provides the results of the design and evaluation sessions. Section 7.5 presents an analysis and discussion on the design and evaluation sessions and Section 7.6 draws conclusions from them, including what was learnt about meaningful play (7.6.1), working with and foregrounding the voices of disabled children (7.6.2), and conveying this to designers (7.6.3). The next section examines existing research in the area of participatory design with children. This provides a background to this findings chapter and references some of the key literatures used to inform the design and evaluation sessions undertaken in schools participating in the project.

7.1 Background to the Design and Evaluation Sessions

This background section draws upon some of the key references, first introduced in Chapter 2, that were used to inform design and evaluation sessions

undertaken in schools participating in the project. Issues of social and physical exclusion can be difficult to discuss with children. They are also referred to as 'wicked problems' (Rittel and Webber, 1973) - a term used to describe problems that are difficult to solve due to incomplete, contradictory or changing requirements that are usually difficult to identify. Design problems are often 'wicked' as they are ill defined, involve different stakeholders and offer no clear solution (Conklin, 2005). Thus, the application of standard methods cannot be used to solve wicked problems - they require creative solutions (Conklin 2007).

Due to the complex nature of this research topic, design and evaluation sessions in participating schools were informed by a research by design method (Frayling, 1993). Research by design is an approach to action research through which the process of designing and evaluating a product for a situation becomes a vehicle for developing understanding of the situation - actively involving children in developing and testing ideas and creative solutions. Drawing upon research into special methods and considerations for engaging children in design (Druin, 1999; Markopoulos et al. 2008), it responds to the issue of engaging disabled children in the design process - an under-researched area, as identified in the literature review.

Design and evaluation sessions undertaken in participating schools were informed by Druin's (1999) method of co-operative inquiry - an established technique for engaging children in the design process, which was further extended to address designing with children with 'special needs' (Guha et al., 2008). Co-operative inquiry (Druin, 1999) involves the process of developing and evaluating designs with children as a basis for exploring their views. It was anticipated that hypotheses about children's aspirations for meaningful play and barriers encountered by the children, would be embodied in the children's designs, which would become probes for eliciting feedback and stimulating discussion.

Although it is widely recognised in the field of participatory design with children that the cooperative Inquiry design approach can enable children to contribute to the design of new technology, not only by evaluating software, but also by generating new design ideas (Druin, 1999), some design researchers have reported difficulties in involving children in the process (Marti and Banon, 2009). Giannakos and Jaccheri (2013) noted that in creative programming activities with children, there is a trade-off between collaboration and control. The original intent of cooperative inquiry was to involve teams of adults and children (Guha et al., 2013).

Within the area of participatory design with children, there are examples of children employed as users, testers, informants and design partners (Druin, 2002),

but not as independent designers in their own right. Differing levels of child, adult and peer involvement can have a significant impact on a child's sense of value and empowerment in participatory design. Moreover, despite multiple examples of disabled children being engaged in the design of toys and games (Bartoli et al., 2014, and Malinverni, et al., 2014), there is little evidence of design and evaluation sessions being undertaken with disabled and non-disabled children together.

Some researchers have highlighted the challenges in enabling meaningful participation for children engaged in design projects. Sawyer (2003) argues that the school environment can be particularly problematic as it can inhibit natural creativity (Sawyer, 2003) and Antle et al. (2014) raised the issue of enabling children's 'meaningful participation in dialogue' (Antle et al., 2014, p. 39). Regarding children's creative abilities, although children often demonstrate expressive spontaneity which adults find pleasing (Cropley, 2001), the issue of translating research findings into 'actionable design decisions' (Antle et al., 2014, p. 39) that may be used to inform design considerations is often overlooked. It is argued that children's lack of knowledge and understanding of the design process prevents them from make a lasting contribution (Feldman, 2003).

Such assumptions may also influence the way in which adult researchers use designs developed by children. From an ethical standpoint, others raise concerns over the lack of transparency in participatory design processes with children (Read et al., 2014), which can leave children and future design researchers misinformed and hinder learning. With an awareness of the issues that can affect the balance of power amongst design teams consisting of children and adults, the next section reflects upon the design and evaluation sessions undertaken in participating schools. It focuses on the children and the research instruments used.

7.2 Method

7.2.1 Method for Facilitating Design and Evaluation Sessions

Shortly after the focus group studies and mind mapping activities were completed, the researcher led three design sessions and one evaluation session at each of the participating schools. This was part of phase three of the research - the process of participatory design with children. As discussed in Chapter 3, participatory design involves the process of designing *with* rather than *for* users (Sanders, 2002). During a two-month period, the researcher visited each participating school for two hours per design and evaluation session. This involved a 30-minute pre-session discussion and briefing, 1 hour for design and evaluation

activities, plus 30 minutes for packing up, questions, and accompanying the children back to class.

Design and evaluation sessions were inspired by the cooperative inquiry and participatory design low-tech prototyping techniques developed by Druin (1999) and other researchers from the field of Human Computing Interaction (Guha et al., 2004; Walsh et al., 2010). The desired outcome of this phase of the research was not to develop new products, but to develop a greater understanding of the children's needs and aspirations through feedback and interaction with conceptual designs and prototypes. It was anticipated that this process would be more fruitful than straightforward interviewing with the children.

The process of engaging children in the development of ideas for toys and games, and evaluating prototype toys and games with them, became a 'probe' for discussion. It was not the intention of the research team to assess these artefacts as 'good' or 'bad' toys and games in their own right (Holt et al., 2013). This stage of the research involved critical design. 'Critical design' is defined by Dunne and Raby as 'design that asks carefully crafted questions and makes us think, as opposed to design that solves problems or finds answers' (cited in Pullin, 2009, p.121). Druin (1999) suggests that as children may find it difficult to communicate what they are imagining to adults, prototyping enables them to discuss ideas in a concrete way.

The research sample included all children involved in the focus group discussions and mind mapping activities, with the addition of Holly and Dawn at St Amelia's RC Primary School - two pupils given permission to participate in the study at the discretion of their class teacher. Whole classes and school staff were not included in the design and evaluation sessions for reasons given in Section 6.2.1. Design and evaluation sessions took place in meeting rooms and spare classrooms, separate from the children's regular classrooms. Such research settings were used with the intention of causing as little disruption as possible. It was also hoped that alternative spaces would distinguish the project from regular classroom activities and allow space for creativity and open discussion.

7.2.2 Research Instruments used During Design and Evaluation Sessions

In preparation for design and evaluation sessions at schools participating in the project, the researcher designed a semi-structured interview schedule (see sample E.1 in Appendix E). This included a session plan and list of questions that would be used in order to bring structure to discussion, emphasise the research questions and ensure a level of consistency throughout the design and evaluation sessions.

Questions included in the interview schedule were designed to be inclusive of both disabled and non-disabled children. They were also designed to enable the children to share information about their experiences - providing insights that cannot currently be found in the literature.

Resources prepared for each of the design sessions included general art and design supplies inspired by the *Bags of Stuff* (Druin et al., 2001) approach to cooperative inquiry, a prototyping technique through which large bags filled with pre-determined art supplies are used to enable children to create low-tech prototypes. In addition to the use of general art supplies such as paper and pens, the researcher sourced mixed media/collage materials from S.C.R.A.P. - a local social enterprise focused on helping the environment by reusing waste materials from businesses as resources for art and play. These materials were provided in a bid to spark the children's imagination and to enable them to develop affordable, low-tech prototypes.

7.2.2.1 Briefing

Due to the length of time between school visits, time was built into the start of each design and evaluation session for a briefing with the children. The researcher designed a briefing and script to be read and presented to the children at the start of each session (see samples E.3 and E.6 in Appendix E). Each briefing script was designed to reinforce the aims of the project and the aims for the session. It was intended the briefing would then lead seamlessly into the focus group discussions.

7.2.2.2 Focus Group Discussion Topics (Session 1)

Semi-structured interview questions developed for the first set of design sessions in participating schools were designed with three main purposes in mind - firstly, to enable the researcher to gain insight to children's knowledge and understanding in relation to disability; secondly to enable the children to discuss potential solutions to the social and physical exclusion of disabled children and thirdly, to cast light upon the children's views on the design of toys, games and play environments. Semi-structured interview questions were designed to enable children to define and clarify key terms such as 'design' and 'disability' and encourage them to ask questions about these topics and the task set. They were also designed to remind the children about the research aims, reinforce expectations regarding the task set, agree a set of ground rules for the research activities with the children and flag up any questions or problems. The researcher anticipated that some children might find it difficult to generate new ideas independently, particularly those lacking confidence in their design skills. Thus the

researcher developed some additional questions and activities to help scaffold the task for them (see Appendix E, section E.5). For example, prompting children to imagine an ideal play situation at school, a travelling device or toy character.

7.2.2.3 Debriefing

Based on her observations during the initial focus group discussions, the researcher anticipated that the children might have some questions about forthcoming research activities. Thus, she built some time into the end of each design and evaluation session for a debriefing with the children. Again, a debriefing script was designed to ensure consistency in task setting and the communication of information across schools.

7.2.2.4 Focus Group Discussion Topics (Design Session 2)

Discussion topics for design session 2 were based on the children's designs. Questions included in the interview schedule were designed to encourage the children to communicate their ideas to the researcher and to enable the researcher to seek clarification on their design concepts. Design session 3 was used to enable the children to complete their designs and for the researcher to clarify her interpretation of their ideas with the children, before undertaking evaluation sessions with them. For the evaluation session, a series of semi-structured questions were developed, based on the children's design concepts and prototype toys and games. These questions were designed to give the researcher insight to children's play preferences; their perspectives on inclusive play products and their aspirations for play in the future. The questions were also designed to gain insight to children's engagement in research and their experience of participatory design.

7.3 Procedure

The researcher began each design and evaluation session with a briefing or pre-session discussion with the children, as planned in her interview schedule. The briefing was designed to reinforce the aims of the project and the aims for the session with the children. The children were given the task of designing toys, games or play environments that will allow disabled and non-disabled children to play together. The researcher informed the children that they could describe their ideas to her in a range of different ways and that they could use any of the collage, mixed media, model-making and general art supplies provided in their designs. To explore the options available to the children and to clarify the aims of the task with them, the researcher then led a semi-structured focus group discussion, following her interview schedule.

7.3.1 Facilitation of Focus Group Discussions

During the first design session, the researcher followed each of the questions in her semi-structured schedule. This provided a protocol for the session, whilst permitting discussion on relevant topics to emerge. She built upon discussions when it was necessary to respond to emergent issues and questions raised by the children. It was also important to clarify key terms, tasks, or questions. She took note of suggestions that could be used to inform the design process. She intervened to interpret the children's comments when they were unable to answer questions explicitly, when conversation deviated from the scheduled discussion topics and to manage the discussion of sensitive topics, such as issues of diversity and bullying. In the facilitation of the focus groups, the researcher used the children's comments to help contextualise the task, the research project and key terms for the children. The children were encouraged to challenge their own assumptions. The researcher emphasised the children's role as designers on the project and when children proposed design ideas, she advised them to develop these ideas further later in the session with the materials provided.

7.3.1.1 Design Sessions

During each design session, children were given 45 minutes to 1 hour to work on their design concepts and prototype toys and games. At each school, the researcher set up one workstation from which the children could collect collage, mixed media, and general art supplies. In the facilitation of the design sessions, the researcher sought to avoid influencing the children's ideas by avoiding sharing ideas with the children or providing them with exemplars or sources of inspiration. No initial limits were placed on the potential solutions developed by the children, in order to allow greater scope for exploration and insight. Proposals were open to the inclusion of ideas for toys, games, or environmental features, such as new playgrounds. Children were given the opportunity to use as few or as many materials as they wished. They were also allowed to work independently, in pairs, or as a team at any workspace within the allocated room. With the children's consent, the researcher kept the Dictaphones running, in order to record the conversations that took place alongside the design activities, in the event of any pertinent topics being discussed.

7.3.1.2 Facilitation of Design Sessions 2 and 3 and Evaluation Sessions

Children needed longer than anticipated to develop their prototype toys and games - therefore design sessions 2 and 3 were allocated to enabling the children

to complete their designs. As time was limited, the researcher consulted the children to decide upon the best way in which to allow them to review and present their designs. In evaluation sessions at Willow and St Amelias RC Primary Schools, the children chose to present their own design ideas first and then to review designs developed by children at other schools. At Willow and St Amelias RC Primary Schools, children responded to one of the evaluation questions 'Which two ideas would you choose to be made into final prototypes?' At Willow Primary School, there was also sufficient time for the researcher to ask questions developed for design session 2.

During evaluation sessions at Woodlands and Aspen Primary School, the children chose to review designs produced by children at other schools first and to then move onto the evaluation questions. As a result, this left time for the children to respond to question 1 of the evaluation questions, 'Which design would you most like to play with?' At each of the schools, the researcher presented designs produced by children at other schools on a laptop. She also provided printouts of the children's work, so that all could see the work clearly. The number of schools visited previously shaped the number of designs reviewed by the children at each school. For example, some schools were still designing their toys and games whilst others were evaluating theirs. This meant that some schools reviewed more designs than others. All designs were reviewed by the children through focus group discussion, which were recorded, with the children's consent, via Dictaphone.

7.3.1.3 Recording and Analysing Focus Group Data

Written transcripts were produced from the focus group discussions recorded via Dictaphone. Faculty staff at the university used the transcription guide developed by the researcher, to write up focus group discussions, as described in Chapter 6. Conversations that took place during design and prototyping activities were selectively transcribed, with only relevant topics being reported. Again, an inductive approach was taken to the analysis of the transcripts. Thematic analysis of qualitative data focused upon identifying: children's currently play experiences, their aspirations for play with other children, current barriers that prevent them from achieving these aspirations, and any emergent issues. The researcher used the focus group discussions as an opportunity to learn about the children's engagement in the research activities, plus their views on, and preference for, the different research techniques used. Analysis was undertaken by the researcher and cross-verified with Dr. Beckett, the co-investigator for the project. This provided a check on the conclusions, in order to minimise bias. The next section describes the

findings of design and evaluation sessions with the children. It includes some of the rich data gathered from participating schools through design and evaluation activities, which includes examples of design concepts produced by both disabled and non-disabled children.

7.4 Results of the Design and Evaluation Sessions in Participating Schools

This section examines the findings of the design and evaluation sessions undertaken with children participating in the project. This section is divided into three parts. Section 7.4.1 examines the results of the focus group discussions undertaken at the start of design session 1. It examines the children's responses to the researcher's semi-structured interview questions and the briefing/debriefing activities that took place. Section 7.4.2 examines the findings of the design activities undertaken during design sessions 1, 2, and 3, and the children's engagement in these activities. Finally, Section 7.4.3, examines the results of the evaluation sessions, including what was learnt about meaningful play and the process of working with and giving voice to disabled children.

7.4.1 Results of Design Session 1 in Participating Schools

Observing the dialogue and interactions between the children during the focus group discussion undertaken at the start of design session 1 gave the researcher insight to children's knowledge and understanding of disability; the design of play resources and potential solutions to the social and physical exclusion of disabled children. Each of these topics will be discussed in more detail in the following section. It is worth noting that all quotes are included in the children's own words, for authenticity.

7.4.1.1 Disability and Issues of Diversity

In the initial focus group discussions reported in Chapter 6, it was evident that many of the children held negative assumptions about disabled people. Such views were evident in transcribed data from design session 1 also. There was evidence of othering (Bauman, 1993), with disability being described by Luke as 'not being able to do stuff that other people can' and ableism (Simi, 1998), with non-disabled people being described as 'abled'. Bullying was evident, with Suzie noting:

In the playground, a girl called Sky spat at her [Rosie] and she got told off. She batter me as well.

Similarly, Flint reported his experience of bullying, stating:

When I just started this school, someone called Stephen started picking on me and calling me Freddie Kruger in the toilet and I wouldn't go to the toilet by myself.

There was further evidence of the negative self-perception of disabled children as a result of such treatment, with Freddie noting apologetically during the discussion at St Amelia's RC Primary School 'sorry, I've just realised my mind can't be used', in a self-deprecating tone. The social barriers to meaningful play for disabled children dominated the children's transcripts - the stereotyping of children in the RP department at Woodlands Primary School being a key example. RP stands for the Resourced Provision set up to meet the complex learning needs of a small group of children at the school. Suzie and Josh informed the researcher 'RP, it's a class that doesn't talk'. 'They can't talk and they've got stuff wrong with them'. This statement provides evidence of the othering of disabled children at the school.

When asked 'what is disability?' Flint and Joanna responded by identifying themselves as disabled. They responded directly to this question and spoke frankly about their personal experiences. Freddie stated: 'I can't really tell you what I think it is, I *know* what it is because I've got it myself' and Joanna stated 'because I have a hearing aid, I'm a little bit unstable [disabled] because I've got implants'. Discussions on this topic required careful management as some of the children began to single out participants with physical impairments. For example, Eve stated:

Joanna - she's a little bit disabled because she can't hear as well, so there's basically something wrong with your body.

Communication barriers prevented Rosie from providing a meaningful answer. Rosie misinterpreted the question, replying 'to help people play better'. Again, it was important for the researcher to manage such situations sensitively.

7.4.1.2 Influence of the Media

There was further evidence of the influence of media on the children's views towards disability in the transcripts of the children's discussions. Jasper and Joseph's definition of disability was influenced by media representations of the Paralympics. For example, Jasper stated: 'Some people have lost access to their

legs and that's what the Paralympics is for'. Similarly, Dylan's knowledge about visually impaired people were informed by a television, as illustrated below:

Blind people have these glasses, so there are certain blind people who can see. I watched a programme and it is caused by people looking at the sun too long.

He also spoke in depth about operations he had seen on *Surgeon TV*. Further, there was evidence to suggest that the children's views on disability were informed by their observations of the disabled people in their lives. For example, when asked about the meaning of disability, Dawn based her definition on a disabled class peer and acted to generalise the experiences of disabled people, noting: 'People who have a disability don't really understand different things to other people'.

7.4.1.3 Design and the Design Process

Most of the children grasped the concept of design. They described many of the activities typical of the design process, although each had different interpretations of its meaning. The children defined design in terms of creativity, imagination and inventiveness, amongst other ideas. However, some children found design a difficult concept to define. For example, when asked 'what is design', Luke replied 'I don't really have anything.' Others were unable to fully answer the question. For example, when asked how the children might communicate their ideas through design, Suzie replied 'paper'. Thus, articulating the design process was difficult for some of the children.

7.4.1.4 Issue of Ownership

Confusion over the process of prototyping and the issue of ownership raised some unexpected questions for the children. For example, James asked 'Are these things actually going to come to the school, or are they just ideas?' When informed that the children's ideas would be developed further as prototypes at the University, Luke asked 'Can we get one?' and Jasper added 'Do we get to go on *Dragon's Den*?' Further complicating the issue of ownership, the researcher had not anticipated that the children would want to take their work home with them. For example, Jasper asked 'Could we make a small prototype and take it home, out of cardboard and stuff?'

From an ethical perspective, the researcher found it necessary to respond to the children's questions in a clear and transparent manner. She reassured the children that their designs were their property, but that these ideas would be used to inform prototypes developed by undergraduate students at the University. She

also used child friendly language to explain that designs would not be used for commercial purposes, stating 'they are not going to be final products that could be sold'. Despite this conversation, James did not fully grasp the concept of prototyping. He asked: 'So when it comes out, are we going to have to pay for it, or can we just get it because we designed it?' These issues required careful consideration and thoughtful responses on the part of the researcher.

7.4.1.5 Issue of Collaboration

The children had mixed views on collaboration in design. For example, Jasper, considered collaborative methods as a positive means of communicating ideas, stating 'we could collaborate and put stuff down that we are going to put on our designs'. Others, on the other hand, felt precious over their ideas. For example, Eve noted 'It's like where you think up your own ideas and you don't copy anyone else'. Thus, despite the collaborative nature of this project, some children were uncomfortable with sharing ideas with others.

7.4.1.6 Influences

For some of the children, their knowledge and understanding of the design process was influenced by previous and current design projects at school. Jasper made reference to a homework task involving the design of Egyptian jewellery, and children at Woodlands Primary School drew upon a monster themed project. For example, Suzie described design as 'When you design something like a monster and that' and Rosie noted:

We've been learning about monsters and when we come back from holidays, we are making monsters. That will be like art.

Thus, school-based design projects clearly had an impact on the children's design ideas, which shall be discussed in more detail in Section 7.4.2.

7.4.1.7 Lack of Confidence in Design Skills

Some children lacked confidence in their design skills. For example, Jasper noted 'We'd have to do a crash course because you did say we are going to make one of them'. This statement suggests that Jasper did not feel equipped with the necessary skills to produce a prototype toy or game. Similarly, Joseph suggested simplifying design tasks, noting: 'If someone draws a picture for you and you make patterns on it'. This lack of confidence became more apparent during the design session, which shall be discussed further in Section 7.4.2.

7.4.1.8 The Meaning of the Project for the Children

Some children, such as Lily made the project their mission. For example, Lily stated: 'At playtime, I've been going around the playground and asking my friends:

I'm in this design club, it goes on a Friday, we are designing toys and which toys do you want?

Ophelia felt the designer had an important role to play, noting 'You've got to think carefully about what you are making'. Others brought their own toys and games into school, to help support discussions and describe their play preferences in more detail. Thus, this project had a genuine purpose for many of the children.

7.4.1.9 Toys, Games and Play Environments

Some of the children defined toys and games in terms of commercial play products. For example, Flint stated 'It's like when you get a *PlayStation*, that's actually a toy because you can play with it' and Tim noted 'It's what you can play with and what you can do on it', bringing in examples such as remote control cars and *X-boxes*. Some children were unsure about how to describe toys and games. For example, Ophelia informed the researcher: 'It's something which kids do. I'm not quite sure'.

Other key terms such as environment were problematic for some of the children, with Joanna stating 'I don't know what it means'. Israel and Eve interpreted the term environment literally, becoming fixated upon eco-friendly themes, which were used to inform the design of their games later in the session. During the discussion, some children also became fixated upon the design of existing toys and games. For example, Eve suggested that *Monopoly* could be an inclusive game and discussed the design of this product at length. Thus, it may have been difficult for some of the children to conceptualise original ideas.

7.4.1.10 Potential Solutions to the Exclusion of Disabled Children

Some of the non-disabled children had ideas about the type of games that they would like to play with, but were uncertain about whether such games were inclusive. For example, Dawn stated 'I know what I am going to design, but I don't know how we can all play together' and Dylan asked 'does it have to help people or can it just help children enjoy themselves?' such statements suggest that the children were unsure about whether or not an inclusive game could be mutually enjoyable. Others simply found it difficult to conceptualise their ideas at this stage. For example, when asked about her ideas, Ophelia replied 'I don't really know'.

Suggestions made by some of the disabled children were informed by their own experiences of physical impairment. For example, Flint had Cerebral Palsy, which affected his lower limbs. Flint suggested 'More cars. If the disabled can[']t walk, they can just play with a car like that'. Freddie had a form of Cerebral Palsy that affected his upper limbs. In Freddie's reflections, he noted: 'If you had a game for two hands, then I wouldn't be able to play it'. With such physical barriers in mind, Freddie made suggestions for a one-handed wire loop game, which would involve guiding a metal loop along a length of wire without touching the loop to the wire.

Thus, recommendations made by Freddie and Flint involved the design of a game that they felt confident they could play with while providing an appropriate level of difficulty. Many of the children were uncertain about how to make toys and games more inclusive. For example, instead of further developing or adapting computer games, Jasper suggested designers could simply make 'more computer games', so that 'disabled people can try it out'. Much like the initial focus group discussions reported in Chapter 6, the children lacked understanding of the diversity of disabled children's lives. Many of them held the assumption that disabled people were wheelchair users, and such assumptions informed their initial design proposals.

Amber suggested 'I would get a chair or a table tall enough so the disabled person could reach the game'. This comment was based on the assumption that all disabled people are wheelchair users. Some children felt that design solutions would not make a difference to the inclusion of disabled children. Instead, Lily felt that attitudinal change was required. When asked what would help disabled and non-disabled children to play together, she argued:

Help them, like (...) If the disabled people are lonely, just go: "Do you want a friend? Come and play with me." Just stop teasing people and ganging up on disabled people.

Similarly, Joanna suggested: 'they could say "Do you want to be my friend?" and they could say: "Yes"'. Suzie felt it was the role of the *teacher* to intervene when a child was excluded from play, noting:

If you can't walk and you are in the playground, if someone sees you in the playground all alone, if you say "are you okay?" and they say "no", then you will go and get the teacher or the head teacher and get them back inside.

Here, Suzie suggests that disabled children are a disempowered group, portrayed as victims of social exclusion at the school. Joseph, on the other hand, hoped disabled people might be able to 'fix' their impairments, noting:

Do you know like on telly where they are in wheelchairs? (...) Some people were doing the Olympic torch. All disabled people were doing it (...) if they keep trying, they might be able to walk on crutches.

Some children made positive suggestions in relation to the social inclusion of disabled people through play. For example, James argued that non-disabled people should play computer games with disabled people as in his view, 'that's for both of them to do'. Yet he used ableist language to draw a distinction between disabled people and 'normal people'. He also placed non-disabled people in a position of power by suggesting that they should allow disabled children to play too.

James perceived disabled children as recipients of positive discrimination - putting them at an unfair advantage to their non-disabled counterparts. For example, he described a non-disabled person as 'able to do what they like on the fun stuff', but noted 'it's quite unfair for them because they don't really have access to anything'. Clearly, the children's views were shaped by their experiences, observations and cultural influences, which ultimately informed their behaviours and actions. The next section will explore the way in which the views and ideas discussed above were embodied in the children's designs.

7.4.2 Design and Evaluation Research Instruments

Children at each of the participating schools responded differently to the design tasks set. As a result, this section presents the findings of design sessions 1, 2 and 3, school-by-school. Findings are grouped into observations, mind maps, drawings and prototypes. The observations section relates to the researcher's observations of the children's engagement with the design tasks. The mind maps section includes a summary of the mind maps and written work produced by the children. The drawings section includes a description of the hand-drawn design concepts developed by the children and the prototypes section includes a report of the 3-D and sculptural artefacts developed by the children. The summary section includes an overview of the key themes emerging from research activities undertaken during design sessions 1, 2, and 3.

7.4.2.1 Woodlands Primary School

Observations

Some children at Woodlands Primary School chose to work independently on their design concepts and prototypes, whereas others worked in small groups. Initially, Flint worked independently on his bus and train designs (see Figure 7.2), but soon worked with other boys in the group to develop prototypes based on their favourite computer games. Rosie, Joseph and Suzie grouped up with Lily, as Lily was a strong illustrator, whereas Tim worked independently on his own monster designs. In addition to her work with the rest of the group, Lily also produced a range of designs based on her own ideas (see pictures 1, 3 and 4 in Figure 7.1). The children's decision to work independently or as a group included whether or not the child had confidence in their own ideas, shared ideas, or mutual interests with other children, varying levels of confidence and rules agreed by the children at the start of the session.

Mind Maps

Most of the children at Woodlands Primary School, with the exception of Flint, Tim, and Suzie, chose not to use mind mapping as a method of idea generation during the design and evaluation sessions. This group was the youngest of all groups participating in the project. Some children simply doodled their name on the mind mapping sheets provided. Thus, from a design perspective, the mind-mapping task may have appeared unfruitful for some. However, this in itself provides insight to the children's need to be represented in the designs. It also provides insight to their preference for personalisation or customisation.

When issues of disability were discussed directly, the children gave insight to their experiences and observations of bullying. For example, Tim noted on his mind map that Rosie's vandalised and broken bike would need to be repaired, in order to 'make it better'. He also drew a picture of Rosie crying as a result of the actions of bullies (see Appendix F, item F.1). It was necessary for the researcher to engage in conversation with the children alongside their mind mapping activities. Some comments were illegible, whereas others lacked clarity. For example, Suzie noted 'How to make it better - get more cars' and Rosie's mind map was illegible. Others simply reported their preferences for existing toys and games and suggestions for improving them.

Drawings

Drawing was the most common method for communicating design ideas for the children at Woodlands Primary School. Yet some children failed to use the materials for their intended purpose. Despite the provision of felt-tipped pens and colouring pencils, the children used *Play-Doh* to apply colour to their drawings. This may have affected the way in which these designs were received during the evaluation sessions, as this method for applying colour was messy and the final outcome was perishable. Despite drawing being the most popular method for communicating ideas, some children, both disabled and non-disabled, lacked confidence in their drawing skills. This gives insight to some of the barriers to participation in the design process. For example, as Lily was a confident illustrator, Suzie, Rosie, and Joseph asked her to draw a set of teddies for them to decorate. Illustrations developed for Rosie were based on a teddy given to her by her deceased Mum. This choice of subject matter emphasised Rosie's emotional connection to this toy and this influenced Joseph's decision, as he wanted one too.

The monster themed project discussed during focus group discussions undertaken at Woodlands Primary School (as noted in Section 7.4.1) was a common theme in the children's designs. Tim designed a monster themed robot, Suzie drew some witches, and Lily developed a set of *Monster-eye Dolls* (see pictures 1 and 4 in Figure 7.1). Lily challenged gender and racial stereotypes in her designs. Challenging traditional dolls for girls, Lily suggested that designs should be 'more gory'. Lily also included a range of ethically diverse characters in her doll range, as illustrated in Figure 7.1. Such designs provide insight to the barriers encountered by other marginalised groups and Lily's needs and aspirations as a child from an ethnic minority group. Lily's designs illustrated her desire to see more diverse female characters featured in children's toys, and self-representation in the design of toys and games.

1.



2.



3.



4.



Figure 7.1 Design Concepts Developed by Children at Woodlands Primary School.

Prototypes

Play-Doh was the most popular material used in design concepts and prototypes developed by children at Woodlands Primary School. Although the children particularly enjoyed working with this material, its use required the researcher's intervention. For example, some children opted to use *all* of the *Play-Doh*, which meant that she had to step-in and encourage them to share. It was also difficult for the children to develop aesthetically pleasing designs with this material. For example, as illustrated in Figure 7.2, the children's *Play-Doh* prototypes were not immediately identifiable. As a result, the researcher had to consult them about their designs, in order to seek more detailed description and clarification. The children at this particular school chose not use any of the mixed media materials provided in their prototype designs.

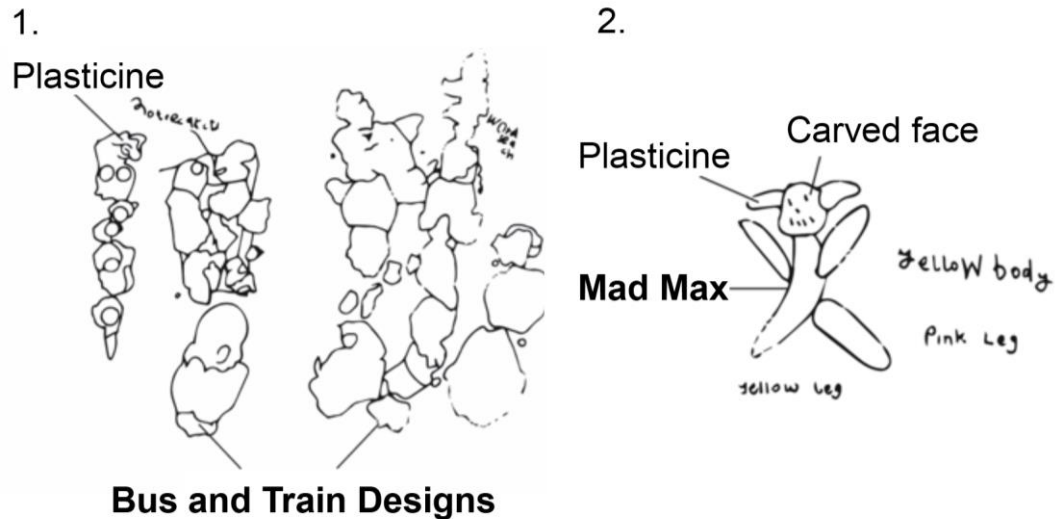


Figure 7.2 Illustration of Flint's Bus and Train Prototype Toys (1) and Illustration of Josh's *Mad Max* Prototype Toy (2).

Summary

Overall, the final concepts and prototypes developed by children at Woodlands Primary School were adaptations of existing toys and games. The majority of the children's designs reflected their fixation on commercial toys and games. For example, the *Monster High Doll* range (see Figure 7.3) inspired Lily's *Monster-eye Dolls* range. *Monster High* is an American doll franchise by *Mattel*, launched in 2010. Characters in the range are inspired by sci-fi horror, thriller fiction and monster movies. As previously discussed, Rosie's teddy designs were inspired by one of her own toys and Joseph, Josh, Flint and Tim developed characters inspired by *Call of Duty: Black Ops* and *Modern Warfare*. *Black Ops* (see Figure 7.4) is a range of first-person shooter video games developed by *Treyarch*. Such influences illustrate the use of commercial symbols (Langer, 2005) in the children's designs.



Figure 7.3 *Monster High Dolls* (Source: <http://monsterhigh.wikia.com/wiki/Dolls>, 2016).



Figure 7.4 Scene from *Call of Duty: Black Ops* (Source: www.callofduty.com, 2014).

7.4.2.2 St Amelia's RC Primary School

Observations

The majority of children at St Amelia's RC Primary School chose to work independently on their design concepts and prototypes, with the exception of two of the children. Holly and Dawn chose to work as a pair. It is worth noting that Holly and Dawn were already good friends. The majority of the children, including Freddie, Ophelia, Dylan, and Skye, chose to focus on their own designs, building upon ideas discussed during the focus group discussions. With the exception of Dawn and Holly's designs, many of the children's proposals were inspired by the design of traditional toys and games. Freddie's 'Electric shock' game (see Figure 7.5, picture 1) was a variant of traditional wire-loop games, Ophelia designed a tree house (see Figure 7.8, picture 3) and Skye designed a doll's house (see Figure 7.5, picture 3).



Figure 7.5 Prototypes Developed at St Amelia's RC Primary School.

Mind Maps

Children at St Amelia's RC Primary School chose not to use mind mapping as a method for developing design concepts - most of the children were already confident in their ideas. Holly and Dawn, however, took their ideas to a more advanced level by developing a specification sheet (see Appendix F, section F.2).

Drawings

With the exception of Skye, each of the children at St Amelia's RC Primary School opted to include a combination of drawing and prototyping in their conceptual designs. Thus, a mixed-method approach was essential at this particular school. Dylan sketched some initial designs of his hover board, before developing a prototype of his final ideas. As illustrated in Figure 7.6, his ideas were not immediately obvious. As Dylan's drawings were not labelled, this further emphasised the importance of consulting the children about their design concepts and their meaning.



Figure 7.6 Dylan's Hover Board Illustration.

Prototypes

Prototyping with mixed media materials was the preferred method for idea generation at this particular school. Mixed media materials such as wool-cones, cardboard boxes, masking tape, and bubble wrap were used in the children's designs, as illustrated in Figure 7.7.



Figure 7.7 Illustration of Holly and Dawn's *Mic Wow* Prototype.

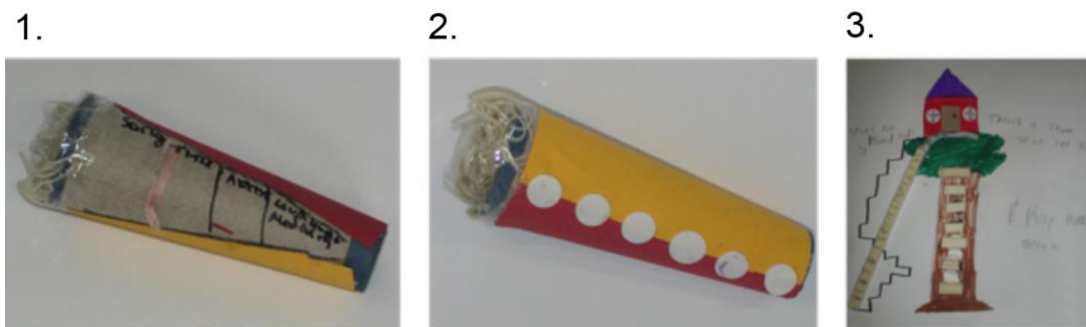


Figure 7.8 St Amelia's RC Primary School Prototypes Set 2.

Summary

Children at St Amelia's RC Primary School each included accessibility features in their designs. Thus, consideration was given to the needs of disabled children. Dylan's hover board idea was designed to encourage collaborative play. Ophelia included a separate set of steps in the design of her tree house, to enable access for blind children. Dawn and Holly also included a 'disabled mode' in their designs - an idea that was strongly rejected by Freddie during the evaluation session.

7.4.2.3 Aspen Primary School

Observations

Initially, the boys at Aspen Primary School developed conceptual designs and prototype toys and games independently. James came up with the idea for a solar-powered trampoline (see Figure 7.9, picture 1). Luke produced concepts for TV

Luke, a portable TV (see Figure 7.9, picture 2) and Jasper developed a tennis-themed game (see Figure 7.12, picture 3). In a similar fashion to children at St Amelia's RC Primary School and Woodlands Primary School, concepts developed by James, Luke, and Jasper, were inspired by the design of existing toys, games, and home entertainment products. The children also worked as a team on the design of a castle-themed game entitled *The Fort of Doom*.

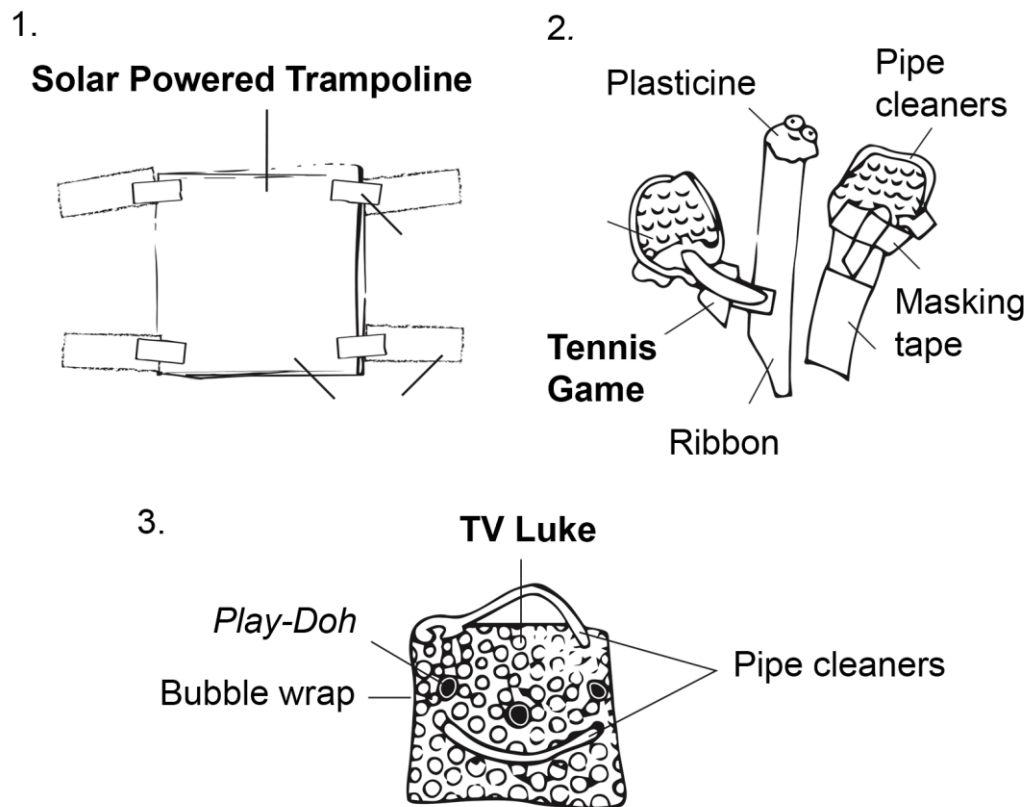


Figure 7.9 Illustration of Prototype Games Developed at Aspen Primary School.

Mind Maps

Children at Aspen Primary School chose not to use mind-mapping techniques in the development of their prototype toy and games. When asked to label their designs, Jasper wrote on his design sheet: 'Things I don't like doing at school: writing!' and Luke wrote: '*TV Luke* - it's a TV' - assuming this a patronising request.

Drawings

At first, children at Aspen Primary School used mixed media materials to prototype their ideas. Once their prototypes were complete, the researcher provided the children with some doodling templates, in a bid to encourage them to further develop their ideas. This approach proved most fruitful for Luke and James as they

confidently conceptualised their ideas on these sheets (see Figure 7.10, pictures 1 and 2). Jasper was not present during this particular design session. Thus, it was not possible for the researcher to observe how he might respond to this activity.

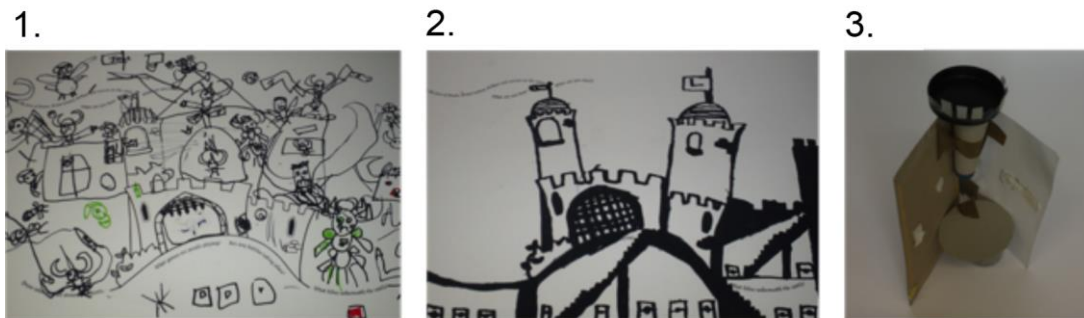


Figure 7.10 *Fort of Doom* Design Concepts Developed at Aspen Primary School.

Prototypes

Luke and Jasper worked confidently with mixed media materials in the development of their *Fort of Doom* prototypes (see Figure 7.10), but tasks such as cutting cardboard with scissors and peeling off masking tape, proved difficult for James. James has dyspraxia, which affects his fine motor skills. Hence, prototyping techniques were disabling for James. It was frustrating for him to be reliant upon the support of the researcher and the Teaching Assistant.

Summary

Children at Aspen Primary School chose to develop designs informed by their personal preferences and designs that they considered suitable for other children. They did not propose to adapt their designs in order to make them accessible to disabled children. The implications of these self-determined play preferences in relation to disabled children's experience of meaningful play, working with and giving voice to disabled children and conveying this to designers, shall be discussed further in Section 7.6.

7.4.2.4 Willow Primary School

Observations

Children at Willow Primary School chose to work independently on their design concepts. Some, including Eve, Israel and Amber, further developed designs conceptualised during the focus group discussion (design session 1). Inspired by the issues discussed, Israel and Eve developed eco-friendly games and Amber invented a '*Make Your Own Birthday Party Kit*' to help children combat loneliness.

Others, including Joel, Rio, and Joanna, found inspiration in the mixed media materials provided.

Mind Maps

Amber, Eve and Joanna used mind mapping as a method of idea generation and a means of recording their ideas. This technique enabled Amber to identify 'sad children' as the target users of her party kit. She suggested the way in which this resource might be inclusive of, and adapted for, disabled children - taking measures to 'Include disabled children in everything' and to 'Explain to def [deaf] people clearly'. Eve's initial ideas included segregated play activities for boys, girls, and disabled children. The girl's game involved rescuing the girl from a castle, with the caption: 'Castle - needs help'. Eve assigned her favourite playground game, 'Stuck in Muck' to the boys, whereas an 'Eco game' was allotted to disabled children. In her view, in order to ensure the inclusivity of the eco game, disabled people should 'get a chair or table tall enough' so that they can 'reach the game'. Eve's mind map gave insight to stereotypes and negative assumptions based on disability and gender. In Beauvoir's (1949) feminist writing, *The Second Sex*, women, like disabled people, are objectified and restricted to the status of other. Eve's design ideas give insight to the othering of disabled people and women.

Drawings

Each of the children at Willow Primary School used drawing as a means for communicating their ideas. Eve and Amber elaborated upon their designs at home, producing additional development sheets for the final evaluation session. This suggests that the children felt a level of commitment to, and ownership of, their work on the Together through Play project. Joanna's drawings were used to help explain the purpose and context for her prototypes. Joanna devised a telescope idea, which she intended to give a pirate theme. In her drawings (see Figure 7.14), she described the objects she would see, including birds and butterflies.

1.



2.

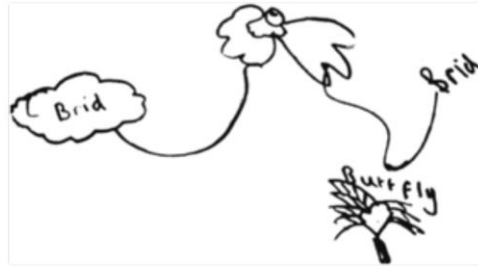


Figure 7.11 Joanna's Drawings to Accompany her Telescope Designs.

Joel drew a monster as his final design. Joel and Rio were the first to complete their designs. During the final design session, the researcher provided doodle sheets linked to their design themes, in order to encourage them to develop their ideas further. For Joel, this approach was useful as it enabled him to come up with a range of monster designs, based upon his initial ideas. For Rio, however, this approach was unfruitful. Rather than inventing his own designs, he simply copied the doodles on the template - further emphasising the need to give children a choice in activities.

Prototypes

Prototypes developed by the children at Willow Primary School were shaped by the mixed media materials provided. Wool-cones were popular with Israel and Joanna, and were used in Israel's bull (see Figure 7.17, picture 1) and eco games (see Figure 7.17, picture 2) and Jessica's telescope designs (see Figure 7.14). The children also used containers used to store the arts and crafts supplies in their designs, for example, shoeboxes, yoghurt pots, and *Play-Doh* containers (see Figures 7.15 and 7.16).



Figure 7.12 Rio's Prototype Designs at Willow Primary School.



Figure 7.13 Amber and Eve's Prototype Designs at Willow Primary School.

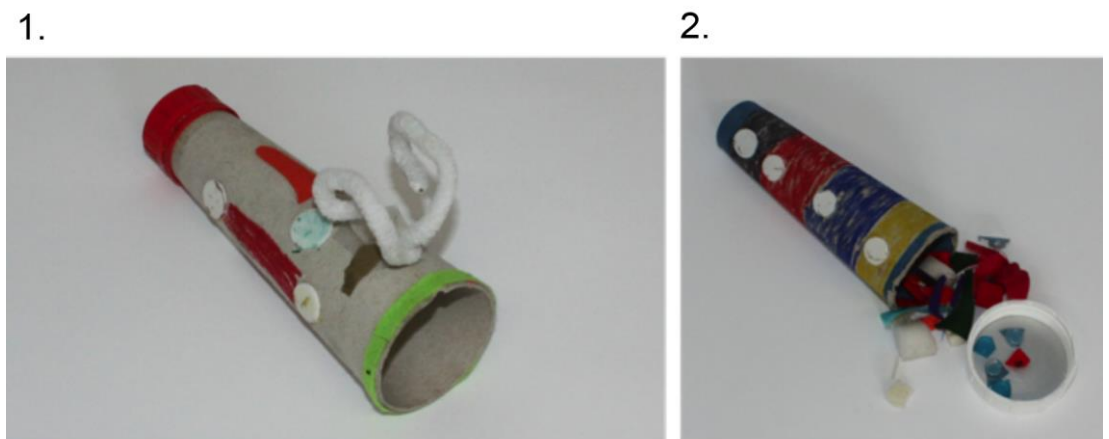


Figure 7.14 Israel's Prototype Designs at Willow Primary School.

Summary

The majority of the children at Willow Primary School considered issues of accessibility in their design solutions. Amber's suggestions were informed by her observations of Joanna, as a deaf child. Similarly, Joanna's telescope design

concept was influenced by her hearing impairment. Joanna developed intuitive designs, requiring no instructions or verbal feedback. The telescope design was also a concept for a toy that a child could play with independently. Yet on the day of the evaluation session, Joanna chose to replicate Eve's 'Save the Chicks' designs. This suggested a lack of confidence on Joanna's part and further evidence of the approval-seeking behaviour (Morgan et al., 2002) discussed in Section 5.1.

Negative assumptions about disabled children were evident in the designs developed by Joanna's non-disabled counterparts. Separate tasks assigned to disabled children in the design of Eve's games, were based on the assumption that disabled children are wheelchair bound. This view provides further evidence of ableism (Hehir, 2007). The impact of such ableist views on disabled children's experience of meaningful play, working with and giving voice to disabled children and conveying this to designers, shall be discussed further in Section 7.6.

7.4.2.5 Evaluations at Woodlands Primary School

During the evaluation session at Woodlands Primary School, the children first presented their own designs. They then went on to review designs developed by children at other participating schools. Each child expressed a preference for their own designs over those developed by other children. The process of critical evaluation did not come naturally to children at this particular school - it took time for them to get used to critiquing the designs. It is worth noting that this friendship group was the youngest of all groups participating in the project and this may have been an influential factor.

Methodological Issues

Israel's designs were presented first and the children did not offer any feedback at that point. The children then commented on the overall construction of the prototypes rather than the conceptual ideas presented. For example, in response to Dawn and Holly's Mic Wow designs, Rosie noted 'It looks like they have painted them.' This was a key finding across all schools. The group then reviewed Freddie's electric shock game, in response to which Tim simply clarified his understanding of the game's function, rather than providing insight to his views on its design. At the point at which Dylan's hover board design was reviewed, the children were able to discuss the concept of the design. Lily and Rosie identified toys and games with a set number of players as problematic - noting that the children 'might fight over it' if they have to share.

Lily applied her imagination when reviewing Ophelia's dolls. She recommended further enhancing the design, suggesting the inclusion of a 'special key where you

can lock it'. Lily also recommended sanctions, noting 'if they [other children] wreck it, they would be banned from playing with them'. From this discussion, the researcher gained insight to Lily's needs and aspirations. She learnt that Lily would like her toys to be protected from damage and for other children to be punished if they break them. Lily's comment also suggests a reluctance to share. This presents a dilemma for designers. Although designers can build inclusive features into the design of a product, play facilitators, and the children themselves, have a role to play. Lily's views were clearly informed by her own experience, as illustrated in the following statement:

Yes because some people don't look after their dolls because I went to my friend's house and their clothes get thrown on the floor and they take their heads off and their arms.

Some children did not fully understand the research process. For example, Rosie queried the process of prototyping, asking 'Are we actually going to make these instead of doing it like this?' and 'are we actually going to make our own teddy bears and dolls?' By asking such questions, Rosie also suggests that she may not have been engaged in the process of critical evaluation. However, by the end of the evaluation session, the children had developed the confidence to express their personal preferences. For example, Suzie stated 'I like that one there, that chick one'. She was also able to explain the reasons for her preferences, stating: 'Yes I do like it because it has got a bit more detail on it'. Again, this comment relates to the *quality* of the prototype, rather than the concept of the design presented. Reviewing prototypes generated by children from other schools led some children to question their own designs. As highlighted in the following quote, Lily was led to doubt her interpretation of the brief:

We have only put ours on a piece of paper, but they have put loads of details on and actually made the box and they have started putting stuff inside it. We thought they were doing it on paper.

Perhaps the task needed to be framed differently or scaffolded for the children. Perhaps the task was too open, or needed to be more specific for this particular group. It is worth noting that the children looked to each other for guidance on how to respond to the task. This may have influenced the way in which children at this particular school chose not to include mixed media materials in their prototype designs. Regarding issues of voice - some of the children did not express any views

during the evaluation session. The implications of this finding in relation to working with and giving voice to disabled children and conveying this to designers will be discussed in more detail in Section 7.6.

7.4.2.6 Evaluations at St Amelia's RC Primary School

Children at St Amelia's RC Primary School chose to evaluate designs produced at their school, and other schools, together. The children critically evaluated the designs with confidence. It is worth noting that this group consisted of the eldest children participating in the project, thus they may have been more experienced in engaging in critical debate.

Preferences

Dylan was first to express his preference for the teddy bear designs developed by children at Woodlands Primary School, stating: 'I would probably pick that one because teddies wouldn't give you nightmares'. Yet during previous focus group discussions, and later in the evaluation session, Dylan bragged about playing gory computer games. Freddie disliked the sinister appearance of Rio's dog design, stating 'Get rid of the red eyes, because it makes the dog look like some evil robot'. Dylan contested this view, stating 'I would like it'.

For Dylan, there was an element of machismo attached to playing frightening games. Dylan's comments also cast light upon the influence of commercial toys and home entertainment on his personal preferences. As well as referencing *X-men*, he likened the children's *Fort of Doom* designs to *Blade Storm* and *Lord of the Rings*. Skye and Freddie raised concerns about the *Call of Duty* inspired designs presented. Skye noted 'If there is a little child who is like four or three played this (...) he would have nightmares'. Freddie agreed, noting: 'No, I don't think it is wise to come up with those kinds of designs'. Thus, Freddie and Skye felt *Call of Duty* themed games would be inappropriate for children as they would be too frightening.

Group dynamics influenced the children's preferences. Ophelia revealed that she would purposely avoid choosing a design, based on the designer who created it. For example, stating: 'Erm, definitely not Dylan's'. Holly and Dawn's *Mic Wow* designs were criticised for being too unrealistic. When the girls explained that the product would have limitless songs, Freddie noted 'Well I don't really think it's possible for anything to have every song they want'. Freddie was also concerned about children's online safety, as illustrated in the following extract:

Dylan: *There is a really creepy person on Skype called Muddy Hand and she has got a hand and she goes, "hello little child"... and he is really mean and he has got a little cigarette in his hand.*

Freddie: *Yes but I am really not sure about this internet thing, if this is going in the hands of children.*

Here, Dylan's comments also raised concerns about the type of content the children were accessing online, particularly via social media.

Methodological issues

It was beneficial to have children present to verify their design concepts and to respond to queries. For example, in response to Freddie's concerns, Dawn was able to propose some potential solutions. Dawn presented some ambitious plans to use fingerprint technology to enable more secure access for children and enhance product safety. Freddie particularly enjoyed debating and discussing design ideas as a team, stating:

These are the arguments that people actually find in modern life, the ideas that we have said are the things that loads of people would be doing every day. (...) Like some people say "but it can't be done", and then others say "yes it can be done".

From Freddie's perspective, the evaluation session gave him a voice in the research process, yet the discussion surrounding his designs, and the conversation that followed, provides evidence of the group contributing to the silencing of his views. The extract below provides evidence of the groups negative assumptions about disabled people and their failure to listen to Freddie:

Dawn: *With disabled people, if their hand wobbles, it would be unfair if they get zapped because it would do more damage to them.*

Skye: *Yeah, but, disabled people could drop it and then...*

Freddie: *Yeah, but, (...) non-disabled people can drop it as well.*

Dylan: *Yes, because for disabled people, it would be unfair for them.*

Freddie: *Well, you don't literally get electrocuted - it's just a fun board game.*

Despite Freddie explaining that non-disabled people could have accidents too, his peers did not take his perspective into account. Dylan's suggestion to include a 'disabled mode' in the design of the game also casts light on the children's ableist assumptions, as illustrated in the extract below:

Dylan: *It should have a disabled mode.*

Freddie: *No, I don't think a disabled mode is quite good. You can't do disabled mode because it is one of these games where disabled and non-disabled can use it and it is going to be quite boring if they get out of the electrocution.*

Freddie strongly objected to the idea of segregated activities for disabled people and concerned that his design concept may have been misunderstood, Freddie attempted to clarify his ideas. Yet the rest of the group failed to listen to him, as highlighted in the following extract:

Skye: *When you are playing that game with the wires, how would you know where to put the wires?*

Freddie: *Well if the game won't really, (...) fully do it then you could just do it quickly, do it quickly, and then "Oh, I win." It is a bit boring isn't it?*

Freddie: *And also can I tell you a good point, which hasn't been thought about? If it isn't even a pretend little electric shock game, it is almost like without it, wouldn't it be a bit boring because you could do it really quickly and still win?*

Dylan: *Yeah, and so you would have to go quickly so it could be a confusing game, like a brain game...*

This conversation highlighted some of the limitations of using prototypes as discussion tools. It was difficult for Freddie to articulate his design idea to his peers. It was also difficult for his peers to distinguishing pretend actions in the game from real ones. Nevertheless, this discussion provided insight to the children's needs and aspirations. Freddie expressed the need for an appropriate level of challenge or difficulty in game play and Dylan gave insight to the elements that would make the game mutually appealing to him. The dilemma for designers is striking the right balance. Freddie's frustration with the discussion is evident in the extract below.

Freddie: *You might be thinking: "yeah it is a bit upsetting giving little shocks". Can I tell you something? The person you are arguing with is disabled himself, so really, I should know because I am disabled!*

Dylan: *No part of my family is disabled, because they hate getting electric shocks.*

Freddie: *Fine, but I don't think you were listening when you said: "it isn't really electrical shocks".*

Negative assumptions about disabled people were also voiced in response to designs developed by children at other schools, further contributing to Freddie's frustration. For example, rather than challenging the segregated activities built into Eve's Save the Chicks game, Dylan suggested the separate targets for disabled

and non-disabled children should be closer. This recommendation is an example of the integration, rather than the inclusion of disabled children - based on the assumption that close physical proximity equates to their inclusion. This view was strongly contested by Freddie, as highlighted in the following extract:

***Freddie:** I don't really like it. Do you know what I mean? Sometimes these non-disabled modes, I am thinking: "I don't want these non-disabled modes because I want to be seen as more capable of handling things." Some disabled people would think: "I don't want to do this disabled mode, I want to actually do the harder one".*

***Dawn:** Well, some people aren't as independent as you, Freddie, because some people still need a little bit of help when they write something or still need a little bit of help when they are doing something.*

***Freddie:** Yes, but do you know what I mean, how I really don't think it should be automatic or anything.*

***Dawn:** You just say whether you want disabled mode on.*

***Freddie:** But what if someone chooses for you?*

Both disabled and non-disabled children at St Amelia's RC Primary School expressed aspirations for autonomous game play. Freddie wanted to be able to choose how he might play a game and Skye suggested enhancing Amber's 'Birthday Party Kit' by giving players choice over its contents. Plus, contradictions in the children's views and preferences further emphasised the children's desire to be autonomous through play. For example, Freddie noted 'I mean for our age, we won't really be entertained much by stretching monsters, would we?' Ophelia replied 'I would.' Children's differing preferences pose a tension for designers, which shall be discussed in Section 7.5.

7.4.2.7 Evaluations at Willow Primary School

During the evaluation session at Willow Primary School, the children opted to present their own design ideas first and to then review designs developed by children at other schools. Time also allowed for the researcher to ask the children the interview questions originally developed for design session 2. Participants at Willow Primary School were as confident as those at St Amelia's RC Primary School in presenting their own designs and in critically evaluating designs developed by other children.

Issues of Inclusion

It was difficult for many of the children to explain how or why their designs were inclusive. When asked how his toy designs might help disabled and non-disabled children to play together better, Rio simply replied 'I don't know'. When Israel

presented his designs, he did not describe any specific accessibility features or adaptations for disabled children. Instead, he explained that his designs were simply aimed at 'Friends, children and small kids' and that 'Lots of them' can play with them. Amber suggested making the designs more physically accessible for disabled children - for example with a 'flip up', rather than 'screw top' lid. Yet Amber recommended adding an individual scoring board to Joanna's *Save the Chicks* game, which contradicted the idea of collaborative play or putting children on a level playing field.

Negative Assumptions about Disabled People

Both disabled and non-disabled children at Willow Primary School made ableist assumptions during the evaluation session. Eve, Israel, Joanna, and Amber assumed that games should be made easier for disabled children, as, in their view, non-disabled people would be more capable. Eve suggested simplifying Israel's Eco game for disabled children by adding magnets to its design. In Joanna's version of *Save the Chicks*, Joanna adapted the game to give disabled children more 'goes'. Negative assumptions about disabled people were evident in the following comments made by Amber and Israel:

Israel: Well with this, it would be easier because the disabled person can just sit somewhere and play with it. And with this one, the disabled person can just sit on the floor and open it.

Amber: I think it is good but I am not so sure about disabled people playing on it (...) and also for disabled people it is just a bit...I don't think they have thought of that and I don't really like the idea...well I do like the idea for normal people but I think it might be dangerous for disabled people.

Rio suggested excluding disabled children from play with his toys, as in his view, 'disabled children might ruin it'. Yet when asked who can play with the game, he contradicted this view, stating 'anyone' can play with it.

Needs and Aspirations

By asking the children about their designs and encouraging them to comment upon designs developed by others, the researcher gained insight to their needs and aspirations. For example, when asked about the rules for playing with his toys, Israel noted 'The rules would be not to break them', and when asked about the name of his dog design, Rio named it after his own dog - revealing his interest in personalising his toys and games. By giving feedback to others, Joanna provided insight to her own aspirations. For example, in response to Israel's designs, Joanna

expressed the desire to play with precious items and for keeping them safe, stating it could be 'an area to store a precious toy or Israel might want to put money in it to keep it safe'. Again, some of the children challenged designs they considered unrealistic. For example, Amber asked 'How can you make a hover-board?'

Methodological Issues

Some language barriers were identified during the evaluation session. Such barriers may have impeded the children's participation in the research. For example, when asked who his designs were aimed at, Rio replied 'What do you mean?' This led the researcher to rephrase the question, asking 'Who are they for?' instead. It was difficult for Rio to articulate some of his ideas. When asked how his design worked, he replied 'I don't know'. He also misinterpreted some of the questions. When asked what the rules or instructions might be for his game, he replied 'You could have a spaceship for it'.

Similarly, when asked how her designs might help disabled and non-disabled children to play together better, Joanna replied 'I could change the name "Save the Chicks" to make it better'. This suggests that Joanna may have misunderstood the question. Again, much of the children's feedback related to the quality of the prototypes rather than the quality of the design concepts. Amber noted 'with the alien, it needs to be a bit tidier' and Israel added: 'I think they could improve it by putting more detail and more colour on to it'. Joel also commented 'I like the microphone, they are very good drawings'.

The concept of scale was difficult for some of the children to grasp. In response to the *Fort of Doom* designs, Joel asked 'Is it a bit bigger because on here it looks a bit small?' Some of the children were unclear about the purpose of the prototypes. For example, in response to the Rio's design, Joanna asked 'Does that really work for something?' This suggests that Joanna may have been unsure about the meaning of a prototype. Further questions asked by Joanna included 'how does the microphone work when it is real...have they made it to make it real?' and 'is it actually a toy or is it a real microphone?' The difference between prototypes and final products was clearly difficult for her to understand.

The order in which the design were presented had an impact on children's responses. For example, when two designs were presented together, Joel suggested merging them together. Some children also took the designs literally. For example, in response to Freddie's electric shock game, Joel noted 'I thought it might be electric, so I thought it might hurt you and it will hurt you a lot' and Israel explained 'It would be dangerous if it had a real electric shock'. Children at Willow

Primary School felt strongly that children should not play 18 certificate games, as illustrated in the following extract:

Researcher: *Do you think children should be playing eighteen certificate games?*

Amber: *No.*

Eve: *No way.*

Joel: *It should be for grown-ups.*

Amber: *No, they shouldn't and disabled people especially shouldn't play gory games and stuff because it could either bring really bad memories back to them like how they got disabled or something, or they might be eight but they might act like they are three and so they might be really scared.*

Joel: *I don't think you should play it before bed because you will have an awful dream and you can't do anything about it.*

Israel: *Don't play it close to your bedtime because you can't get it out of your head then because that is what happened to me - I was watching a film that had shooting in and stabbing and stuff and then I couldn't get to sleep because it was a bit scary.*

This discussion provided insight to the profound impact of exposure to 18 certificate games on a child. It also provided further insight to children's ableist assumptions and negative attitudes towards disabled children.

7.4.2.8 Evaluations at Aspen Primary School

Children at Aspen Primary School evaluated their own designs and designs developed by children at other schools concurrently. When asked which two designs should be developed further, they each chose their own designs - firstly their group effort on the *Fort of Doom*, followed by designs developed by Jasper and James. From designs produced by children at other schools, James, Jasper and Luke were in agreement in their selection of Ophelia's tree house and the teddies developed by children at Woodlands Primary School as their favourite designs. Such preferences differed from the gory games James and Jasper boasted about playing later in the session.

Methodological Issues

The children occasionally went 'off-topic' and although comments were not always directly related to the researcher's questions, the children provided insight to issues of concern for them. For example, James stated:

No, there is a five year old I know and she is very breakable and that is why I don't like her and I never go near her.

Children with dyslexia are often referred to as clumsy children (Missiuna and Polatajko, 1995). Hence, a child like James may have been discouraged from playing with more vulnerable children. Safety was an important issue for the children. For example, when asked what he liked about the hover board design, Luke pointed out 'that it looks very stable'. However, this again reflects the children's views on the quality of the prototypes, rather than the quality of the design concepts. Some of the children were critical of games with familiar themes - emphasising the impact of prior experience upon their interpretation of the designs. For example, in the extract below, Jasper was critical of Joanna's design as it reminded him of something he had previously developed, noting: 'Well I made a robot at home and it does exactly the same thing as that'.

Designs based on existing products gained criticism from the children at Aspen Primary School. For example, in response to designs developed by Josh and Lily, James said 'They have already been invented, so they are copy cats' and in response to Holly and Dawn's Mic Wow designs, he argued 'That is just exactly the same - pretty not good'. Again, the order in which the designs were presented influenced the children's responses. For example, when Rio's alien and dog designs were presented together, James thought it would be a good idea to combine the two designs, to make a 'robodog'. The language used in the brief may have also influenced design considerations made by some of the children. For example, in the design of his solar powered trampoline, James took environmental factors into account. He suggested his solar powered trampoline could be used to generate electricity for the home.

Although all three children involved in the evaluation session at Aspen Primary School were given the opportunity to express their views, James used the discussion as an opportunity to insult Luke. The process of critiquing the designs led James to be competitive, stating: 'What I want to say is Luke's design is not very...' 'I have got to say that mine is really cool'. Thus, some disabled children also used the discussion as an opportunity to express negative views on others.

Preferences

The children had some queries about the prototypes presented. Luke was critical of the assumed lack of function with Rio's dog and alien designs, stating 'To be honest, I don't really like them much because they don't do much' and the boys suggested the toys could be improved if they were 'remote controlled'. This may have been Rio's intention, but he did not state this specifically in his description. Jasper was critical of the quality of his group's *Fort of Doom* prototype designs, as

they were incomplete. They did not fully grasp the concept of scale, in relation to the prototypes. Their designs were originally intended to represent an adventure playground and were inspired by castle-themed playgrounds, as illustrated in the extract below. Thus, Luke suggested 'Make it really big' and the others agreed.

The boys were not fazed by the low quality prototype designs developed by some of the other schools. For example, although Flint's train designs were hard to decipher, the boys said they liked the designs. They suggested various vehicles for disabled and non-disabled children to play with, including scooters, BMX bikes, motor-wheelchairs, and hover boards. However, the boys soon became bored and began to overlook some of the designs presented. For example, in response to Tim's remote controlled monster, James asked 'Why don't we skip a few?'

The boys were critical of games with an inappropriate level of difficulty, or games they considered too easy or too hard. For example, in response to the Holly and Dawn's *Mic Wow* designs, Jasper stated: 'I think it is a very good thing for younger children than us (...) well like five year olds'. James and Luke also felt the *Mic Wow* design would be more suitable for younger children. James disliked the level of difficulty involved in Eve's *Save the Chicks* game, stating 'I don't like the part where it is quite hard when you are chucking it into the bucket'. Jasper expressed a preference for playing independently from adults, but had concerns about children with health conditions, stating 'unless they have asthma like me'. James dismissed Freddie's electric shock game as 'irresponsible' and 'unfair', noting 'electric shocks could actually kill people, so it is very, very, very dangerous'. The boys were also critical about games with a short shelf life. They disliked the way in which the *Make Your Own Birthday Party Kit* could only be used once a year. Therefore, Luke suggested 'I would take the "birthday party" bit out'.

Luke expressed the desire to take ownership of the design of game, stating 'I like it because it is mine.' James then used this as an opportunity to further exclude Luke, stating: 'I like the bits that me and Jasper made'. He was also openly critical of Luke's *TV Luke* designs, stating: 'I would improve that bit there, because it looks a bit like a handbag smiling [laughs]'. Jasper was dissatisfied with the quality of his prototype. He informed the researcher 'I want to improve the bats and I just really want to improve loads of things (...) Well I wanted to make the bats more stable'. When asked specifically about might change or improve, it was difficult for Jasper to articulate his views, noting 'Loads of stuff'. Thus, the teaching assistant intervened, in order to gain a more specific response from Jasper.

Barriers

Children at Aspen Primary School expressed an interest in finding out more about children at other schools. They were particularly interested in finding out about their age and gender. For example, James asked 'How old are these people?' and there was a gender-bias in the boys' response to designs developed by girls. For example, James asked: 'So all these ideas are just girls'. I agree with that one but not with that one and I hate dolls'. This response provided further evidence of 'othering'. Furthermore, when the boys learnt that a girl had developed the tree house design, they were more critical of it, as illustrated below:

Researcher: *She also said you would need to actually put your thumbprint in, to get in to the tree house.*

James: *Oh so it is a girl!! (...) That is rubbish because that means that somebody else wouldn't be able to go in there, so that is a bit rubbish.*

When informed that the gender of the designer should not matter, Jasper replied 'Yes it does because I might not agree if it is a girl'. James identified games with a set number of players as a barrier to inclusive play, stating: 'I think that any amount of children should be able to play together, unless it is a two-player game or something like that'. There was an element of machismo in the boys' response to sinister character designs, with Jasper stating 'Oh that's really cool!' In the evaluation of the *Call of Duty* inspired game designs, Jasper engaged in approval seeking behaviour - seeking approval from his peers by expressing a preference for gory or violent 18 certificate games and this peer pressure was used by James to exclude Luke. There were also contradictions in the children's preferences - on one hand claiming to have a preference for gory games, and on the other, their preference for 'cute' teddy bears.

Concerns

One issue of concern was evidence of James playing online games against adults. For example, James stated: 'One of my friends was playing on *Minecraft* with me, I have deleted him now, but he was a man'. Regarding issues of voice, despite being a disabled child himself, James contributed to the silencing of Luke during the evaluation session. Luke made some positive suggestions for the group design the *Fort of Doom*, yet James was quick to criticise his comments, stating 'No that's rubbish!'

Inclusive Approaches

James and Luke suggested the design of their videogame could be improved if children were given the opportunity 'make your own character' or 'you are (...) a character'. This could potentially be an inclusive approach to character design in game design. However, James' negative response to Luke's suggestions contributed to the silencing of Luke through the research process.

Negative Assumptions about Disabled Children

Negative assumptions about disabled people were evident in the evaluations undertaken by children at Aspen Primary School. James and Jasper assumed disabled children were given an unfair advantage in play. James stated: 'Disabled people get to do more fun things than normal people and that is quite unfair and Jasper agreed, noting: 'Yes just because they are disabled, it doesn't mean that they should get more privileges and stuff like that'. Conversely, James also expressed aspirations for all children to be treated equally, stating 'I wish there wasn't one for disabled people and then it would be all the same for everybody'. The boys assumed younger children were also at an unfair advantage, due to gaining more attention, as noted by Jasper:

Yes also for the younger people like three year olds like my little cousin; he gets loads more attention than me.

Thus the children's comments provide insight to their personal experiences and negative assumptions.

Differing Communication Methods

Children at each participating school used different methods for communicating their views and preferences. The language used by the children could potentially be used to inform future research methods. For example, whereas adults might describe a product as unsatisfactory, James used phrases such as 'pretty not good'. 'Cool' and 'awesome' were words commonly used by Amber, Joel and Joanna, in response to designs they particularly liked. Using language employed by the children could, therefore, be a way in which to make the research methods more meaningful to children.

When asked which designs they would like to develop further, the children each responded differently. For example, Jasper asked 'can I choose three?' whereas other children pointed out just one, or all of the designs they liked. There was no defined voting system in place - thus, the children developed their own voting scales. Dylan raised his hand to vote for a specific design whereas children at

Aspen Primary School, used a 'thumbs up, thumbs down' technique, which they extended further with a 'super thumbs up' or 'sideways thumb', used to describe a game scoring somewhere 'in the middle'. They also graded some designs, with Jasper stating 'Mark out of ten is one thousand', Luke: 'Mark out of ten is two thousand' and James: 'A billion!' The children did not apply this voting system to all of the designs. James even turned ranking the children's work into a competition with Luke, stating 'Well, it is two versus one: me and Jasper win don't we?' Some of these voting systems were not without fault - they were inconsistent, sporadic and at times, used insensitively. However, they provide evidence of the way in which children may contribute to the development of research methods on the topic of meaningful play in the future, which shall be discussed further in Section 7.5.

7.5 Procedure

7.5.1 Interpretation and Explanation of Results

Findings of focus group discussions undertaken during design sessions at each participating school correlated with the findings presented in Chapter 6. Multiple examples of the social and physical exclusion of disabled children from play were evidenced and the 'ableist' culture (Burstow, 2003, Campbell, 2008) within the groups continued. Again, negative assumptions about disabled people (Paterson & Hughes, 1999) were prominent in comments made by both disabled and non-disabled children. Social barriers included the stereotyping of disabled children in the RP department at Woodlands Primary School and associated bullying reported at the school. There were also echoes of the othering (Bauman, 1993) of disabled children and girls reported in Chapter 6. For example, at Aspen Primary School, there was a gender bias in the boys' response to designs presented, with the boys rejecting designs developed by girls. Similarly, at Willow Primary School, Eve segregated activities for disabled children, girls and boys.

7.5.1.1 Fixation

Design and evaluation sessions were facilitated in such a way as to enable the children to take ownership of the design process and for their designs to be untainted by adult views. Yet the majority of designs developed by the children gave insight to design fixation. Fixation is a term employed by psychologists to describe the various blocks that can obstruct insight, often as a result of the counterproductive effects of prior knowledge (Smith, 1995). In their designs and prototypes, the children fixated upon existing artefacts, materials, facilitator-set constraints, and/or current trends in the setting, as evidenced in research

undertaken by Roth (2009). For example, as discussed in Section 7.4.2, Freddie's designs were inspired by traditional wire-loop games and Ophelia and Skye drew upon children's traditional play spaces, including tree houses and dolls houses.

The majority of designs produced by children at Woodlands Primary School reflected their fixation on commercial toys and games, including Lily's *Monster-eye dolls* inspired by the *Monster High Doll* range, and characters developed by boys at the school were inspired by *Call of Duty: Black Ops* and *Modern Warfare*. Previous school-based design projects were also influential in designs developed by children at Aspen and Woodlands Primary School. In their evaluations, many of the children were fixated upon the quality of the prototypes rather than the concept of the designs and there were influences from the media and home entertainment in the children's responses to designs presented. Group dynamics were also influential, with the occurrence of approval-seeking behaviour between Jasper and James and Ophelia noting that she would purposely avoid choosing Dylan's designs.

Defeyter & German (2003) note that children aged 6-7 are more susceptible to functional fixation, as children begin to learn about objects based on their intended function at this age. This point helps to explain why the younger children, such as the children at Woodlands Primary School, became particularly fixated upon the design of commercial toys and games, whereas the older children, such as the children at Willow Primary School, were more experimental in their designs. Nevertheless, fixation is a problem that affects adult designers and not just children (Crilly, 2015). Despite the ability of children at Willow Primary School to be more experimental in their designs, the conceptual designs and prototypes they developed were shaped by the mixed media materials provided. Wool-cones were popular with Israel and Joanna, and the majority of the group was fixated upon making use of the storage boxes and containers provided.

Defeyter and German (2003) argue that prior to the age of 6, children do not process knowledge about artefacts based on a 'design stance' (Dennett, 1987) or an understanding of the conventions of the relationship (meta-representation) between the features of an object and its purpose, despite being aware of everyday objects and their function. Thus, while past experience contributes to design fixation, in an inappropriate way, the inability of children aged 6-7 and up to alter meta-representations is likely to be the most influential factor - blocking their ability to generate new and alternative representations of function and stifling their creativity. Design and innovation literature suggests that design fixation can affect the quality of design outcomes and act as a barrier to creativity (Toh and Miller

2013). Many of the children's criticisms during the evaluation sessions were a response to this stifled creativity, with designs lacking in novelty or originality being most open to criticism from children such as James.

7.5.1.2 Inclusivity

Despite the project's emphasis on inclusive design, children at Woodlands Primary School and Aspen Primary School failed to consider issues of inclusion in their toy and game designs. Instead, they focused on their personal preferences. Children at St Amelia's RC Primary School and Willow Primary School considered the needs of disabled children by including accessibility features in their designs. However, they assumed that special adaptations would be required in order to cater for disabled children, rather than simply accommodating the needs of both disabled and non-disabled children in the design of a mainstream product - a common mistake made by adult designers also. Not all of the children shared the aims of the research. For example, James felt that disabled children were already given an unfair advantage and that it was unfair to prioritise their needs.

Many of the children were unable to describe how they might ensure the inclusion of disabled children through the design of their toys and games. Where the needs of disabled children were considered in designs developed by non-disabled children, they were either fixated on the needs of a disabled person they knew, or they focused upon people with a specific type of impairment. For example, Amber's suggestions were based upon Joanna's needs as a deaf child. Where children with physical impairments developed designs intended to be inclusive of disabled children, they based the concept on their own specific needs. For example, Joanna developed a non-verbal game and Freddie designed a game that could be played one-handed. Thus, the children were not aware of the diversity of disabled children's lives. In some cases, their views were quite narrow and in others, especially younger (or less mature) children, their views were self-motivated. For example, during the evaluation sessions, children at Woodlands and Aspen Primary Schools expressed a preference for their own designs over those developed by other children.

7.5.2 Response to the Research Question - the Role of the Designer

Findings of design and evaluation sessions undertaken in participating schools suggest that designers cannot single-handedly ensure the facilitation of meaningful play between disabled and non-disabled children. Many of the barriers identified by the children were social barriers. Thus, the children identified attitudinal,

behavioural, and cultural aspects to play as key areas to address. In the children's evaluations of their toy and game designs, many of their suggestions related to the *facilitation* of play rather than the design of their playthings. However, in response to the research question, it was identified that some design features may contribute to the social and physical exclusion of some children through play, as identified in Section 6.5. Exclusionary design features identified during design and evaluation sessions include games with a set number of players, causing children to engage in infighting and inappropriate videogames causing some children to feel distressed, whilst instilling a sense of machismo in others. Some of the children also raised concerns about their wellbeing and online safety, from a safeguarding perspective.

By asking the children about their designs and encouraging them to comment upon designs developed by others, the researcher also gained insight to their needs and aspirations. Expressed needs and aspirations included an appropriate level of difficulty and sense of autonomy through which children are given an ownership and an element of choice. Child participants expressed the desire to be represented in a game - for example, designing their own character or being the character in a game. Some children also hoped for equal play opportunities and for toys to be protected from damage.

Regarding whether or not designers are responsible for the inclusion of disabled children - some children felt they had an important role to play as designers. Lily referred to *herself* as a designer on the project and took ownership of this task. As part of her work on the project, she made it her mission to find out what other children would like to play with in the playground or, as she called it, the 'design club'. In this respect, some of the children felt designers could make a difference. Ophelia emphasised the important role designers had to play. Others, such as Eve, Tim and Amber, continued their mission beyond the design sessions by further developing their work at home. Arguably, the project was meaningful to the children, which suggests that this subject matter has potential to give meaning to the work of the designer too.

7.5.3 Justification for Design and Evaluation Sessions with Children

Focus group discussions undertaken during the design sessions provided insight to the children's perspectives on disability, the design of toys and games and potential solutions to the social and physical exclusion of disabled children. It was useful to run focus group discussions at the start of the design sessions with the children, in order to gain insight to their needs, aspirations and experiences. It

was also helpful to clarify the task, to give the children the opportunity to ask questions and to learn about their initial design ideas. The children each found ways in which to express their ideas during design and evaluation sessions. Some worked independently on their own designs, whereas others worked as a team.

Drawing and model making with *Play-Doh* were the most common design methods employed by children at Woodlands Primary School. At Willow Primary School, children used a combination of drawing, mixed media, and mind mapping techniques, whereas children at Aspen Primary School and St Amelia's RC Primary School used mainly mixed media materials in their design concepts and prototype toys and games. Thus, it was essential for the researcher to apply a mixed-method approach to the facilitation of design activities in the participating schools. By putting no initial limits on the designs produced, the researcher was able to gain insight to the children's personal views and experiences. During evaluation sessions, self-representation also enabled children to describe their own designs and respond directly to queries.

7.5.4 Critical Evaluation of the Design and Evaluation Sessions

The aim of the study was to give children, and particularly disabled children, voice in inclusive design research. In the most part, this aim was fulfilled. For example, through their designs, Freddie and Lily were able to express their views - challenging negative assumptions based on disability, race and gender. Design and evaluation sessions also enabled children with physical impairments to discuss identity, with some children identifying as disabled and talking explicitly about their experiences during focus group discussion. Although most children embraced the opportunity to express their views during design and evaluation sessions, in some cases, barriers to participation contributed to the silencing of their voices. Thus, methods of cooperative inquiry did not always give children voice in this study.

7.5.4.1 Barriers

Negative attitudes towards disabled people and ableist assumptions proved the most significant barrier to participation in the design and evaluation sessions, resulting in the silencing of some of the children's voices. For example, Negative assumptions about disabled people led to Joanna and Freddie to be singled-out during focus group discussions. These negative assumptions were internalised by the disabled children and these internalised assumptions manifested themselves in different ways. For example, Freddie was silenced by his peers for having different views on the needs and aspirations of disabled people, whereas James persistently

excluded Luke, a non-disabled child, for having different views on the design of toys and games - contributing to the silencing of Luke.

Some children also faced psychological barriers during the design activities. Some children chose not to actively participate in the discussions, suggesting that they may have been disempowered through the research process. And at Woodlands Primary School, Joseph, Rosie, and Suzie demonstrated their lack of confidence in drawing tasks by asking Lily to draw their pictures on their behalf. James and Freddie faced physical barriers to participation in the prototyping activities. Whilst Jasper and Luke worked confidently with the mixed media materials provided, tasks such as cutting cardboard with scissors and peeling masking tape proved difficult for James and Freddie. James had dyspraxia, which affected his fine motor skills, and Freddie had limited use of one arm due to cerebral palsy. Language barriers during evaluation sessions meant that the researcher had to adapt her vocabulary in order to meet the needs of the children. It was difficult for children such as Rio and Freddie to articulate their views and some children, including Joanna, did not understand some of the questions asked.

Thus, focus group discussions and evaluation sessions had to be managed sensitively. The children were not always prepared to listen to each other - as evidenced at St Amelia's RC Primary School. This required careful intervention and a degree of diplomacy on the part of the researcher. On-going dialogue was also required between the children and the researcher, in order to enable her to clarify the designs, especially when the children's work was illegible or hard to decipher.

7.5.4.2 Prototyping

Evaluation sessions highlighted the challenges of using children's prototypes as discussion tools. It was difficult for Freddie to articulate his design idea to his peers by referencing his prototype, as his prototype was not 'real', as such. It was also difficult for other children, such as Joanna and Joel, to distinguish pretend actions in a game from real ones. In the construction of their prototypes, some of the younger children were confused about the purpose of some of the model-making materials, which meant that they failed to use these materials for their intended purpose. For example, despite the provision of felt-tipped pens and colouring pencils, some of the children at Woodlands Primary School used *Play-Doh* to apply colour to their drawings. Thus, the children may have benefited from technical demonstrations on the use of the arts and crafts materials supplied. As illustrated in Section 7.4.2, despite being informed they could use any of the materials provided, Lily did not realise that she was allowed to use the mixed media materials. Children at each

participating school looked to each other for guidance on use of materials. However, the input of a design practitioner may have been beneficial.

Some of the children required support in terms of developing understanding of the design process. For example, although most children had some understanding about a specific aspect to design, they were not fully aware of its various dimensions and full potential. Joanna found it difficult to understand the difference between prototypes and final products and many of the children took the designs literally, as illustrated in their negative response to Freddie's electric shock game in Section 7.4.2. Lily and Jasper were dissatisfied with the quality of their prototypes and Rio was confused about their assumed lack of function. Some children, including Joanna and Rosie, were confused about the meaning of key terms used in the design and evaluation sessions, such as 'design' and 'prototype', and children such as James, Jasper and Rosie had a number of queries regarding the intention of the prototypes. Thus, it was important for the researcher to set children's expectations appropriately, in order to avoid disappointment, as suggested by Hanna et al. (1997).

Regarding the issue of children working as designers - there was evidence to suggest the children may have required some additional support in the form of instructional scaffolding. Instructional scaffolding is an educational term that refers to the tailored support given to a student during the learning process. The intention of this support is to help the pupil to achieve their learning goals (Sawyer, 2005). For example, during focus group discussions, Jasper noted that in order to develop prototype designs, the children would need to do a 'crash course' first. It is argued that by scaffolding design tasks, design facilitators, researchers or practitioners may enable the user to clarify their designs and enable them to reach a 'workable state' (Robertson & Nicholson, 2007, p.43). Soloway et al. (1994) note that the aim of scaffolding is to enable the learner to develop the necessary skills and knowledge and for the practitioner to then gradually take the scaffolding away, so that the learner is in control.

7.5.4.3 Evaluation

It took time for the children at Woodlands Primary School to develop confidence in critically evaluating the designs. This process did not come naturally to them. For example, at the start of the session, designs presented received little feedback, whereas at the end of the session, children such as Suzie and Lily were able to express their personal preferences. Similarly, at Willow Primary School, children grew in confidence as the evaluation session progressed. Towards the end of the

evaluation sessions at each of the schools, children such as Lily, Israel, Joel, and James began to apply their imagination, making creative and inventive suggestions in response to the designs presented. Evaluations were not always consistent and children at Aspen Primary School overlooked some of the designs. Subtle differences in the order in which designs were presented, and timing in the session, also influenced the quality of feedback given during the evaluation sessions.

7.5.5 Recommendations for practice

Based on the findings of the design and evaluation sessions, this section makes recommendations for researchers in the field of inclusive design with children.

7.5.5.1 Facilitating Focus Group Discussions and Evaluation Sessions

- **Employ effective behaviour management strategies** in order to mitigate bullying, discrimination and encourage children to share
- Be transparent about the research aims and set children's expectations appropriately, in order to avoid disappointment (Hanna et al., 1997)
- **Employ child-friendly language and clarify key terms** such as prototype and design, by providing exemplars
- **Introduce taster or starter activities** in order to build children's confidence in group work and the process of critical evaluation
- Include children in the design and development of research and evaluation tools, for example, thumbs up/thumbs down evaluation techniques

7.5.5.2 Facilitating Design Activities

- **Explore scaffolding design tasks for children** by providing demonstrations, exemplars and offering guidance if needed
- **Explore strategies for avoiding fixation** - this is important for developing understanding of the barriers to creative design and how to mitigate those barriers (Crilly, 2015, p. 54)

7.6 Conclusion

Design and evaluation sessions in participating schools enabled the researcher to gain insight to disabled and non-disabled children's perspectives on topics ranging from disability to the design of children's play products. However, when it came to issues of meaningful play and inclusion, it was much more difficult for the children to articulate their views. This section examines the research by design

approach employed by the researcher in order to cast light upon children's views on issues of meaningful play and inclusion. Section 7.6.1 examines what was learnt about meaningful play. Section 7.6.2 examines what was learnt about working with and giving voice to disabled children and Section 7.6.3 examines the issue of conveying this learning to designers.

7.6.1 Meaningful Play

From designs and prototypes developed by disabled and non-disabled children participating in the project, it was not easy to identify their needs and aspirations for meaningful play. Studied in isolation, designers might struggle to identify the children's needs and aspirations from their artefacts, as the children did not express their needs and aspirations explicitly. Steve Jobs, American information technology entrepreneur, inventor, and co-founder of Apple Inc. noted:

It's really hard to design products by focus groups. A lot of times, people don't know what they want until you show it to them (BusinessWeek, 1998).

Similarly, many of the children were unable to describe how they might ensure the inclusion of disabled children through the design of their toys and games. This suggests that as users or consumers of play products, children may require the input of designers and engineers with the expertise to support the development of innovative solutions to issues of meaningful play.

7.6.2 Capturing Children's Perspectives on Meaningful Play

Although design and evaluation sessions were facilitated in such a way as to enable children to take ownership of the design process and for their designs to remain untainted by adult views, the children's designs were influenced by a number of external factors. In the development of their conceptual designs and prototypes, the children fixated upon existing artefacts, materials, facilitator-set constraints, and current trends in the setting. Amongst other factors, the children's design ideas were influenced by the design of commercial toys and games, their prior experience of design, the materials provided, and the language employed by the researcher. This does not necessarily mean that the inclusion of such elements would make play meaningful to the children. The inclusion of such references is a reflection of design fixation stifling the children's creativity.

Rather than taking designs developed by the children literally, the researcher engaged in critical design processes, using design concepts and prototypes as tools for discussion. Critical design is a critical theory-based approach to design

which uses fictional design and hypothetical design proposals to challenge assumptions about the role objects play in everyday life (Dunne and Raby, 2016). Focus group discussion transcripts derived from design and evaluation sessions in participating schools revealed that both disabled and non-disabled children shared aspirations for equality (James and Jasper), ownership (Luke and James), autonomy (Luke and Flint), self-representation (James and Luke), and safety in game play (Israel and Lily). As indicated in Chapter 6, games with a set number of players (Rosie, Lily, and James) and inappropriate videogames (Freddie and Skye) were identified as having exclusionary features. Although some of the boys claimed to be fans of violent or inappropriate videogames, many of them described being scared of such games. They were also drawn to the teddy bear designs in their evaluations, which conflicted with their expressed preferences. This presents a tension for designers, as the boys' interest in violent videogames may be indicative of a culture of machismo in participating schools, rather than a reflection of the elements that made play meaningful for them. Thus, developing understanding of children's needs and aspirations for meaningful play requires their engagement in on-going dialogue with the researcher. The process of critical design provided useful insights, in this regard.

7.6.3 Working with and Giving Voice to Disabled Children through Design and Evaluation

The children each found ways in which to communicate their design ideas during the design and evaluation sessions. Yet for some of the children, social, physical or psychological barriers to participation led to the silencing of their voices. Barriers to participation affected disabled and non-disabled children in different ways. Overall, voices were silenced by the negative attitudes of peers, communication barriers, access limitations or a lack of experience, knowledge, or confidence in completing the tasks set. Design and evaluation sessions in participating schools did not enable the children to develop innovative solutions to design exclusion. They did, however, enable the researcher to gain insight to the children's experiences and the norms and expectations within their social worlds, which may be used to inform the design of inclusive play products in the future. It was identified that in order to effectively engage children as co-designers and give them voice in the design process, design researchers, educators or practitioners may be required to scaffold tasks for children. Arguably, one of the main benefits of scaffolded instruction is that it provides for a supportive learning environment (Hogan and Pressley, 1997) through which children can develop the necessary

skills and access the support required to enable them to complete given design tasks with confidence and creativity.

7.6.4 Conveying Learning to Designers

The researcher presented the findings of design and evaluation sessions to undergraduate students at the University of Leeds in short report/written format (see Figure 8.2). The students attended weekly team meetings during term time. They also had access to anonymised mind maps and transcripts of focus group discussions, plus the children's design concepts and artefacts. As discussed in Chapter 6, by presenting the research data to undergraduate students in the form of a short report, the researcher was able to condense large quantities of data into more digestible chunks for the students. Yet it was down to the researcher to interpret the results and identify key themes within the data.

Thus, it was necessary for the researcher to attend debriefing sessions with the students, to discuss the findings in detail and respond to queries. Although student perspectives shall be examined in Chapter 8, it is helpful to note their overall response to the data at this point. At the point at which research data was presented to the students, one iterative cycle of analysis had been undertaken. However, this consisted of more obvious and superficial findings, for example, that Rio designed a robot and Rosie designed a teddy. In order to gain access to more latent themes within the data relating to children's needs and aspirations, the undergraduate students may have benefited from access to more detailed analysis at this stage. This would involve a review of the data following multiple iterative cycles through the process of applied thematic analysis, as presented in this thesis.

The students were selective with the research data and used their own criteria for sorting the children's design ideas, based on their own definition of inclusion. They dismissed design concepts similar to existing products due to their perceived lack of originality. For safeguarding reasons, they avoided themes linked to inappropriate or violent videogames and designs considered too ambitious were not pursued due to limited resources at the University. For this reason, outdoor play solutions were not explored. Additionally, despite a number of children developing doll and teddy design concepts, the all-male team of designers and engineers chose not to pursue these ideas due to their gendered association with products aimed at girls. Therefore, despite their best intentions, the way in which the researcher and students interpreted the research data may have further contributed to the silencing of the children's voices.

The task for designers seeking to undertake participatory design research with disabled and non-disabled children in the future is to explore strategies for enabling children of this age range to overcome functional fixation. This is important for developing an understanding of the barriers to creative design and ways in which designers might mitigate those barriers (Crilly, 2015, p. 54). Instructional scaffolding (Sawyer, 2005) in the form of technical demonstrations, exemplars or guidance (if needed) could potentially enable children to come up with more creative, novel, and meaningful solutions to issues of inclusion and meaningful play.

Children involved in this study found it difficult identify and articulate their views on the elements that made play inclusive and meaningful to them. The task for practitioners seeking to embark on future research in this area is to work with disabled and non-disabled children to define meaningful play and to develop appropriate research and evaluation tools with them. Many of the children involved in this study developed their own methods of communication and evaluation, yet the exploratory nature of the study meant that the children did not use these methods consistently. Nor were they shared between groups - a potential area for further investigation in the future. Working with children to identify individual access needs could also contribute to empowering and giving voice to disabled and non-disabled children through participatory design research. Meeting children's access needs could include the provision of easy read documents, visual flash cards or even self-sticking, pre-cut shapes for design tasks.

Design and evaluation sessions highlighted that this project was meaningful to the children and that it has the potential to give meaning to the work of the designer. This chapter examined the role that children might play in generating new designs and concepts for meaningful play between disabled and non-disabled children. The social, physical, and psychological barriers encountered by some of the children suggest that some form of bridging is required between children and designers, in order to empower and give voice to children in the research process. The next chapter examines the contribution that designers and engineers might make towards the facilitation of meaningful play between disabled and non-disabled children. The findings of which will be used to inform a new approach or method for inclusive design with children in the future.

Chapter 8

The Students' Design Study

This chapter is the final of four findings chapters that feed into Chapter 9. Where Chapter 7 focused upon design and evaluation sessions undertaken with the children, this chapter examines the design study undertaken by the undergraduate students recruited for participation in the project. It also examines their reflections on the process of participatory design with disabled and non-disabled children. Undergraduate students were responsible for the development of working prototypes based on, and informed by, initial ideas generated by the children, through the process of cooperative inquiry (Druin, 1999).

Aims

By examining the design study undertaken by undergraduate students participating in the Together through Play project at the University of Leeds, this section aims to:

- Reflect upon the lessons learned about meaningful play between disabled and non-disabled children through the students' participatory design study
- Examine the methods used by the researcher and the undergraduate students in the process of working with and giving voice to disabled children through the students' participatory design study
- Examine what was learnt about conveying research findings to designers and using the research findings to inform guidelines for design curricula

These three foci are part of the body of methodological work that leads into Chapter 9.

Scope

Regarding research activities in participating schools - the researcher facilitated two prototype evaluation sessions with children at each school between the winter of 2012 and spring of 2013. Prototype evaluation sessions were spaced approximately four months apart in order to enable the undergraduate students to act upon feedback received from the children and use it to inform and refine the prototypes. In the summer of 2013, St Amelia's RC Primary School also scheduled

an additional debriefing session with the researcher. This enabled the children to reflect upon the research process and the final prototypes developed by the undergraduate students. Other schools were unable to offer this provision, due to other commitments at the school.

Regarding research activities at the University of Leeds - between the autumn of 2012 and summer of 2013, the researcher attended weekly term-time project meetings with the undergraduate students. The researcher also facilitated focus group discussions and semi-structured interviews with the students at the end of the summer term in 2013. Focus group discussions and semi-structured interviews were designed to gain insight to the students' reflections on the project and to be flexible to their needs at a particularly busy period in their academic careers. Due to the students' various work commitments, two participated in focus group discussions together, one attended a semi-structured interview, one sent his response to the interview questions via email and one sent some reflections on the project in their own time.

Limitations

Undergraduate students involved in the development of prototype toys and games with the children were not able to work directly with, meet, or observe the children. The University of Leeds Research Ethics Policy (2013) restricts undergraduate students from working with children in schools for research purposes. This is to ensure compliance with safeguarding and child protection regulations in UK schools. This meant that it was not possible for the students to gather feedback on their designs directly from the children. All feedback was communicated via the researcher, who acted as a bridge between the children and the undergraduate students. For ethical reasons, the children's data was anonymised when presented to the undergraduate students. In order to protect their identities, the researcher assigned codes to each child and their schools, such as 'Child A' and 'School B'.

The availability of the undergraduate students was limited. Due to the nature of their Masters programme, they operated on a 0.5 timetable for the project. Access to resources and materials at the University were also limited, which restricted the scope of the students' work on the project. Plus, as their course finished before the completion of the Together through Play project, this meant that they were not available for consultation whilst conclusions were being drawn from the research. Taking prototype products into the school environment raised health and safety concerns and a number of steps were taken to ensure their safe use in participating

schools. For health and safety reasons and to ensure effective facilitation of evaluation sessions, the researcher was responsible for taking prototypes into schools, supervising their use, and then de-installed the prototypes after use, rather than leaving the prototypes with the schools.

Structure of the Chapter

Section 8.1 provides a background to the students' design study, making drawing upon key additional references. Section 8.2 examines the methods employed during the study in participating schools and at the University of Leeds. It includes two sub-sections: one on the undergraduate students involved and the other on the research instruments used. Section 8.3 describes the procedure, namely a report of what happened in participating schools and at the University of Leeds during the students' design study and Section 8.4 provides the results of the students' design study. Section 8.5 presents an analysis and discussion of the results and Section 8.6 draws conclusions from the results, including what was learnt about meaningful play (8.6.1), working with and foregrounding the voices of disabled children (8.6.2) and conveying this to designers (8.6.3). This chapter then concludes with guidelines for design curricula for IxD (interaction design) with children. The next section examines existing research surrounding user-engagement in participatory design with children in design education and practice. This topic provides a background to this findings chapter and references some of the key literatures used to inform the students' design study.

8.1 Background

Students participating in the research drew upon key references from the following areas to inform their design study: the literature on affordances (Norman, 1990, Riddick, 1982), Endicott et al.'s (2010) Development of the Inclusive Indoor Play Guidelines, The 7 Principles of Universal Design (Mace, 1997), child development (Jenkinson, 2001; Casey, 2005b) and disability studies perspectives (Morris, 2001) - each of which will be discussed in detail in this section.

8.1.1 The Principles of Universal Design

The students' study was underpinned by The 7 Principles of Universal Design - a set of principles established in 1997 by a team of architects, designers, engineers and researchers led by Ronald Mace at the Carolina State University. These principles were intended to guide the design of communications, products and environments and they relate to universally usable design for people with diverse abilities (Connell et al., 1997). Universal design is defined as:

The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialised design (Connell et al., 1997).

Although the students were keen use the Universal Design principles to inform their prototypes, the idea of meeting the individual needs of each user (Nussbaumer, 2012) was considered a challenging prospect. In order to assist with this task, the students developed a set of personas based on information provided by the researcher on each of the disabled children involved in the study.

8.1.2 Personas

Personas are commonly used in user-centred design and marketing. Personas are fictional characters used to represent the different types of users of a product, site or brand. They are designed to represent a key audience and are used as a reliable source of reference. Yet the reliability of a persona depends upon the quality of research used to inform them (Usability.gov, 2016). In Usability.gov (2016) guidance, personas are used to generalise user needs:

Remember that it is better to paint with a broad brush and meet the needs of the larger populations than try to meet the needs of everyone. The goal of personas is not represent all audiences or address all needs (...) but instead to focus on the major needs of the most important user groups.

Although the undergraduate students described seeking to 'embody the children's ideas in as many aspects of the work as possible' in their reports, they became preoccupied with the children's personas and these resources encouraged them to label and categorise their target users by impairment. Arguably, this goes against the principles of inclusion. It undermines equality and neglects the needs of users considered 'atypical'. The students used quantitative data within the literature on 'disabling conditions' (Nessa, 2004) to identify common forms of child physical impairment in the UK (Reddihough & Collins, 2003; Pakula et al. 2009; NHS, 2012).

Based on this data, the students sorted the disabled children by impairment category. In their view, as the needs of the disabled children fell into 'typical categories of impairment', designs based on impairment categories would capture the needs of a broader audience. Yet by prioritising the needs of children based on disability status, the students risked developing solutions specifically for disabled children. Sorting children by impairment categories also implied developing

solutions for those impairments, and by filtering key information based on physical impairment, they risked silencing children's voices.

In keeping with the aims of the project, the students sought to employ a social model view of disability, referencing researchers from the field of disability studies, such as Morris (2001). Yet the literature surrounding disability was referenced indiscriminately. Some references used to inform their design study portrayed disabled people in a negative light. For example, Felix drew upon Riddick's (1982) claim that 'young persons with handicaps often have difficulty playing games'. Not only is use of the term handicap now considered inappropriate, this statement provides evidence of medical model thinking. Such negative language permeated the students' reports. Other influential medical model perspectives included the Gov. legislation (2010) definition of disability, which states that a person is disabled under the Equality Act 2010 if they have an impairment that has a 'substantial' and 'long-term' negative effect on their ability to carry out normal daily activities.

Influenced by this definition, Felix proceeded with negative assumptions about disabled people, describing them as 'less able' than non-disabled people. He also described the disabled target user group as having:

lower abilities in coordination and dexterity; which in turn can affect their ability to play on an equal level with children with no physical disability.

Thus, Felix attributed the barriers encountered by disabled children to physical impairment.

8.1.3 Affordances

In addition to the use of personas, the students used Norman's (1990) theory of affordances, and Riddick's (1982) perspectives on 'toys and games for the handicapped child' as sources of reference for their design study. Gibson (1977) defined affordance as the action possibilities latent in the environment. Affordances are also described as the functional properties of environments [or products] related to individual users (Moore & Cosco, 2007). The students used the term affordance to denote physical affordance, and thus, the physical functional properties of products or environments (Garzotto & Bordogna, 2010). Inspired by Riddick's (1982) guidance on sorting play activities into tasks and necessary component skills for disabled children, Jimmy proposed redesigning each feature of the product to accommodate specific user needs, 'in order to mitigate the difficulties that people with specific impairments could encounter'. Evidently, by focusing upon physical

affordances, tasks and skills required, the students embarked on the project with an emphasis on children's physical capabilities rather than their aspirations.

Rather than seeking guidance from the literature on the varying needs and aspirations of children aged 7-11, the students referenced anthropometric data (Snyder, 1977) for evidence of the physical differences of children of this age range. They referenced literature linked to the physical functional properties of products, as opposed to semiotics or meaning making. Semiotics relate to symbols and their use and interpretation (Eco, 1976). Within the literature, the students focused upon the tangible aspects that make play accessible, rather than the intangible aspects that make play meaningful.

Definitions of play focused upon the literature surrounding child development and learning (Piaget, 1962; Casey, 2005b; Ludvigsen, 2005) - evidence of an adult-centric agenda for play. Literary references also assumed inclusion involved normalising disabled children to complete actions in the same manner as their non-disabled peers (Hehir, 2002). For example, non-stigmatising designs with mainstream appeal (Cassim, 2004) inspired Felix. It cannot be denied that toys designed specifically for disabled people are stigmatising, but an attempt to normalise disabled children suggests altering the child to fit in with their non-disabled peers (Hehir, 2002) - undervaluing disability.

8.1.4 The Inclusive Indoor Play Guidelines

In a bid to help determine the inclusivity of their prototypes, the students used the Endicott et al. (2010) *Development of the Inclusive Indoor Play Guidelines* as a key source of reference. Building on the Principles of Universal Design, these guidelines were developed to inform the design of inclusive playthings for indoor play. However, this guidance focuses upon the accessibility of play products, rather than their associated meaning. It also uses impairment categories to define children's play experiences and encourages designers to think about physical limitations rather than aspirational goals. It individualises problems and overlooks the social barriers involved in the exclusion of disabled children. Arguably, existing guidelines encourage designers to simplify user needs, rather than problematising or politicising them. Compliance with 'tried and tested methods' also prevents designers from listening to individual needs and aspirations, reconceptualising problems or embracing new approaches.

8.2 Method

This section includes two sub-sections - one on the research participants (Section 8.2.1) and the other on the research instruments used (Section 8.2.2).

8.2.1 Research Participants

Once design and evaluation sessions with children in participating schools were complete, the team of undergraduate students were tasked with developing a set of working prototypes based on the children's initial design concepts. This was part of phase four of the research - the process of prototyping and refinement. As the students were unable to meet, visit, or work with the children, the researcher served as a liaison between them and the children. Student prototyping activities took place in the University's workshop facilities during a seven-month period. During this time, the researcher visited each participating school twice, for a two-hour prototype evaluation session in each school. This involved a short pre-session discussion and briefing, a 1-2 hour evaluation session, plus 30 minutes for packing up, questions, and returning the children to class.

Evaluation sessions were inspired by the critical design techniques employed by Dunne and Raby (2016) and the research by design approach developed by Frayling (1993). The desired outcome of this phase of the research was not the design of new products, but a greater understanding of the children's needs and aspirations through feedback and interaction with designs and prototypes developed by the undergraduate students. As discussed in Chapter 7, it was anticipated that this process would be more fruitful than straightforward interviewing with the children. The researcher attended meetings with the undergraduate students for one hour each week during term-time, in order to provide feedback throughout the various stages of prototype development.

In participating schools, the research sample included all children involved in the design and evaluation sessions, in line with sampling criteria set in Sections 6.2.1 and 7.2.1. At the University of Leeds, five male Level 4 undergraduate students were recruited to take part in the study at the School of Mechanical Engineering. Three of the students specialised in Product Design and two specialised in Engineering. The students were in their early twenties and were working towards a Masters level qualification in Product Design at the University.

School-based prototype evaluation sessions took place in meeting rooms and spare classrooms, for reasons discussed in Section 7.2.1. At the University of Leeds, research activities with the undergraduate students involved weekly term-

time meetings between the students, researcher and Principal Investigator for the project at the School of Mechanical Engineering, prototyping and refinement undertaken by students in the University's workshop facilities and focus group discussions and semi-structured interviews between the students, the researcher, and the Co-investigator for the project, at various sites across the University. As discussed in the introduction to the chapter, semi-structured interviews and focus group discussions with the students were designed to be flexible to their needs during a particularly busy period of their academic careers. Thus, the focus group discussions and semi-structured interviews took place at different times and in different settings.

8.2.2 Research Instruments Used During the Design and Evaluation Sessions

Research instruments used during the design and evaluation sessions included personas (see Figure 8.1), semi-structured interview questions developed by the researcher for prototype evaluation sessions with children (see Appendix E, part E.8), semi-structured interview questions developed by the researcher for debriefing with undergraduate students (see Appendix E, part E.10), two sets of prototypes developed by the students (see Appendix G) and a summary of the children's feedback on the prototypes (see Figure 8.2). Each of these tools will be discussed in detail in this section.

8.2.2.1 Personas

At the start of the students' study, the researcher was asked to develop a set of anonymised personas, which would be used as a source of reference for the students. Observations undertaken at the start of the project were used to inform the personas, which were based on each of the disabled children. A sample of the personas may be found in Figure 8.1.

Child D:

Year: 3

Gender: Male

Disability: Cerebral Palsy

Level of Support: As this student is new to the school, teachers are currently waiting for his records from his previous school. Teaching Assistants are present in the classroom at all times, to support the learning of students in the group. This particularly student, however, is currently working confidently without assistance in the classroom

Barriers: New to the school

At break time, he is being excluded from team games by his peers

Running is a particular challenge to this student

Likes: Team sports, i.e. football. Learning in general – he is very friendly and enthusiastic during lessons

Class: This is a particularly lively class. A specific group of boys are very noisy and regularly get into trouble during break and lunchtimes for their being badly behaved

School environment: There is a 'Green Area' beside the classroom that is yet to be used by the class. The teacher is unsure of how it may be accessed, as there is no door linking the areas. Perhaps this could be incorporated into the students' designs

Other Comments:

Students commented 'we should have some monkey bars to stop kids swinging on the toilet doors' The class teacher also commented that the small group of boys would benefit from more inclusive, more engaging resources at playtime.

Figure 8.1 Sample Persona Based on Child D.

8.2.2.2 Prototype Evaluation Session Questions

For the first evaluation session at each participating school, the students provided the researcher with a set of 'run through instructions' and a list of questions for the children (See Appendix E, part E.11). The researcher also asked spontaneous questions, based on the children's feedback. At the end of the first prototype evaluation session, she planned to review the designs with the children, to find out how they might be further refined. To assist with this task, she prepared a set of semi-structured questions, which were designed to enable the team to draw conclusions from the children's general feedback (see Appendix E. part E.8). For the second evaluation session in each participating school, the students provided the researcher with a rulebook for the operational use of each game. The students chose not to prepare a set of semi-structured questions on this occasion, opting to enable the researcher to gather initial feedback and more general comments from the children instead.

8.2.2.3 Semi-structured Interview Questions

At the end of the students' Masters programme, in order to enable the students to reflect on their engagement with the research, the researcher designed a semi-structured interview schedule. This included a list of questions aimed at capturing the views of the undergraduate students on their involvement in the project and their attitudes towards meaningful and inclusive play, on its completion.

8.2.2.4 Summary of Prototype Evaluation Session Feedback

Findings of each of the prototype evaluation sessions were written up by the researcher and disseminated amongst the student team (see feedback sheet in Figure 8.2).

Game 1 - *3D Stack*

Observations:

- Student K compared *3D Stack* to *Jenga*
- Student K stacked a few block and said 'Cool. Look, I've made it already'.
- When divided into two teams, Student M asked if the aim of the game was to get onto the 'other team's spaces'
- Student I was interested to find out where the idea for this game came from, and how this game represented the children's ideas
- Student K explained that her Mum has Tetris on her phone and she often plays on it
- Student J commented that he would like to play this game
- The students preferred the smooth blocks to the textured blocks, as according to Student K, 'they're a bit sticky...and your nails might get caught in them, if they're quite long, and they might break'. Student K also thought that balance was an issue with the textured blocks. Student K added 'they might stick together; they're really sticky'.
- Student M felt that the blocks should be smooth, as 'they have to be all the same material to balance'. Student J said that the smooth blocks would be better, because 'the bumpy ones will, like, stick on the board and the smooth ones will be easier to, like, stay still'. Student H said that she preferred the smooth blocks, because 'when you stroke the textured block, it feels really sticky'. Student M added 'I don't really like this material, because bumpy is a bit too much for me, and I don't really like it'

Figure 8.2 Sample of Feedback from Willow Primary School, Prototype Evaluation Session 2.

In the prototype evaluation feedback sheets, the researcher recorded her observations of the prototypes in use in participating schools. She also summarised key findings for the students, drawing on key quotes within the transcribed data of the children's focus group discussions. The aim of the feedback sheets was to extract the key findings from the lengthy interview transcripts and to present the findings in a digestible format for the students.

8.3 Procedure

8.3.1 Team Meetings

The students' study began with an initial team meeting and briefing between the students, the researcher and the Principal Investigator for the project. At this introductory meeting, the researcher presented the children's personas to the students (see Figure 8.1), along with a description of progress to date and research findings so far. This was a mutually beneficial opportunity for all members of the research team - the students had the opportunity to learn about the children and the project brief, and the researcher had the opportunity to learn about the skills, experience, and expectations of the students. Team meetings then took place on a weekly-basis during term time until the completion of the students' design study.

8.3.2 Initial Prototypes

For the first month of the student's study, the students undertook a review of the literature - researching topics such as 'inclusive play', 'disabilities', and 'existing toys and games'. They allotted time to establishing their research aims and objectives, concept generation and planning prototyping activities. They then allocated one month to the development of an initial set of prototypes based on designs generated by the children. During this time, the researcher liaised with schoolteachers to plan and schedule prototype evaluation sessions in participating schools. Once the prototypes were ready for testing, the students briefed the researcher on the game rules, instructions and key questions.

8.3.3 Facilitation of Prototype Evaluation Sessions

In the facilitation of all prototype evaluation sessions, the researcher was responsible for setting up the prototypes, demonstrating their use and de-installing the equipment. In a similar fashion to design and evaluation sessions previously undertaken in participating schools, the researcher briefed the children at the start of each session. The purpose of each briefing was to inform the children of session plans, enable the researcher to seek the children's assent for the recording of focus group discussions, to revisit agreed ground rules and to give children the opportunity to ask questions. During each prototype evaluation session, the children were given up to two hours to play and interact with the prototype toys and games and provide feedback. The researcher introduced each prototype one by one and where space permitted, she set up separate workstations, to enable the children to gather around the toy or game as a group.

During the evaluations, the researcher attempted to enable the children to speak freely and openly about their views, but intervened to respond to emergent questions or issues raised by the children; to clarify game rules or key aims; to encourage the children to share their views and to encourage more positive behaviour. The children were under the supervision of the researcher at all times whilst the prototypes were in use: this was one of the key reasons for the researcher taking the prototypes into schools for set evaluation sessions, rather than leaving them with school staff. After each session, the researcher provided the students with a summary of her observations of the children's interactions with the prototype and feedback received from the children (see Figure 8.2).

8.3.4 Facilitation of Prototype Evaluation Session 1

During the first prototype evaluation session, as well as enabling the children to provide general feedback, the researcher used the semi-structured interview schedule set by the undergraduate students in their list of 'run through instructions'. At the end of the session, the researcher also introduced the short list of semi-structured interview questions that she had prepared in advance of the session (see Appendix E, part E.8), to help draw conclusions from the children's feedback.

8.3.5 Prototype Refinement and Prototype Evaluation Session 2

Once feedback from the first prototype evaluation session had been disseminated to the students, they then spent two months further refining their prototypes, based on feedback received from the children and the researcher. Again, during this time, the researcher liaised with schoolteachers, to plan and schedule the second set of prototype evaluation sessions in participating schools. The students prepared a 'rulebook' for use of the prototypes and provided the researcher with demonstrations of their operation, ahead of school visits. The students did not develop a set of interview questions for the children at this point - opting to give the children the opportunity to give their own feedback at this stage. The children were given the opportunity to use their own modes of communication and the researcher acted to enable the children to express their feedback in ways most suitable for them. Again, the researcher recorded a summary of the children's feedback and her observations of their interactions with the prototypes, in the form of a prototype evaluation feedback sheet (see sample in Figure 8.2). She disseminated the findings to the students shortly after each session.

8.3.6 Facilitation of Interviews and Focus Group Discussions with Undergraduate Students

Interviews and focus group discussions with the undergraduate students were undertaken during a two-week period at the end of their design study. Semi-structured interviews and focus group discussions were arranged once the students' project work had been submitted and marked. It was hoped that this would enable the students to be critical in their reflections on the project with confidence that it would not impeded their marks. Semi-structured interviews and focus group discussions with the students were designed to be flexible to their needs during this particularly busy period in their academic careers.

All students were invited to attend a focus group discussion with the researcher, however, only two, Felix and Jimmy, were available for the first scheduled meeting. The researcher used her semi-structured interview schedule to guide discussions and the flexibility of the schedule allowed emergent issues and questions to be investigated. During the discussion, an unscheduled fire alarm brought the session to an early finish. As a result, in order to complete their responses, Felix attended a one-to-one interview with the researcher, and Jimmy attended a second focus group discussion with Lee, at a later date. As Neil and Rik were unavailable on the proposed dates, Neil opted to send his feedback via email and Rik submitted a set of handwritten reflections.

8.3.7 Recording and Analysing Focus Group Discussion Data

Prototype evaluation sessions were recorded and used to further refine the thematic analysis carried out in Phases 2 and 3 of the research. Written transcripts were produced from the focus group discussions recorded via Dictaphone. The researcher used the transcription guide described in Chapter 6 to write up focus group discussions undertaken with the children. Focus group discussions undertaken during prototype evaluation sessions were selectively transcribed, with only relevant topics being reported to the students. Semi-structured interviews and focus group discussions undertaken with the undergraduate students were fully transcribed. An inductive approach was taken to the analysis of all transcripts.

Thematic analysis of qualitative data from prototype evaluation sessions focused upon identifying: children's aspirations for play with other children, barriers that prevent them from achieving these aspirations, their preferences in relation to the prototype toys and games, and any issues emerging from their interactions with the prototypes. Analysis was undertaken by the researcher and cross-verified with Dr. Beckett, the co-investigator for the project, to provided a check on the

conclusions, with the intention of minimising bias. As previously discussed, the researcher typed up her observations of the children's focus group discussions and summarised key findings in the form of prototype evaluation feedback sheets, which were disseminated to the students, drawing upon key quotes within the data.

The researcher used focus group discussions with children as an opportunity to learn about their engagement in the research activities and their views on, and preference for, the different research techniques employed. Semi-structured interviews and focus group discussions with the undergraduate students were used as an opportunity to learn about the students' perspectives on issues of meaningful and inclusive play, and their reflections on the process of participatory design with disabled and non-disabled children. The next section describes the findings of the students' design studies and prototype evaluation sessions undertaken in participating schools. It includes examples of the prototypes developed by the undergraduate students and the rich data gathered from participating schools through the prototype evaluation activities. It also provides insight to the students' reflections on their experience as designers and engineers on the project and their perspectives on inclusive play between disabled and non-disabled children.

8.4 Results

8.4.1 Children's Feedback on Students' Low-tech Prototypes

The children's feedback on the low-tech prototypes developed by the undergraduate students was mostly positive. However, it has previously been noted that children tend to give positive feedback in research with adults (Hourcade, 2008). Where the children found fault with the designs, they were mostly critical of the quality of the low-tech prototypes, rather than the concept of the designs. For example, the painted blocks for *3D Stack* were still wet when taken into schools for feedback and the children were quick to raise this issue. The polystyrene material used was resistant to paint. Thus, the blocks were unfinished. Eve noted 'they're a bit sticky (...) and they might break'. Similarly, Jessica noted 'when you stroke the textured block, it feels really sticky'.

Many of the children took the design of the low-tech prototypes literally. For example, they assumed that the final products would be made of the same materials as the prototypes. They did not understand that the polystyrene was used for model-making purposes only. Dylan felt that the low-tech polystyrene blocks were too light, as, in his words, 'they'll be easier to fall down.' He did not realise that the blocks might be made of more robust materials in the final product, despite the

researcher clarifying this point. Similarly, Joel noted 'You might drop them on the floor and they might be a bit fragile, so they might break'. There was also some confusion over inconsistencies in the colours used. For example, colours included in the instructions did not correlate with the colour of the blocks, which children such as Jasper found confusing.

The children gave great attention to detail when reviewing the prototypes. For example, they were critical of discrepancies in the navigation of the game, particularly with the game being entitled '*Escape the Castle*'. Holly noted: 'You know it's *Escape the Castle*, you're heading *towards* the castle'. Thus, there were some criticisms about discrepancies in the game. Older children at St Amelia's RC Primary School found it easier to imagine how the prototypes might work, without being too pre-occupied with their quality, whereas such issues were dominant in feedback from many of the younger children.

8.4.1.1 Influence of Commercial Toys and Games

Many of the children compared the undergraduates' prototype toys and games (see Appendix G) to existing products. They also drew upon their knowledge of commercial toys and games when reviewing the prototypes. Children at Willow and Woodlands Primary Schools compared *Jump On* to *Twister* and it is worth noting that they expected *Jump On* to be played in a similar fashion. Others compared *Jump On* to *Ludo*; the *Nintendo Wii*; the *X-box Kinect* and *Kinect Adventures*. However, Joanna found the rules to *Jump On* misleading.

Despite its similar appearance to *Twister*, the rules for *Jump On* differed significantly. Joanna's feedback captured this issue succinctly. Joanna noted 'I don't really get it... because it's not like *Twister*'. Luke expressed an interest in seeing elements of *Minecraft* and *Captain America* featured in the design of *Jump On*, however, he was concerned that such themes would not be viable, due to trademarking restrictions. Eve and James linked *3D Stack* to games such as *Jenga* and *Tetris*. Children at Aspen Primary School suggested *3D Stack* could operate like *Minecraft*, or that the two could be merged to become *Stackcraft*.

At Woodlands and Aspen Primary School, Lily, James, and Jasper compared the *Battle Balls* to *Moshi Monsters*. However, the boys and girls were divided on this matter. Lily described the likeness as a positive, suggesting giving the *Battle Balls* a *Moshi Monsters* theme, whereas James felt this was a negative, suggesting this would make them 'too cute'. Jasper compared the *Battle Balls* to *Monster Munch* characters and Rosie suggested revising and renaming the game after *Star Wars*. In their own *Battle Ball* designs, the children included faces from popular

culture, such as Lady Gaga, Justin Bieber and Horrid Henry. Freddie suggested the *Battle Balls* should follow themes such as *Toy Story* and 'things from popular entertainment ... such as famous footballers and *Daleks*'. Holly designed a set of characters based on famous football players and Dawn suggested designing 'an actual logo' for the *Battle Balls*. James and Jasper proposed the inclusion of *Lego* people and *Halo* figures. Similarly, Holly and Dawn suggested the designs should include other elements of celebrity culture.

8.4.1.2 Children's Engagement in Evaluation Activities

Factors that contributed to children's engagement in the evaluation sessions included social barriers requiring the intervention of the researcher, issues of physical accessibility, the appeal of tasks set by the undergraduate students and the varying levels of difficulty involved in the completion of tasks set, loss of concentration or external distractions and limited time or resources. Each of these aspects will be discussed in detail in this section.

Social Barriers Requiring the Intervention of the Researcher

In the facilitation of the children's play and interaction with the low-tech prototypes developed by the undergraduate students, the researcher was required to intervene with some behaviour management strategies. At Woodlands and Aspen Primary Schools, groups had to be prompted to take turns when playing with *3D Stack*, as the children were all keen to place their blocks on the board at the same time. The researcher was required to intervene when children were unkind to each other, to remind them that all comments were important and valid and to allocate roles for play with *Escape the Castle*, as this proved problematic. It was also difficult to engage large groups with this game.

Escape the Castle involved a number of educational tasks, which required further explanation or translation for the some of the children. Although Holly felt the questions were appropriately pitched for Primary School children, Flint noted that as there were no correct answers on the back of the question cards, players were unable to check whether their answers were right or wrong, ultimately affecting their engagement in the activity. At Aspen Primary School, James found the questions confusing, asking abruptly 'what's all that about?' However, the T.A. simplified the question for the group, which helped resolved this issue.

The Appeal of Tasks Set

In addition to reviewing the *Battle Balls*, the undergraduate students asked the children to design their own faces for the balls. The pupils thoroughly enjoyed this

design activity and children at Woodlands Primary School even wanted to take a copy of the design templates home for their siblings. This activity also sparked discussion between the children about their play preferences in the out-of-school setting. In the facilitation of this design task, the researcher was required to be flexible to the children's needs. For example, some children were unable to complete this task in the time set, whereas others generated multiple designs.

Physical Accessibility

In their feedback, some of the children at Woodlands Primary School gave demonstrations of the ways in which they might like to play with the *Battle Balls*. However, it was difficult for the researcher to capture their actions via Dictaphone. This raised the question as to whether voice recording enabled the children to fully express their views and whether recording their views in this way gave voice to the children through the research process. Some of the children developed their own methods of interaction with *Jump On*. For example, at Woodlands Primary School, Rosie found it more comfortable to lie down on the mat and to place her hands on some of the circles and her feet on others.

She also opted to move her body in different ways, turning her head to steer the mat instead of her hands. The game was not intuitive. The children had to be prompted to huddle together to sit on the mat, as the lack of space was off-putting to some of them. They felt there was not enough space between the circles for them to sit together comfortably. Rosie was not able to sit cross-legged on the mat and Joseph noted that when he was sat in the middle, he could not put his hands down properly, but that he could put his hands in front or behind him.

Loss of Concentration or External Distractions

The children's attention deteriorated towards the end of the evaluation session at Woodlands Primary School, which affected the quality of feedback given in response to games such as *Puzzled*, and their engagement in this task. Thus, their lack of interest may have been a reflection of attention loss rather than a true depiction of their views on the designs. When they began to misbehave, the researcher was responsive to their needs by intervening and giving them the opportunity to take a break.

Limitations of Time and Resources

Whilst reviewing the *Trash Heap Transformational Challenge*, there was not enough equipment to go round in three of the schools. Nevertheless, children at Woodlands Primary School worked well together whilst reviewing this game -

describing it as their favourite. On one hand, this may have been a reflection of their engagement with the design task involved. On the other - more positive engagement in this activity may have been the result of them taking a break. This group did not follow the rules of the task correctly. As the children were not given specific guidance on how to use the materials provided, some of them included the equipment intended for use in the making of their inventions as component parts of their artefacts. For example, Rosie made a rocket out of a rubber glove and some screwed up newspaper - materials designed for use in their construction. Although her design did not resemble a rocket, she was happy with her creation.

The boys at Aspen Primary School recognised the computer graphics used in the student's *Jump On* concept sheets and this issue was a distraction for them. They found the style of the characters in the students' concept sheets confusing. For example, Jasper noted the character depicted playing the *Jump On* game 'did not have a face' and in relation to the decoration applied, James asked: 'what are the little squiggles about?' The children had a tendency to take the designs literally. As the character featured in the concept sheet was standing, children at Willow Primary School assumed that they should replicate it. For example, when instructed to sit on the mat, Eve asked 'why's he standing up then?'

Some of the designs were intuitive to the children, whereas others were not. For example, Joseph was confident in identifying where the blocks would have to go on the prototype game board for *3D Stack*, whereas on the *Escape the Castle* board, many of the children were unclear about where the game was supposed to start. On navigating the game, the directions were not obvious to the children. When instructed to steer the boat or raft forward, Joanna noted: 'It might be quite complicated because you don't really know which is left and right'. Eve suggested it may be better for an 'L' or an 'R' to be displayed on a screen, in order to direct the player more effectively. Time was an issue in the completion of the *Trash Heap Transformational Challenge* at each of the participating schools. At Woodlands Primary School, the children did not have sufficient time to complete both design tasks set in the given time frame. Freddie felt that time allocated in the design of the task was insufficient. As illustrated in the extract below:

If this was real life, we couldn't actually do this, because we'd have to design it... then we'd have to build it all, think about how able it is, and we'd have to do that in like one week, so do you think that's a bit impossible? ... If this is in real life, I think they need a bit more time.

At St Amelia's RC Primary School, the prototype evaluation session ran alongside 'Golden Time', which Freddie described as 'basically, time to ourselves'. At which point, some children opted to take a 30-minute break. At Willow Primary School, Joanna was concerned that she had missed some time testing the prototypes, therefore she did not feel she could confirm her which toy or game was her favourite, as she had not had chance to play with the *Battle Balls*. In the *Trash Heap Transformational Challenge*, the oversized pencils were popular with children at St Amelia's RC Primary School. However, there were not enough to go round with the larger groups. At Aspen Primary School, the Teaching Assistant stepped in to encourage the boys to share the equipment. James found it difficult to draw with the oversized pencil, yet he claimed to enjoy the challenge.

James' Teaching Assistant spoke openly to the researcher about the difficulty he may encounter in the completion of this task and this comment may have contributed to his frustration. James stated firmly that he did not want to play with this resource as a one-to-one activity with his Teaching Assistant. Although some of the materials provided proved inaccessible to James, he expressed aspirations for playing this game with his friends. At Willow Primary School, Joanna was restricted by the physical limitations of her hearing aids. Her batteries were running low, which meant that she had to return to class to recharge them and was unable to complete her designs. Time limitations also meant that her group was unable to evaluate the *Battle Ball* designs. Children at Willow Primary School had less time to evaluate the students' prototype designs than other schools as their evaluation session was limited to one hour due to a whole school assembly.

Children at Willow Primary School did not give the evaluation of the *Escape the Castle* designs their full attention as the children continued to work on their *Battle Ball* designs and were too engrossed in their design work. Nevertheless, the *Battle Balls* templates (see Appendix G, Section G.10) proved a useful and engaging resource for the children. They enabled the children to produce a higher quality of designs than those developed in previous design sessions at the school. This design activity also encouraged the children at Willow Primary School to work more positively together. For example, the children advised each other on colouring techniques whilst working on their designs. The children also wanted to take ownership of the designs. For example, Israel exclaimed 'we might be like famous!'

8.4.1.3 Methodological Issues for the Undergraduate Students

Some children expressed preferences for more than one design, which made it difficult for the undergraduate students to select prototypes for further refinement.

For example, Holly said 'I've got two; I like the *Battle Balls* and I like the castle one [*Escape the Castle*]'. It was difficult for the undergraduate students to determine whether positive or negative feedback was a reflection of the children's preferences or not. For example, at Aspen Primary School, group dynamics influenced the children's responses to the prototype designs. James contradicted Jasper and Luke' views on the materials of *3D Stack*, 'just to be different'.

The undergraduate students were put in a difficult position regarding ownership of the design concepts. The aim was for them to build upon conceptual ideas and prototypes developed by the children. The children were keen to claim ownership of their design ideas. For example, when reviewing *Escape the Castle*, James, Jasper and Luke noted that the undergraduate students had 'copied their idea', with James insisting 'but we did make it!' and as the students had renamed the children's game, Jasper suggested that the game could be called '*Escape the Fort of Doom*' instead, which would combine ideas developed by the children with those of the undergraduate students. James noted that he would also like their names included in the game's packaging, along with a statement inspired by them.

8.4.1.4 Summary

Battle Balls were the most popular designs at St Amelia's RC Primary School, Willow Primary School, and Aspen Primary Schools. This specific design seemed to generate the most excitement amongst the children. When the children were asked what they liked about them, Holly replied:

Because every hit could go either way, because every time you hit one, it breaks yourself as well, ...so I like that, you're left in suspense until the next hit.

James and Jasper liked the way in which the *Battle Balls* were funny and 'goofy looking'. At Aspen Primary School, although *Escape the Castle* was based specifically on the boys' ideas, they felt that the characters were too babyish for them to consider it to be their favourite design. Luke and Jasper noted that they would prefer to see more realistic zombie characters featured in this game instead. For this reason, *Battle Balls* was their favourite of the designs presented. At Woodlands Primary School, the children informed the researcher that the *Transformational Scrapheap Challenge* was their favourite game. *Puzzled* was the least popular game due to its complexity. Some of the children, such as Joanna and James, were not entirely confident that they were making an informed decision in their selection as they had missed some time testing the prototypes.

8.4.2 Children's Feedback on High-fidelity Prototypes

This section examines the findings of the focus group discussions undertaken with children at schools participating in the Together through Play project as part of prototype evaluation session 2. During this phase of evaluation, children tested, and provided feedback on, the high-fidelity prototypes developed by students at the University of Leeds. At St Amelia's RC Primary School, Dylan compared many of the high fidelity prototypes to commercial toys and games, drawing similarities between *3D Stack* and *Tetris*. He also recommended adapting some of the prototypes to make them more like existing toys and games.

For example, Dylan suggested *Button Bash* should be more like shooting games such as *Call of Duty* and that the *Battle Balls* should be based on Public Enemy themes. Holly suggested the *Battle Balls* should be based on celebrities in popular culture, such as *One Direction*. At Willow Primary School, Eve compared the *Stackamo* 'Free Play' mode to the television show, *The Cube*. The children identified the new mechanism and case for the revised *Battle Ball* designs as similar to the *Pokemon Pokeball*. At Woodlands Primary School, Joseph and Lily also found some games, such as *Button Bash*, similar to a classroom game previously played at the school.

8.4.2.1 Children's Suggestions

In order to further enhance the appearance of games such as *Button Bash*, children at Woodlands Primary School suggested adding a pink button, as according to Suzie, Rosie and Joseph, this colour appeals to girls and boys. Dylan and Josh expressed aspirations for more aesthetically pleasing designs, with the inclusion of more colourful blocks and 'acid colours' in the design of *Stackamo*. Some suggested adjusting the games to make them more intuitive. For example, Dylan felt that the inclusion of guns, 'like arcade games', would be more appropriate for the shooting games in *Button Bash*, rather than buttons. Children at Willow Primary School suggested ensuring the games were sustainable and robust, with the inclusion of spare parts, should a game be damaged or parts lost. Lily also suggested including additional accessories to further enhance the games. Children at St Amelia's RC Primary School raised health and safety concerns in their feedback on the high-fidelity prototypes, with Dylan, Freddie, and Holly suggesting the use of more durable materials such as wood, particularly in the design of the *Battle Balls*. Additional themes for the games ranged from shopping to superheroes and from animals to aliens.

8.4.2.2 Children's Aspirations

Autonomy

Many of the children expressed aspirations for a level of autonomy whilst playing with and evaluating the games. Children at Willow Primary School suggested including customisable features, and in her feedback on *Stackamo*, Amber suggested there should be a choice in levels. Skye suggested there should be an element of novelty and exclusivity, with limited edition Easter egg or Christmas themed *Battle Balls*. Despite the children's aspirations for autonomous play, Flint also expressed aspirations for games with rules.

Inclusive Elements

Both disabled and non-disabled children suggested adapting some of the games to be more inclusive of disabled children. Holly and Eve suggested the inclusion of more sensory elements and different textures in the design of the games. Joseph felt children should be able to operate games such as *Jump On* with different parts of their bodies and from a therapeutic perspective, Rosie and Suzie suggested the game should be designed to improve skill or dexterity and provide therapeutic benefits for disabled children. Eve, a non-disabled child, suggested this idea for *Stackamo* also. Freddie liked the idea that whilst playing with the *Battle Balls*, there was a random chance of winning - omitting the pressure to perform whilst playing this game. Holly suggested including adjustable straps in the design of the *Battle Balls*.

Appropriate Level of Difficulty

Ensuring an appropriate level of difficulty and greater sense of competition in the design of the games were dominant themes in the children's feedback on the high fidelity prototypes. Freddie felt that an 'against the clock timer' would help make the games 'more sophisticated' and that there should be 'harder levels and stuff'. Similarly, Eve suggested adding a timer to *Stackamo* and Lily suggested children should play *Escape the Castle* against the clock, with a scary voice counting down. Flint felt there should be a greater level of difficulty in games such as *Stackamo*. He expressed aspirations for an element of competition in this game and the desire to be the first to finish. Dylan suggested including a sense of competition in the design of the *Battle Balls* by running a 'tiny little tournament' and issuing suitable rewards.

Children at Willow and Woodlands Primary Schools also suggested adding complexity through dares, missions, cheats, races and additional obstacles. Flint

suggested making the games faster, in order to apply more time pressure. In the design of *Stackamo*, Amber felt that an element of suspense would make the game more engaging. Rosie suggested splitting the screen for console games such as *Jump On*, to enable players to observe themselves competing. The motivation behind this comment was that Rosie would like to see herself succeed in a game. She informed the researcher: 'because I liked winning'. The inclusion of rewards was also motivating for children such as Rosie. Children at Willow Primary School suggested gold coins as collectable rewards and keeping score of items collected.

Team Effort

A number of children suggested including more opportunities for teamwork in the design of the games. Suzie and Josh suggested multiple teams should be able to play *Battle Balls* together and Lily suggested introducing team scoring. At Willow Primary School, there was also the suggestion for the *Battle Balls* to interact with each other. There were, however, contradictions in some of the children's comments, with Dylan expressing aspirations for team play in the *Fort of Doom*, and then changing his mind to say 'I don't wanna be in groups, I don't like being in groups of three'. He also expressed a preference for individual scoring in other games, noting 'I want to be amazing. I want to get the last one'.

8.4.2.3 Children's Preferences

The *Battle Balls* were the most popular designs overall. Ophelia liked the way in which the game was funny or entertaining. Children at Willow Primary School found the playful appearance of the *Battle Balls* appealing. Holly liked the way in which the *Battle Balls* were inclusive of both players and spectators. She also liked their unpredictable nature and the way in which 'it [the game] could go either way'. At St Amelia's RC Primary School, there were mixed views in response to the *Fort of Doom* (Dylan, Skye, Dawn, and Ophelia). Some expressed a preference for the board game version of this game, whereas others preferred the free play modes.

8.4.2.4 Barriers to Meaningful Play and Participation

At Willow Primary School, social barriers to participation in research activities were the most prominent. During the wait time of *Button Bash*, some of the children became disengaged and engaged in infighting. According to the group, the game was also too short. Some refused to share when players were assigned positions in the game. For example, Rio refused to work with Joanna and Joanna insisted 'He hates me'. Joanna cried and left the room, turning to her Teaching Assistant for comfort and support. This incident provided evidence of more dominant members of the group claiming ownership of the device and excluding others. It also illustrates

the way in which Joanna's reliance on school staff contributed to her isolation from the rest of the group.

Many of the children at Willow Primary School were dissatisfied with the design of *Crazy Crows*. Joel described it as too babyish and Israel found it too simplistic. Functional limitations associated with the game also led Eve to become disengaged. Whilst reviewing *Crazy Crows*, the researcher attempted to resolve issues relating to the orientation of the tablet. At which point, Rio and Eve participated in bullying, casting insults at Joanna. The Teaching Assistant overheard this conversation and ordered them back to class. There was also a gender bias/divide during play with *Stackamo*. Girls at Willow Primary School wanted to play this game in mixed teams, whereas the boys wanted to play this game as an all male group. This caused infighting amongst the group, which was most detrimental to the girls' engagement in the game. Some designs were disengaging for some of the children. In response to *3D Stack*, Dawn noted 'It's a bit boring'.

Games considered too difficult or too easy to play were disengaging for some of the participants, acting as a barrier to participation for some children. For example, Amber felt games such as *Stackamo* were not challenging enough. On the other hand, she considered the *Battle Balls* too difficult to play with, noting 'I think it's a bit too hard'. Some children at St Amelia's RC Primary School found games such as *Stackamo* physically inaccessible. Ophelia noted the game would be particularly inaccessible to blind people, thus Freddie suggested audio-navigation. Some children also felt this game would be too difficult for some people. Children at this school also considered games with a set number of players, such as *Button Bash*, to be exclusionary. For example, Freddie noted 'Hang on, I'm not included in this' and Dawn said 'Yeah, I'm not included either'. There were not enough buttons to go around and the children's reluctance to share resulted in infighting. Competitive scoring was identified as barrier to participation for some, as illustrated by Freddie below:

Otherwise people will all want to win and they will all start falling out, and before you know it, this whole game is just one big argument maker.

Holly agreed with this sentiment. The negative assumptions of others and a fear of these negative assumptions, acted as both a social and psychological barrier to participation for some of the children. At Woodlands Primary School, Rosie was concerned someone might say 'you're rubbish at this'. Ophelia feared infighting,

stating 'But what if someone's got a really bad temper? (...) I think it can cause too much arguments'. Negative assumptions about disabled people were still evident in the children's feedback on the prototypes at this stage. For example, Ophelia noted 'You've got to think about disability people. They don't necessarily know how to play it'. In their evaluation of the *Fort of Doom*, the limited number of counters contributed to infighting amongst some of the children. There was also infighting in the children's allocation of teams and ownership of different counters. For example, Ophelia complained that the others would not let her be the dragon.

8.4.2.5 Functional Limitations of the Prototypes

In the evaluation of *Stackamo* at Woodlands and St Amelia's RC Primary Schools, the researcher was required to use a pair of pliers to operate the switch on the board. She also faced some problems when attempting to start up the lights in the 'free play' mode of this game. The rules in the 'free play' mode were unclear to some children and some used individual, broken cubes to gain an unfair advantage in the game. Broken blocks contributed to infighting amongst the group at Willow Primary School. The aim of this game was for the children to use the least number of blocks, yet some children, such as Flint, found this confusing. Whilst evaluating *Button Bash*, the touch screen on the tablet occasionally failed to register contact. Rio stated 'This isn't working' when attempting to 'Zap' the aliens.

The buttons on *Button Bash* were not intuitive for any of the children to use. For example, regarding the design of the buttons, Ophelia asked 'do they act like a mouse?' and Holly and Freddie found the buttons unresponsive and difficult to use. Ophelia suspected the game was not adding up scores properly and other children agreed. Unfortunately, it was not possible for the researcher to check whether this was the case or not. Similarly, one of the *Battle Balls* did not work properly - the release mechanism was faulty. For example, Rio noted that his *Battle Ball* broke away before being hit on the nose and Joanna found the mechanism temperamental, stating: 'You don't know if the button works or not'. Amber suggested 'I think it should be a bit more sensitive, coz sometimes, a person hits it and it doesn't come out'.

Although Dawn felt there had been an improvement in the revised designs of the *Battle Balls*, she was not clear on who the attackers and defenders were. She identified the way in which the *Battle Balls* were restricted to just two players as a limitation, noting: 'only two people do it and then the other people just sit there and get bored'. Dawn also found the straps 'annoying'. Due to the size of the tablet, it was not easy for some of the children to see games such as *Crazy Crows* (see

Appendix G, section G.7). Instructions for the game lacked clarity, with Ophelia, Dawn and Holly noting 'I don't get it'. Holly identified a glitch in the game, arguing 'it just picks one for you' and again, other children felt the touch screen was not sensitive enough. Israel highlighted 'sometimes, it freezes, so you can't get it' and Holly suggested 'if the touch thing was a bit easier to touch, it would be fun. Coz a minute ago, you had to click it a few times'.

8.4.3 Student Reflections on the Project

This section examines the findings of the focus group discussions and semi-structured interviews undertaken with undergraduate students participating in the Together through Play project at the University of Leeds. It includes student reflections on inclusive play and their involvement in the project.

8.4.3.1 Meaningful and Inclusive Play

Through their work on the project, the undergraduate students focused specifically upon the design of games for inclusive play. In their response to the project, their perspectives on inclusive play varied. Jimmy defined inclusive play as a means of enabling children to 'compete on an equal level' and to 'play together' in ways in which 'no one has an advantage over the other'. He also felt inclusive play was about 'ensuring the designs are fun'. Lee felt it important to focus 'more on the game than the disability', whereas Neil assumed products would need to focus on specific impairments, in order to be inclusive, as illustrated below:

You have to realise the limitations of what you're designing, you need to be able to see the areas of impairment that it'll really help and focus on those instead of trying to add in little pieces here and there to factor in other needs (...) the phrase "Jack of all trades, master of none" springs to mind; inclusive toys need to pick a specific range of impairment[s] and focus everything on that.

Without a consensus on the meaning of inclusive play, the students risked setting conflicting goals for their design study.

8.4.3.2 Influential Factors in the Students' Decision-making

At the start of their design study, the students used the children's mind maps to establish themes on the topic of inclusive play, as illustrated in the extract below:

One of the good things is that "what is play?" thing you asked them to start with, coz we got the "what is play?" thing, and (...) made like a big whiteboard of all the different ideas and then from that, we (...) got themes that they all found with the play.

However, the students did not rely solely upon the children's feedback to inform their decisions. In addition to the children's feedback, the students' personal assumptions, preferences, experiences and external influences informed their decision-making. The prototype designs developed were shaped by their own agendas for the research. The students also undertook a task analysis, as illustrated below:

In terms of (...) refining the ideas, I think the task analysis was (...) the stage where we made (...) the most changes to the designs, like going through it with each of them and deciding what tasks would be needed in each thing, then mitigating for each of those tasks. That was where, sort of the most development (...) occurred.

Task analysis involves observing users in action, in order to develop understanding of the ways in which they perform tasks and achieve intended goals (Usability.gov, 2016). In the transcripts of focus group discussions and summary sheets provided by the researcher, the students looked for 'common themes' and 'hints to inclusivity' (Lee) in the children's feedback. However, in the refinement of the prototypes, student interpretations of inclusivity were prioritised over the children's expressed preferences. Felix found the process of selection one of the biggest challenges encountered through the project as he 'didn't know what to choose'. Arguably, enabling the children to take ownership of decision-making may have been a more inclusive approach to take. As the students made the final decision on the selection of designs taken forward, Neil felt that ultimately, they took control away from the children.

External Influences

In their decision-making, some of the students were heavily influenced by current market demand, with students such as Jimmy noting '[It's better to design a product] as broad as possible, to get as many children involved as possible' rather than designing a product for 'only like one child in the classroom, or like a couple of children' as 'it's going to be hard to like really have a market for a "one" sort of product'. Felix also gave insight to the way in which the Endicott et al., (2010) guidelines were influential, stating 'Well, (...) you can see that particular design ticked quite a few boxes from (...) Endicott...'

Personal Experiences and Preferences

According to Neil, designs were selected on the basis of their 'potential for development' and 'whether they were actually feasible in terms of creating prototypes later on in the project'. Others were selected on the basis of how

'interesting' they looked to the team and Rik noted that the 'skill-base' of the students was an influential factor. Jimmy described 'looking back' to his school play experiences to inform his decision-making and Felix noted the way in which personal preferences played a part, stating 'I think a lot of them were favourites, actually (...) it was like "I really like this one".'

Assumptions and Low Expectations of the Children

Some students lacked confidence in the children's ability to grasp the concept of inclusion, as illustrated in the extract from Jimmy below:

I think it's hard for the children (...) there isn't any toys out there that they can compare it to and a lot of their feedback was relating to (...) the toys that they are (...) playing with at the moment, and so it's quite hard for them to (...) suddenly think of inclusive. I'm not sure at that age that they really think of what inclusivity (...) really is...so (...) it was good to get ideas of what they enjoy with play, but then it was up to us to (...) take those ideas and then try and make them inclusive (...).'

Similarly, Felix felt the children's designs failed to consider inclusion, since they were not focused specifically upon impairment, stating: 'They weren't necessarily like inclusive play (...) a lot of them were just (...) talking about the game'. Thus, the students took ownership of 'making the children's ideas inclusive'. Yet the children's suggestions may have helped the students towards more meaningful designs. Some students held low expectations of, and expressed negative assumptions towards, the children - for example, assuming that bullying was inevitable for disabled children and that weaker children would not typically be selected to play during team games. Lee stated: 'If one person's weaker at it (...) you're not gonna want them on your team'. The students also formed opinions on some of the children, which may have also influenced their decision-making. For example, in the extract below, Jimmy described identifying a bully in the transcripts, as illustrated in the extract below:

'It was (...) the same characters coming up with the same (...) negative to disabled (...) comments, and (...) it's (...) like "Ooh, here he is again...piping out..."'

In some cases, the students overestimated the level of input to expect from the children. They assumed the children would allow their imagination to direct the course of the games. However, for some children, this was a difficult task, particularly in the prototype games with 'free play' modes such as *Stackamo* and

Escape the Fort of Doom. Likewise, the children interacted with the toys and games in ways that were not anticipated by the students. Jimmy noted:

We were sort of assuming the way you'd use them, but then when you gave them the children, they were sort of using them in a completely different way to what we'd envisaged.

Understanding and relating to the children's needs and aspirations, therefore, was a particular challenge for some of the students.

Conflicting Views on 'Inclusive' and 'Mainstream' Games

The students had conflicting views on the design of 'inclusive' and 'mainstream' toys and games. Whilst 'trying to incorporate as many people as possible', Jimmy felt it was important to define children's needs and to sort them into specific impairment categories, in order to 'deal with them individually'. Lee was concerned that 'bespoke' products would be less appealing, as, in his view, it would be 'more obvious that it's a toy designed for disabled users'. Lee suggested inclusive toys or games should offer an alternative to 'normal' play products. He felt disabled children should be given a 'choice' between inclusive and mainstream products - for example, a choice between 'whether they want to go and play football with their friends', or 'whether they want to stay in and play this [the inclusive] game'.

Neil felt inclusive toys required a 'mainstream aesthetic' in order to appeal to disabled and non-disabled children. Felix, on the other hand, was concerned inclusive play products would not have the same appeal, as they would be 'more expensive'. Lee suggested the marketing and branding of a product would determine whether a product was perceived as an inclusive or mainstream product, as illustrated in the extract below:

I think the key thing is not to push it as "this is a toy for the disabled" (...) making sure that the designs are inclusive. So they're still going to see it as a new fun toy, and it's designed to be inclusive for more users.

Research Agendas

The students set their own agenda for the study. They were keen to develop a varied collection of toys and games through their research, as illustrated by Jimmy in the extracts below:

We wanted to get as much variety to them six, coz obviously, we were (...) researching, (...) what was the best thing. We didn't want six things that were all very similar. We wanted six that (...) encompassed the (...) most variety of different types of players (...) so we had (...) that big game mat, and (...) ones that were (...) based on memory; ones that were competitive; ones that were (...) cooperative and we tried to (...) incorporate as much variety as possible within our six designs that we, like, selected.

Coz, I thought, like, (...) to get as (...) thorough a research as possible, it was probably best that we (...) explored (...) as wide a variety of options as possible, (...) to (...) fully define what (...) the (...) best toy was to facilitate this (...) inclusive play.

Thus, Jimmy felt observations of children's interactions with a wide variety of toys and games would give the team a richer understanding of inclusive play. Arguably, ideas that failed to meet the criteria of this product range may have been discarded or omitted by the students. The students chose to work specifically on the design of inclusive games. This decision was motivated by their research into the current market for toys and games and the lack of existing inclusive team games, as illustrated by Jimmy below:

There's not a lot of products on the market that (...) are for (...) inclusive play between disabled and non-disabled children, as in a (...) group context (...) There's inclusive toys, but there's not really any inclusive games for (...) normal children to play.

The lack of inclusive play products on the market triggered an emotional response for Jimmy. He noted 'I thought it was pretty bad, to be fair (...) that there'd not really been anything developed like this' as 'There's never (...) been any that you can grow up with and both (...) play with'. In Jimmy's view, 'that is (...) where the root of the social issues comes from'. Hence, Jimmy attributed the social barriers to inclusive play to a failure of the design industry to develop products that enable inclusive play between disabled and non-disabled children.

Motivations

The students had various motivations for taking part in this study. Jimmy felt it was beneficial to develop skills in inclusive design, in response to market demand, noting: 'There is a big market of (...) designs for disabled, and inclusive design' and being able to design for 'common impairments' was 'quite a good thing to focus on'. Jimmy noted 'there's now going to be more elderly, in the next twenty/ten years', suggesting that future designers would need to be responsive to the growing elderly population in the UK, which for him, gave value to learning about inclusive design.

Felix was keen to participate in work that he enjoyed. He was motivated to take part in the making activities, stating 'only coz I find it more fun'.

8.4.3.3 Roles and Responsibilities of Designers and Engineers

Participation in this project encouraged the students to discuss their roles and responsibilities as designers and engineers in the process of inclusive design with children. They each had different perspectives on this topic. Felix did not see the relevance of inclusive design to engineering, as, in his view, 'Inclusive design is to do with (...) the (...) outer-design, and (...) the casing', whereas Engineering is 'more like the inside, isn't it?' Felix felt engineering was concerned with the mechanics of a product, which, in his view, did not relate to inclusive design. According to Felix, 'Mechatronics are just about making it work' and 'a lot of it doesn't have anything to do with it being inclusive'. Further, 'a lot of the stuff isn't really used by people'. However, one could argue that all engineering is geared towards human use in one way or another.

Talking things through encouraged Felix to reconsider the roles and responsibilities of the Engineer. On rethinking the place of engineering in society, Felix noted 'yeah...actually...I've changed my mind then'. Jimmy, on the other hand, felt engineers had an important role to play, and that the engineering of a product could determine its inclusivity, based on the 'fact that the mechanism would work'. Plus 'there are times where, like the actual mechanic system does help in the inclusivity of it'. Jimmy also felt it was the responsibility of the designer to ensure products were inclusive, stating:

If all things were designed to enable people, then they wouldn't be as disabled as they actually are'.

Jimmy and Lee felt inclusive play products could help to challenge assumptions surrounding disability and act to enable disabled people, as highlighted in the extracts below:

It's just getting the kids to play together, in that (...) scenario. Then the design of the games can (...) break down the barriers and lessen the stigma.

I never really thought that like disability is that the things around you are not enabling you to be able, sort of thing. But that is probably a better way of looking at it, from a designer's perspective (...) looking at things that can be changed, and that can help.

Voice

Not all of the children's design ideas were given consideration by the students. Some of the students found feedback from the children amusing, dismissing their suggestions as comical. Jimmy described some of the children's ideas as 'a bit crazy', recalling one particular comment with amusement: 'Death board - so cool because you die on it!'. He also found some of the children's suggestions, particularly those linked to existing toys and games, unappealing, noting: 'Yeah, like *Call of Duty* was like "Ah, I don't wanna do that"'. Hence, the students' personal preferences contributed to the silencing of the children's voices in the selection of ideas to take forward.

Lack of Confidence in the Power of Inclusive Design

Some of the students lacked confidence in the power of inclusive design, thus highlighting the need to challenge assumptions through design curricula. Neil felt it would be impossible for designers to develop a 'singular toy' for inclusive play, as 'every impairment is different'. Felix agreed, noting it is 'difficult to design for all of them'. Similarly, Jimmy noted 'Design for everyone, at any time... obviously, you can't ever do that'. The majority assumed that it would be *impossible* to design an inclusive product for disabled and non-disabled children to play with together.

They also had reservations about whether an inclusive product 'would work' and felt that inclusive design was 'idealistic'. Researchers from the field of disability studies would argue that rather than being an ideal, inclusion is a fundamental right. Moreover, by placing an emphasis on the physical aspects of impairment in their design solutions, the students may have overlooked the 'real issues in disability', which, from a sociological perspective, are 'oppression, discrimination, inequality and poverty' (Oliver, 1990, p. 2).

Felix initially felt children with specific physical impairments would be required to play with toys separately from their non-disabled peers. However, by talking the problems through, he began to realise the potential for more inclusive solutions. He even talked *himself* out of the idea of developing separate games for blind and deaf children, as illustrated in the extract below:

Yeah, then you'd need separate ... well, maybe you could do it in the same game... You could probably do it in the same game.

Jimmy and Lee assumed inclusive toys would not have the same appeal as mainstream toys and games. They suggested inclusive games should be

'educational' and played with at school during lesson time. For Jimmy, an inclusive toy would not 'get that much buzz about it' in the home. Lee proposed designing an inclusive toy or game for lesson time, in order to encourage disabled children to develop their social skills. This was based on the assumption that 'disabled and the non-disabled children probably aren't going to play together at playtime'. He also noted that adults should prescribe inclusive play in the classroom, stating:

If they, I don't like to say "forced", but if they are encouraged to play together in the classroom, then they are going to have some social interaction, so its only going to be good really, isn't it?

Thus, the students' suggestions provided evidence of an adult-centric agenda for play, focused upon child development. By prioritising an educational agenda in the design of inclusive play products, the students overlooked concerns raised by children such as Freddie about the need for disabled children to engage in play for play's sake, rather than play with an educational or therapeutic agenda.

Value of the Project

The children's feedback helped to challenge the students' negative assumptions about the role of children in design research. The students were surprised by how constructive the children's feedback was, as illustrated by Jimmy below:

The children were (...) quite positive a lot of the time (...) they were always quite helpful, to (...) where it could possibly take the design. They never just went "Oh, I hate that!"

Feedback from the user made the project more meaningful for the students. The students also felt that user feedback made the prototype designs better informed. For Lee, 'one of the most helpful things' was 'getting early prototypes done...getting them into schools... and...getting the feedback'. In the extract below, Lee also described the way in which the children's feedback helped the team to refine their prototypes, stating:

I think that really shaped the design of the high fidelity ones, and I don't think they would have been anything near the quality they were if we hadn't done the early prototypes. There's stuff we didn't even consider, and then we got the feedback, and it seemed really obvious. Stuff you don't really think about if you don't get the real life feedback from the users, so I think that was probably the most helpful thing. I think if you kept it going, (...) the more feedback you get; the better it's gonna be.

In Felix's view, the level of feedback provided by the children was sufficient enough for the team to make the designs inclusive. He struggled to think of other resources that might be used to inform the design process, noting 'I think we had enough. I'm not sure what else you'd research'. Jimmy, on the other hand, found that as the students were not able to observe the children interacting with the prototypes, the level of feedback was not specific enough to inform the design process, as illustrated in the description below:

We ended up putting like a handle which they could attach to everything, but it would have been interesting to have seen where they were holding it and whether they had preferred a handle you could grip onto and things like that (...) But there was like so much feedback, if we'd had like videos as well; it would have been almost like overload.

Jimmy felt observation techniques would have been beneficial, as this would have enabled him to 'physically watch how they [the children] were playing with the toys'. He also suggested filming the children's interactions with the prototypes may have been useful to the team. Similarly, in relation to children's personal preferences, Felix noted 'stuff like that is difficult to ask. It's easier to see, I guess' It is worth noting that despite the students' desire to observe the children's interactions with the prototypes, Jimmy was conscious of ensuring effective management of large quantities of data.

Interdisciplinary Collaboration in Design Education

The students referred to their interdisciplinary collaboration as a challenging, yet positive experience. Differences in their approach to the design study, according to Felix, were a result of the engineers and product designers being taught differently. It was assumed the product designers were more 'creative', whereas the engineers were perceived to be more procedural. According to Felix, engineering is 'less creative, and it's a lot more 'this is how you do it - get exact numbers, results, get it right'. It was agreed that between them, they had a different 'work ethic', with the engineering students taking a more 'structured', and 'analytical approach'. Jimmy, Felix, Rik and Lee agreed that their interdisciplinary collaboration was a positive experience for the team. Rik also felt regular team meetings and a combination of the two approaches, led the group to make 'better decisions'. Similarly, Lee noted the benefits of bringing different perspectives together in the extract below:

It's good to have people's different view on a design point and stuff like that, that you wouldn't necessarily think of (...) instead of sat by a computer by yourself - it's quite nice to throw ideas off each other; and it's (...) a different way of designing.

Benefits of engagement in the project for Rik included 'learning to co-operate with a team'; 'understanding other ways of thinking' and 'learning to use new tools', such as *Solidworks*. Rik noted that by talking their ideas through, the team was able to clarify and explain their ideas fully, which enabled them to learn from each other. Regular meetings also encouraged the team to immerse themselves in the project and to investigate all possible ideas. Initial assumptions about their counterparts were for some, dispelled, and for others, further amplified. Engagement in the project encouraged students such as Felix to challenge preconceptions about their teammates. For example, first impressions based on physical appearance led Felix to assume the Product Design students were 'last minute guys', and that they were 'crazy' and 'immature'.

However, Felix soon realised that the product designers had a diverse range of skills to offer, noting 'Neil, he was good (...) He was like the organiser in the team'. The most significant divide lay in their assumptions about the role of the engineer in inclusive design. Assumptions, in this regard, further intensified as a result of the project. As a product designer, Neil was sceptical about the involvement of engineers as he found them particularly difficult to work with. For Neil, they have 'different ways of doing things'. Thus, 'compromises had to be made on both sides'.

8.4.3.4 IxD curricula

The Study of Inclusive Design

Due to their lack of prior experience, the students identified the need for issues of inclusive design and participatory design with children to be covered in design curricula. Lee, Felix and Neil informed the researcher that they had no prior experience of inclusive design before embarking on the project, although Lee was aware of 'design for disabled people'. Neil considered his prior knowledge to be 'extremely limited', and for Jimmy, designing for children was a new experience. Students such as Jimmy felt there had been a positive change in their views towards disability as a result of the project, with a shift from a 'subconscious medical model view', which he described as: 'like disability is the impairment', to social model thinking. However, at the end of the project, some of the students were still preoccupied with impairment. In his reflections, Lee noted 'I don't know what more we could have done. Perhaps a little more time looking at the different cases of sort of cerebral palsy and that', whereas the students may have benefited from engaging in the sociological debates and using the data to inform their designs in more meaningful ways.

Bridging

The student team found working with the researcher helpful in the overall management of the project. During the early stages of the project, the researcher suggested a series of deadlines for the students to work towards, based on her understanding of the needs and expectations of participating schools and her observations of previous student team projects. The benefit of working with the researcher in this way, or the way in which she bridged work with the schools and the student team, are illustrated by Neil and Jimmy in the extracts below:

***Neil:** This team project is a huge step up from anything that we've done before (...) The timeline that we were given meant that we had rough goals to work towards that we then, as a team, broke down into weekly targets that we had to hit. Without this aid, I doubt we would have worked as effectively as we did.*

***Jimmy:** It was helpful that we had meetings every week, coz it (...) meant that like, your list, when we first met, of (...) like "What you need to be doing by each week", that obviously (...) helped get the project rolling, as opposed to (...) if we'd just started on our own accord, we'd have had a few week off, whereas we hit the ground running, which was good.*

These extracts suggest that this project was a learning curve for the students and that they benefitted from guidance in project planning.

Conveying Children's Feedback to the Design Team

In-depth focus group discussions and interviews with children generated some rich qualitative data for the students. However, this data gained a mixed response from the students. The Engineering students found the qualitative data difficult to work with. They were overwhelmed by the depth of feedback received and raised concerns about the time and opportunity available for them to process this data. On the other hand, Product Design students, including Jimmy and Lee, worked confidently with the qualitative data. However, they found themselves working with the qualitative data more intuitively. Jimmy argued 'feedback is (...) your results (...) if you're designing for like, people - it's not really, like, a sort of figures thing'. On reflection, Jimmy was concerned that the team's approach lacked rigour, noting:

It was literally subjective. We were like "Oh, what do you reckon?" "Eight? Nah, maybe nine." It was (...) pretty wishy-washy.

Jimmy was also concerned about the lack of quantitative data generated through the students' design study. Similarly, Jimmy and Felix were concerned

about the lack of comparable evidence collated, noting: 'we didn't actually directly compare toys that are existing with our toys', which, in his view, let them down.

Although Felix supported the idea of taking into account 'everyone's views', he also suggested limiting user feedback opportunities to short questionnaires, in order to generate more 'manageable' data: arguably, a move that would be detrimental to the richness of the in-depth qualitative data. Nevertheless, despite having reservations about the 'subjective' and 'wishy-washy' approach of the product designers, the Engineering students were inspired by their counterparts. They recognised the importance of bringing interdisciplinary teams together. Felix argued:

This [project] can't be exact, but there's got to be some, like middle ground between the two - really intuitive and really exact.

Addressing the Social Aspects to Inclusion

The students informed the researcher that despite covering the Principles of Universal Design in their studies, no modules were in place to address the social aspects to exclusion, which they found 'hardest to deal with', as illustrated by Lee:

I think you can sort of design the toys to put the kids on a level playing field, something that they can play together, without disability being (...) like an issue, but then again its like the social side again... I think that's more complicated.

As the project brought researchers from the fields of design and sociology together, the students benefitted from the opportunity to learn about the social model of disability. Based on his understanding of the social model, Jimmy felt that his perception of disability and impairment had changed as a result of the project. He suggested designers should be introduced to the social model of disability through design education. Despite being a well-known model in the area of disability studies, students such as Jimmy and Lee assumed designers would 'probably not' be aware of this perspective. In their view, designers are simply taught about 'the design of the object'.

Jimmy associated his prior knowledge of disability to the individual model, which 'locates the "problem" of disability within the individual' (Oliver, 1990, p. 3). Evidently, the students may have benefitted from the opportunity to critically reflect upon the debates surrounding disability and children's voice in research. For example, when introduced to the social model of disability, there was a tendency for

the students to simply *accept* this theoretical perspective, rather than adopting a critical gaze. Similarly, Felix argued that the Principles of Universal Design 'does the job', without challenging this approach.

It is worth noting that although the students did not attend disability studies modules, they were signposted to useful sources of literature from this field. As a result, their understanding of the politics surrounding disability, and the nature of impairment for disabled people, required further development. Nevertheless, the students found discourse across disciplines beneficial. On completion of the project, one student explained that he felt compelled to reconsider the roles and responsibilities of the engineer. Jimmy felt he had become a more responsible designer, and that for him, Together through Play had become an important project.

Need for Greater Awareness of Children's Voice in Research

The students' reflections on the success of their project highlighted the need for a greater awareness of children's voice in design research. Neil felt that simply involving children as users in the design process made the team's approach inclusive, overlooking the ways in which some of the disabled children were excluded by their non-disabled peers, particularly during the latter stages of prototype evaluation sessions. Felix noted that the students aimed to ensure the inclusivity of the games by reducing the 'competitive element' and encouraging 'team-working'. However, many of the children expressed aspirations for engaging in competitive play.

Distinction between Disability and Impairment

The students' reflections highlighted the need for clarification on the distinction between disability and impairment. For example, Felix assumed 'everyone knows (...) a bit about disability', however this was not the case. Students such as Jimmy, Neil, and Felix, focused on impairment throughout the project, assuming that disability and impairment meant the same thing - a view strongly contested in the field of disability studies. Likewise, much of the students' prior knowledge and research related to impairment rather than disability, highlighting the need to clarify the distinction between the two in design and engineering curricula.

Making Inclusivity a Priority

Some of the product designers argued that just as sustainability had been emphasised in the past and is now taught as a dedicated module on their programme of study, so too should inclusive design, as noted by Lee:

Now, we get it all the time when we're designing products, about them being environmentally sound. Why isn't it they should be pushing the inclusivity? (...) they need to push that like they do with the environment. Yeah, (...) disability.... put it at the forefront of sustainability. Like it was a few years ago, it was sort of the environment; I bet people then weren't designing for the environment like they are now, so it's (...) the next route it needs to go down - designing for disability'.

However, as a dedicated area of study, 'designing for disability' could result in mainstream designers considering inclusive design to be beyond their remit, removing themselves from all lines of responsibility.

Choice in Module Topics - More Cross-curricular Studies

The students had mixed views on the idea of integrating cross-curricular modules into Product Design and Engineering programmes. On the one hand, Felix expressed concerns about students deviating from their subject specialisms and going too 'in-depth' into issues of inclusion. For Felix, 'if you go in-depth, then it's not really Product Design, is it?' He was also concerned about time and motivation for students. In hindsight, the team felt it might have been better for them to engage with disability studies literature before embarking on the design process. Rather than being a compulsory part of their studies, they suggested disability studies should be optional and dependent on the student's choice of vocation. Felix argued it is 'not for everyone', as 'a lot of designers would want to focus on aesthetics'. However, Felix argued that one module, may be 'quite helpful', particularly for those 'looking for jobs' in the area of Inclusive Design.

The team's response to the topic of inclusion was subjective and the engineers perceived their involvement in the project as an exception to their typically 'objective' approach. Felix suggested inclusive design or 'designing for disability' should be taught as a discipline in its own right, alongside Product Design. He did not see the relevance of integrating inclusive design into Engineering, noting:

There's enough to do and you don't really want to bother with design inclusivity. It's more, later on, after it's, like, done (...) Yeah, I feel like there's enough on the plate already.

Felix deemed the engineer's work as 'stand alone' or 'separate'. Jimmy, however, liked the idea of learning something 'extra on the side', in order to be make them more adaptable as a designer. In order to make inclusive design more accessible to designers and engineers, Felix suggested design curricula should be responsive to different learning styles and needs. For example, Felix felt visual

exemplars; comparisons to existing products and knowledge sharing opportunities, would reinforce the key messages about inclusive design in a visual way for designers and engineers. Lee and Jimmy suggested it might already be too late: that assumptions about disabled people may already be embedded into the psyche of students by the time they reach undergraduate level. For Neil, assumptions should be targeted within design education 'from an early age, and to make it something that can be discussed'.

Reinforcing the Value of User-centred Design

The students recognised the benefits of engagement with the user. It gave them insight to the children's experiences, their perspectives on play and their ideas for toys and games. It also encouraged the designers to consider issues they may have otherwise overlooked, as noted by Felix and Jimmy below:

Felix: *I think there's always hidden stuff, isn't there? Stuff that you haven't really thought of.*

Jimmy: *I think it was definitely better to have real users, coz then you can you've sort of got like real opinions (...) like Puzzled (...) it was just a rubbishy little prototype that didn't properly show the game, so we didn't get (...) as good feedback as some of the other prototypes, and that sort of showed in (...) the final ones; coz that was in the end, (...) the least favourite and I think that's because like in the early stages, we didn't get as much feedback, so we didn't really know where to go with it. So then obviously, developing it on our own back, it (...) came out a lot worse than developing it with their feedback, sort of thing.*

Engaging with the user also brought students' attention to the wider impact of, and social aspects to, inclusive design. They particularly disliked working with fictional personas. Jimmy felt fictional personas were inadequate as they led the students to more narrow solutions, as illustrated below:

Yeah, coz we tried to design for just like one, we created (...) three personas just (...) to design things for, (...) but it's not very easy to (...) formulate what their opinion would be. You're (...) just ticking the boxes on like what their (...) physical requirements sort of are.

Neil also emphasised the need to engage with the user and stakeholder groups, stating:

I learnt that everyone who will have some interaction with the products needs to be involved in one way or another in the design process, regardless of whether it is the child, the parent or the teacher. They will all interact with the product in one way or another, thus their needs must be taken into account.

Neil felt that child-centred research was particularly undervalued within the academic environment. He explained that members of the wider student cohort dismissed their design study as a mere 'kiddies project' and that 'there is a stigma around this field that seems to warrant it less merit'. Regarding designing with, and for children, he suggested:

Neil: 'The first big step is to actually show designers why this type of design is important, and the benefits it can have to both the target users and the designers themselves'.

The playful, fun, and creative aspects to this project made it appealing to the students. Jimmy was attracted to the way in which the project involved developing toys and Felix noted 'I liked it because it offered a lot of creativity, and also, it looked quite fun, compared to some of the other ones'. Thus, the students suggested the creative aspects to design for inclusive play should be used to give substance and appeal to this research topic in design curricula in the future. Neil felt the assessment criteria for the course lacked relevance and that examiners favoured the engineering aspects of the designs over the more human-centred factors explored by the Product Design students. He felt the human-centred aspects were undervalued, emphasising the need for a more humanistic approach to design in the future.

The project became more meaningful for the students when they developed an emotional connection to the data. For example, Jimmy was 'surprised' by the way in which children were 'left out' during play, and the realisation of 'how extreme that was'. He found some of the children's experiences 'hard to have to read'. Furthermore, Felix noted that when children were given codes rather than names, the designers 'disconnected' from their feedback. It made it difficult for them to empathise with the user, and to identify or remember individual comments made. For them, pseudonyms may have worked better, as illustrated in the extract below:

Coz also, they're called like "Student A", "Student B", so its kind of disconnecting a little bit. Also, it's hard to remember exactly, "Student A" said this here, "Student A" said that there (...) it sort of blurs, though, coz there's so many.

It is worth noting that in their analysis of focus group discussion data, the students sought to develop designs that they felt represented the full cohort of children, as opposed to individuals, as illustrated below:

We were trying to look at sort of the whole feedback (...) as opposed to each like, coz each time we got the feedback, we'd go through it and (...) summarise everyone's into (...) categories of each thing, (...) coz, we didn't want to just design for (...) "Student A" coz he was feeling left out.

Neil felt it necessary to emphasise the importance of inclusive design project in design curricula in the future. He suggested that the novelty aspect of designing inclusive toys should be maximised and used to promote this area of research to future design students. For Neil, 'design is meant to be fun, and designing toys is about as fun as it gets'. According to Felix, the students felt they benefited from the opportunity to develop original designs that were untainted by the work of other students. Had the students seen the work of other students, in Felix's view, 'it may have affected our creativity (...) it may have influenced us'. Once initial ideas had been developed, Felix felt it would have been helpful to see other groups' ideas for critiquing purposes, and 'seeing what you can steal from their ideas'.

Inclusive Working Practices

The team found it beneficial to mix up their roles and responsibilities, as this encouraged them to be less precious over their designs. They felt that adopting more inclusive working practices in their teamwork contributed to the success of the project. Neil felt that initially, individuals had become attached to their own designs, explaining 'everyone had their "baby"' and that this was 'inevitable'. Rather than taking ownership of the design of a specific game, they divided tasks up into areas of special interest or expertise. Their aim was to work together, towards a collective goal, rather than working competitively.

Lee felt this collaborative approach was one of the most positive aspects of the project, describing designs as being 'all of our ideas, rather than five different people having five different toys that they focused on'. When the students were given the opportunity to experiment, for example, by working with new softwares, they found that they came up with more innovative solutions. One setback for them was having limited access to new software. They found experimentation difficult initially, as they had little guidance on programs. They suggested access to a basic level of training in current softwares would be both beneficial to them, and necessary for innovation, in the future.

8.5 Analysis and Discussion of Results

8.5.1 Interpretation and Explanation of Results

Prototype evaluation sessions in participating schools cast light upon the ways in which fixation (Smith, 1995) can stifle children's creativity and imagination, acting as a barrier to meaningful participation in design research. This finding corresponds with results presented in Chapters 6 and 7. Functional fixation (Defeyter & German, 2003) was evident in the children's preoccupation with the functional limitations of the prototypes and the design of existing toys and games, as previously seen in research undertaken by Roth (2009). The children's fixation on commercial toys and games also echoed findings of research undertaken by Connors and Stalker (2007), in identifying pressure on children within youth culture and consumerism, to keep up with the crowd and avoid standing out.

Just as the children were limited by functional fixation, so, too, were the undergraduate students. The influence of existing or commercial toys and games dominated the students' design concepts. Inspiration came from traditional playground games and existing commercial games, ranging from *Twister* to *Pokemon*. The students were fixated upon assistive technology, with the inclusion of accessibility switches and grips in their designs. This provided evidence of the students' preoccupation with the access needs of children with physical impairments. By focusing on access, the students ran the risk of neglecting the aspects to inclusion that make play meaningful to children. The students also assumed a product would need to be adapted in some way, in order to make it accessible to disabled children, rather than building inclusive elements into the design of the game from conception.

In their response to the prototype toys and games developed by the undergraduate students, many of the children expressed the need for challenge and autonomy in play. For the disabled children, this need was more profound, and more deeply expressed, as a direct response to the stigma surrounding childhood disability. Stigma is defined as an adverse response to the perception of a negatively evaluated difference (Susman, 1994). Within the context of power, Link and Phelan (2001) describe five components of stigma: labelling, stereotyping, separation, status loss, and discrimination. In this study, as illustrated in Section 8.4, disabled children such as Rosie expressed aspirations to compete, succeed and achieve, as a direct response to her experience of segregated play. Similarly, Joanna expressed the need for a greater level of difficulty in game play, in response to the positive and negative discrimination of classmates and school staff. This

emphasises the need to challenge negative assumptions about disabled children through design curricula. Reinforcing this view, Campbell et al. (2003) note that in educational environments, negative attitudes lead to low expectations, resulting in reduced opportunities and the start of a cycle of impaired performance.

8.5.2 Response to the Research Question - the Role of the Designer

Undergraduate students participating in the project had mixed views on the role of the designer or engineer in the facilitation of inclusive play. As highlighted in Section 8.4.3, some of the students felt inclusive play products could be used to lessen the stigma surrounding disability. In their reflections, some students felt *all* involved in the process of inclusion had a role to play, whereas some of the engineers removed themselves from all lines of responsibility (Dykstra, 1939), taking ownership of the design of the component parts of a product only. Nevertheless, in-depth discussion encouraged the students to reconsider the role of the engineer. Discourse across the disciplines of sociology, design and engineering emphasised the importance of critical reflection and engagement with the debates surrounding the role of the designer and engineer.

Regarding the students' perspectives on the role of children as designers - the students underestimated the contribution children can make - providing evidence of adultcentricism (Verhellen, 1994). For example, as illustrated in Section 8.4.3, Jimmy assumed the children would be unable to grasp the concept of inclusion and Felix assumed the children's suggestions were merely a reflection of personal preferences rather than valid recommendations for inclusion. In Jimmy's reflections at the end of the project, his surprise at how constructive the children's feedback was provides further evidence of the low expectations of children in design research. The students also lacked confidence in the power of inclusive design. Neil felt it was impossible for designers to develop a singular, inclusive play product, and that this was an idealistic goal. However, rather than an ideal, inclusion is a fundamental right for all children. Therefore designers and engineers have a duty to ensure the inclusion of disabled children through the design of toys and games, and this view is reinforced in policy. Article 31 of the UN convention of the rights of the child recognises the right of the child to engage in age-appropriate play and leisure activities (UNICEF, 1989).

While designers can facilitate inclusive play by ensuring the accessibility of toys and games, they cannot tackle the social barriers to inclusive play alone. Findings presented in this chapter emphasise the significant role various stakeholders play in

the process of inclusive play, including child peers, family members, and school staff. However, the research team identified four steps designers can take towards mitigating the social barriers to meaningful and inclusive play:

- 1) Providing variability in player numbers, in order to accommodate additional participants: where player numbers were limited, the disabled children were invariably last in the pecking order – where there was scope for everyone to play, this problem was alleviated;
- 2) Enabling autonomous play through choice or customisable features;
- 3) Keeping gameplay pauses to a minimum in order to reduce opportunities for bullies to strike. Bullying behaviours had a tendency to emerge during gameplay pauses, rather than during play;
- 4) Encouraging collaborative rather than competitive scoring: the children were competitive, which encouraged infighting and occasional bullying. Thus, collaborative scoring was less problematic than individual scoring.

Enabling children to engage in the process of participatory design as co-designers, rather than child users, requires an attitudinal shift towards considering *all* people as creative. It involves giving power to the end user (in this case, children), challenging established power structures between designers and users (Sanders & Stappers, 2008) and exploring ways in which to harness children's creativity. When the students introduced tools to facilitate children's participation in the design process - for example, by providing pre-designed template sheets - the children were able to make a valuable contribution to the design process. This approach involved scaffolding: steps taken to reduce the level of freedom in a task to enable a child to concentrate on developing the new skill they are in the process of acquiring (Bruner, 1978).

Scaffolding involves purposeful and structured interaction between an adult and child, with the aim of enabling the child to achieve a specific goal - for example, to express themselves in creative ways. This finding emphasised the need to include design students in the development of tools and methods for research and design, in order to enable children to participate in design research. In addition to their design skills, designers keep track of current technologies and have insight to production processes (Sanders & Stappers, 2008). Thus, designers play an important role in co-designing teams as they offer skills, knowledge and experience that other stakeholders do not have.

8.5.3 Justification for the Students' Design Study

During the prototype evaluation sessions, both disabled and non-disabled children expressed the need for inclusive toys and games. Their feedback on the prototype toys and games also emphasised ways in which both disabled and non-disabled children could benefit from more inclusive designs, bringing further justification to the students' design study. Existing studies have explored ways in which designers can make the process of user-centred design more meaningful for users (Nicholson, 2012). However, the findings of this chapter highlight that in order to enable design students to develop a richer understanding of, and empathy for, the user, the process of user-centred design must also be meaningful to them. Direct feedback from the children made the project more meaningful for the students - helping them to refine their designs and make better decisions.

On reflection, the students felt it was insufficient to rely solely upon personas in their work on this project. However, they did find personas useful in their planning and evaluation, when considering issues of accessibility and user needs more generally. The information used to inform the personas was limited - justifying the mixed methods employed by the students (i.e. using personas in conjunction with primary research data collated by the researcher). As noted in Section 8.1, the reliability of a persona depends upon the quality of research used to inform it (Usability.gov, 2016).

The students categorised the children's needs by impairment, which not only involved the discriminatory practice of labelling (Muncie, 2010), but it was also limiting for the students as they had little information on the nature of physical impairment for the disabled children due to confidentiality and safeguarding issues. The only insights to the children's physical needs were found in the researcher's observations and focus group reports, which involved reporting upon physical difficulties observed or expressed by the children. The research team did not access children's statements of special educational needs and disabilities (SEND), which are used to inform inclusive practice in school curricula.

Furthermore, personas are used to generalise user needs (Usability.gov, 2016), yet this small-scale study investigated the needs of a small group of children and represented only a small sample of impairments. It was not the aim of the project to obtain a representative sample of impairments and the prototype toys and games were designed specifically for the needs and preferences of the research participants, which meant that they could not be considered universally popular or accessible amongst all children. The range of impairments was less than the

research team had hoped. Whilst a requisite number of children were recruited, children with arm impairments due to cerebral palsy dominated the sample of disabled children recruited. While this did not invalidate the research findings, it would have been preferable to obtain a wider range of impairments. In relation to the use of personas, Usability.gov (2016) advises researchers to focus upon the significant needs of the user groups considered most important. However, in doing so, designers would be required to prioritise the needs of one group of users over another - going against the Principles of Universal Design (Connell et al., 1997) the students were hoping to meet.

8.5.4 Critical Evaluation

8.5.4.1 User-centred Design

The undergraduate students took a user-centred approach to the project, however, their perspectives on the engagement of users differed. As illustrated in Section 8.4.3, in keeping with the Principles of Universal Design (Connell et al., 1997), some students felt it important to respond to as many different user needs as possible. Others placed an emphasis upon personalising games and focusing upon specific physical impairments, in order to meet individual needs. However, Newell et al. (2011), raised concerns that products aimed at users with specific impairments may be difficult for non-disabled people, or users with different needs, to access.

Furthermore, in focusing upon the needs of children with specific physical impairments, the students risked overlooking the needs and aspirations of their non-disabled counterparts. The students' design study was not always value-neutral. Their conflicting views on the purpose of their design study were influenced by personal assumptions, preferences, experiences and external influences. All knowledge of cultural reality (...) is always knowledge from a particular point of view (Weber, 1994, pp. 228-248). The students each formed personal opinions on the cultural realities of the individual children. For example, Jimmy identified a 'bully one' within the transcripts.

8.5.4.2 Ableist Assumptions

The students' perspectives on disabled children's participation in inclusive play gave insight to their ableist assumptions (Burstow, 2003, Campbell, 2008). As highlighted in Section 8.4.3, Jimmy assumed bullying would be inevitable for disabled children as they would be physically weaker, thus unlikely to be selected for participation in team games. As previously discussed, the students perceived physical impairment in a negative light, with impairment being used to label

disabled children, as identified in research undertaken by Connors and Stalker (2007). There was also evidence of 'medical' and 'tragedy' model perspectives (Hevey 1993) in their reflections on the project.

Ableist assumptions manifested themselves in the low level of difficulty or challenge built into some of the prototype toys and games developed by the undergraduate students. They were also evident in the students' readiness to shape designs to fit existing societal norms, based on the assumption that there would be 'stigma' attached to inclusive toys and that a 'mainstream aesthetic' would be preferable. Student reflections on the project also highlighted the need to dispel assumptions about children as users more generally through design curricula. In some cases, the students overestimated the children's ability to use their imagination during play - an issue particularly prominent in the design of games with 'free play modes'. Thus highlighting the need to challenge ableist assumptions through design curricula.

8.5.4.3 Adultcentrism

As highlighted in Section 8.1, the students set an adultcentric (Verhellen, 1994) agenda for their design study - determining the selection and further development of prototype games based on what *they* felt would give them a broader understanding of inclusive play, rather than following suggestions made by the children. This provides insight to design research operated from the 'expert perspective' of the designer. There was also evidence of othering (Bauman, 1993), and a gender bias in the way in which the students, as a team of adult male designers and engineers, failed to take into account the girls' preference for play with dolls. Adultcentrism was also evident in the assumption that inclusive products would be best suited to an educational setting. As highlighted in Section 8.4.3, the students felt inclusive play products would not have the same appeal in the home. By setting an educational agenda for the design study, they politicised their work. As noted by Freire (1985) and Hlynka (2003), education and technology are neither neutral nor unbiased. Furthermore educational technologies are:

Intricately connected with political agendas, economic gains, and social needs and consequences (Amiel & Reeves, 2008, p. 33).

Yet by focusing upon the educational benefits of play and its potential to contribute to child development and learning (Piaget, 1962; Casey, 2005b; Ludvigsen, 2005), the students overlooked the ways in which disabled children's

play experiences can be restricted and overly prescribed (Goodley & Runswick-Cole, 2010). Arguably, this involved examining play with a 'narrow lens' (Hendricks, 2006). Further evidence of adultcentricism includes ways in which the students prioritised the commercial potential of inclusive design projects - overlooking the potential for a commercial agenda to put pressure on children to conform and consume.

8.5.4.4 Guidelines

The students considered their prototype designs to be inclusive due to their compliance with existing guidelines on inclusive play, universal design, and inclusive design (Endicott et al., 2010; Connell et al., 1997; Clarkson et al., 2007). However, as noted in Section 8.1, these guidelines focus upon ensuring access to different users, rather than the elements that make user interactions meaningful. Moreover, guidelines are simplifications drawn from general practice - they involve the application of generalisable information to a range of technologies and products (Nicolle & Abascal, 2001). When applied to a specific context, it can be difficult to apply them to another area and some designers may find them too limiting. The way in which the team's decision-making and acceptance of existing guidelines went unquestioned by the students suggests a need for more critical thinking and reflective discussion.

Sociologists strive for value neutrality - seeking to overcome biases and address their own personal values whilst conducting their research. The students were signposted to sociological literatures from the field of disability studies and the social model of disability. However, they did not reflect critically upon these perspectives, stressing the importance of engagement with sociological modes of discourse. Engagement in this interdisciplinary project between the fields of sociology, engineering and design encouraged the students to challenge their own negative or ableist assumptions (Burstow, 2003, Campbell, 2008) about disabled children, however, they did not challenge existing perspectives on the disabled children's experiences of inclusive play, despite this being a contentious topic. Nor did they fully grasp the emancipatory nature of the project, which relates to disabled people, rather than professional academics and researchers, having control of the research process (Barnes, 2002).

Moreover, theorists such as Connors and Stalker (2007) note that few studies relating to the social model of disability and disabled children focus upon children's perceptions and experiences of impairment and disability, or the implications of these for theorising childhood disability. Such findings highlight the need for the

student team to give more power to the children in their research and to reflect critically on their own part in the research process.

8.6 Conclusions

Focus group discussions undertaken during prototype evaluation sessions with the children gave insight to their views on designs developed by undergraduate students at the University of Leeds. They also cast light upon the barriers encountered by disabled and non-disabled children when seeking to participate in academic design research with adults. Focus group discussions and semi-structured interviews with the undergraduate students enabled the students to reflect upon their participation in the study and to express their views on issues of inclusive play.

The researcher was also able to develop a deeper understanding of the challenges of participatory design with children for designers and engineers. This section summarises the findings and implications of the prototype evaluation sessions with participating schools and the students' reflections on their involvement in the project. Section 8.6.1 examines what was learnt about meaningful play and Section 8.6.2 examines what was learnt about working with and giving voice to disabled children. Section 8.6.3 examines the issue of conveying this learning to designers and Section 8.6.4 concludes with guidelines for design curricula for interaction design with children.

8.6.1 What was Learnt about Meaningful Play

The students' design study focused upon disabled children's access to inclusive play, rather than play that was meaningful to disabled and non-disabled children. In the children's evaluation of the prototype toys and games generated by the students, it was not easy for them to suggest ways in which designers might enable meaningful play and it is possible that the children did not have a vocabulary for meaningful play. As the children were unable to identify or state explicitly the elements of play that made play meaningful to them, they relied more heavily upon existing guidelines on universal design (Connell et al., 1997), and inclusive play (Endicott et al., 2010) to inform their understanding of inclusive play. In doing so, they prioritised adult perspectives over children's interpretations of meaningful play.

The research team learnt most about meaningful play through the children's expressed needs and aspirations and the barriers to participation identified. They learnt that the most significant barriers to meaningful play for disabled children were the social barriers created by peers and others, such as the negative assumptions

of class peers, as identified in Section 8.4 and previously in Section 5.5. Expressed aspirations included the desire for a sense of autonomy in game design and gameplay, for play with games to be appropriately pitched (i.e. with a suitable level of difficulty) and to play multiplayer games with friends. For the disabled children, the need for a greater sense of difficulty was more profound, and more deeply expressed, as a direct response to the stigma surrounding childhood disability - emphasising the need to challenge negative assumptions about disabled children through design curricula.

8.6.2 Working with and Giving Voice to Disabled Children

Disabled children participating in the study particularly enjoyed working with the design team and felt empowered by being consulted about their views, particularly when new design tools were made accessible to them. However, the negative views and behaviours of their non-disabled peers and others led to the silencing of their voices during process of prototype evaluation, through victimisation, verbal abuse and social exclusion. Such barriers relate to the psycho-emotional dimension of disability referred to by Thomas (1999) as 'barriers to being' or restrictions placed on an activity arising from social or physical factors. Arguably, the adultcentric (Verhellen, 1994) and ableist views (Burstow, 2003, Campbell, 2008) of the students also contributed to the silencing of the children's voices through the research process.

By rejecting or dismissing the children's design suggestions and taking ownership of the selection of designs for realisation, the students gave insight to participatory design practiced from an 'expert perspective' (Sanders & Stappers, 2008, p. 9). In doing so, they risked compromising the process that user participation is designed to support (Newell et al., 2011). Other barriers to participation in the research process for disabled children included communication barriers, loss of concentration, limited time or resources and other external distractions, including the intervention of gatekeepers.

Regarding working with disabled children as co-designers or co-creators - it is worth noting that creativity and play are intertwined (Vygotsky, 1930/1967), thus denying disabled children access to play also acts as a barrier to creativity. This emphasises the need for designers to develop tools or resources that will harness creativity and enable children to participate in design research in ways that are meaningful to them. The disabled children gained voice when they were able to express themselves in more nuanced ways. For example, in addition to verbalising their views on the prototype toys and games, some of the disabled children found it

best to act out their gameplay suggestions (see Appendix G, section G.2). Similarly, Stalker and Connors (2003) suggest adults should learn to communicate in ways that children feel most comfortable, in order to honour children's accustomed modes of communication.

Children at each of the participating schools expressed the need for a greater sense of ownership over the design of the prototype toys and games. Some of the children were also keen to find out how their ideas had been used to inform the design of the prototypes - highlighting the need for more transparency in the process of participatory design research. Both children and students involved in the study expressed the need to bridge the gap between user and designer through the process of user-centred design. The children were keen to find out more about the students and the students expressed the need for more detailed interaction with the children, in order to inform the design process.

8.6.3 Conveying Learning from the Project to Designers

The researcher presented the findings of design and evaluation sessions to the students in the form of a written summary/short report on the findings, and debriefing at weekly team meetings, in line with the model introduced in Section 7.6.3. Regarding ways in which the research findings were conveyed to undergraduate students - from their reflections, it is clear that the undergraduate students found focus group discussion data coded numerically, and their use of personas, too impersonal.

Engaging with the children as users, however, made the project more meaningful for the students - albeit via the researcher. The vast quantity of focus group discussions data generated through the evaluation session was overwhelming for some of the students. The way in which they reflected upon their approach as 'wishy-washy' or 'intuitive' emphasised the need to bring more rigour to the process of qualitative research by bringing them closer to the methods of sociological analysis undertaken by the researcher.

One of the challenges identified in the students' feedback was making the qualitative data manageable, without losing its richness. This was particularly difficult for the students as the children expressed such a variety of different preferences in their feedback. Furthermore, the students had to be critical about some of the suggestions made by the children. Not all of the children's suggestions would contribute to enabling meaningful play between disabled and non-disabled children. Some suggestions made by the children would make the games inaccessible to some disabled children. For example, reliance on verbal feedback in

a game would exclude children with hearing impairments. The children expressed conflicting views on timings, what was considered an appropriate level of challenge and suitable game themes. There were also tensions in their expressed views on inclusivity and exclusivity.

As the students were unable to observe the children interacting with the prototypes, they felt that they did not gain enough detailed feedback. The iterative process was very slow, due to the level of planning and organisation involved in setting up focus group discussions in schools and the limited time available to meet the school children. This meant that many of the questions posed by the designers retrospectively went unanswered. More collaborative work with children as co-designers could potentially take place virtually via *Skype* or *FaceTime*, with the researcher acting as a bridge between schools and design students. This approach could be used to enable quick iteration, whilst ensuring children's safety and wellbeing, in line with safeguarding policies. Such an approach could also help facilitate discussion and collaboration through a community of practice, in order to 'bridge the research-practice gap' (Buysse et al., 2003, p.263).

8.6.4 Guidelines for Design Curricula for IxD (Interaction Design)

This section makes recommendations for IxD with children, based on children's feedback during prototype evaluation sessions, and the students' reflections.

1. Emphasise the value of participatory design with disabled and non-disabled children.

In the students' reflections on the project, they expressed concerns over child-centred design research being particularly undervalued in their respective fields, due to lack of weight and significance. This emphasises the need for IxD curricula to address adultcentricism (Verhellen, 1994) and ableism (Hehir, 2007) by encouraging students to respond to the user needs of disabled and non-disabled children as a human rights issue (UNICEF, 1989). In order to address the real issues of disability, which are discrimination, inequality and poverty (Oliver, 1990), it is important to politicise and problematise child-centred research with disabled children and to encourage critical discourse on this topic via IxD curricula.

2. Clarify the distinction between user-centred design and co-design through design curricula.

The distinction between user-centred design and co-design lies in the power differentials between designer and user. User-centered design (UCD) is a framework of processes through which user needs, aspirations, and limitations are

given detailed attention at each stage of the design process. In contrast, co-design builds upon methods and principles of participatory design, which assumes 'users' are the experts of their own domain and should be actively involved in the design process.

However, for students involved in this study, the meaning of user-centred design and co-design became blurred, resulting in them taking ownership of the design process or the position of 'experts' through the project. Co-design, on the other hand, involves positioning children as experts of their experiences (Sanders & Stappers, 2008). By developing understanding of the distinction between user-centred design and co-design, IxD curricula could help to highlight the tensions and power struggles between designer and user and encourage students to reflect critically on their contribution to designer-user power imbalances, in order to bring greater equality to the research process.

3. Involve students in the design and development of new research tools, to enable non-designers to participate in design research.

It cannot be assumed that non-designers will be able to participate in design research. Yet in addition to their expressed aspirations for autonomous play, children involved in this study expressed aspirations for a greater sense of autonomy in the design and development of the prototype toys and games. Design tools developed by the students towards the end of their study helped to scaffold (Bruner, 1978) design tasks for the children, making the process of co-design fruitful for the students and the children. Furthermore, as highlighted in Section 8.4, the children were given voice when they were able to engage in the research in more nuanced ways.

4. Challenge negative assumptions about the role of children and disabled people as consumers.

As illustrated in the children's feedback in Section 8.4, disabled and non-disabled children can be discriminating consumers (Roberts et al., 1980), with the ability to characterise product options of different quality. Therefore, it is important to ensure designs aimed at children are of the quality afforded adult consumers - for example, by ensuring that designs are aesthetically pleasing, robust, and embrace new technologies. IxD curricula could also be used to challenge traditional stereotypes built into the design of products aimed at children - for example, the stereotypes reinforced via gender-specific toys and games. As highlighted in this study, some boys like pink toys too.

5. Embed inclusive design into design curricula.

Some of the students involved in this study considered inclusive design to be separate from, or supplementary to, their work as designers and engineers. Thus emphasising the need for inclusive design to be embedded into design curricula and for inclusive design to be brought to the fore. Encouraging students to consider ways in which products might be adapted to be more intuitive and accessible to users with different needs, with the inclusion of (multi) sensory elements, adjustable parts and clear rules or instructions, is also a challenge for design curricula.

6. Enable knowledge sharing on the topic of inclusive design, and ensure IxD curricula are responsive to different learning styles.

In Section 8.4.3, the undergraduate students' lack of awareness of existing inclusive toys and games highlighted the need for more knowledge sharing on the topic of inclusive design and for more inclusive and engaging resources on this topic to be made available to students via design curricula - for example, with the provision of visual or interactive exemplars or Q&A sessions with practitioners from the field of inclusive design. Doing so would help raise awareness of the way in which designers can respond to different user needs through their practice.

7. Encourage students to engage in discourse across disciplines, and reflect critically on their work.

Engaging in the debates surrounding emancipatory disability research (Barnes, 2002) could potentially encourage IxD students to reflect critically on their role in the research process of inclusive design and the power imbalances at play when undertaking research with marginalised groups. Engaging in discourse across disciplines could help to raise awareness of the different perspectives on issues of inclusion and potentially bring greater rigour to the process of qualitative analysis. Students involved in this study found the interdisciplinary nature of the project a challenging, yet positive experience. However, by addressing different perspectives on inclusive play, they felt better equipped in their decision-making. They also felt employing more democratic working practices led them to more inclusive solutions.

This chapter examined the role that design students might play in generating new designs and concepts for meaningful play between disabled and non-disabled children. It also made recommendations for IxD curricula. The next chapter revisits the whole research process, as seen in Chapter 4, and discusses how the different research areas were bridged. This will be packaged as a new approach to inclusive design with children in the next chapter.

Chapter 9

Discussion and Conclusion

This chapter summarises the key findings of this research and the broader Together through Play project. It considers the reflective work undertaken with undergraduate students. It also considers research activities and how they were bridged. It reflects upon the meta-conclusions drawn from the research and analysis undertaken by the researcher and reflects upon the overall process. It focuses on the contribution to knowledge made on the role of the designer in the facilitation of meaningful play between disabled and non-disabled children and makes recommendations for a new approach to inclusive design with children.

Aims

This chapter draws conclusions from the three following areas of methodological work undertaken through this research:

- a.) Lessons learned about meaningful play between disabled and non-disabled children through participatory design
- b.) The process of working with and giving voice to disabled children through participatory design
- c.) The use of participatory design methods with disabled and non-disabled children and the way in which findings may be conveyed to designers

Scope

Three key areas of study are reflected upon in this chapter, including:

- Focus group discussions and mind mapping activities with children in participating schools
- Design and evaluation sessions with children in participating schools
- The evaluation of undergraduate student designs with children in participating schools, plus focus group discussions and semi-structured interviews with students at the University of Leeds

Limitations

This research is the first of its kind to focus on the role of the designer in the facilitation of meaningful play between disabled and non-disabled children. Existing studies in the field of design have either focused on ensuring that toys, games or play spaces are accessible to disabled children (Dunn et al., 2003) therapeutic (Weightman, 2010) or educational (Druin, 2009). However, as highlighted in Section 8.5.3, this small-scale study investigated the needs of a small group of children and represented only a small sample of impairments. It was not the aim of the project to include children with specific physical impairments or for these impairments to be representative of children's needs. Prototype toys and games developed through the project were designed specifically for the needs and preferences of the research participants, which meant that they could not be considered universally popular or accessible amongst all children.

The range of impairments was less than the research team had hoped. Whilst a requisite number of children were recruited, children with arm impairments due to cerebral palsy dominated the sample of disabled children recruited. While this did not invalidate the research findings, it would have been preferable to obtain a wider range of impairments. The researcher did not set about developing a solution to the barriers to inclusive play through the project. However, research findings suggest that in order for children and students to make a meaningful contribution to participatory research as *co-designers*, they must be equipped with the relevant skills and experience to enable them to overcome the barriers to creativity, bring a greater balance of power to the research process and bridge the gap between user and researcher.

Structure

This chapter summarises the key research findings and ways in which research activities in participating schools and the University of Leeds were bridged by the researcher. Section 9.1 reflects upon the lessons learned about meaningful play between disabled and non-disabled children. Section 9.2 examines the process of working with, and giving voice to, disabled children, and Section 9.3 examines the issue of conveying this learning to designers. Section 9.4 reflects on the role of the designer in the facilitation of meaningful play between disabled children and considers a new approach to inclusive design with children. Section 9.6 examines the impact of the research context on the project and its contribution to knowledge and Section 9.7 makes recommendations for future research.

9.1 Meaningful Play

Research activities undertaken in participating schools were designed to cast light upon children's needs and aspirations for meaningful play. However, it was not easy for the research team to identify the factors that made play meaningful for the children, as they did not describe these factors explicitly. The research team learnt most about meaningful play through the children's expressed preferences and the barriers to participation identified. They learnt that the most significant barriers to meaningful play for disabled children were the social barriers created by peers and others - such as the negative assumptions of class peers - as identified in Sections 5.5 and 8.4.

Focus group discussions and design and evaluation sessions undertaken in participating schools revealed that both disabled and non-disabled children shared aspirations for equality, ownership, autonomous play, self-representation, appropriately pitched games (i.e. with a suitable level of difficulty) and safety in game play. As indicated in Chapter 6, games with a set number of players were perceived to be exclusionary and inappropriate videogames were divisive, due to the children's different play preferences. For the disabled children, the need for a greater sense of difficulty or challenge in gameplay was more profound, and more deeply expressed, as a direct response to the stigma surrounding childhood disability - thus emphasising the need to challenge negative assumptions about disabled children through design curricula.

9.2 Working with and Giving Voice to Disabled Children

Although the children's design and evaluation sessions were facilitated in such a way as to enable children to take ownership of the design process and for their designs to remain untainted by adult views, a range of internal and external factors influenced the children's designs. Existing or commercial toys and games and current trends inspired many of the children's conceptual designs. The children's prior experience on design projects, the materials provided and facilitator-set constraints were also influential.

Challenges encountered by the children during the design sessions provided insight to the ways in which design fixation can stifle children's creativity. In order to equip children with the skills to participate in the design activities, some form of researcher intervention may have been required - for example, scaffolding design tasks or introducing divergent thinking strategies to help children to overcome barriers to creativity. Contradictions in the children's expressed preferences and

their observed behaviours highlighted the need for researchers to triangulate research findings, maintain an on-going dialogue with the children and undertake member-checking with them. The process of critical design provided useful insights, in this regard.

Although each of the children found ways in which to participate in the research activities, some encountered social, physical, or psychological barriers to participation, resulting in the silencing of their voices. For disabled children, social barriers were most prominent, with the inclusion of the negative views and behaviours of their non-disabled peers and others, and in the worst case, the occurrence of victimisation and verbal abuse was evident. Regarding physical barriers - verbal instructions were exclusionary for Joanna due to her hearing impairment.

Children with upper limb and motor impairments found written tasks difficult and some topics were too sensitive for others to discuss in a focus group scenario. Non-disabled children also encountered barriers to participation in focus group discussions and mind mapping activities, due to concentration-loss; disengagement with written tasks and limited time or resources. Thus, addressing issues of inclusion in research is beneficial to disabled and non-disabled children. From this study, we can conclude that all children are unique. It was important, therefore, for the researcher to tailor the research methods to children's individual needs.

The disabled children gained voice when they were able to express themselves through self-initiated research methods and participate in the research in more nuanced ways. They developed their own techniques for evaluating toys and games and at times, chose to deviate from the research schedule, in order to discuss topics of significance to them. For example, in addition to verbalising their views on the prototype toys and games, some of the disabled children chose to act out their gameplay suggestions. However, self-initiated research methods were not applied consistently, nor were these methods shared between groups. This is a potential area for further investigation in the future. Children at each of the participating schools also expressed the need for a greater sense of autonomy over, and participation in, the design of the prototype toys and games. Some children were also keen to find out how their ideas had been used to inform the design of the prototypes - highlighting the need for more transparency in the process of participatory design research.

9.3 Conveying what was Learnt about Voice to Designers

Many of the children were unable to describe how to ensure the inclusion of disabled children through their own designs and designs developed by the undergraduate students. Perhaps they did not have a vocabulary for this concept. As a result, the students relied more heavily upon the use of personas and existing guidelines on universal design (Connell et al., 1997) and inclusive play (Endicott et al., 2010) to inform their understanding of inclusion. In doing so, they risked prioritising adult perspectives on play over the aspects that made play meaningful to the children. School-based observations were useful as they gave insight to the participant's context. They were limited, however, in that they relied primarily upon the researcher's interpretation of events. These observations only offered a 'snapshot' of the disabled children's experiences.

Nevertheless, the resulting data provided important converging information on the disabled children's experiences of play in participating schools. As the students were unable to gather feedback directly from the children, reports produced by the researcher helped to summarise key research findings and condense large quantities of in-depth discussion data for the students. Debriefing sessions enabled the students to discuss the findings in detail and ask questions. Some of the Engineering students found in-depth discussion data generated through the research overwhelming. They also expressed concerns over their analysis of this data - assuming that their approach may be perceived as 'wishy-washy' or intuitive. This lack of confidence in the process of qualitative analysis emphasised the need to equip students with the necessary skills to bring rigour to the process, plus the need to bring value to the process of qualitative analysis in engineering.

One of the challenges identified in the students' feedback was making the qualitative data manageable, without losing its richness. This was particularly difficult for the students as the children expressed such a variety of different preferences in their feedback. Furthermore, the students had to be critical about some of the suggestions made by the children. Not all of the children's suggestions would contribute to enabling meaningful play. For example, reliance on verbal instructions in a game, as suggested by one of the non-disabled children would exclude children with hearing impairments. Some of the children's views and suggestions conflicted - for example, there were disagreements on timings, levels of difficulty, themes, plus there was a tension between their desire for inclusivity and exclusivity.

As the students were unable to observe the children interacting with the prototypes, they felt that they did not gain enough detailed feedback. Furthermore, the limited availability of participating schools meant that the iterative process was slow and that many of the questions the designers asked retrospectively went unanswered - highlighting the need for tools to enable quick iteration between children and students. The students were selective with the research data and used their own criteria for sorting the children's design ideas, based on their own definition of inclusion. They dismissed design concepts linked to existing products due to their perceived lack of originality. For safeguarding reasons, they avoided inappropriate or violent videogame themes, and designs considered too ambitious were not pursued due to limited resources at the University. For this reason, outdoor play solutions were not explored. Additionally, despite a number of children developing doll and teddy design concepts, the all-male team of designers and engineers chose not to pursue these ideas due to their gendered association with products aimed at girls. Such an approach provides evidence of adultcentrism.

Student reflections on the Together through Play project emphasised the need for a more humanistic approach to the research process for designers. Seeing mind maps, and reading direct quotes from children made the research process more meaningful for the students and led them to develop an emotional connection to the data. Numerical coding and the use of personas, on the other hand, dehumanised the research process for students. The students' Masters programmes finished before the completion of the project. However, they may have benefited from participation in further iterations of sociological analysis with the researcher, in order to give them insight to more latent themes within the data relating to the children's needs and aspirations for meaningful play.

9.4 The Role of the Designer in the Facilitation of Meaningful Play

While designers can facilitate inclusive play by ensuring the accessibility of toys and games, they cannot tackle the social barriers to meaningful play alone. Findings presented in this thesis emphasise the significant role various stakeholders play in the process of meaningful and inclusive play, including peers, family members and school staff. However, the research team identified four steps designers can take towards mitigating the social barriers to meaningful and inclusive play:

- 1) Providing variability in player numbers, in order to accommodate additional participants: where player numbers were limited, the disabled children were invariably last in the pecking order – where there was scope for everyone to play, this problem was alleviated;
- 2) Enabling autonomous play through choice or customisable features;
- 3) Keeping gameplay pauses to a minimum in order to reduce opportunities for bullies to strike. Bullying behaviours had a tendency to emerge during gameplay pauses, rather than during play;
- 4) Encouraging collaborative rather than competitive scoring: the children were competitive, which encouraged infighting and bullying. Thus, collaborative scoring was less problematic than individual scoring.

Enabling children to engage in the process of participatory design as co-designers, rather than child users, requires an attitudinal shift towards considering *all* people as creative. It involves giving power to the end user, challenging established power structures between designers and users (Sanders & Stappers, 2008) and exploring ways in which to harness children's creativity. When the students scaffolded design tasks for the children by developing tools to facilitate children's participation in the design process - for example, by providing pre-designed template sheets, the children were more engaged in the design task and articulated their ideas with greater skill and confidence. In relation to disabled children's participation in co-design projects, it is worth noting that denying disabled children access to play can also act as a barrier to creativity. This emphasises the need for design researchers to develop tools or resources that will harness creativity and enable disabled and non-disabled children to participate in design research in ways that are meaningful to them.

The findings of this research highlighted the need to equip user and researcher with the relevant skills and experience to participate in co-designing teams, in order to bring a greater balance of power to the process of co-designing. Designers play an important role in co-designing teams as they offer skills, knowledge and experience that other stakeholders do not have. Both children and students involved in the study expressed the need to bridge the gap between user and designer through the process of user-centred design. The children were keen to find out more about the students and the students expressed the need for more detailed interaction with the children, in order to inform their design practice. This

finding further emphasises the need to bring a humanistic approach to participatory design for designers of inclusive play products.

9.5 The Significance of the Project

Research activities in participating schools emphasised the importance of listening to children through the research process and unpacking some of the problems surrounding inclusion with them. The way in which the social and physical exclusion of disabled children was internalised by the disabled children, and the negative impact this had on their self-perception, stressed the significance of this research area for designers. Some children made some good suggestions about the design of toys and games, which could be used by designers to inform their practice. Some children also set a positive example to designers with their inclusive attitudes and approaches to this topic. During observations in participating schools, numerous examples of inclusive practice were evidenced. The researcher felt that much could be learnt about giving voice to disabled children from the inclusive strategies employed by teachers and support staff at each of the participating schools. Examples of inclusive practices included giving children visual prompts to support their learning and group rewards for teamwork.

9.6 The Impact of the Research Context on the Project and its Contribution

This project gave insight to the specific needs and experiences of a small number of disabled children and their school peers. The descriptive and exploratory orientation of the inductive analyses employed cast light upon their individual experiences. Thus, participating schools and children made a significant impact on the research and its contribution to knowledge. Views expressed by the children provided insight to the norms and expectations of their unique social worlds. However, the findings of this small-scale study are not indicative of the social worlds of *all* children. This research acknowledges that if replicated in a different context - for example, in different schools with children with other forms of physical impairment or in the out of school setting, the results may have been quite different.

The prior knowledge, experience and personal preferences of the children played a role in their engagement with, and contribution to, the research. In relation to play, some children drew upon their personal experiences and observations of play in the school playground, whereas others referenced play with siblings and other family members. In relation to their engagement with the research, the

children's preferences for certain modes of communication over others were influenced by their prior education and experience of research. For example, Freddie's prior involvement in research at the University meant that he was particularly well versed in, and engaged with, issues of inclusive play, whereas this was a relatively new concept for other child participants.

Group dynamics, cultural norms and expectations within the children's social worlds, particularly within the school environment, also played an important role in the research and its contribution. With the built environment of some of the schools being more accessible than others, exposure to, and awareness of, the needs of disabled people varied between schools. The intervention of gatekeepers such as Teaching Assistants also varied, as did the age of the children in the friendship groups. Older children were more confident articulating their views than the younger children and group dynamics were influential, with evidence of approval-seeking behaviour (Morgan, 2002) taking place across schools. Group preferences influenced discussion topics raised during focus groups and the choice of materials used during design tasks.

School schedules and timetables dictated the types of lessons observed by the researcher and the extent to which disabled children were present during scheduled observations. Although the researcher prepared the same resources for each of the research activities, no two situations were the same. Observational studies provided a single snapshot of the children's experiences, which were recorded and interpreted by the researcher. Nevertheless, the resulting data provided important converging information on disabled children's experiences of play with their non-disabled peers in a small sample of mainstream schools. The value of this approach was the individual insights gained as opposed to the production of generalisable data, with research findings providing unique insights that cannot currently be found elsewhere within the literature.

9.7 Future Directions

This research makes recommendations for a new method for inclusive design with children. In order to bring a greater balance of power to the process, a mixed-method approach is recommended. The provision of opportunities to develop accessible methods with disabled children is also recommended. One way to achieve this goal is to involve disabled children in the development self-initiated research methods. Meeting children's individual access needs could include the provision of easy read documents, visual flash cards, or even self-sticking, pre-cut

shapes for design tasks. Exploring tools to enable quick iteration between co-designing teams of designers and child users is also recommended, particularly for those based at different research sites.

More collaborative work with children as co-designers could potentially take place via conferencing tools such as *Skype* or *FaceTime*, to enable quick iteration, whilst ensuring compliance with safeguarding policies. More collaborative approaches to the analysis of qualitative data with various stakeholders are also recommended. This could involve member checking, role-play, and/or an on-going dialogue between designers, children and researchers. In the analysis of observation data, it is argued that 'without explanatory power, interpretation and response by adults, observations have little meaning' (Santer et al., 2007, p.xvii). However, explanatory power in participatory research with children should come from children, and children should be given the opportunity to validate conclusions drawn by adults. These insights could potentially give voice to children and, in turn, enhance the quality of their experience (Adams, 2004, p.57).

Collaborative work between design researchers and children as users towards defining meaningful play is also recommended. It is worth noting that the students' design study focused upon disabled children's access to inclusive play, rather than play that was meaningful to disabled and non-disabled children, suggesting that meaningful play was a concept that was not fully understood by the design team. Moreover, further research into design pedagogy in relation to participatory projects with disabled and non-disabled children is recommended, in order to bring a greater balance of power to the process. This research highlighted the need for further research into ways in which to bridge the gap between researcher and user and to humanise the process for them. One way in which to achieve this goal is to examine ways of making textual data more meaningful and accessible to designers and children alike - for example, through the use of pictograms or physical artefacts in the dissemination of research data.

This exploratory research was designed to lay the foundations for larger scale studies to address issues of inclusive play. Children involved in this research were of Primary School age (aged 7-11). Potential areas for future research include the investigation of research methods with other user groups. For example, children with a broader range of physical impairments, children with learning disabilities, and children and young people of different ages. Another option would be to undertake research activities with children in different play settings. For example, play during playtime at school or in the out-of-school setting.

Druin et al. (1999) have noted the significance of the user's context when developing understanding of their experiences. Although research activities undertaken in the Together through Play project took place during lesson time in the school environment, the children spoke often of their play experiences outside of school. Moreover, an investigation of play at different times - for example, at playtime rather than during lesson time, could provide new insights to meaningful play. Another possible option would be to investigate the generalisability of interventions developed through this project and to refine these interventions into products that can be deployed in the future.

Some emergent findings were also relevant to teachers, parents and carers and may warrant further investigation in the fields of childhood studies or education. Furthermore, the way in which schools were unaware of products to support inclusive play emphasised the need to raise the profile of successes and positive exemplars in this area of inclusive design for children. Other issues of concern for teachers, parents and carers include children's use of inappropriate videogames and the occurrence of bullying in participating schools. This study highlighted that if framed properly, focus group discussions and methods of cooperative inquiry (Druin, 1999) can be used to address such concerns through education, and to fulfil the emancipatory aims of such participatory research projects in the future.

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Appendix A Consent/Assent Forms and Information Sheets

A.1 Information Sheet for Child Participants



Hello!

My name is Anne-Marie Moore, and I work at the University of Leeds. I am working on a design project to find out how children play, and what they would like to play with in the future. After I have spoken to lots of children, I will be writing a report. I am writing to ask whether you will agree to talk to me and give me your opinions.

Your parents and Headteacher have said that I can talk to you, but you don't have to and you won't get into any trouble if you say 'no'. If you do agree to talk to me, there will be other children from your class talking to me at the same time, so that might make it easier. One of the teachers from your school will also be nearby when we talk, so you will feel safe. It is not a test - there are no right or wrong answers and you don't have to answer every question.

If you do decide to take part, you will be part of my design team, and you will be working with me to design toys/resources for you and your friends, that would be fun to play with as a group. We will then work together to test our ideas and I will need you and your friends to tell me what you think. We can share our ideas through drawing, writing, model making, photography and by talking to each other. We will have lots of fun, and I am happy to share ideas in new ways.

When we are talking, I will put a tape on to record what people say, so that I can remember what everyone has said for my report. You will be able to ask me at any time to turn the tape recorder off, and I will. What people say on the tape will be typed up and in my report and I might write down what some children have said to me, but I won't ever name you or say which words are yours. This means that you don't have to worry about saying the 'right' or 'wrong' thing, you can just say what you like.

You can ask your teacher or me any questions you like before you decide whether to talk to me. You can also ask me any questions after we have spoken to each other.

Information Sheet



A.2 Assent Form for Child Participants



Consent Form

Please answer these questions and then write your name and today's date at the bottom of the page.

Have you read the information sheet?
(It is okay for you to tick 'yes' if your teacher has read the sheet to you.)

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Do you understand what you have read?

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Do you understand that you do not have to speak to me, even if your Mum or Dad and your Head-teacher have said it is okay?

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Do you understand that you can ask your teacher or me any questions before you decide whether to take part in the project?

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Do you understand that you can stop talking to me at any point, and that you do not have to answer every question?

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Would you like to speak to me about the project?

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Are you happy for me to record what you say on a tape recorder? (I will write up what everyone says, but won't ever use your name or say which words were yours.)

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Your name (signature):

What is the date today? together through play



A.3 Information Sheet for Parents and Carers



together through play

Facilitating Meaningful Play Between Disabled and Non-Disabled Children

Dear Parents and Carers,

This year, researchers at the University of Leeds will be working on a design project at the school, to find out what children need and want from inclusive play. We are pleased to inform you that your child has been invited to work on the project, and we are writing with a request for permission to speak to them. We will also ask your child for their permission, and we will not speak to them unless they agree to take part in the study.

If your child does agree to take part in the project, they will be working with researchers to design toys and games that they would like to play with, with their friends. We will then work with the children to test their ideas and the children will be asked for their views on the designs. The children will be free to draw, write, make models and talk, and all workshops will be very informal.

Workshops and interviews will take place during school hours, and on school premises. The researchers each have CRB clearance and each session will be witnessed by or within hearing distance of a member of staff at the school.

All children involved will be given the opportunity to ask their teacher or the researchers questions before and after they decide to talk. A tape recorder may be used to record conversations for a report on the project, and what people say on the tape will be typed up. Children will be able to ask the researcher to stop the tape at any point, and no one will be named in the report. The views of all children will be treated confidentially.

For more information on the Together Through Play Project, please contact Anne-Marie Moore at the address below. We hope that you will be able to give consent for your child to be involved in this project, and thank you in advance for your time. We would be most grateful if you could complete the consent form attached and return it to your child's class teacher.

Yours sincerely

Anne-Marie Moore
School of Mechanical Engineering, University of Leeds, Leeds, LS2 9JT
Email: mnamm@leeds.ac.uk



A.4 Consent Form for Parents and Carers



together through play

Facilitating Meaningful Play Between Disabled and Non-Disabled Children

Please complete and return to the Headteacher of your child's school, or to their class teacher

Child's name: (please tick)

I am the parent or legal guardian of the child named above.

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

I have read the information sheet attached and understand the aims of the project.

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

I have been given the opportunity to ask questions about the project before reaching my decision.

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

I understand that I can change my mind and decline to allow my child to become involved in this research.

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

I understand that my child's involvement in this project would be voluntary and that they can refuse to be involved even if their parent/s and school have agreed.

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

I understand that the information children give during the project will be kept securely and confidentially and that no child will be named in any research publications.

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

I consent to my child taking part in workshops and group discussions as part of this project.

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Your signature:

Date:



together through play

A.5 Student Information Sheet

Student Consent Form



UNIVERSITY OF LEEDS

together through play

Facilitating Meaningful Play Between Disabled and Non-Disabled Children

Researchers: Anne-Marie Moore, Dr Raymond Holt and Dr Angharad Beckett, University of Leeds

Dear students,

Thank you for your involvement in the Together Through Play project. You have worked extremely well as a team to produce some high quality working prototypes and we hope that the learning experience has been mutually beneficial for you.

Moving forward, we would like to undertake some informal interviews with the team for research purposes, as an extension of the Together Through Play project. Our aim is to use data arising from the interviews to write a report based on the methods of engaging undergraduate students in the design process. You are under no obligation to participate in this study, and you are free to withdraw or decline without this affecting your references in the future.

We are aware of the ethical issues relating to the interviewing of people that we teach or manage in some way, therefore your involvement in the interview process will be entirely voluntary. Recruitment for interview will not take place until after your work has been marked and your mark returned, so that you do not feel that your mark may be comprised in any way.

The interviews will be a great opportunity for you to debrief us on your overall experience of the project, and you will be given the opportunity to ask the researchers questions before and after you decide to share your views. A tape recorder will be used to record conversations for our report, and information given to the researchers during the recording shall be typed up. You may ask the researcher to stop the tape at any point, and the views of all participants will be treated confidentially. No one will be named in the report.

For further information, please feel free to contact Anne-Marie Moore at the address below. We do hope that you would like to take part in this study, and we thank you in advance for your time. We would be most grateful if you could complete the consent form attached and return it to either Anne-Marie Moore or Dr Raymond Holt at the University of Leeds.

Yours sincerely

Anne-Marie Moore
School of Mechanical Engineering, University of Leeds, Leeds, LS2 9JT
Email: mnamm@leeds.ac.uk



A.6 Student Consent Form



together through play

Facilitating Meaningful Play Between Disabled and Non-Disabled Children

Please complete and return to Anne-Marie Moore or Dr Raymond Holt.

Name:

Course:

Questions:

(please tick)

I have read the information sheet attached and understand the aims and objectives of the project.

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

I have been given the opportunity to ask questions about the project before reaching my decision.

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

I understand that I can change my mind and decline to take part in the research at a later date.

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

I understand that my involvement in this project would be voluntary and that I can refuse to take part, even if the university has granted permission for me to take part.

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

I understand that any information I give during the project will be kept securely and confidentially and that no participants will be named in any research publications.

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

I consent to taking part in informal interviews as part of this project.

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Your signature:

Date:



Appendix B Observation Research Instruments

B.1 Transcription Template

2

Together Through Play Project – Transcription of Design Session 1 –School XXXXXXXX Date: XXXXXXXX

Details:

Recording Number	School	School Code	Overall time	Topic	Students Present	Codes of Students Present	Transcription Details Full/Part/None

Interview Data:

Question	Student Response	Student Code	Time	Recording Number	Notes
1. What is disability? How would you describe a disabled person?					
2. How would you describe a non-disabled person?					
3. What is a design?					
4. How can we communicate or share our design ideas?					
5. What is a toy or game?					
6. What is an environment?					
7. What do you think will help disabled and non-disabled children to play together better, and why?					

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2

B.2 Field Notes - Researcher Observation Notes

B.2.1 St Amelia's Catholic Primary School

I.T.:

Roblox
Different characters made out of blocks + zombies.
Shet jagat - favourite computer game.

Espresso = online resources.

said she was finding it hard with the headphones in the IT suite.

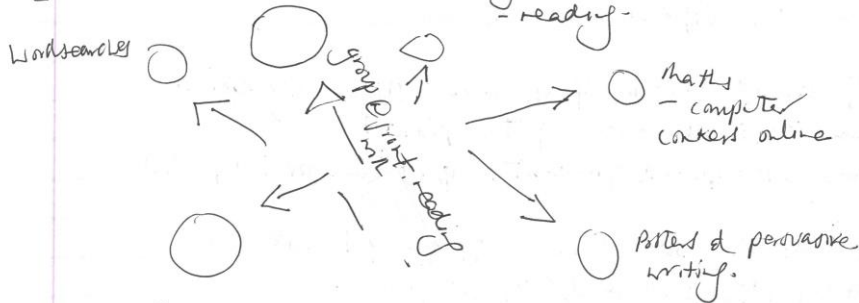
Observations -

Primary School.

explained that during break times is beginning to play more and more on his own in the playground

8:45 - 8:55am = Reading on air (whole class).
- favourite book = horrible Littles.

Activities - personalised learning



me a gap taken for personalised learning

said that when the children were asked, ~~who~~ ^{who} their heroes were, most of the class said footballers, etc. said 'my Mum. I am so proud of how strong she has been through some difficult times.'

B.2.2 Aspen Primary School

Observations

- Day 1 -

Primary School.

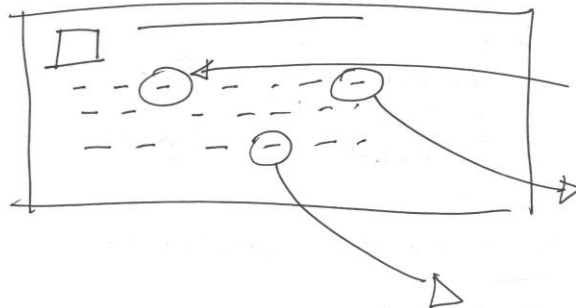
Maths lesson

Dividing by 10 = checking answers - children write their answers on their own mini white boards, teacher shouts out: "3, 2, 1 - show me"

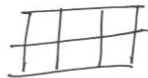
One little boy said "come on, you need to do it faster" and said "I can't do it fast - I can't do it in that time frame".

* Has support with maths, therefore, he goes to a separate, smaller group for these lessons.

* one thing I have noticed that in the seating plan for children sitting on the floor:



Activities move on quickly to "Bingo" & children learn to draw their own Table



B.2.3 Woodlands Primary School

Day 1 - Visit 1 -

Primary (Observations)

Activity 1 - Jumping Jack Army (Ceri Hies) ✓

Drawing character from the Army. ✓

Incentives = table points.

Students working with = ✓ and friends

I was introduced as an 'observer', that I will be looking at things closely, ✓

and that ✓ have been chosen to work on this project ✓

Q: (Will this have an impact on 'inclusion', if these students are working on a 'special project?' with

whilst teacher was talking. ✓

Was assertive talking about paragraphs, and described blocks of words with hands. ✓

is a new student, however seems to be settling in well & is friendly - another student answered correctly and he turned to give him a smile. ✓

(a.g.)

The children really enjoy questioning & challenge with prompts. ✓

Time limits motivating. ✓

In lesson, needs to climb onto a chair - big effort, however, her back was to the board, so she needed words written down on a white plastic board in front of her.

said she enjoyed writing & stories.

writing the words rather than spoken prompts given by - lots of fun language mixed.

B.2.4 Willow Primary School

Observations - Primary School.

N.B. (School day starts at 8:55)

= potential friendship group -

Observations:

hearing aids & cochlea implants are very visible.

The teacher wears a mic.

She is good friends with

They were turning their books into telescopes & spying through the hole at each other.

brought in some Mehendi patterns from India, a gift from a visiting uncle & she wanted to share it with the class, so that 'everyone could look at it'.

Letters - University affiliation was popular.

- Children wanted to tell us about their parents:

- connection with the university, → lecturers / previous students, etc.

Design/Engineering related jobs

→ students/children interested in.

Questions children asked: 'Will we be out during lesson times or at breaktime?'

What is a designer? The 'best' student definition picked

by the teacher was 'designing' deciding what things look like.

Idea: Could explore other things a designer is - challenging assumption

Good way of counting = hands up / hands down

- punching up, lifting knees, squats.

Leaves the room earlier for breaktime - misses opportunity

B.2.5 Reminder Slip for Child Participants



The University of Leeds - Together Through Play

Our next meeting will take place on _____. During this meeting, we will be talking about toys and games.

Please bring to the meeting an example of a toy or game that you like to play with, with your friends. You can bring it into school to show me (if it is easy to carry), or you can draw or find a picture of it. You can even describe it to me in words.

I would also like you to show me an example of a toy or game that you do not like to play with, with your friends.

Many thanks

Anne-Marie

B.3 Sample Field Notes - School-based Workshops

B.3.1 St Amelia's Catholic Primary School

- During the debriefing, all students said that they enjoyed the workshop activities
- Freddie sought to develop practical solutions to problems at the school through his designs
- Freddie suggested children should have individual desks and access to a museum with a giant skeleton, to support their learning
- Freddie chose to use Play-Doh, to help model his ideas
- Timings worked well
- One member of staff was able to accompany each group and this allowed the research activity to run smoothly. Staff also regrouped the students, to make notes in their notebooks
- It was helpful to carry out group discussions whilst the children were on around the school
- During the design activity, some students were influenced by the ideas of those around them

Criticisms and suggestions:

- Limited number of cameras was an issue
- One pupil felt it may have been helpful to pre-warn children that their designs would may not be realised, in order to avoid disappointment. Communicating this idea at this stage was problematic
- Examples of children's ideas included underground tunnels, tree houses, roller coasters, and trains around the school
- One student suggested setting up different workstations for the workshop to enable children to focus upon their individual play preferences, but participate in design activities together
- As more time was allocated to discussion at this school, each pupil had the opportunity to present their ideas to the rest of the group, giving them a sense of ownership

- More rich questioning took place at the end of the debriefing session as pupils began to think about the implications of their designs

B.3.2 Woodlands Primary School

Rosie enjoyed the activity, however, she had to leave the classroom on a regular basis to join the lunch queue or go to the bathroom before other students. Throughout the day, she had to be carried down the stairs by a member of support staff.

Rosie cannot move around the school independently. She is accompanied by a member of support staff at all times and is never alone with other students. Her class teacher highlighted that Rosie often whispers in a noisy, crowded room, and attends seeing speech therapy sessions. 'She doesn't have trouble with her speech though', she said.

Rosie took photos of the stairs and the carpet in the music room at the school. 'This room needs a new carpet', she said. Other students took note of the stairs and said 'they should put like a ramp here, so Rosie can get up here in her chair'.

Problems identified:

- Three members of staff were not enough to manage the behaviour of this group
- As soon as the children went outside, they dispersed across the vegetable patch and climbed over walls
- The students had never been engaged in an activity like this before, therefore, this may have added to the excitement
- One girl picked up a frog and passed it around for her peers to hold. During the debriefing session, when I asked the students what they did not like about the day, some commented 'I didn't like holding the frog'. This emphasises the importance of setting ground rules at the start of each session. It also highlighted that although children might gravitate towards certain activities, they might not necessarily enjoy them
- All of the students confirmed that they enjoyed the activities throughout the day
- At each school, the Pay-Doh activity was the most popular material. In future activities, it may be best to give children a choice in materials to work with
- The researcher noticed that at some of the tables, children were influenced by the work of those around them. At one table, for example, all of the students drew a slide. At another table, all of the children designed a den or a tree-house
- During the mind mapping session, students commented 'we should have some monkey bars to stop kids swinging on the toilet doors'
- This group recommended that other collage materials could be incorporated into the creative workshop such as cotton wool, fabrics and yarns, clay, etc.

B.4 Sample Field Notes - Minutes of Meetings with Teachers

B.4.1 St Amelia's Catholic Primary School

Notes on the class:

- Potential research participants identified include Freddie and Emily (each of these pupils have one-to-one support)
- There is a large cohort of SEN pupils in this class, with varying needs
- 2 pupils in the class have autism
- Approximately 5 members of staff will be supporting the workshop
- According to the class teacher, this class is unique as they have a positive attitude towards inclusion
- The researcher will need to prepare an information sheet for parents, giving them the option to attend either an afternoon or afterschool project briefing

Workshop planning considerations:

- Be aware of building works taking place at the school - the tour will need to go around the back of the school
- An Interactive Whiteboard will be available on the day
- 'Healthy Me' will be the topic for the term

Other topics the class will be studying:

- The Solar System
- The local area (linking with themes of citizenship and cultural identity)
- Water
- Historic topics such as the Olympics

B.4.2 Aspen Primary School

Notes on the class:

- The class teacher is the Y3/Y4 coordinator
- Super heroes will be the topic for the term, with the aim of looking at strengths rather than weaknesses
- Inclusion is part of the school development plan. It's aims are to enhance children's social skills and to develop a sense of community
- The researcher will be working with another class teacher during the project
- Research activities will start at 1:15pm and the researcher will need to arrive at 12:45, in order to allow 30 mins to set up the classroom
- Parents from marketing and design professions have expressed an interest in the project
- There is the potential for the front of the school to be re-developed in the near future and there may be the opportunity for children to make a contribution to its design

B.4.3 Woodlands Primary School

Notes on the class:

- Rosie is a potential participant for the project. Rosie has cerebral palsy and requires one-to-one support
- There are currently 23 students in the class
- There will be 4 staff supporting workshop activities on the day
- A council representative will be visiting Rosie on the day of the workshop and taking a tour of the school

Workshop considerations:

According to the class teacher, the 'green area' beside the classroom is rarely used. This is something that could be incorporated into the students' designs

The class teacher also highlighted concerns about a small group of boys in the class. As they are regularly in trouble during break and lunchtimes, they may benefit from more inclusive, engaging resources at playtime

Parental engagement:

Only two parents returned slips about the 'Together Through Play' project and neither expressed an interest in attending the project briefing. Parental engagement will need revisiting.

Proposed workshop timings:

9.15 – school starts

9.30 – be ready to start activity

9.30 – assembly

10 – 10.45 – session 1

10.45 – 11 – break

11-12 session 2

12- 1 – lunch

1 – 3pm – session 3

Appendix C Research Context

C.1 Schools Participating in the Project

C.1.1 St Amelia's Catholic Primary School

Name of School	Size (number of pupils on roll)	Type	Number of form intakes each year	Nature of catchment area	Philosophy and educational policy	Latest Ofsted Grade	Physical characteristics of the school, including general accessibility	Age of building	Number of pupils (disabled and non-disabled)
St Amelia's RC Primary School	200, 73% of whom are Catholic	Voluntary Catholic Academy Primary School for pupils aged 4-11	Admission Number of 30	<p>The majority of pupils have English as their first language with a small number from the European mainland and from India.</p> <p>Almost all pupils are from White British backgrounds with a small minority of Gypsy/Roma heritage. 9% of pupils are from the travelling community.</p> <p>The number of pupils eligible for free school meals is below the national average.</p>	<p>Its mission is to offer a distinctive Catholic education with a caring Christian community where everyone feels valued, confident and secure.</p> <p>The school aims to deepen children's knowledge, experience and practice of Gospel values and to provide a curriculum that ensures all children learn and achieve to the best of their ability.</p> <p>The school follows the diocesan Religious Education programme, The Way, the Truth and the Life. Personalised learning is included in the daily curriculum.</p>	Outstanding	<p>The school is situated on a large site and has a large sports field as well as extensive mature woodland within its grounds.</p> <p>The majority of the school is single-storey with open plan sections. This makes navigating the school accessible to those with limited mobility.</p> <p>All pupils benefit from extra support in the classroom. Training is given to support staff to enable them to assist pupils with additional needs.</p>	<p>The school has been involved in a staggered rebuild since 2009, to the value of £1081,000 thus far.</p> <p>This has involved the design of new offices, classrooms, cloakrooms, toilets, a music room, group room, staff room, entrance, and a courtyard.</p>	<p>The proportion of pupils at the school with special educational needs and/or disabilities is 11.5%, which is above the national average. Seven pupils have an Educational Health Plan.</p> <p>Seven pupils participated in the Together through Play project at this particular school - one of which has a physical impairment.</p>

C.1.2 Aspen Primary School

Name of School	Size (number of pupils on roll)	Type	Number of form intakes each year	Nature of catchment area	Philosophy and educational policy	Latest Ofsted Grade	Physical characteristics of the school, including general accessibility	Age of building	Number of pupils (disabled and non-disabled)
Aspen Primary School	480	Community Primary School for pupils aged 3–11	Admission Number of 60	<p>At this larger than average-sized Primary School, most pupils are White British. A remaining small number of pupils originate from a wide range of minority ethnic heritages.</p> <p>The proportion of pupils who are believed to speak English as an additional language is low. The proportion of pupils known to be eligible for the pupil premium is lower than average.</p> <p>The majority of children start school in the Reception class with skills, dispositions and attitudes that are a little better than those typically expected for their age.</p> <p>Pupils leaving school in Year 6 have not made as much progress as would be expected, thus reflecting the need for improvement at the school in the latest Ofsted inspection.</p>	<p>This school aims to create Success Stories, with SUCCESS relating to the following:</p> <p>S-Stimulating the development of Knowledge, Skills and Understanding,</p> <p>U-Understanding how to be an effective life-long learner</p> <p>C-Creating Equal Opportunities to be Successful,</p> <p>C-Commitment to the provision of a Dynamic Curriculum,</p> <p>E-Educating responsible Citizens of the World,</p> <p>S-Supporting the promotion of community cohesion,</p> <p>S-Striving to be technologically capable.</p>	Needs improvement	<p>This Victorian, multi-storey building is surrounded by a small, but well resourced concrete playground. It has narrow stairwells, making it difficult for pupils with limited mobility to navigate the building. For this reason, few children with physical impairments attend the school.</p> <p>Pupil premium funding has helped to fund a number of specialist staff with a permanent base at the school. This includes a family support worker, speech and language therapist and staff employed to work one to one with targeted pupils to boost their phonic and writing skills.</p>	120 years old. This Victorian building was founded in 1897.	<p>The proportions of pupils supported by school action, school action plus or with a statement of special educational need are low. Their needs range from physical impairment to speech, language and communication needs and behavioural, emotional and social difficulties.</p> <p>All of the pupils are educated at the school and none receives alternative provision. Three pupils participated in the Together through Play project at this school - one of which has a physical impairment.</p>

C.1.3 Woodlands Primary School

Name of School	Size (number of pupils on roll)	Type	Number of form intakes each year	Nature of catchment area	Philosophy and educational policy	Latest Ofsted Grade	Physical characteristics of the school, including general accessibility	Age of building	Number of pupils (disabled and non-disabled)
Woodlands Primary School	302	Mainstream Community Primary School for pupils aged 4-11	Admission Number of 60	<p>Pupils often join the school at times other than the beginning of the school year. Despite this disruptive start for some, most make good and better progress.</p> <p>The vast majority of pupils arrive at the school with lower and often much lower than expected levels of skills and knowledge for their age. Children often start school with the social and language development expected of a child of eight to 20 months.</p> <p>By the end of Year 6, standards in English and mathematics are close to national expectations. This represents good achievement overall. Results are improving year on year.</p> <p>The vast majority of pupils are of White British origin with a small number from other ethnic backgrounds.</p> <p>The majority of pupils at the school (a much higher than average number) are eligible for and supported by the pupil premium (which provides additional funding for pupils known to be eligible for free school meals and those in the care of the local authority).</p>	<p>Woodlands values include:</p> <p>Being a Democratic School by enabling pupils to vote for and elect school council and House Captains and consulting with pupils to design a state of the art play area to the value of £14,000 budget. Offering 'children's choice' lunches and an open door letter writing policy, which allows children to write a request to the head teacher at any time.</p> <p>Rules of Law - Each class has their own class rules to learn which are decided by the class for the class. School rules are written and delivered by the school council.</p> <p>Individual Liberty -Encouraging children to make requests without the fear of people saying 'no' and encouraging open discussion.</p> <p>Mutual Respect - respecting all regardless of appearance, race, gender or religion</p> <p>Tolerance - Respecting and acknowledging different religions while promoting British values.</p>	Good	<p>This is an average-sized, multi-storey Primary School. Although the school has one accessible lift, there are sections of corridor with stairs and no ramps, making some areas surrounding classrooms inaccessible to pupils with limited mobility.</p> <p>This school has a large playground and is surrounded by playing fields. However, green spaces are not fully accessible and/or utilised at this school. The textured surface of the playground is also reported to be inaccessible to some pupils with limited mobility.</p> <p>The school has a state of the art Resourced Provision with 12 places for children with learning difficulties and/or complex needs. Pupils who attend the specialist provision spend time learning together in the morning. In the afternoon, supported by staff from the base, they join classes in the main school. It is intended that this will enable them to make good progress academically and socially.</p> <p>Other disabled children are also in attendance of classes across the rest of the school. The school runs a small nurture provision, which supports pupils with behavioural difficulties.</p> <p>The school recognises the importance of developing pupils' reading skills. The recent purchase of a large number of reading books for home use has improved achievement.</p>	Approximately 40 years old.	<p>The proportion of pupils identified with special educational needs through school action is close to average levels for similar schools.</p> <p>The proportion of pupils supported at school action plus or with a statement of special educational needs is twice the national average.</p> <p>Seven children from this particular school participated in the Together through Play project - three of these children were disabled.</p>

C.1.4 Willow Primary School

Name of School	Size (number of pupils on roll)	Type	Number of form intakes each year	Nature of catchment area	Philosophy and educational policy	Latest Ofsted Grade	Physical characteristics of the school, including general accessibility	Age of building	Number of pupils (disabled and non-disabled)
Willow Primary School	Community Primary School for pupils aged 3-11	210	Admission Number of 30	<p>There are very few pupils at the school who are known to be eligible for free school meals.</p> <p>Around one quarter of the pupils come from minority ethnic groups, with the largest group being pupils of Pakistani origin.</p> <p>Behaviour is outstanding. Pupils take responsibility for their own behaviour and respond with considerable maturity in their dealings with others.</p>	<p>Willow Primary School values include:</p> <ul style="list-style-type: none"> • Respecting each other • Expecting our best • Learning in a happy school <p>This school hopes to support students by enabling them to:</p> <ul style="list-style-type: none"> • Develop values and attitudes such as self-respect, curiosity, open-mindedness, justice and fairness; • Develop skills for intellectual, physical, emotional and social learning; • Acquire knowledge in a way that encourages concept formation, independent learning and self-assessment. 	Outstanding	<p>Large, multi-storey Victorian building with a large concrete playground.</p> <p>The school also has a large playing field, garden, pond, allotment area, outdoor classroom, picnic area and gardening club.</p>	128 years old. This large, Victorian building was a former children's home established in 1889.	<p>The proportion of disabled pupils and those with special educational needs pupils is well below average.</p> <p>Seven pupils at this particular school participated in the Together through Play project. One of these children was disabled.</p>

C.2 Child Participants

C.2.1 Freddie

Name of disabled child participant	School	Age at start of research	Number of siblings in family (if known)	Position in family (if known)	How long the child has been at the school (if known)	Prior educational experience	Persona (personality, temperament, etc.)
Freddie	St Amelia's RC Primary School	10 (Year 5 pupil)	One sister (infant)	Eldest	Since entry level	<p>Freddie has access to a specially adapted keyboard and a designated Teaching Assistant, for support in the classroom.</p> <p>Freddie had previously been involved in a University of Leeds-based research project concerned with the design of rehabilitative technologies.</p>	<p>Freddie enjoys learning and playing outside during break time. However, his play interests differ to those of his classmates. He has a tendency to play imaginary games such as <i>Star Wars</i> and <i>Dr. Who</i> alone in the playground. Peers of his age are, however, more interested in playing football.</p> <p>Having participated in research with the University of Leeds in the past, Freddie is interested in issues of inclusion and accessibility.</p> <p>Freddie's interests include drama and history. According to his class teachers, Freddie is caring, empathetic and understanding, however, he is becoming increasingly isolated from his classmates due to their different interests.</p> <p>Freddie gets frustrated when he is not able to do something he wants to do and occasionally, there are tensions between having a teaching assistant and his desire to work independently. Freddie has cerebral palsy.</p>

C.2.2 James

Name of disabled child participant	School	Age at start of research	Number of siblings in family (if known)	Position in family (if known)	How long the child has been at the school (if known)	Prior educational experience	Persona (personality, temperament, etc.)
James	Aspen Primary School	9 (re-sitting Year 4, which includes children aged 7-8)	Four - James has three half-sisters and one half brother	Eldest	Several years, however exact number not specified.	<p>Despite being within the age range for pupils normally entered into Year 5, James attended a number of classes scheduled for Year 4 at Aspen Primary School.</p> <p>James received additional support with numeracy and literacy through separate classes. He also received one-to-one support to help develop his fine-motor skills and assist with the social and emotional aspects of learning during out-of-class sessions.</p> <p>James has moved from school to school throughout his educational career, due to the separation of his parents.</p>	<p>James enjoys running around and playing playground games at break time. He likes Minecraft, drawing and reading. At times, James can be loud and disruptive. He needs clear rules and no ambiguity.</p> <p>James finds it difficult to respond to deadlines and complete timed activities. He dislikes writing tasks. He is sometimes forgetful, for example, forgetting to bring his PE kit into school.</p> <p>According to the Playground Supervisor, James' friends vary from day to day. At playtime, he has a tendency to engage in infighting with his peers. He sometimes has his own set of rigid rules and expects friends to understand and honour them. When they do not comply, this creates conflict.</p> <p>James is unaware of any other children at the school with physical impairments. James has dyspraxia.</p>

C.2.3 Joanna

Name of disabled child participant	School	Age at start of research	Number of siblings in family (if known)	Position in family (if known)	How long the child has been at the school (if known)	Prior educational experience	Persona (personality, temperament, etc.)
Joanna	Willow Primary School	8 (Year 4)	None - Joanna is an only child	N/A - Joanna is an only child	Since entry level	<p>Joanna attends most of the classes scheduled for Year 4 at this particular school. Joanna receives one-to-one support in the classroom and a therapist visits her at the school for out-of-class consultations twice a week.</p> <p>Joanna requires additional support in numeracy and literacy. Audio equipment is set up in the classroom to support her needs specifically and the teacher wears a microphone whilst she is in the classroom.</p>	Joanna has a preference for drawing and fashion. Increasingly, there have been tensions and infighting between Joanna and her classmates, with incidents of kicking and pushing taking place, particularly in enclosed spaces such as the cloakroom. Joanna's friendship group changes regularly as a result of this infighting. Joanna is deaf.

C.2.4 Suzie

Name of disabled child participant	School	Age at start of research	Number of siblings in family (if known)	Position in family (if known)	How long the child has been at the school (if known)	Prior educational experience	Persona (personality, temperament, etc.)
Suzie	Woodlands Primary School	7 (Year 3)	One older sister and two younger brothers	Second eldest	Suzie was new to the school during the early stages of the research. She joined the project shortly after its start.	<p>Little is known about Suzie's prior learning. As she was new to the school, teachers at Woodlands Primary were waiting for records from her previous school during the early stages of the project.</p> <p>Suzie attended all classes scheduled for Year 3 at this particular school. She received one-to-one support in her learning.</p>	As a new pupil, Suzie did not already have an established friendship group at the school. However, she was settling in well and made friends with both disabled and non-disabled children at the school. Suzie likes playing with dolls and reading. Suzie has cerebral palsy.

C.2.5 Flint

Name of disabled child participant	School	Age at start of research	Number of siblings in family (if known)	Position in family (if known)	How long the child has been at the school (if known)	Prior educational experience	Persona (personality, temperament, etc.)
Flint	Woodlands Primary School	7 (Year 3)	Two younger sisters and one younger brother	Eldest	Flint was new to the school at the start of the research.	<p>Little is known about Flint's prior learning. As Flint was a new pupil at the school, teachers were waiting for records from his previous school at the start of the research.</p> <p>Flint attended all classes scheduled for Year 3 at this particular school. A Teaching Assistant was present in the classroom at all times, to support the learning of children with additional needs. Yet Flint worked confidently in the classroom, without assistance.</p> <p>Flint attended mainstream This is a particularly lively class. A specific group of boys are very noisy and regularly got into trouble during break and lunchtimes for their being badly behaved</p>	<p>Flint has a preference for team sports such as football. He appears to enjoy learning and is very friendly and enthusiastic during lessons.</p> <p>Flint is a friendly and polite boy, however, he was observed being excluded from play in the playground. Flint has cerebral palsy.</p>

C.2.6 Rosie

Name of disabled child participant	School	Age at start of research	Number of siblings in family (if known)	Position in family (if known)	How long the child has been at the school (if known)	Prior educational experience	Persona (personality, temperament, etc.)
Rosie	Woodlands Primary School	7 (Year 3)	Two younger brothers and one younger sister	Eldest	Since entry level	<p>Rosie attended most classes scheduled for Year 3 at this particular school. She received one-to-one support in the classroom at all times.</p> <p>Rosie regularly participated in Literacy and Phonics learning activities with staff during break time. She also benefitted from visual prompts in her learning.</p> <p>Rosie had a personalised chair for use in the classroom, plus a wheelchair and a frame for walking short distances indoors.</p>	<p>Rosie is an orphan. She lives with her grandparents and younger siblings. She enjoys reading and writing stories.</p> <p>Despite being a popular child and well liked in her class, Rosie spent a limited amount of time playing with friends at lunchtime due to the inaccessible design of the playground.</p> <p>Rosie is kind and thoughtful. She is softly spoken and tires easily as she has limited mobility. Rosie has cerebral palsy.</p>

Appendix D Ground Rules

D.1 Ground Rules set at St Amelia's Catholic Primary School



D.2 Ground Rules set at Woodlands Primary School



D.3 Ground Rules set at Willow Primary School



D.4 Ground Rules set at Aspen Primary School



Appendix E Interview Resources

E.1 Semi-structured Interview Schedule Session 1

What is play?

Who can play?

Where are your favourite places to play?

What do you like about playing with other children?

Is there anything that you don't like about playing with other children?

Does anyone ever get 'left out' when children are playing?

What do you think stops some children from playing with other children?

Do you know any games that disabled and non-disabled children can play together and have fun?

Are there any games that they can't play together?

How can we make school more fun and help children to play together better?

E.2 Semi-structured Interview Schedule Session 2

What is your favourite toy or game?

What do you like about it?

Can you play with it with your friends?

Do you prefer to play with this toy or game on your own or with your friends? Why do you like playing with it on your own/with your friends?

Is anybody not able to play with your favourite toy or game?

Could your favourite toys or games be changed in any way, so that all children could play with them?

How could your favourite toys or games be made *even* better?

Which toy or game do you dislike the most?

What do you not like about it?

Look at the pictures of different toys and games. Choose the one that you would most like to play with together. Why did you choose this particular toy or game?

Are there any toys or games in the pictures that you would like to play with together, but cannot? Why could you not play with this together?

What do you think toys and games should be like in the future?

E.3 Briefing Script Design Activity 1

'As part of the *Together Through Play* project, we will be working together to design toys, games and environments to help children to play together better and to have more fun when they are at school. This means that we are designing toys and games that disabled and non-disabled children can play together with or environments in which they can play in together.

Your task today is to use the collage, model making and drawing materials to design toys games or play environments that will help all children (disabled and non-disabled) to play together better and to have more fun at school. During the session, you can also describe your ideas by talking to me. But before we make a start on our designs, we need to talk about what some of these things mean'.

E.4 Semi-structured Interview Schedule Design Activity 1

What is disability? How would you describe a disabled person?

How would you describe a non-disabled person?

What is a design?

How can we communicate or share our design ideas?

What is a toy or game?

What is an environment?

What do you think will help disabled and non-disabled children to play together better, and why?

E.5 Semi-structured Interview Schedule Design Activity 1 Extension Task

a). Imagine a day at school where all children are playing together and having fun – what games might they be playing? Where would they be playing? Use your imagination to describe what you think would be the perfect playtime at school.

b.) Design a new kind of travelling device that will help disabled and non-disabled children to move around the school together in a more fun way – it could be something to help children move faster; it could be a device that takes you to

imaginary places, it could be a futuristic vehicle or even an adventure playground.

c.) Design a doll/character or action figure for disabled and non-disabled children to play with. This could have a brand new theme or style, and it could also have lots of different accessories to help children to do different things'.

E.6 Briefing Script Design Activity 2

'Good afternoon everyone. When I last visited the school, I asked you to work as my design team, to design toys, games or environments that will help disabled and non-disabled children to play together better, and to have more fun.

During today's session, I would like you to describe your design ideas to me in detail. I would like you to explain the design of your toy/game or environment to me clearly, so that the ideas can be included in some of the prototypes and models we make at the university during the summer.

You are welcome to share any written ideas you have brought with you. You can also use pictures, photographs, models, or objects that you have brought along, to help you to describe your ideas'.

E.7 Semi-structured Interview Schedule Design Activity 2

What have you designed?

Who is it aimed at?

How many people can play with this toy/game/environment?

What would you like it to be made of?

Where would it go? How might you store it?

How does it work?

What would the rules or instructions be for play with this toy/game/environment?

Would you like to give it a name?

Is it played with in a virtual/imaginary way or do children physically play with it?

How would it help disabled and non-disabled children to play together better and to have more fun?

Could any changes be made, to make this design *even* better?

Does anyone have any questions about this design or any comments/suggestions to make?

E.8 Semi-structured Interview Schedule Evaluation Session

Which design would you most like to play with?

Which designs would help disabled and non-disabled children to play together best?

Which two ideas would you choose to be made into final prototypes?

Can any ideas be combined?

How could the designs be made even better?

Could any of these toys/games/environments be played with/in/at school?

Are there any toys/games/environments here that you would not like to play with? Why?

Would anyone be left out from playing with any of these toys/games/environments? Why?

Some children created designs that have included fighting and weapons. Do you think it is good for children to play with toys and games that include fighting? Do you think that these games help children to play together?

Which activity did you enjoy the most?

Which activity did you enjoy the least?

In the future, would you prefer to work on designs on your own, as part of a team, or with the researcher, using the resources that she has prepared?

E.9 Focus Group Discussion Transcript Samples

E.9.1 Aspen Primary School - Focus Group Discussion 1 Sample

Details:

Recording Number	Date	School	School Code	Overall time	Topic	Pupils Present	Codes of Pupils Present	Transcription Details
2 and 3	[Date] 2012	Aspen Primary School	B	29 min 58 s (Recording 2) 10 min 26 s (Recording 3)	Interview 1 - Play	James Jasper Luke	N O P	Full/ Part / None

Interview Data:

Question	Student Response	Pupil	Pupil Code	Time	Recording Number
1. What is play?	'When you just have fun and play'.	Jasper	O	00 min, 44 sec - 00, min 47 sec	2
	'Running around'.	Luke	P	01 min, 02 sec - 01 min, 04 sec	
	'I think it should be turning the whole world into Minecraft'.	James	N	01 min, 07 sec - 01 min, 12 sec	

E.9.2 St Amelia's Catholic Primary School - Focus Group Discussion 1 Sample

Details:

Recording Number	School	School Code	Overall time	Topic	Pupils Present	Codes of Pupils Present	Transcription Details
1	St Amelia's Catholic Primary School	A	35 min, 53 sec	Interview 1 - Play	Ophelia Freddie Dylan Skye	Q R S T	Full/Part/None

Interview Data:

Question	Student Response	Pupil	Pupil Code	Time
1. What is play?	'Is it supposed to be fun time for kids?'	Ophelia	Q	00 min, 47 sec – 00 min, 50 sec
	'Well, I think there's two types of play. There's game play, where you, where it's something to entertain yourself, and the next sort of play is when you use your imagination; sometimes with toys, sometimes not, and you use your imagination to sort of, er, sorry, er, so that basically, there's two types of play; imagination and game'.	Freddie	R	00 min, 57 sec – 01 min, 25 sec
	'Well like, it's fun for kids to like communicate to each other'.	Dylan	S	01min, 31 sec – 01 min 38 sec
	'Er, well, like, it's where the people, like the kids, get to have fun, like, like, when they're playing in the classroom, like, they don't get to talk a lot because they're too busy doing work, and when they're outside, they get to talk and play and shout and everything'.	Skye	T	01 min, 42 sec -02 min, 00 sec

E.9.3 Willow Primary School - Focus Group Discussion 1 Sample

Details:

Recording Number	School	School Code	Overall time	Topic	Pupils Present	Codes of Pupils Present	Transcription Details
6, 7 and 8	Willow Primary School	D	39 min, 59s (Recording 6) 08 min 44 s (Recording 7) and 22 min 52s (Recording 8)	Interview 1 - Play	Joanna Amber Israel Eve Rio Joel	H I J K L M	Full/ Part / None

Interview Data:

Question	Student Response	Pupil	Pupil Code	Time	Recording Number
1. What is play?	'Fun.'	Rio	L	00 min, 32 sec - 00 min, 33 sec	6
	'Funny.'	Joanna	H	00 min, 38 sec- 00m, 39 sec	6
	'Erm, I think, erm play is good, and nice to play it, because it's quite fun to do and stuff.'	Eve	K	00min, 41 sec - 00 min, 51 sec	6
	'Enjoyable, so you have to enjoy it because if you don't enjoy it, it's just like daft playing.'	Amber	I	00 min, 53 sec – 01 min, 00 sec	6
	'Erm, it's fun to play, because if you don't play, you'll just have a sad face and you'll never have a smile.'	Israel	J	01 min, 07 sec - 01 min, 15 sec	6

E.9.4 Woodlands Primary School - Focus Group Discussion 1 Sample

Details:

Recording Number	School	School Code	Overall time	Topic	Pupils Present	Codes of Pupils Present	Transcription Details
4	Parklands Primary School	C	26 min, 51 sec	Interview 1 - Play	Flint Rosie Joseph Tim	B C D E	Full/Part/None

Interview Data:

Question	Student Response	Pupil	Pupil Code	Time	Recording Number
1. What is play?	'Where you play together'.	Rosie	C	00 min, 39 sec - 00 min, 40 sec	4b
	Flint: 'Play fighting'. Researcher: 'So you think it's play fighting'? Flint: 'You could do that.'	Flint	B	00 min, 45 sec - 00 min, 48 sec	
	"Erm, don't play fight, but, 'erm, don't mess about and fight, but you can play arm wrestling'.	Tim	E	00 min, 57 sec – 01 min, 06 sec	
	'Play football'.	Joseph	D	01 min, 09 sec – 01 min, 10 sec	

E.10 Debriefing Questions for Undergraduate Students

1. Did you know much about physical impairment and inclusive design before embarking on the project?
2. What did you learn whilst working on the project?
3. What was the most challenging thing about the project?
4. Did you enjoy working as a team?
5. When refining designs and discarding some of your initial ideas, what were the key influences on your decision making process?
6. Did you find that you became emotionally attached to any of the designs or child personas, or did you find yourself having a bias towards any particular ideas?
7. Was it helpful to have access to real users during the product development process or would you have preferred to have based your work on hypothetical personas?
8. Did it help to have a schedule laid out which took into account your deadlines for assessment as well as the needs of the participating Primary Schools, or would you have preferred to have managed your time differently?
9. Do you think it is possible to design fully inclusive toys and games for children?
10. Do you think that one product can accommodate all children's physical needs in the play setting or do you think that more bespoke products aimed at individual needs would facilitate more inclusive play between disabled and non-disabled children?
11. Would you have liked more time to explore some of the issues surrounding disability before embarking on the design process?
12. Do you think there is a place for disability studies in design education?
13. Do you think that product design and engineering courses place enough emphasis on inclusive design at the moment?
14. How do you think designers might be encouraged to promote more inclusive play between disabled and non-disabled children through their work in the future?
15. If you could start your projects again, what would you have done differently? Would you have liked any additional support to help you through the design process, i.e. additional equipment; a larger team; more time; training; access to a particular area of expertise; etc.?

E.11 Questions for Children's Evaluation Sessions (Developed by Undergraduate Students)

3D Stack Questions:

- Natural feedback responses of the kids?
- Which were better - grip or non-grip pieces?
- Are the boards and pieces a good size? Bigger/smaller?
- Any name suggestions?
- General suggestions to improve on games?

Jump On Questions:

- Any name suggestions?
- Any game ideas?

Battle Ball Questions:

- Hand out kids' battle ball templates so they can draw their personalised *Battle Ball* designs.
- How did they use it? Easy to use? Would they benefit from a handle?

Escape the Castle Questions:

- General feedback?
- Were the questions of an adequate difficulty?

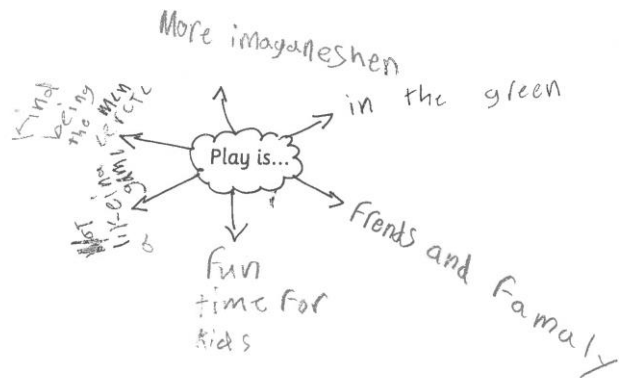
Puzzled Questions:

- Which pictures/themes for the buttons would the kids like?
- Which noises would the kids like for the sound buttons (i.e. monsters, farmyard animals, etc.)?

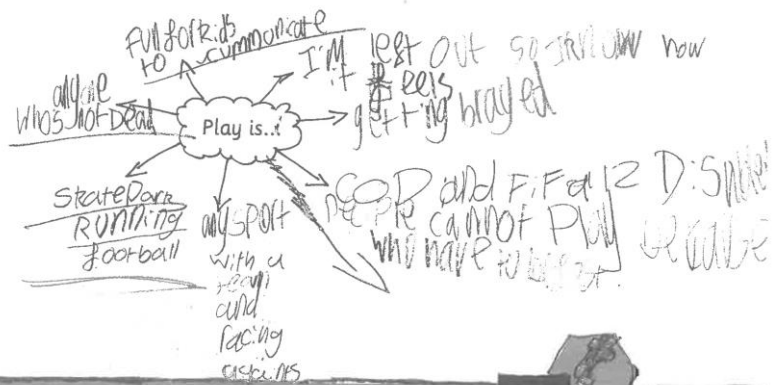
Trash Heap Transformational Challenge Questions:

- General feedback?

F.1.3 Ophelia's Mind Map



F.1.4 Dylan's Mind Map

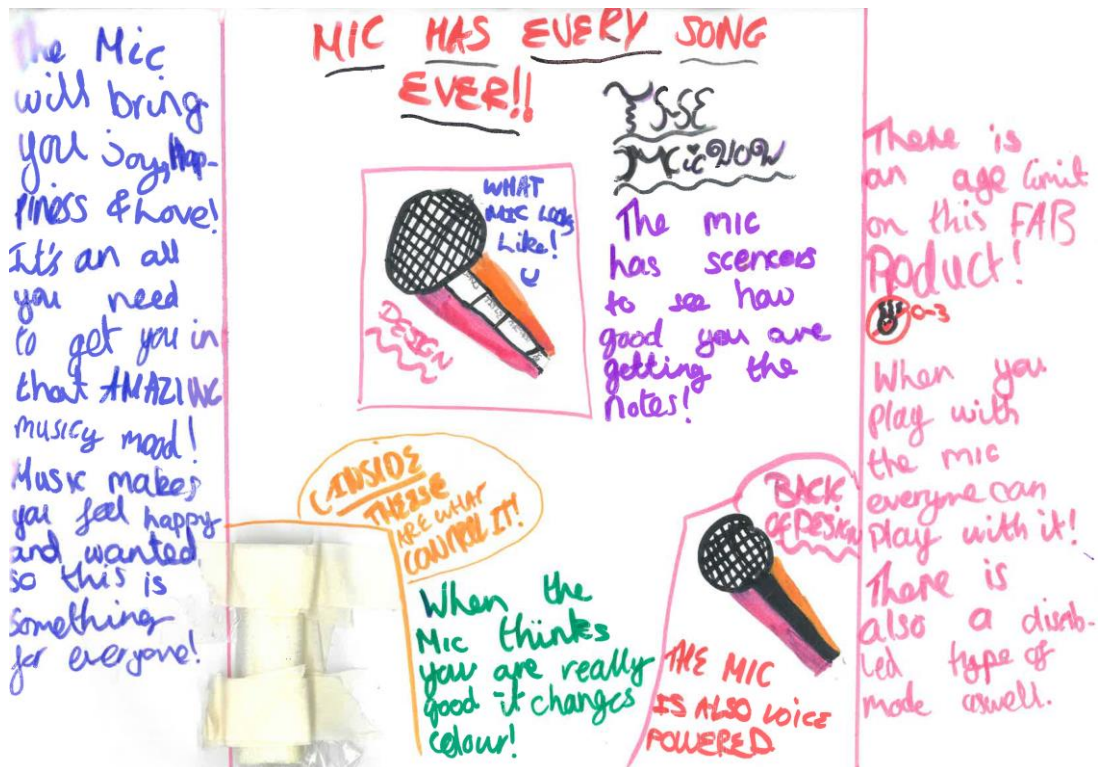


F.2 Children's Illustrations

F.2.1 Tim's Mind Map Illustration



F.2.2 Dawn and Holly's Mic Wow Specification Sheet



Appendix G

Undergraduate Student Design Concepts and Prototypes

Based on the children's ideas, six initial game concepts were developed by the team of undergraduate students at the University of Leeds. Initial ideas realised as low-fidelity prototypes included *Stackamo*; *Jump On*; *Battle Balls*; *Escape the Castle*; the *Trash Heap Transformational Challenge* and *Puzzled*. Each of these games shall be discussed in detail in this section. Based on the children's feedback during the evaluation sessions, along with guidance offered in the Endicott et al. (2009) guidelines and the Universal Design Guidelines, the undergraduate students further developed four of these games as high-fidelity prototypes. These included *3D Stack*, a further iteration of *Stackamo*; *Battle Balls*; *The Fort of Doom*, a further iteration of *Escape the Castle* and *Crazy Crows*, a further iteration of *Puzzled*. Each of these games shall be discussed in detail in this section.

G.1 Stackamo/3D Stack

Stackamo/3D Stack involved two teams of 1-2 players building a tower from randomly shaped blocks. The aim of the game was for each team to take turns to build the highest tower possible. This was a 'race against the clock type game' with an electronic timer and accompanying music designed to encourage co-operation between disabled and non-disabled young people.



G.2 Jump On

Jump On was a 1-3 player adventure themed videogame, operated by pressing buttons on a mat. The aim of the game was for children to work together to help steer a boat downstream in the game by moving around the mat and pressing buttons to shift/steer and navigate the boat.



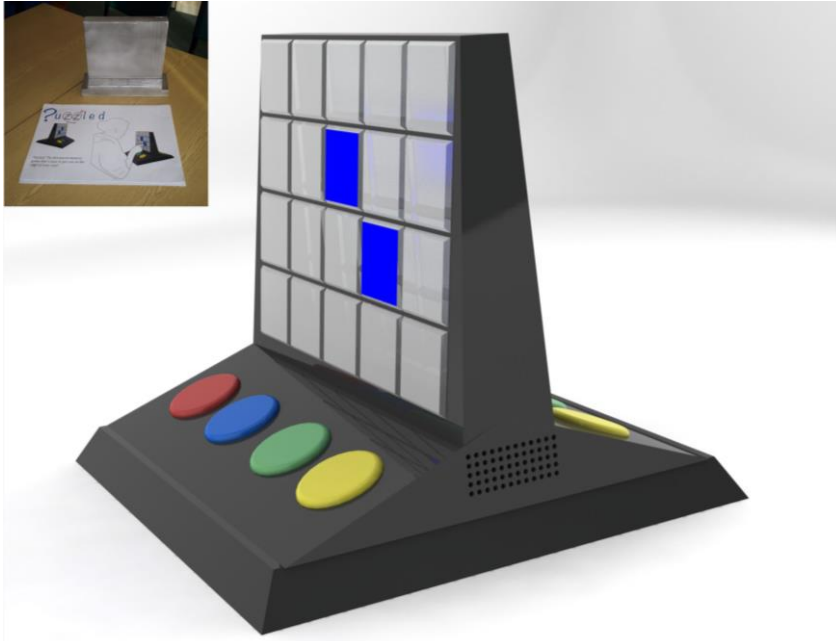
G.3 The Trash Heap Transformational Challenge

The *Trash Heap Transformational Challenge* was an 'upcycling' invention-type team game, through which teams of 2-4 players would work together to produce the best invention from a selection of scrap materials, fulfilling the brief set on their given 'task card'. The aim was for the whole group then to vote for the best designs.



G.6 Puzzled

Puzzled, a 2-player memory game, involved one player pressing out a sequence of buttons, causing lights to flash on the other player's side of the board, and the other player imitating the opposing team's sequence, within a given time limit.



G.7 Crazy Crows

Crazy Crows was a further iteration of *Puzzled*. The high-fidelity version of this game was based on the idea of crows raiding a cabbage patch. In order to make this concept more visually appealing, it was implemented as a computer game using National Instruments' LabVIEW™ on a tablet computer, with a physical dividing screen to separate the two halves.



G.8 Button Bash

Button Bash was a further iteration of *Jump On*. This high-fidelity prototype was the only concept to be significantly modified due to feedback on the low fidelity prototype. The mat concept was discarded in favour of the use of tactile switches and the use of National Instruments' LabVIEW™. The game shifted from the concept of steering, to a game closer to *Wackamole*. This involved each player pressing their button when the relevant colour of alien popped up. Each player was given a score and the team accumulated a score as a whole.



G.9 Fort of Doom

The *Fort of Doom* was a further iteration of *Escape the Castle*. This game was renamed at the children's suggestion. The board was made more "scary" and it was made clearer that players would be heading towards the exit. Its design was also amended to be double-sided, to give the children a choice between structured play, through which they follow set questions and directions, and free play, through which they engage in freely chosen play that is personally directed, with no external goal or reward (Hughes, 1982).



G.10 Design Templates Developed by the Students

In order to give the child participants the opportunity to develop their own *Battle Ball* character designs, the undergraduate students produced a template for the children to complete during the evaluation sessions. They also produced a set of exemplars, for the children's reference.

