THE UNIVERSITY *of* EDINBURGH

Creativity for Children:

Assessing Children's Creativity in Play and Design Recommendations for Educational Outdoor Environments to Enhance Children's Creativity

Reyhaneh Mozaffar

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Declaration

I hereby declare that this thesis has been composed solely by myself. The following thesis is entirely my own original work and this thesis has not been submitted for any other degree or qualification.

Abstract

This research studied children's educational outdoor environments in order to understand which contexts and environmental characteristics support children's creativity in play. Creativity is an important factor in children's cognitive development; children's creativity can flourish in outdoor environments as they can engage in free play. Accordingly, this research had two central aims:

Aim 1: To classify and assess children's levels of creativity during play.

Aim 2: To develop design principles for educational outdoor environments in order to nurture children's creativity in play.

Initially, behaviour observation and the Leuven Wellbeing and Involvement Scale were used to collect data for a pilot study. Children's play behaviours were observed and analysed, and based on the Evaluation of Potential for Creativity, the Creative Play Taxonomy was designed in relation to the first aim of the study.

Then, at two study sites, experimental research was designed. At both study sites, children were observed in four different play contexts. At Study Site One, duration recording was used and the videorecorder observations were coded with the Creative Play Taxonomy using the software The Observer from Noldus. At Study Site Two, narrative recording was used in the observation sessions and focus group discussions were held with the children. The findings from both study sites achieved the second aim of this study.

The current research makes two main contributions to knowledge. Firstly, it introduces the Creative Play Taxonomy, which can be used by researchers, psychologists, educationalists and related disciplines to understand, categorise and assess children's creativity in play.

Secondly, it increases the understanding of the particular play contexts that support children's creativity in play, and the environmental characteristics that enhance these types of play. Accordingly, this research suggests that:

- Outdoor play spaces should include a variety of different play contexts to encourage creative play amongst different groups of children.
- The most effective play contexts for children's creativity are those facilitated with flexible, changeable, mouldable, movable, multi-functional and open-ended play materials.
- Children's outdoor play spaces should be facilitated with loose parts, both natural and synthetic, as they are highly supportive of children's creativity.
- Natural outdoor environments and elements highly encourage creative play behaviours amongst children.

The findings are intended to guide landscape architects and playground design professionals to produce informed design decisions based on the framework of creativity, in order to nurture children's creative thinking abilities.

To my most loving mum who nurtures me with her pure emotions

And to my kindest dad who supports me in every stage of life

And to my dearest Shahab, who is always my best friend

And to my beloved Mohammad, who is the passion of my life.

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who always makes me smile. Honestly, life wouldn't have been so exciting without you here.

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Mohammad, my son, my true passion to live and my happiness of life, I love you to the moon and back. I thank you for being such a good little boy when your mummy had to spend less time playing with you as she was giving the final touches to her thesis. You are my bright star. I hope you can benefit from the findings of this research along all the other beautiful children in this world. You are your mummy's world.

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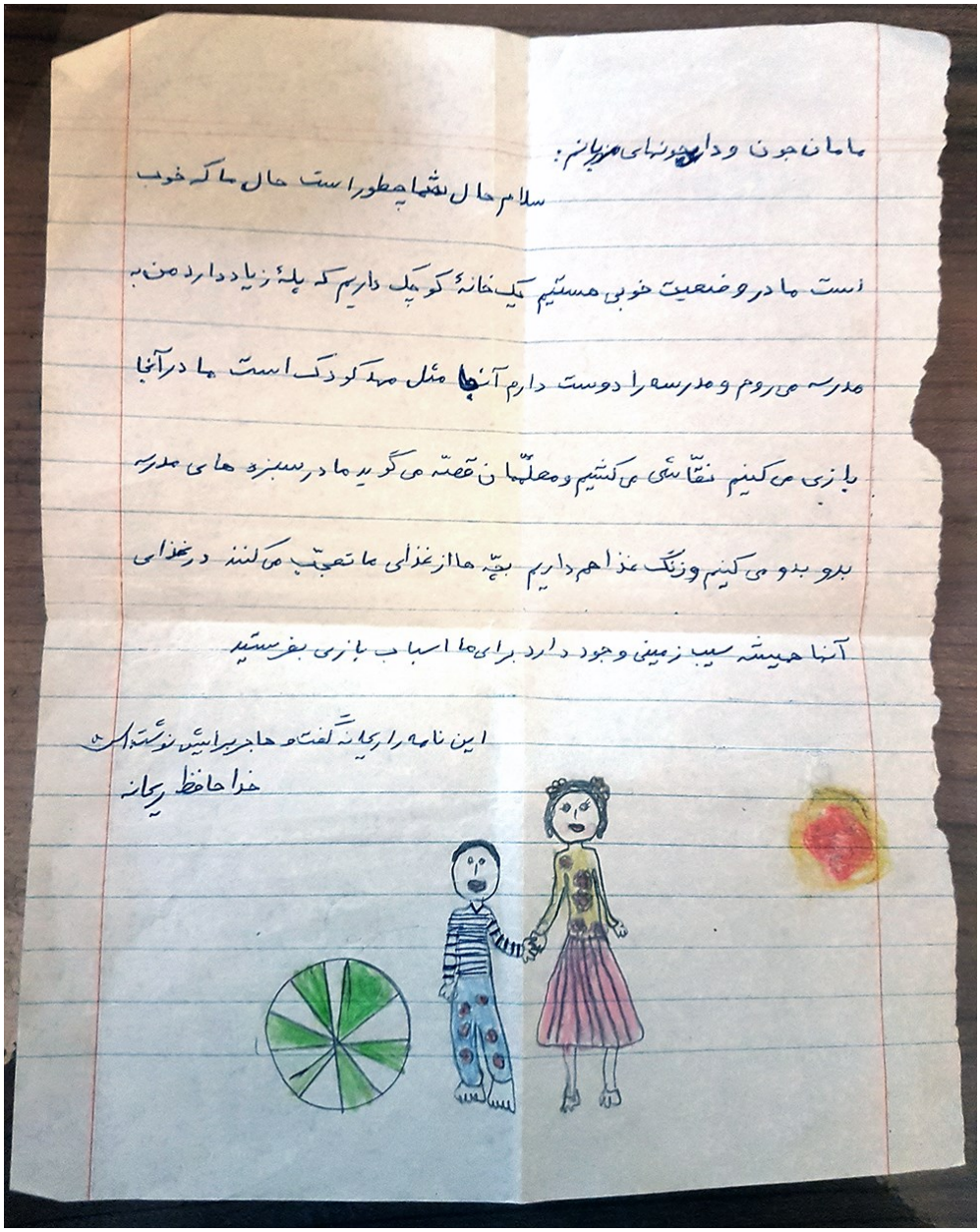


مامان جون و داداشهای مهربانم:

سلام حال شما چطور است حال ما که خوب

است ما در وضعیت خوبی هستیم یک خانهٔ کوچک داریم که پلهٔ زیاد دارد من به

مدرسه می‌روم و مدرسه را دوست دارم آنجا مثل مهد کودک است ما در آنجا

بازی می‌کنیم نقاشی می‌کشیم و معلّمان قصّه می‌گویند ما در سبزه های مدرسه

بدو بدو می‌کنیم و زنگ غذا هم داریم بچّه ها از غذای ما تعجب می‌کنند در غذای

آنها همیشه سیب زمینی وجود دارد برای ما اسباب بازی بفرستید

این نامه را ریحانه گفته و هاجر برایش نوشته است

خدا حافظ ریحانه

"Dear Grandma and my kind uncles,

Hello, how are you? We are all well. We are in a good situation. We have a small house with lots of stairs. I go to school and I love school. It's like a nursery. We play there, make drawings and our teachers tells stories. We run around the grasses in the school and we have lunchtime as well. Other children are surprised with our food. They have potatoes in all of their dishes. Please send us toys.

Reyhaneh said this letter and Hajar wrote it for her

Goodbye, Reyhaneh."

CHAPTER 1 INTRODUCTION

1.1 Prologue

UNICEF (2001) states: “The early years from conception through birth to eight years of age are critical to the complete and healthy cognitive, emotional and physical growth of children” (p.2). In these early years of life, unstructured outdoor play should be encouraged as it has many health and wellbeing benefits amongst children. Research has shown the effects of free play on children’s emotional wellbeing, which result in less depression, aggression and anxiety. Even amongst adults, physical activity can have similar affects (O'Neal, Dunn et al. 2000, Dunn, Trivedi et al. 2001). Outdoor play can encourage problem-solving and decision-making and foster creative thinking abilities, as it is less structured so it can provide more variety of opportunities compared to indoor settings (Burdette and Whitaker 2005). Outdoor settings are known to encourage curiosity and imaginative thinking in children (Moore and Wong 1997, Pica 1997). Creativity is essential in many domains of today’s life, on both individual and social levels (Sternberg and Lubart 1996). Nowadays, it is not only needed for the arts, but in various fields such as economics, business, science etc. In fact, creativity can lead to novel movements in arts, scientific inventions and social programmes (Sternberg and Lubart 1996, Robinson 2001).

Human creativity is highly dependent on the individual’s childhood (Krippner 1999) and “play” fosters children’s creative thinking abilities (Russ 1996, Oncu 2015). Physical environments can play an important role in promoting creativity (McKellar 1957, Amabile 1988, Sternberg and Lubart 1996, Stokols, Clitheroe et al. 2002, Simonton 2003, Lubart, Zenasni et al. 2013, Berlin, Tavani et al. 2016, Kandler, Riemann et al. 2016).

On the one hand, one of the most important things that children do is to spend long hours of their day learning in school (Mozaffar 2012). This is the most important and effective time for cognitive development, education and learning. The school environment is known to influence children’s creativity (Clifford and Chou 1991).

On the other hand, play is also highly influential on human cognitive development (Piaget 1962, Vygotsky 1978, Moore 1986, Titman 1994, Lansdown 1996, Moore and Wong 1997, Kopp 2010, Mayesky 2014). Alfred Ledermann (1968) stated: "The consequences of insufficient possibilities for active and creative play clearly show results such as: poor imagination, nervousness, and irritability of children, waste of spare time, and craving for entertainment, aggressiveness and rowdies of many teenagers". Of course, other issues such as inadequate nurturing methods and unhappy family conditions can also cause these bad behaviours, but a correctly designed environment can minimise these issues by providing a sufficient setting for children to express their emotions; thus, less bad behaviour and more creative behaviour will occur (Ledermann and Trachsel 1968).

This research aimed to investigate the potential association between children's educational outdoor environmental design and their creative play behaviours. Another aim was to develop design principles that could be considered by school outdoor designers in order to promote children's creativity as an essential cognitive development factor.

1.2 Definition of the Problem

Research has shown that children's access to outdoor play has reduced over time (Moore 1986, Hillman and Adams 1992). More researchers are concerned about the fact that children are spending less time in outdoor settings and that their free time is increasingly occupied with predetermined games (Louv 1992, Nabhan and Trimble 1995). Moore (1997) listed several reasons why children now have less access to outdoor play:

- Lack of Play Space: since urban lands are becoming more expensive and there is more building construction on vacant lands, there is less focus on using sites for public resources such as parks and recreation spaces.
- Children's Playtime Restrictions: children's free time has become very limited due to tight school time structures, and they have little time left for free play, especially outdoor play.
- Family Relationship Changes: the growth of single-parent families, as well as families where both parents work outside the house, has influenced children's

play behaviours. In these families, parents have less time to take their children outside for play.

- Air Conditioning: in countries that have hot summers, the growth of air conditioning facilities indoors has encouraged children to stay inside, which results in less outdoor free play.
- Commercialisation of Play: due to changes in family relations and the belief that there is a lack of safety in outdoor play spaces, many indoor play centres have developed, offering scheduled activities for children.
- Electronic Media: children spend increasing amounts of time watching television or playing on computers, known as the "socially toxic environment" (Garbarino 1995).

The last parameter has been of even more concern in recent years. In fact, the growth of availability of computer games, television channels and the internet induces children to spend a large amount of their time in front of screens, with little time left for outdoor play (Rideout, Vandewater et al. 2003, Sturm, Bekker et al. 2008). One study, conducted between 1981 and 1997, showed that as time went on, children spent 25% less time in free outdoor play, instead choosing structured and sedentary activities such as computer games (Owens and Hofferth 2001).

1.2.1 Importance of Play

Tina Bruce (1999) argued, “It is becoming increasingly clear through research on the brain as well as in other areas of study, that childhood needs play. Play acts as a forward feed mechanism into courageous, creative, rigorous thinking in adulthood.” (Bruce 1999, p.40).

The Association for Childhood Education International (ACEI) has argued that children of all ages need to play, especially now that they are forced to make progress in every arena (Isenberg and Quisenberry 2002). In other words, children are under adult pressure to learn different skills and gain knowledge in various fields. In such a dense environment, having time to engage in free play becomes very important for children’s development (Isenberg and Quisenberry 2002). Isenberg and Quisenberry (2002) believe that a good environment that supports children’s basic development

will result in a more successful adulthood and next generation. Even the sort of play that only involves physical activities is important (McCune and Zanes 2001).

UNICEF states that brain development is most rapid in early childhood (UNICEF 2001). Research in brain studies and neuroscience also supports the positive effects of play on brain development (Lester and Russell 2008, Cole-Hamilton 2012).

Many childhood psychologists and researchers believe that play is essential to children's physical growth, social development, emotional wellbeing and cognitive development (Piaget 1962, Vygotsky 1978, Titman 1994, Burdette and Whitaker 2005, Ginsburg 2007, Kopp 2010, Wilson 2012, Mayesky 2014).

Physically, they will develop gross and motor skills, and will assess and expand their physical abilities and build self-esteem. Socially, they learn to make friends with others, cooperate, share, negotiate, manage risks, lead and stand up for themselves. Emotionally, they experience happiness, achievement, pleasure, joy and a positive sense of self, coping with stress, anxieties, phobias and living in a challenging world. Cognitively, children develop their creativity, logic and problem-solving abilities through play. These aspects all result in further academic achievement (Lester and Russell 2008, Beunderman 2010, Gleave 2012, Wilson 2012).

1.2.2 Importance of Creativity

Creativity is an essential driving force for encouraging success and civilisation amongst human beings (Kandler, Riemann et al. 2016). The majority of today's wealth is built upon creative people's inventions and creative ideas throughout history (Runco 2004). Creativity is a key feature in individuals' performance, personal development and academic success (Kim and Zabelina 2011, Besançon, Lubart et al. 2013). It is a crucial feature in today's society as individuals face new issues and need to come up with original ideas to solve them(Lubart and Sternberg 1995, Amabile 1996a, 1996b). A survey of 1541 CEOs in 60 countries found that the top most important characteristic for managers is creativity (Berman and Korsten 2010). Another survey of 4000 teachers and parents in different countries found that creativity is a highly appreciated goal in education (Lubart, Zenasni et al. 2013).

Regarding the importance of creativity in the Scottish context, Frank McAveety, the Scottish Minister for Tourism, Culture and Sport, stated on the Scottish Executive website in an article published in April 2004:

> "The creativity of Scots – from the classroom to the boardroom – is the edge we need in a competitive world. Our duty as an Executive is to create the conditions that allow that creativity to flourish – whether in arts, sciences, commerce or industry. […] Creativity is as valuable in retail, education, health, Government and business as in culture. The cultural sector should become the national dynamo of the creative impulse that can serve all these areas." (Executive 2004)

This was what persuaded James Boyle to establish a creative strategy for Scotland in June 2004, which eventually led to Creative Scotland (Executive 2006).

1.2.3 Research Background

There have been some attempts to improve children's outdoor environments and school playgrounds. Some studies on playgrounds have focused on the role of these spaces for physical activity in tackling obesity issues. Nilda Cosco (2006, 2007) focused her PhD topic on ways of improving preschool playground design in order to support preschool children's daily activity and hence prevent obesity and sedentary lifestyle problems. Another study found that certain environmental factors and design features were associated with higher levels of park-based physical activity among children (Floyd, Bocarro et al. 2011). Further research has shown the positive impact of multicolour school playground markings on children's physical activities (Stratton 2005, Ridgers, Stratton et al. 2007).

Other studies have also focused on playground design's effect on children's behaviour. One compared children's bullying behaviour between playground and classroom settings (Craig, Pepler et al. 2000). Kelly (1994) argued that playgrounds were one of the most important environments for children's social learning experiences. She believed that a playground that did not provide sufficient play opportunities for different children would result in racist and sexist behaviours. Another study, by Marques et al. (2001), argued that school playgrounds are one of children's important

life spaces and studied the influence of various playground settings on children's aggressive behaviour.

Some studies have focused on safety issues in relation to playgrounds. For instance, one study investigated how various parameters such as the height of play equipment resulted in more injuries while children were playing (Macarthur, Hu et al. 2000). Another study focused on various surface materials in playgrounds and argued that tarmac playgrounds were most likely to cause injuries compared to bark and rubberised playground surfaces (Mott, Rolfe et al. 1997).

Some other studies have gone further and considered children's leisure desires in school playground design. Ward Thompson (1995, 2000) used a projective technique to understand pupils' desires and needs in developing their school playground. She found a considerable difference between pupils' and teachers' aspirations and between what girls and boys wanted.

Despite the importance of creativity, little attention has been paid to improving outdoor play settings in order to allow it to flourish. Aspects related to children's creativity are usually dealt with by psychologists and educationists, and knowledge of the way physical environment can influence children's creativity is still narrow.

In relation to creativity aspects of playgrounds, a study by Susa and Benedict (1994) investigated the influence of two types of playground design – traditional and contemporary – on creativity. In this study, creativity was defined as divergent thinking, which is the cognitive ability to produce a large number of ideas. The authors then referred to pretend play as a measure of children's creativity. In this research, a playground where children engaged in more pretend play compared to other playgrounds was considered to be suitable for nurturing creativity. Susa and Benedict (1994) also asked children to come up with different ideas for playing with a rope in order to measure the divergent thinking abilities in each playground. Although that study aimed to assess creativity in children's outdoor play, it only focused on one dimension of creativity, divergent thinking abilities. Also, judging children's creativity by the amount of pretend play does not cover all aspects of creative behaviour, as a child may be acting creatively but not engaged in pretend play.

Despite the importance of children's play and creativity, many researchers believe there is still a lack of attention paid to designing suitable play spaces for children. Some believe designing play spaces for children does not carry high enough prestige, and thus there is a lack of professional competence in the field (Hendricks 2011). Another reason is that children do not have political power, so designing high quality spaces for their play is not prioritised (Hendricks 2011). Others believe that many playground providers' priorities are to minimise capital costs, reduce the risk of liability and reduce the costs of maintenance (Gill 2006), thus there is not enough focus on designing spaces that support children's real needs. Woolley (2008) also points to some issues such as concerns about funding for renovating play spaces, maintaining differently designed play spaces, adults' and parents' attitudes to specific designs, playground designers and providers and issues related to vandalism.

There are four parameters required to support a child in engaging in play (Senda 1992). These include time of play, playmates, what the child engages in during play and location of play (Senda 1992, Oncu and Unluer 2010). While children's play, as well as their creativity, is important, and the influence that children's play can have on their creativity has been proven in research, there has been a lack of attention paid to the particular play settings that can encourage creativity in play. As per Nicholson (1972), who developed the theory of loose parts: "In any environment, both the degree of inventiveness and creativity, and the possibility of discovery, are directly proportional to the number and kind of variables in it" (p.6). Thus, this research focuses on "the location of play" and how that location can support creative play behaviours as children are engaged in play.

Nurseries and schools are places where children can be provided with access to outdoor settings during their break times in order to play. Therefore, this research focuses on the way these settings should be designed to encourage children to engage in creative play. Accordingly, the following research questions were raised:

1.3 Central Questions and Aims

This research had two central questions, designed to address two central aims, which were:

Question 1: How can children's creative play behaviours be categorised and measured?

Aim 1: To classify and assess children's levels of creativity during play.

Question 2: What are the principles of designing children's educational outdoor spaces in order to nurture their creative play behaviours?

Aim 2: To develop design principles for educational outdoor environments in order to nurture children's creative play.

The present study is an attempt to understand the role of educational outdoor environmental design in relation to children's levels of creativity. The findings are intended to guide landscape architects, children's educationalists and playground design professionals to produce informed design decisions based on a framework of creativity, in order to nurture children's creative thinking abilities and influence school policy.

1.4 Study Sites' Description

1.4.1 Study Site One Play Contexts

Study Site One was Bilston Nursery in Loanhead, Scotland, where the pilot study was also undertaken. The children were provided with four outdoor play contexts. Three of the contexts were modified by changing the play elements in their regular nursery playground, while the fourth context was a woodland within walking distance from the nursery.

1.4.1.1 *The Fixed Manufactured Play Context*

The Fixed Manufactured Play Context was the nursery's current playground, which is a rectangular space approximately 16 metres long by five metres wide and has access from the back of the nursery via a pathway. It includes a fixed climbing frame in the centre with artificial grass on the ground underneath. The rest of the area is covered with tarmac. Two sides of the playground are wire-fenced, with the other two sides attached to the building. The building has two windows with wide window sills and a door that is always locked.

Figure 1-1: An Overview of the Nursery's Outdoor Setting

The fixed timber climbing frame had three climbing routes from the starting point: a ladder, a net and a slope with a diagonal rope. The climbing frame had two stages, each approximately one metre square, which were connected to each other with a flexible timber and rope bridge. The bridge had ropes for protection and handholds on both sides. The second stage had timber walls on two sides, with one featuring a convex circle Plexiglas window. The climbing frame ended with a slide.

Figure 1-2: Timber Climbing Frame

The play space had a hexagon-shaped sandpit as well, but on this occasion no toys were provided in this area. The play space also included several plant boxes with flowers growing in them. Although the play context included several other elements, for ease of reference, in this thesis, this play context will be known as “the Fixed Manufactured Play Context".

1.4.1.2 *The Loose Manufactured Play Context*

The Loose Manufactured Play Context was in the same play area that featured the climbing frame; however, play was further facilitated by manufactured playing equipment. The play equipment consisted of: different types of bikes and toy cars; balls; sticky balls and a target sheet; musical instruments such as mini maracas, mini tambourines, a xylophone and drums; bucket stilts; toy telephones and cars; dolls with a buggy; a barbecue and picnic set including plates, cups and toy food; and a sandpit with buckets, spades and rakes. In this thesis, this play context will be referred to as “the Loose Manufactured Play Context”.

Figure 1-3: Loose Manufactured Play Context

1.4.1.3 ***The Loose Parts Play Context***

The Loose Parts Play Context was also in the same play area as the fixed climbing frame; however, play was facilitated by junk elements and loose materials. These consisted of: plastic boxes; tyres; wooden slabs; wooden bricks; some cloth and carpet pieces; timber logs; a bucket full of small, different shaped pieces of wood; pipes; tubes; chalk; some vertically cut tubes with stands and a few balls; and a sandpit with buckets, spades and rakes. In this thesis, this play context will be referred to as “the Loose Parts Play Context”.

Figure 1-4: Loose Parts Play Context

1.4.1.4 ***The Natural Play Context***

The Natural Play Context was in woodland within walking distance from the nursery. Passing through a narrow path into the woodland, a wider area was reached with trees all around it. The centre of the area was narrow with some logs inside. A large log was laid on one side of the space. Another part of the ground had a mound. There were some clear paths in the area with low density woodland plantation where it was easy to walk through. The nursery teacher had undergone a forest kindergarten programme,

and so, based on her experience, some natural and supportive elements were brought to the woodland to facilitate children's nature play. These elements included items such as water, clay, bowls and brushes, spades, rakes, magnifying glasses and string. In this thesis, this context will be referred to as "the Natural Play Context".

Figure 1-5: Natural Play Context

1.4.2 Study Site Two Play Contexts

Study Site Two was Prestonfield Primary School in Edinburgh, Scotland. Prestonfield Primary School was a large school with nearly 200 students at the time of data collection.

Figure 1-6: Prestonfield Primary School from Above

Prestonfield Primary School has three wide tarmac spaces on three sides of its building. The tarmac space to the north of the building is the main play area for Primary Three to Primary Seven children, and the space on the west side of the building is for Primary One and Primary Two children. Although these are the main play areas for the children, the school also benefits from other outdoor spaces such as a wildlife garden, grassy hill area and a central garden at the centre of the school building[1].

Figure 1-7: Four Different Play Contexts in Prestonfield Primary School

[1] https://prestonfieldprimary.wordpress.com/about/

1.4.2.1 *The Tarmac Playground*

Figure 1-8: An Overview of the Tarmac Playground

The first area used in this study site is marked "1" on the satellite view in Figure 1-7. It was a part of the tarmac playground space with a rectangular shape approximately 55 metres wide and 35 metres long. In this area, children had access to football goals and a ball in addition to a basketball net. They could also use a box of manufactured play equipment that included ropes, hula hoops, Frisbees, bouncy balls, cones, strings and other similar play equipment.

1.4.2.2 *The Grassy Hill*

Figure 1-9: The Grassy Hill

The second area used for the observation sessions and discussed in the focus groups is marked "2" on the satellite view in Figure 1-7. This was a sloping hill on the left side of the tarmac play area covered in grass. On the top of the hill, there was a small rectangular stage made with tarmac. This space was not facilitated with any play

equipment in order to see what the children would actually do without any other items; however, around halfway through the observation the children were making excuses to leave, asking to bring some of the play equipment out, and so they were provided with hula hoops and Frisbees.

1.4.2.3 ***The Wildlife Garden (Woodland)***

Figure 1-10: Wildlife Garden

As shown by the satellite view in Figure 1-7, marked with "3", at the far end of the outdoor play space, the school had a wildlife garden, very similar to the play context in the woodland area near Study Site One. The wildlife garden was enclosed with fencing, with a single door leading to the tarmac playground. The space had several large and small trees that created a lot of shade, various bushes and some tree trunks on the ground. On one side of the garden, there were some logs that the children could move around. The ground was covered in fallen leaves.

1.4.2.4 *The Central Garden (Outdoor Classroom)*

Figure 1-11: The Outdoor Classroom

The fourth setting used for observation sessions and discussed in the focus groups was the central garden, which was mainly used as an outdoor classroom and not a space for playtime. This area which is marked with "4" in Figure 1-7, was located in the centre of the school building. This was a designed space facilitated by natural elements such as various ornamental and fruit trees, grass-covered areas and a statue of a mother holding her child in the air, which also functioned as a fountain. There were paths that linked the four sides of the space to each other, joining at the fountain. Also, there were willow plants that formed tunnels and small dens on one side of the space, and wooden stages on the opposite side with a tree trunk dug into the ground around the stages, which were of various heights. In the other angle, there were some planting boxes filled with soil, which were mainly used to plant seeds and vegetables. Also, there was a pool in one corner covered with a fence, filled with water that was not clean. There were also several benches placed near the pool. Various plantations and bushes were designed around the paths and the fountain.

Figure 1-12: Different Parts of the Central Garden

1.5 Thesis Structure

Chapter One pointed to the importance of children's play and creativity. It then presented some of the playground examples and research done by others in relation to children's play environments, which showed that there has not been sufficient research into children's creativity in play. Accordingly, it presented the central questions and aims of this research. Finally, it introduced the two Study Sites which were chosen for this research based on the research questions and aims.

Chapter Two focuses on the available literature in relation to the topic of this research. The literature is divided into three main fields. The first part focuses on play and outdoor play environments, which is the main topic of this research. The second and third part focus on two different fields that influence the design of the outdoor play environments related to this research: children's educational methods and creativity.

Chapter Three outlines the detailed research questions and aims. It then presents the research design and methods: first, the theoretical framework of this research; second,

the deductive and inductive approaches to the research; third, the qualitative and quantitative methods used as strategies for this research; and finally, the experimental study as the research design.

The chapter then presents the site selection and the ethical considerations of the research. The data collection methods used in this research are then explained in detail, and the data collection process is introduced. Finally, it presents the data analysis methods of the research.

Chapter Four focuses on the development of the Creative Play Taxonomy, which was the first contribution of this study. It starts by describing the Evaluation of Potential for Creativity as the theoretical framework, and then presents its pros and cons in relation to this research. It then presents the different development stages of the Creative Play Taxonomy and finally describes the final version of the taxonomy. It also presents the reliability test that was carried out for the developed taxonomy.

Chapter Five presents the data gathering process. It introduces the Pilot Study, Study Site One and Study Site Two with the different play contexts that have been studied in each of the sites. The implementation of the main data collection process is also described in detail.

Chapter Six presents all the findings of the research. This includes the data gathered via observation and the Leuven Wellbeing and Involvement Scales in the Pilot Study, the data gathered through observation at Study Site One, and the data collected at Study Site Two via observation and focus group discussions.

Chapter Seven draws on the discussions of the research. It answers the research questions by referring to the findings of the study and the literature in the field. It then presents the limitations of the research as well as future opportunities for research. Finally, it presents conclusions in the form of the two main contributions of this study.

CHAPTER 2 LITERATURE REVIEW

This study has drawn on the available literature in relation to the research topic in order to understand the best way to approach the research questions. As one of the research questions was "What are the principles of designing children's educational outdoor spaces in order to nurture their creative play behaviours?", the literature initially focused on the topic of outdoor playgrounds and children's play. This also helped to gain an understanding of the various play and playground types in which children could engage. Accordingly, two main aspects were identified as influencing the design of such play spaces, which formed the second and third fields of literature:

- One of the most important places for children, given that they spend long hours of their day learning, is school (Mozaffar 2012). This is the most important and effective time for cognitive development, education and learning. The school environment is known to influence children's creativity (Clifford and Chou 1991). Due to the importance the early years of life have for cognitive development (UNICEF 2001) and the fact that children spend long hours in educational spaces, educational outdoor spaces were chosen for this research. Accordingly, children's various educational methods were the second field studied. This was to ascertain which parameters needed to be taken into account when developing design principles for these settings. It also helped to gain an understanding of the way the available educational methods explain the importance and design of these settings.
- As this research aimed to find design principles for playgrounds that could nurture creativity in play, the topic of creativity was the third field studied. This helped with understanding the theories in relation to the topic and choosing a comprehensive definition and parameters. It was also essential to study the measurement tools of creativity, as this answered the research question, "How can children's creative play behaviours be categorised and measured?" The literature on different genders' creativity was also studied.

2.1 2.1 Play and Outdoor Play Environments

2.1.1 Definition of Play

The National Voluntary Council for Children's Play defined play as:

> "[…] a generic term for a variety of activities, which are satisfying to the child, creative for the child and freely chosen by the child. The activities may involve equipment or they may not, be boisterous and energetic or quiet and contemplative, be done with other people or on one's own, have an end product or not, be light hearted or very serious" (National Children's Bureau 1992, p.4).

Lady Allen of Hurtwood (1968), in her book *Planning for Play*, writes: "[…] play is not a passive occupation. For children and young people, it is an extension of their desire to make their own discoveries in their own time and at their own pace" (p.2).

A professor of early childhood education, James L. Hymes Jr (1991), believes that play is not only a recreational or leisure-time activity, but also a thinking process activity for children. It involves problem-solving, investigation and organisation of ideas (Hymes Jr 1991).

Play is a process where children engage in high levels of learning (Kopp 2010). It is known as a complex, essential and significant requirement for children's development and wellbeing (Moore 1986, Titman 1994, Lansdown 1996) and is strongly related to children's cognitive development (Piaget 1962, Vygotsky 1978, Kopp 2010, Mayesky 2014) as well as emotional, social and physical growth (Moore and Wong 1997, Kopp 2010, Mayesky 2014). Quality play is ensured by using suitable environmental features to provide children with safe, enjoyable, motivating, creative, exploratory and spontaneous play opportunities (Lansdown 1996).

2.1.2 Play Types

According to Hughes (1996, 2002, 2013) there are 16 play types:

- Symbolic Play: play that allows control, gradual exploration and increased understanding, without the risk of being out of one's depth, e.g. using a piece of string to symbolise a snake.
- Rough and Tumble Play: play that involves physical contact but does not hurt, and uses a lot of energy, e.g. touching, tickling or gauging relative strength.
- Social Play: play that includes social engagement and interaction with others, and may have rules and criteria, e.g. games, making something with others or conversation.

- Sociodramatic Play: the enactment of real and potential experiences of an intense personal, social, domestic or interpersonal nature, e.g. pretending to be a mother, going shopping or cooking.
- Creative Play: play that allows a new response, the transformation of information and awareness of new connections, with an element of surprise, e.g. creating things with materials and tools.
- Communication Play: play that involves using words, gestures and nuances, e.g. singing, saying jokes, mime or "mickey-taking".
- Dramatic Play: play that dramatises events in which the child is not a direct participator, e.g. presenting a TV show or a festive event.
- Locomotor Play: play that includes any type of movement in directions for its own sake, e.g. tag, hide and seek, climbing trees.
- Deep Play: play that includes some type of risky activity, which may even be dangerous, but can develop survival skills, e.g. lighting fire, climbing obstacles or balancing on a high beam.
- Exploratory Play: play in order to access factual information, consisting of manipulative behaviours such as handling, throwing, banging or mouthing objects, e.g. assessing an object's properties.
- Imaginative Play: play where the conventional rules, which govern the physical world, do not apply, e.g. imagining that one is a cat and playing as a cat.
- Fantasy Play: play where the children's imagination can lead the way, rearranging the world regardless of the unlikeliness of the situation, e.g. pretending to be a tiny person or playing as if they are flying to the moon.
- Mastery Play: play where the child interacts with the physical and affective aspects of the environment, e.g. digging soil, making fire, building a den.
- Object Play: play that involves many interesting sequences of hand-eye operations and activities, e.g. using a broom, a bucket or a cloth in an original way.
- Role Play: play exploring ways of being, although not normally of an intense personal, social, domestic or interpersonal nature, e.g. driving a car or dialling with a telephone.

- Recapitulative Play: play that enables the child to experience earlier human evolutionary stages while exploring history, traditions, stories and ceremonies.

Wolff (1979) divides play types based on the social interactions of the child into six categories:

- Solitary Play: where the child plays alone, offering a sense of privacy with no social interaction.
- Parallel Play: where the child engages in the same sort of play in which other children are engaged, but without any physical or verbal interaction with others.
- Positive Interaction with Peers: where the child engages in verbal communication with other children while playing and develops social skills.
- Negative Interaction with Peers: where the child engages in aggressive behaviours during play, such as shouting, fighting or arguing over play equipment.
- Positive Interaction with Adults: where the child engages in some sort of social communication with adults which may include helping in play.
- Negative Interaction with Adults: where the child acts against an adult by shouting, kicking or doing activities that are forbidden.

Moyles (1989) counts three key forms of play with their subdivisions:

1. Physical Play: including gross motor (using large body muscles for movements), psychomotor (voluntary body movement with a predetermined end result) and fine motor (using small muscles for movements).
2. Social Emotional Play: including therapeutic, repetitious, self-concept, empathic and linguistic.
3. Intellectual Play: including creative, symbolic, linguistic, scientific and mathematical.

Woolley et al. (2006, 2008), in a more recent study, categorise play that takes place in an educational outdoor play setting into “play with high verbal content”, “play with high imaginative content”, “play with high physical content” and “play with less structure” (walking, sitting and talking).

2.1.3 Play Types and Creativity

When talking about encouraging children's creativity in play, it is important to know how play can be creative and which type of play includes creativity.

Russ (2004) argues that one of the types of play highly associated with creativity is pretend play. Fein (1987) defines pretend play as the process where "one thing is playfully treated as if it were something else" (p.282). In her study, Russ (2004) found that children who engaged in more positive affects in pretend play did better in their storytelling, which was more creative, imaginative and enjoyable. She argued that those who were more imaginative in play were more creative in telling a story (Russ and Grossman-McKee 1990, Russ 2004). She counted five ways in which children are encouraged to engage in more creative behaviours with play (Russ 2004):

1. Play engages practice in making relations, which is vital in divergent thinking processes.
2. Play encourages experiencing and expressing of positive effects, which are vital to creativity.
3. Using symbols, manipulating elements and integrating different ideas are led by pretend play. These relate to insight abilities and the ability to transform, which both relate to creativity.
4. Pretend play encourages the child to think about negative and positive affect themes, which results in building relations and memories, thus encouraging problem-solving skills.
5. Pretend play leads to cognitive development in containing, integrating and controlling affect.

Another type of play that includes creativity is dramatic play (Hughes 2013). In a study, Sutton (2011) found that adding loose parts to children's play spaces encouraged them to become involved in higher levels of dramatic play. The children engaged in thematic play where they could build a story by using these materials and then engage in dramatic play.

In her study, Kirkby (1989) found that natural settings encouraged 68% dramatic play amongst children compared to 42% dramatic play in manufactured settings. A lot of examples of this were seen in the wildlife garden at Study Site Two.

In another study, Maxwell, Mitchell and Evans (2008) did a comparison of the way two different play contexts would encourage children to engage in specific play types. Their first context was facilitated with manufactured play equipment and fixed structures. For their second play context, they added some loose parts and junk materials to the same play setting. They particularly focused on constructive play, referring to children's engagement in building something with a specific aim, and dramatic play, referring to children imagining being something or someone else. In this study, they found that adding loose materials to the play context encouraged children to engage in constructive play where they built they own spaces and play features, which then resulted in dramatic play in the setting. Again, when they removed the loose parts, their dramatic and constructive play behaviours reduced considerably (Maxwell, Mitchell et al. 2008).

The Scottish Executive's Curriculum for Excellence also supports the idea that children should be encouraged to engage in "active play", which includes creative play and imaginative play (Executive 2004, Executive 2006, Henderson 2010, Kidner 2013).

Neill (2013) believes that facilitating play settings with loose parts encourages various types of play amongst children. These are creative play, dramatic play, exploratory play, cooperative play and constructive play. He believes that they are supportive as they are flexible and the children can adapt them in their play based on their own abilities and preferences (Neill 2013).

2.1.4 Outdoor Play Environment Categorisations

Children have an inherent desire to play in outdoor environments in order to satisfy their curiosity by exploring the world (Louv 2008). Playing outdoors has several benefits to child development and childhood education (Fjørtoft 2004, Burdette and Whitaker 2005); in such settings, children have better immune systems, are physically fitter, are less stressed, have more self-respect and respect for others and have better imaginations and creative abilities (Fjørtoft 2004, Burdette and Whitaker 2005).

Playgrounds are categorised in different ways. A categorisation by Hayward et al. (1974) divides playgrounds into Traditional, Contemporary and Adventure Playgrounds.

2.1.4.1 *Traditional Playgrounds and Contemporary Playgrounds*

Traditional refers to "individual, un-connected play equipment" (Brown and Burger 1984), usually involving big metal structures such as swings and slides that are designed for specific physical activities (Hayward, Rothenberg et al. 1974). Contemporary playgrounds refer to "multi-functional, integrated play structures" (Brown and Burger 1984) where several structures are connected to each other and children have the choice of entering and exiting from different sides (Hayward, Rothenberg et al. 1974). These include features such as timber climbing frames.

Fjørtoft (2004) believes that, while traditional playgrounds do encourage play amongst children, they do not provide any exploratory or learning processes. Some research shows that while contemporary playgrounds are known to provide more diverse activities for children, they do not have more influence on cognitive, social and motor skills than traditional playgrounds (Brown and Burger 1984, Hart and Sheehan 1986). Also, there is evidence that contemporary playgrounds provide less physical activity for children (Hart and Sheehan 1986). Other research shows contemporary playgrounds are more supportive of pretend play and divergent thinking (Susa and Benedict 1994).

2.1.4.2 *Adventure Playgrounds: Junk Materials or Loose Parts*

Adventure playgrounds include materials that are movable, where the children get to decide how they want to use them (Hayward, Rothenberg et al. 1974). Children give meaning to these materials by their play behaviours through exploring, building and breaking (Kozlovsky 2008). Also known as Junk Playgrounds, they were first suggested by Carl Theodor Sørensen, a Danish landscape architect, in 1931 (Kozlovsky 2008). He suggested, "Perhaps we should try to set up waste material playgrounds in suitable large areas where children would be able to play with old cars, boxes, and timber." (Allen of Hurtwood 1968).

Loose parts refer to adjustable materials that can be used in various ways in children's play through invention and experiment (Nicholson 1972). Sutton (2011) defines loose parts as:

> "[…] any collection of fully movable elements that inspire a person to pick up, re-arrange or create new configurations, even realities, one piece or multiple pieces at a time. Loose parts require the hand and mind to work in concert; they are catalysts to inquiry. Loose parts are the flexible edge of an inviting open-ended interactive environment that allows participants to make an imprint of their intention. Experiences with loose parts provide a profound yet playful way for children to form associations between learning and pleasure".

Neill (2013) defines them as:

> "[…] materials with no specific set of directions, and they can be used alone or together with other materials. They can be moved, carried, combined, redesigned, lined up, taken apart, and put back together in multiple ways. The child, rather than a manufacturer or other adult, determines how the materials are used. Loose parts are the opposite of the battery-operated toys that require only that children push a button" (pp.2-3).

The theory of Loose Parts is built upon two parameters (Nicholson 1972):

1- No evidence supports the idea that some children are born creative while other children are not.
2- There is evidence that supports the idea that all children desire to interact and play with variable surroundings including flexible materials and shapes.

Loose material can be natural or synthetic (Neill 2013). Neill gives a list of the different types of loose materials that can be used in playgrounds:

Table 2-1: Detailed list of loose parts including natural and synthetic options (Niell 2013)

Manufactured	Natural	Location/ Season Dependant
Recycled tires	Stones	Sea shells
Pallets	Stumps	Beach rocks

Wooden or plastic crates	Logs	Driftwood
Buckets, tubes, laundry baskets	Large branches	Hay bales
Plastic garden pots	Small twigs	Troughs
Boxes	Sand	Old street signs
Gutters	Gravel	Traffic cones
Drain tile	Water	Car parts
PVC pipe	Leaves	Logs
Wood (planks)	Pebbles	Pine cones
Rope	Sunflowers	
Chain	Seeds	
Cardboard rolls and tubes		
Wooden reels		
Plastic bottles		
Landscape netting		
Ice cream tubes		
Fabric, tarps, mesh		
Hoops		
Bricks		
Chalks		

Liu (2011) lists the five best play toys as Sticks, Boxes, Strings, Cardboard Tubes and Dirt.

2.1.4.3 *Nature*

Cosco (2006) categorises playground settings based on physical activity into manufactured, natural and mixed playgrounds including both manufactured and natural equipment.

Studies show the importance of children's interaction with open green spaces and natural environments (Thompson, Travlou et al. 2006, Thompson, Aspinall et al. 2007). The positive influence of play in nature influences children on various levels. Moore and Cosco (2013) believe that natural settings influence children's functional behaviours and emotional development. This is highly supportive of their cognitive development (Chipeniuk 1995, Falk and Dierking 1997, Wells 2000, Wells and Evans 2003, Dadvand, Nieuwenhuijsen et al. 2015), and has a positive influence on their social development (Fjørtoft 2001, Jorgensen 2001, Fjørtoft 2004), wellbeing (Taylor, Kuo et al. 2001, Thomas and Thompson 2004), mental health (Pretty, Peacock et al. 2005, Pretty, Peacock et al. 2007) and physical health (Pretty, Peacock et al. 2005, Cosco 2006, Wells, Ashdown et al. 2007, Sandercock, Voss et al. 2009, Cosco, Moore

et al. 2014, Bocarro, Floyd et al. 2015, Islam, Moore et al. 2016, Smith, Moore et al. 2016). It can also positively impact on attention functioning and reduce the symptoms of children's attention deficits (Taylor, Kuo et al. 2001). Contact with natural environments also reduces the risk of depression in adulthood (Snell, Lam et al. 2016).

2.1.5 Outdoor Play Environment Design Aspects

Cram (2001) counts seven major approaches to designing playgrounds for children:

- Environmental Integration: where nature provides a sufficient setting for the child to interact in a diverse set of unstructured play activities. For instance, when children play in a woodland setting they are provided with natural unstructured elements to play with.
- Educational Process: where the setting supports the child to learn through play. Learning Through Landscapes[2] is a good example of an organisation that designs education playgrounds for schools and nurseries. They believe that school and nursery playgrounds are the places that children can access and benefit from most frequently, so they only design such educational outdoor spaces.
- Cultural Heritage: where the setting supports the child's personal identity and social development. The Pyrmont Point Playground in Sydney, Australia, is an example in this category where the design is focused on highlighting the maritime history of the area (Carillo 1998).
- Therapeutic Value: where the outdoor space is designed to offer therapeutic aspects such as stress relief and relaxation (Thompson, Roe et al. 2012). Many hospitals have such spaces for children and adults.
- Age and Activity: where the age requirements, both from the scale point of view and mental needs of different groups of children, are considered. For instance, some gardens are designed for infants while other play spaces are designed for teenagers.

[2] https://www.ltl.org.uk/

- Imagination and Creativity: where the setting supports children's creativity and imaginative thoughts to develop through assessing their ideas, themselves and their surroundings. Montessori schools aim to provide such spaces.
- Multipurpose Use and Integrated Design: where the setting is designed for various uses such as refreshment, school playtime area or after-school community space.

The International Play Association (IPA),[3] focusing on children's right to play, believes the following aspects should be taken into account while designing play settings:

- Play and Health, considering both physical and mental health.
- Play and Education, providing suitable educational environments for all children that support socialisation, interaction and creativity through play settings.
- Play and Social Welfare, providing a suitable setting for child-parent relationships, as well as considering disabled children's needs in community play activities.
- Play and Leisure, providing joy, a sense of belonging and self-esteem for children to play in a setting.
- Play and Planning, providing a suitable environment for children to make decisions about their play settings, considering their abilities.

Educational outdoor settings are said to be used in three ways (Funnell, Alford et al. 1997):

- For a formal curriculum, such as outdoor classrooms.
- For an informal curriculum, when the children can spend free playtime in the setting.
- For a hidden curriculum, where the children read and learn about the way the playground is designed and managed.

[3] http://www.ipausa.org/

2.1.6 Educational Outdoor Environments

School outdoor environments are valuable as aspects such as the way they are used, the amount of time spent in them, the features they can contain and how they are organised and perceived by the children and the staff can all significantly affect the children's lives and the quality of education that they can get. Play in school playgrounds differs from play in other outdoor settings as it is supervised by the school staff and attaches to hidden curriculum (Malone and Tranter 2003). Learning Trough Landscapes (Lucas 1995), a charity which designs children's educational outdoor environments in the UK since 1990, believe school playgrounds are different from other outdoor play areas because of six main factors that they have[4]:

1 Universal: nearly every child has access to their school playground while not all children have access to local parks, gardens or natural environments.
2 Regular: children can experience playing in their school outdoor environments in different seasons and weather conditions.
3 Time: Most of the children can spend about 1500 hours of their life in these playgrounds which for most children is more than the time they will spend in any other outdoor setting.
4 Accessible: School playgrounds are amongst the most accessible outdoor areas for children.
5 Ownership: Children can engage in the management of school playgrounds, which supports stewardship and responsibility.
6 Community: School outdoor environments can play an important role in community gatherings and they are also usually willing to involve the community to help improve their space

Malone & Tranter (2003) believe School outdoor environments should allow children to engage in a variety of play activities which are enjoyable, spontaneous, energetic, self-initiated, stimulating and encourage children's learning and development.

Rickinson et al. (2004) present how playing in school grounds as one of the outdoor learning environments can impacts children's cognitive, social, physical and behavioural aspects. According to his research, the children who had such access were

[4] https://www.ltl.org.uk/

able to think more creatively and critically(Ballantyne and Packer 2002, Rickinson 2004).

Some Education aspects focus more on children's access to natural outdoor environments in educational settings. Friedrich Froebel (1782–1852) was the first person who used the term 'Kindergarten' for children's nursery's which is the German word for 'garden for children' (Constable 2012). He believed children need to connect with the nature and through this connection, the children in Kindergartens will learn to take responsibility of themselves, their peers and the nature around them (Bilton 2002, Ouvry 2003). In Kindergartens, children are encouraged to investigate and discover their environment which results to more creative and independent children. They learn to make connection with the wider world around them and learn how they can affect their own environment (Bilton 2002, Ouvry 2003, Constable 2012).

In regard to outdoor play settings in educational environments, Forest School[5] (Knight 2011) is an example of free play in natural settings. Forest School first opened in the UK at Bridgwater College in Somerset in the early 1990s (Maynard 2007, Constable 2012). Since then, many other nurseries have integrated it in their pre-school setting by taking the children out in nature at least once a week. Forest School developed based on a childcare concept in Denmark and other Scandinavian countries where children spend their whole time at kindergarten in the outdoor environment and have little or no access to indoors. They are led by qualified teacher and support children gaining social, personal and emotional life skills through nature-based experiences (Maynard 2007, Knight 2011). Accordingly, Forest School is where the children play in woodland, with trees and a forest floor (Constable 2012).

There is another term used in educational outdoor known as the "outdoor classroom". Although the concept of outdoor classroom was created based on the Forest School, it has its own specifications. While Forest School needs to be in a woodland area or similar, outdoor classroom can be held in any outside environment which doesn't have roof and wall. The floor may be covered in grass, mud or autumn leaves. The activities can be led by the teachers or the children themselves (Constable 2012).

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

Ledermann (1968) has a list of recommendations for children's educational play spaces. In his book, *Playgrounds and Recreation Spaces*, he identified ten points that need to be well thought out when designing playgrounds in educational environments:

1. Playing should be the main aim of designing these settings.
2. Educationalists and landscape architects should cooperate with each other in designing such settings in order to consider children's real needs in these settings.
3. These play spaces should motivate children to engage in creative, spontaneous and active play.
4. Equipment that is "half-finished" is preferred over fixed manufactured play equipment, as it gives the children the opportunity to explore and create.
5. Children's age varieties should be considered in design.
6. The space should not be designed for a certain set of play activities, and instead should provide a variety of different play opportunities that the children could engage in based on their own thoughts.
7. The design of the space should consider children's movement abilities and support functional aspects.
8. The play space should encourage pretend play and "dreamy games" for children.
9. Landscape architects should "play" as they design these settings. They should play with their ideas and think creatively while installing the various elements in these settings.
10. The community around the school, including children's parents and the neighbours, should be encouraged to engage in the construction and maintenance of these settings.

There are several tools designed to evaluate and work as guidelines for designing outdoor environments for schools and preschools. As this research aimed to develop design principles for children's educational outdoor settings, it was important to compare these to some of the recommendations developed by previous researchers in this field.

The Preschool Outdoor Environment Measurement Scale (POEMS) (DeBord, Hestenes et al. 2005) was designed by a group of researchers, including Robin Moore and Nilda Cosco. It contains five domains that are evaluated, each containing several items which add up to 56 assessment items overall. The domains are: 1) physical activity (13 items); 2) interaction (13 items in four categories, including children's interaction with the setting, with other children, with their teacher and with their parents); 3) play and learning setting (13 items in two categories of features and materials/loose parts); 4) programme (nine items); and 5) teacher/caregiver role (eight items including an interview) (DeBord, Hestenes et al. 2005).

The Early Childhood Knowledge and Learning Centre (ECKLC) website [6] has developed a Play Space Assessment for evaluating the quality of play spaces designed for children aged three to five, to identify the strengths and weaknesses in these spaces and to consider these factors when designing new settings. The assessment includes eleven research-based categories, adapted from the POEMS assessment tool (DeBord, Hestenes et al. 2005) and Casey's (2007) book *Environments for outdoor play: A practical guide to making space for children.* The eleven categories are:

1. Key features: the play spaces should have a good variety of different features that provide "diverse" experiences. Some of the features recommended are as follows: fixed manufactured play equipment (e.g. climbing frames, slides); wheeled toys (e.g. bikes and cars); manufactured play equipment (e.g. balls, hula hoops); musical instruments; water features and sandpits; natural settings (e.g. vegetable gardens, flowers and trees); and loose parts.
2. Movement opportunities: the play space should promote physical activity amongst children. This could be achieved by providing spaces for travelling actions (walking, running), stabilising actions (turning, swinging) and manipulating actions (throwing, catching).
3. Flexibility and play: the space should have a good "variety" of "changeable" features that can be used "in many different ways" to support children's flexible and creative thinking. This could encourage different social types of play, including solitary play, parallel play and cooperative play (Wolff 1979).

[6] https://eclkc.ohs.acf.hhs.gov/hslc/tta-system/teaching/eecd/nature-based-learning/Create%20and%20Naturalize%20a%20Play%20Space/play-space-assessment-preschool.pdf

It can also result in functional play, constructive play, symbolic play, role play and fantasy play (Hughes 2013).

4. Shelter and shade structures: some shelter or shade, which could be either manufactured structures or trees, should be provided.
5. Natural features: some natural settings should be provided for the children including a variety of species (trees and shrubs), flowers, different topographies (slopes or mounds) and safe natural surfaces.
6. Welcoming atmosphere: the play setting should be clean and tidy and the play equipment, whether manufactured or loose parts, should be well organised. Some decorative features such as a sculpture or banners are suggested.
7. Sensory elements: the space should provide a "variety of sensory experiences". For instance, children should be able to engage their vestibular stimulation, proprioceptive stimulations and smelling senses in the play space.
8. Accessibility and inclusive play: Children of different abilities and different ages should be able to engage with and access different parts of the play settings; there should be sufficient paths, surfacing and a variety of play features in order to support everyone's needs.
9. Risk and challenge: the play space should have open-ended and challenging features that encourage more advanced physical, social and cognitive abilities to occur. Providing spaces with different varieties of textures, visual effects, heights and surfaces can result in development of these aspects. The space should be safe while encouraging children's curiosity and creativity through providing "original" ways of using or experiencing new materials or using the familiar material in "flexible" ways.
10. Surfacing: surfaces should be soft and well maintained. It is also suggested that "different varieties" of textures should be included, providing various experiences for the children.
11. Enclosure and safety features: all the play spaces should follow playground safety standards. For instance, the space should be enclosed and fenced, the equipment should be safety checked, no sharp materials should be in the setting and the paths and equipment should be trip hazard free.

2.2 Children's Educational Methods in Relation to Creativity

In 1997, the British Government published the White Paper *Excellence in Schools* and argued that, in order to be prepared for the twenty-first century, in addition to literacy and numeracy, it is essential to develop other talents in individuals (NACCCE 1999). Accordingly, the National Advisory Committee on Creative and Cultural Education (NACCCE 1999) was developed according to five main themes, one of which was entitled Creative Potential, which focused on the importance of creativity in the educational environment:

> "Creativity is possible in all areas of human activity, including the arts, sciences, at work, at play and in all other areas of daily life. All people have creative abilities and we all have them differently. When individuals find their creative strengths, it can have an enormous impact on self-esteem and on overall achievement." (p.6)

With regards to creative education, they stated:

> "[…] creative and cultural education are not subjects in the curriculum: they are general functions of education. They can and should be promoted in all areas of the curriculum and not just through so called 'creative subjects'" (NACCCE 1999, p.101).

Some education methods and theories are highly supportive of creativity aspects. The Creative Partnership (2005), the Creative Action Research Awards (CARA)[7] and the Qualifications and Curriculum Authority (QCA) Creativity Project[8] are among the many projects funded for the purpose of developing creativity in education (Craft 2006).

Montessori and Reggio Emilia are two of the most progressive approaches to children's education known as strong alternatives to traditional education (Edwards 2002). Friedrich Froebel's Kindergarten innovation has also been studied due to its relation to children's creativity (Sutton 2011).

[7] http://www.curee.co.uk/our-projects/creativity-action-research-awards
[8] http://www.qca.org.uk/

In addition, the curricula that are taught in Scotland have also been studied as another method considering creativity as a goal in education. The Curriculum for Excellence (Executive 2004, Henderson 2010) is the curriculum developed for the Scottish education system.

According to the Scottish Executive (2004), creativity aspects such as motivation for learning, creative thinking, problem-solving, openness to new thinking and ideas will be learnt through this educational system. It has been suggested that one of the well-developed aspects in the curriculum for excellence principles is the environment for learning (Executive 2004, Henderson 2010, Kidner 2013).

2.2.1 Jean Piaget's Child Development Stages

Jean Piaget (1896-1980), best known for his theory on children's cognitive development stages, believed play has had a valuable influence on understanding children's cognitive development (Piaget 1962). According to Piaget, there are four major cognitive development stages. The first stage is Sensorimotor, from birth to two years old. At age two, a child uses play to move onto symbolic thoughts where she/he can start to use an object flexibly as something other than it is. If the child is provided with sufficient elements, she/he can start abstract and imaginative thinking while transferring from the first to the second stage, which is the Preoperational stage, lasting from two to six years old (Piaget 1962, Pulaski 1971). By the time the child reaches age four to five, symbolic play starts to become more social, and cooperative play takes place where the child takes different roles and is aware of other children's roles as well (Berk and Winsler 1995). According to Hughes (1996, 2013) this stage is when pretend play, fantasy play and sociodramatic play form.

The third cognitive development stage is the Concrete Operational stage, from age six to twelve. By age seven, sociodramatic play and pretend play drops and is replaced with rule games as the children develop social skills and understand cooperation and competition (Piaget 1962, Pulaski 1971, Garvey 1990).

The fourth stage is the Formal Operational stage, from twelve years old to adulthood. In this stage, play moves into an intellectual stage (Piaget 1962).

As Piaget's(1962) cognitive development stages suggest, the Preoperational stage, which starts from age two and continues to age six, is highly associated with flexible

thinking and imaginative thoughts. Accordingly, it is very important to provide children with a supportive environment that encourages them to achieve their potentials.

2.2.2 Friedrich Froebel's Kindergarten

Friedrich Froebel was the first person to bring loose parts into the educational system and use them for pedagogical purposes. He designed hands-on educational activities and developed kindergartens across Germany by bringing together aesthetic and cognitive development skills in the use of various objects and materials (Weston 1998). He also designed playing kits that included geometrical shaped wooden parts, which later inspired Milton Bradley to design toys and games for children with educational value (Klar, Winslow et al. 1933, Shea 1973).

Froebel's use of loose parts in educational settings later influenced Maria Montessori, who also used hand-sized loose materials for the children to engage with (Standing 1998).

2.2.3 The Montessori School

Montessori Education is an educational approach for young people from birth to the age of 18, developed by Maria Montessori in 1907 in Italy, which has now spread worldwide. The theory drew on philosophers such as Rousseau, Pestalozzi, Seguin and Itard (Montessori and Simmonds 1965, Röhrs 1994, Edwards 2002, Montessori 2013, O'Donnell 2014). This educational method was based on specific characteristics such as children's independence and respect, children's natural development, auto-education and indirect education, mixed age classes, pupils' choice, children's absorbent minds and liberty (Edwards 2002, Montessori 2013). This education method focuses on children's natural capabilities and own initiative developments, and the majority of the learning happens through play.

Besides these issues, an important factor in the Montessori approach is the "Environment", which should have specific characteristics. In the Montessori school's environment, the child should feel free. This freedom includes physiological, spiritual and psychological development. Children not only move freely around the area and choose from among their Montessori clothes, but can also freely choose their environmental settings. In other words, children should have liberty in their school

environmental settings. Cleanliness is highly important in these environments. The windows of the classrooms are wide so that the children can have access to the gardens. The size of the furniture is an important issue and is based on pupils' anthropometry. "Light" furniture is suggested, in addition to simple and movable parts, so that pupils can change it as per their desire and need. The furniture should be "artistically beautiful", meaning that the lines and colours should be harmonic and simple (Montessori and Simmonds 1965, Röhrs 1994, Edwards 2002, Montessori 2013, O'Donnell 2014).

2.2.4 The Reggio Emilia Approach

The Reggio Emilia approach was also established in Italy by the effort of Loris Malaguzzi, a young teacher who started a school in 1963. The philosophy of this educational approach is influenced by philosophers such as Dewey, Piaget, Vygotsky and Bruner (Edwards 2002). Malaguzzi focused his education method on infants and preschool children; he believed that Piaget's (1962) cognitive development stages are too limited and that even young children are very intelligent, social and creative, so he built a powerful image of a child (Edwards 2002). This approach to education has been of high interest in Scotland.

The Reggio Approach is based on six main factors (Edwards 1993, Valentine 1999, Abbott and Nutbrown 2001, Giudici, Rinaldi et al. 2001):

1- The image of the child:

The child is known to be rich in potential, competent and strong. Children are strong in knowledge, driven by curiosity and imagination.

2- The expressive arts; The Hundred Languages:

The child has one hundred languages, so as per Howard Gardner's multiple intelligences, the Reggio approach uses all of these different learning languages in order for children to express themselves; expressive arts are highly valued.

3- *Progettazione*:

This aspect refers to the way teachers observe and listen to children closely, in order to fully understand and learn from them, and then guide them to build on their interests and talents.

4- Community and parent–school relationships:

The Reggio approach is known as "pedagogy of relationship". Not only are children encouraged to develop relations within the school and outside the school, but parents and communities are also strongly encouraged to communicate with the school.

5- Teachers as learners:

In this approach, teachers are encouraged to learn from the children by understanding their learning process. They then have meetings with other teachers in order to build their own role in supporting pupils' learning path.

6- Environment:

One of the most important and well-known aspects of the Reggio approach is its environmental factors. The environment is known as "the third teacher", with parents being the first and teachers the second, which shows the importance of it being developed in an appropriate manner.

The school's spaces in the Reggio approach flow into each other and are not detached for different purposes. The areas are open, and this openness encourages free movement and interaction between the children and teachers. The different areas are separated either by screens through which children can tell stories, or movable walls and wall-sized windows. There is usually a central area covered in mirrors, for which the philosophy is "seeing oneself" and one's own identity. Reggio schools have large windows that lighten the classroom with natural light, and the walls are painted in white, with children's own artwork decorating the walls. The classroom is decorated with children's own arts and at the end of the year, the classroom never looks the same as it did at the beginning of the year. The environment and its materials are multi-sensory, and the furniture is designed to be multi-functional. There are usually lots of plants in the classrooms of Reggio schools (Edwards 1993, Valentine 1999, Abbott and Nutbrown 2001, Giudici, Rinaldi et al. 2001).

Loris Malaguzzi (1996) says:

"[...] we consider the environment to be an essential constituent element of any theoretical or political research in education. We hold to be equally valuable the rationality of the environment, its capacity for harmonious coexistence, and its highly

important forms and functions. Moreover, we place enormous value on the role of the environment as a motivating and animating force in creating spaces for relations, options, and emotional and cognitive situations that produce a sense of well-being and security. It has been said that the environment should act as a kind of aquarium which reflects the ideas, ethics, attitudes and culture of the people who live in it." (p.40)

2.2.5 The National Advisory Committee on Creative and Cultural Education (NACCCE)

The National Advisory Committee on Creative and Cultural Education (NACCCE 1999) was established in 1998 by the Secretary of State for Education and Employment in collaboration with the Secretary of State for Culture, Media and Sport. The aim of this committee was:

> "To make recommendations to the Secretaries of State on the creative and cultural development of young people through formal and informal education: to take stock of current provision and to make proposals for principles, policies and practice" (p.2).

One of its five main themes, entitled Creative Potential, focuses on the importance of creativity in the educational environment. The NACCCE (NACCCE 1999) believe that creativity in educational environment has been misunderstood; some believe creative teaching only happens when there is a lack of discipline, some believe that not all pupils are creative and others believe creativity can only occur in arts (NACCCE 1999). However, the NACCCE follows the concept that creativity exists in every person and can take place in all different areas of human activity. Therefore, it is essential to develop the environment in order to give every individual the opportunity to behave more creatively. David Blunkett, the Secretary of State for Education and Employment, stated (NACCCE 1999):

> "[…] in the workforce of the future, I have always recognised that creativity, adaptability, and communication skills will also be vital. We must enable young people to develop their creative potential and to meet the fundamental challenges that face our country" (p.18).

Clive Jones, Chief Executive of Carlton Television added:

> "[…] We need to equip our young people with powers of innovation and creativity they need for the rapidly-changing economies of the future. The education system has to develop a new emphasis on creativity and discovery to give pupils the tools they will need to cope with the fast and continuing changes in the nature of work, employment and growth in the world economy that lies ahead" (p.21).

Creative and cultural education is said to be about not subjects in the curriculum, but instead general functions of education. It should not just be promoted in areas called "creative subjects", but in all areas of the curriculum (NACCCE 1999).

The NACCCE have specified four main characteristics for a creative process: imaginative, purposeful, original and valued (NACCCE 1999). Creative teaching is defined in two ways. The first is "teaching creatively", where the teacher is teaching in a creative way. The second is "teaching *for* creativity", where the teacher actually encourages pupils to think and behave creatively themselves (NACCCE 1999). This research uses the second definition, where the environment is designed in order to teach *for* creativity. There are three related tasks in teaching for creativity: encouraging, identifying and fostering (NACCCE 1999). All young people have creative capacities but not necessarily in the same field. An important mission in education is guiding pupils to discover their own creative strengths (NACCCE 1999). By preparing an encouraging environment for creativity to be identified and nurtured, all pupils are helped to find and experience more creative behaviours.

2.2.6 The Scottish Education System (Curriculum for Excellence)

The Curriculum for Excellence (Executive 2004) was developed for children aged three to 18 in Scotland. It includes eight curriculum areas: Expressive Arts, Health and Wellbeing, Languages, Mathematics, Religious and Moral Education, Sciences, Social Studies and Technologies. Each of the curriculum areas contain a range of subjects (Executive 2004, Executive 2006, Henderson 2010, Kidner 2013).

The four main aims of the Scottish education system are to develop children who are "successful learners, confident individuals, responsible citizens and effective contributors". They are expected to experience motivation through learning, problem-solving abilities, openness and creative thinking abilities (Executive 2004, Executive

2006, Henderson 2010, Kidner 2013). The table below shows the four aims of the Scottish education system and its parameters:

Table 2-2: Curriculum for Excellence Aims

Successful learners	**Confident individuals**
with • enthusiasm and motivation for learning • determination to reach high standards of achievement • openness to new thinking and ideas and able to • use literacy, communication and numeracy skills • use technology for learning • think creatively and independently • learn independently and as part of a group • make reasoned evaluations • link and apply different kinds of learning in new situations	with • self-respect • a sense of physical, mental and emotional wellbeing • secure values and beliefs and able to • relate to others and manage themselves • pursue a healthy and active lifestyle • be self-aware • develop and communicate their own beliefs and view of the world • live as independently as they can • assess risk and take informed decisions • achieve success in different areas of activity
Responsible citizens	**Effective contributors**
with • respect for others • commitment to participate responsibly in political, economic, social and cultural life and able to • develop knowledge and understanding of the world and Scotland's place in it • understand different beliefs and cultures • make informed choices and decisions • evaluate environmental, scientific and technological issues	with • an enterprising attitude • resilience • self-reliance and able to • communicate in different ways and different settings • work in partnership and in terms (again, are you sure this isn't teams?) • take the initiative and lead • apply critical thinking in new concepts • create and develop • solve problems

2.3 Creativity

2.3.1 The Study of Creativity in Academic Discourse

Since the 1930s, the study of creativity was in two key articles in psychological abstracts being written on the topic (Hutchinson 1931, Guilford 1950). Guilford highlighted the neglect of the study of creativity in his presidential address at the American Psychological Association, pointing out that only 0.2% of psychological abstracts had focused on the subject up to 1950 (Guilford 1950, Sternberg and Lubart 1996, Coulter 2004, Lubart, Barbot et al. 2011). Later, an analysis by Stenberg and Lubart showed that, from 1975 to 1994, only 0.5% of the articles in psychological abstracts mentioned creativity (Sternberg and Lubart 1996, Coulter 2004). In fact, it was not until the 1990s that the concept developed via the appearance of two journals devoted to creativity articles, namely *The Journal of Creative Behaviour* and *The Creativity Research Journal* (Feist and Runco 1993, Sternberg and Lubart 1996, Sternberg and Lubart 1999, Coulter 2004).

2.3.2 Definitions of Creativity

Creativity has been defined differently by researchers throughout the years. There are over 100 definitions of creativity in the literature (Treffinger, Young et al. 2002).

Paul Torrance (1915-2003), known as the "father of creativity", defined creativity as:

> "[…] the process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficult; searching for solutions, making guesses, or formulating hypotheses and possibly modifying them and retesting them; and finally communicating the results " (Torrance 1965, p.663)
>
> "Creativity is a successful step into the unknown, getting away from the main track, breaking out of the mold, being open to experience, and permitting one thing to lead to another, recombining ideas or seeing new relationships among ideas..." (Torrance 1977, p.7).

Howard Gardner defined a creative person as:

> "[…] a person who regularly solves problems, fashions products, or defines new questions in a domain in a way that is initially considered novel but that

ultimately becomes accepted in a particular cultural setting" (Gardner 1993, p.35)

A more recent definition of creativity is the ability to develop an idea or a product that is original, meaning it is new or unexpected, and useful, meaning it is appropriate to its context (Lubart 1994, Lubart and Mouchiroud 2003, Runco and Jaeger 2012). Accordingly, for the purposes of this research, creativity is defined as:

> "[…] the capability of an individual to produce work that is original (i.e. new, different from that which we can usually see) and adaptive to the context and the constraints of the situation" (Lubart, Besancon et al. 2012, p.15).

Creative individuals produce concepts that are different from other individuals' ideas or products that differ from the usual ones (Kharkhurin 2014). Creativity is known to be one of the features needed to lead a successful life (Oncu 2015).

In recent years, more researchers have come to believe that creativity is not an ability held only by certain people, but instead a "universal capability", meaning that every person has creative potential (Runco 2003, Siraj-Blatchford 2007).

2.3.3 Creativity in Cognitive Psychology and neuroscience

Creativity happens as an ordinary mental process (Weisberg 1993, Boden 1998, Ward, Smith et al. 1999). This makes creative cognition an important field in cognitive science and consequently neuroscience (Dietrich 2004).

Cognitive psychology aims to study human cognition by looking at human's behaviour, so it is the attempt of observing people's behaviours to understand their performance in different cognitive tasks (Eysenck and Keane 2013). It relates to the inner processes engaged in making sense of the environment and deciding what actions should be taken. Accordingly, a cognitive psychologist tries to understand the function of human's higher mental processes (Lachman, Lachman et al. 2015). Reasoning, thinking, imagining, and problem solving are some of the included processes.

Cognitive neuroscience is on the one hand, a link between cognitive psychology and cognitive science, and on the other hand a link between neuroscience and biology (Ward 2015). It is driven by methodological advances which happen in the laboratory to explain brain-based mechanisms (Ward 2015). The aim of cognitive neuroscientists

is similar to cognitive psychologists, however, the former study the brain as well as the behaviours while people are involved in cognitive activities. They argue that human cognition happens within the brain, so they aim to understand human cognition by studying the behaviours and the brain together (Eysenck and Keane 2013).

In order to understand how the brain functions in different cognitive tasks and thus how creativity occurs, the brain is described into different areas. the cerebral cortex divides into four main parts known as lobes. in each brain hemisphere, there are four lobes which are frontal, parietal, temporal, and occipital (Heilman, Nadeau et al. 2003, Eysenck and Keane 2013). It is the frontal cortex which is the central part of the brain involved in creative thinking. The central fissure in the brain separates the frontal lobe from the other three temporal, occipital and parietal lobes which are all together known as TOP (Dietrich 2004). The function of the TOP neurons is related to long-term memory and perceptions, so knowledge and information are stored in this part of the brain (Gilbert 2001, Heilman, Nadeau et al. 2003). As creativity is associated with breaking obvious patterns of thinking and developing new ideas, researchers believe it occurs in the frontal lobe of the brain (Ashby and Isen 1999, Bekhtereva, Dan'ko et al. 2001, Damasio 2001, Heilman, Nadeau et al. 2003).

There are various techniques used in cognitive neuroscience to explore human cognition. Some require the presence in a laboratory due to the tools used for recording brain functions such as the magnetic resonance imaging (MRI) scanner. Some other tools such as electroencephalogram (EEG) can be used outside the laboratory. EEG records brain activity through the small sensors that attach to the scalp to pick up the electrical signals produced when brain cells send messages to each other (Eysenck and Keane 2013). EEG has been successfully used in landscape architectural research (Mavros, Coyne et al. 2012), however, background brain activity or rapid movements while using the equipment confuses the signals processing on the EEG (Eysenck and Keane 2013), so it is not appropriate in all contexts.

2.3.4 Creativity in Children's Play

Research shows that human creative ability depends on fantasising power in childhood (Krippner 1999). Creativity is one of the aspects of wellbeing. Jean Piaget (1976) theorised that both biological progress and children's interaction with the environment

result in cognitive development. Accordingly, when designing children's environment, their cognitive development aspects should be considered. Thus, taking children's creativity to be one of the factors in cognitive development can also support their mental health.

It is important for children to learn how to solve the problems they face in life creatively (Oncu 2015). Play is known to encourage creativity amongst children (Russ 1996, Oncu 2015). Wolfgang (1977) argued that children with self-control who play with a variety of toys are more likely to achieve creative play than passive and aggressive children as they are distracted by their use of materials. Children's creative thinking ability seems to drop when they enter educational systems (Cecil, Gray et al. 1985). Torrance (as quoted in (Cecil, Gray et al. 1985)) identified a reliable fall in creativity test results in school children at the age of eight to nine years old.

Cecil et al. (1985) presented a model of four levels of the "early childhood mosaic": curiosity, exploratory behaviour, play and creativity in children's experiences. Curiosity is defined as "the desire to know more about self and/or environment" (Maw and Maw 1966). Exploratory behaviour is defined as "behaviour which is the active Observable investigation of objects and events. It is an adventure of discovery". Play is defined as "behaviour which has a sensory motor component, but above all, it is marked by a spirit of spontaneity and positive affect". Finally, creativity in this context is defined as "behaviour which presents an uncommon, novel approach to materials or problem solving". Creativity is interrelated and can occur on all three levels (Cecil, Gray et al. 1985).

Hutt (1970) defines exploration as searching for objects' possibilities, play as creating possibilities for the object and creative play as novel possibilities for the object. Accordingly, the child's objective in curiosity is identification, questioning "what is this?" In exploration, the child is categorising and asking, "what can this do?" In play, the child responds to the environment and asks, "what can I do with this?" In creativity, the child starts to re-invent and starts questioning "how can I create/intend/solve?" (Hutt 1970).

2.3.5 Creativity amongst Genders

The majority of researchers have found no significant association between creativity and gender (Balundė and Grakauskaitė-Karkockienė 2014). Dhillon and Mehra's (1987) research showed that both girls and boys of a high social class level gained fairly equal creativity scores. However, in lower social levels, boys gained higher creativity scores, which seemed to be related to their cultural and economic background rather than gender. Another study examined the correlation between children's divergent thinking and their gender. This study also found no significant difference between the two genders (Rejskind, Rapagna et al. 1992).

Kogan (1974, 1976) carried out two different studies, the first of which found no gender differences in creativity, but the second of which concluded girls are more creative than boys.

Rejskind (1987) reviewed 41 studies undertaken in primary schools to test different genders' divergent thinking abilities. This review supported the idea that boys and girls show no significant difference in creativity tests on average, although, similar to Kogan's (1976) second study, in one-third of the studies, girls scored higher in divergent thinking, both in verbal and graphic tests, than boys. Some other studies have also found that women score higher in creativity than men (Duckworth, Phil Rigby et al. 2016).

However, a study by Tegano and Moran (1989) found that boys in the third grade of primary school showed higher creativity than girls in the same grade. They measured fluency as one of the factors of creativity for both groups. Another study compared 136 undergraduate students using three different creativity tests and found that the male participants gained higher scores than the female participants (Stoltzfus, Nibbelink et al. 2011).

Some research shows that girls who have a close relationship with their fathers and boys who have a close relationship with their mothers when they are four to seven years old are more creative than others (Gowan 1972).

2.3.6 Factors Influencing Creativity

There are various aspects that influence human creative abilities. Conative and cognitive factors affect creativity (Lubart, Zenasni et al. 2013, Berlin, Tavani et al.

2016, Kandler, Riemann et al. 2016). While conative factors of creativity focus on personality traits and motivation (Feist 1998, Lubart and Mouchiroud 2003, Batey and Furnham 2006), cognitive factors refer to information-processing abilities and knowledge that can support creative thinking (Berlin, Tavani et al. 2016). These are both human-centred factors that influence creativity (Lubart, Zenasni et al. 2013).

Genetic factors are also known to influence an individual's creative abilities (Kandler, Riemann et al. 2016). Aspects such as birth order have been studied as influencing creativity. While earlier research shows first-born and only children are more creative than later-born children (Lichtenwalner and Maxwell 1969, Eisenman 1987) more recent research shows no difference in the creativity of people in relation to their birth order (Kanazawa 2012, Balundė and Grakauskaitė-Karkockienė 2014).

Gender is another factor that has been studied in relation to creativity. Studying the relation between different genders and creativity is a difficult process. Many believe the opportunities that males have had throughout the centuries compared to females have influenced the study findings. It is claimed that this has even influenced the tests that have been designed to evaluate creativity. For instance, Torrance (1995) designed a questionnaire to score people's creativity that included their abilities in painting, publication, business and other creative productions. However, some of the participants, many of whom were women, did not engage in any of these professions but believed they could still be creative in their lifestyle through raising their children, decorating their home or cooking for the family. Maslow (1974) achieved similar findings when he looked into women's lifestyle in more detail, and argued that an individual could be creative in a typical daily activity, while not all artists were creative. Although Runco (2010) believed that the genders have not had the same opportunities to show creativity, a study of 41 research projects on gender and creativity concluded that half of the studies showed no significant difference between men and women, and one-third showed women scoring higher in creativity (Rejskind 1987).

Research shows that children from middle-class families are more creative than lower-class families (Lichtenwalner and Maxwell 1969). A study by Dhillon and Mehra (1987) showed that girls from an upper-class background showed more creativity than

those from the lower classes. The cultural backgrounds of lower-class families mean that they do not support girls in growing their skills and abilities or encourage them to learn about economics (Dhillon and Mehra 1987).

Other research has shown that children who are known to have higher emotional wellbeing score higher in creative abilities than children with lower mental health parameters. These children have better problem-solving capabilities and divergent thinking abilities such as fluency, flexibility and originality (Hoffmann and Russ 2012).

Adults in different positions can influence children's creativity. In schools, the school environment including the social and the physical environment influences children's creativity (Clifford and Chou 1991). Teachers can encourage or discourage children's creativity through the application of different teaching methods (Besançon and Lubart 2008) and creative trainings that they adapt in their classrooms (Scott, Leritz et al. 2004, Hunter, Bedell et al. 2007). "Play" influences children's creative thinking abilities (Russ 1996, Oncu 2015) and parents can also influence children's creativity when they involve in children's play behaviours. Some researchers suggest that adults have to play as a real partner with children (Hakkarainen, Brėdikytė et al. 2013) while others believe Their involvement in play can be negative as their comments come from preconceived lesson plans (Jones and Reynolds 1992). As play is highly associated with human creativity as a cognitive development (Piaget 1962, Vygotsky 1978, Moore 1986, Titman 1994, Lansdown 1996, Moore and Wong 1997, Kopp 2010, Mayesky 2014), Poor family conditions and insufficient nurturing methods by parents are found to have negative influences on children such as poor imagination or waste of spare time and craving for entertainment, which all result to less creative play amongst them (Ledermann and Trachsel 1968). According to the Play Wales[9] - an independent charity funded by the Welsh Government -, adults affect children's play in four ways: 1-permission: by what play experiences we allow them to engage in, 2-time: by the time we control for their play, 3: space: by the space we provide and

[9] http://www.playwales.org.uk/login/uploaded/documents/INFORMATION%20SHEETS/role%20of%20adults%20in%20childrens%20play.pdf

permit access for their play, and 4- material: by the material we provide or refuse for their play.

In addition to the human-centred conative and cognitive factors that influence creativity, context-centred environmental factors can also influence the development of creative abilities and support the individual in expressing creativity in different ways (Lubart, Zenasni et al. 2013, Berlin, Tavani et al. 2016). Environmental aspects relate to social environment such as family and social aspects as mentioned, as well as physical settings (Lubart, Zenasni et al. 2013, Berlin, Tavani et al. 2016). It is not only social environmental aspects that influence creativity; the physical environment also plays a key role in human creative behaviours (Amabile 1988, Sternberg and Lubart 1996, Stokols, Clitheroe et al. 2002, Simonton 2003, Kandler, Riemann et al. 2016). It is said that physical environment can promote concentration, create situations that encourage creativity and allow motivation to flourish (McKellar 1957).

2.3.7 Creativity Approaches

Sternberg and Lubart (1996) counted seven key approaches that have developed through time in relation to creativity, namely mystical, pragmatic, psychoanalytic, psychometric, social-personality, cognitive and confluence approaches.

2.3.7.1 *The Mystical Approach*

This was the first concept of creativity (Coulter 2004). In this approach, creativity is linked to magical inspirations, relating to the demonic and the divine of the individual (Rothenberg and Hausman 1976, Coulter 2004). Creativity is either defined as a super-naturalistic power, or rejected as explicable in a logical sense (Rothenberg and Hausman 1976). Isaksen and Murdock (1993, quoted in (Sternberg and Lubart 1996) believe this approach has a lack of scientific support as it was considered a spiritual process and could not be assessed or developed any further.

2.3.7.2 *The Pragmatic Approach*

This is a very well-known approach to creativity, which Sternberg and Lubart (1996) believe is equally damaging.

De Bono and Osborn are probably the most well-known people who have used this approach. De Bono ignored the theoretical work done by others on creativity; his perspective was more commercially related to the topic (De Bono 1973), whereby

creativity was viewed practically and commercially rather than theoretically and scientifically (Sternberg and Lubart 1996).

De Bono published over 30 books in this category and many more articles (De Bono 1973). Concepts such as lateral thinking, which refers to the process of shifting from previous views to new ones (De Bono 1973), and "thinking hats", where the individual wears different coloured hats and looks at the problem from different viewpoints depending on the hat he's wearing (De Bono and Markland 1999), are two of his most widely used techniques. Osborn (1953), in his book *Applied Imagination*, introduced brainstorming techniques, which involve solving problems using as many solutions as possible. This encourages divergent thinking ability in individuals. Also, his Creative Problem Solving (CPS) model (Osborn 1953, Kvashny 1982, Puccio and Cabra 2010) fits into this category.

Sternberg et al. (1996) believed this approach lacks empirical evidence, psychological theory and background. They also added that the popularity of the approach may be the reason for its deficiency in scientific theory.

2.3.7.3 *The Psychoanalytic Approach*

This was the first theoretical approach to creativity (Sternberg and Lubart 1996). In this concept, Freud (1910/1964, cited in (Noy 1969, Sternberg and Lubart 1996) suggested that creativity is a process between the conscious and the unconscious, later named the id and ego. In this concept, the creative person has unconscious wishes, which are then turned into conscious production.

Kris (1952, cited in (Noy 1969) then developed the concept of adaptive regression and elaboration. Adaptive regression motivates creative thinking in the unconscious. This usually happens during sleep or daydreaming. The second process, elaboration, is the process of transforming the unconscious thoughts into realistic and conscious thinking, and thus creative production happens.

There was a scientific perspective to the psychoanalytic approach; however, due to the difficulty in measuring the process, especially the primary process, it has not been used as a scientific approach in today's literature of creativity (Coulter 2004).

2.3.7.4 *The Psychometric Approach*

It was not until the 1950s, in Guilford's American Psychological Association Address, that creativity was discussed as it is now considered in the modern world (Guilford 1950, Lubart, Barbot et al. 2011). Before this date, there was a historic vision of creativity – H-Creativity – rather than the psychological – P-creativity – perception (Boden 2003). However, since the 1950s, creativity has been thought of as "everyday creativity" that can be used in everyday life by everyone, in contrast to eminent creativity or genius, which only a few people can use in certain situations (Richards and Runco 1998, Lubart, Barbot et al. 2011). In this approach, Guilford (1950, Hocevar 1980) argued that intelligence and creativity were two different things and suggested that creativity must be distinct and measured differently from IQ tests. He suggested a list of factors that indicated creativity, namely sensitivity to problems, fluency, flexibility, novelty, synthesising ability, analysing ability, reorganisation, elaboration and evaluation. He suggested that divergent thinking is involved highly in creativity; however, it is a complex factor (Torrance 1988, Kim 2006a). In this approach, divergent thinking consists of four aspects: flexibility, the ability to shift from one category to another; fluency, the number of relevant ideas; originality, the ability to produce novel ideas no one has thought of before; and elaboration, the details specifically mentioned for each idea (Guilford 1950, Wallach 1968, Kvashny 1982, Torrance 1988, Treffinger, Young et al. 2002, Runco and Acar 2012). Meanwhile, creative behaviour also includes sensitivity to problems and redefinition (Guilford 1956, Torrance 1988, Kim 2006b).

In 1966, Torrance developed the concept of creativity even further; he is best known for the Torrance Test of Creativity (TTCT), which he renewed later on (Kim 2006a). His tests were designed using the four scoring criteria from divergent thinking as defined by Guilford (Guilford 1956, Torrance 1966, Hocevar 1980, Kim 2006a, Kim 2006b).

However, Barbot et al. (2011) believe that in this approach, only a limited range of creativity factors are specified and measured, which do not cover all aspects of creativity. These are the divergent thinking factors of originality, flexibility, fluency and elaboration, while convergent thinking abilities, which they believe are also part of the creative thinking process, are not considered (Barbot, Besançon et al. 2011). In

addition, the assessment tools used in this approach are old by psychological standards and do not provide sufficient norms.

2.3.7.5 *The Cognitive Approach*

This approach focuses on the cognitive processes and mental structure of creative thinking (Smith, Ward et al. 1995). There are two main aims in this approach. First, by utilising cognitive science methods, it aims to understand the creativity process. Secondly, it aims to question cognition by examining it through the creativity context and then suggesting new ideas (Smith, Ward et al. 1995). One of the methods in this approach is the Geneplore model, which was conceived by Finke and his colleagues (Finke, Ward et al. 1992) and consists of two main processes, the generative and the exploratory. In the generative phase the individual produces ideas with flexible degrees of creative potential, and in the exploratory phase the individual modifies the primarily generated ideas judged to be created (Finke, Ward et al. 1992, Sternberg and Lubart 1996, Ward 2004).

Sternberg and Lubart (1996) argued that this approach to creativity does not consider the personality and social aspects affecting creativity and only focuses on mental representations and creativity processes.

2.3.7.6 *The Social-Personality Approach*

This approach was developed in parallel with the cognitive approach, but focuses on factors such as social/environmental issues, personality characteristics and motivation aspects and the influence of these factors on creativity (Amabile 1983, Sternberg and Lubart 1996, Coulter 2004).

Regarding motivational aspects in creativity, Amabile and Collins (1999) discussed the influence of motivation on creativity, believing there to be two types of motivation: intrinsic motivation and extrinsic motivation (Amabile and Collins 1999). Intrinsic motivation consists of self-determination, task involvement, curiosity, competence, interest in the work and enjoyment. Extrinsic motivation is related to competence, evaluation, recognition and money and any other motivation factor controlled by others (Amabile and Collins 1999). Most recent theories on motivation maintain the positive influence of intrinsic motivation, while extrinsic motivation is said to weaken creativity.

Mihaly Csikszentmihalyi (1997, Csikszentmihalyi and Nakamura 2002) introduced the concept of "flow", which is seen as high intrinsic motivation and thus results in creative production. Flow is when an optimal state of immersive concentration happens, distraction is minimised and the individual responds to the activity with high enjoyment. Usually it involves losing track of time and forgetting daily problems and fatigue (Csikszentmihalyi 1997, Amabile and Collins 1999, Csikszentmihalyi and Nakamura 2002).

Amabile and Collins (1999) restudied extrinsic motivation and categorised it into two types: synergistic extrinsic motivation, which coordinates intrinsic motivation and provides information to the individual in order to help with creativity, and non-synergistic extrinsic motivation, which results in the individual feeling controlled and under pressure, and works against intrinsic motivation and thus creativity. They counted a number of extrinsic constraints that should be controlled in order to nurture creativity, such as assessment, observation, rewarding constraint, task constraint and competition motivation (Amabile and Collins 1999).

Sternberg and Lubart (1996), however, believe that the social-personality approach also fails to cover the full concept of creativity as it only focuses on certain aspects of the concept and provides no knowledge of the creativity processes and mental representations underlying creativity.

2.3.7.7 *The Confluence Approach*

In this approach, theorists believe there are various components that build creativity by merging with each other. In this regard, Amabile (1983) proposed three main factors influencing creativity:

1- Domain-relevant skills that include knowledge and technical skills in the domain plus special talents. These skills depend on innate cognitive abilities, perceptual motor skills and formal and informal education.
2- Creativity-relevant skills, including suitable cognitive style, implicit or explicit knowledge of heuristics from which the individual can produce original ideas, and conducive work style. These depend on the individual's personality characteristics, special training and experience in idea generation.

3- Task motivation that includes attitudes to the task and self-motivation for doing the task, depending on the primary levels of intrinsic motivation toward the task, any relevant extrinsic constraints in the social environment and the individual's cognitive ability to reduce these extrinsic constraints (Amabile 1983).

Csikszentmihalyi (1997) also had a confluence approach to creativity, arguing that creativity results from a system with three components:

1- Domain: cultural practice and symbolic procedure, which are humans' most important reasons to be creative.
2- Field: the individuals that control the creative work in the domain.
3- Individual: a creative person within a domain who can change and influence the domain with his/her ideas (Csikszentmihalyi 1997).

He also listed some abilities of the creative individual, such as interest in the domain, genetic talent in the domain and access to the domain and field. Creative people are usually open and sensitive people who are complex and physically energetic. They are both smart and naive, having the ability to think both in convergent and divergent ways, and have a disciplined and playful nature at the same time. They also have imagination and realistic senses, and display both extroversion and introversion, and ambition and unselfishness, at the same time. They are aware of the role of luck and scholarship in their success, are psychologically intersexual, feel emotional in relation to their work, and respect traditions in a domain, but can be unruly too (Csikszentmihalyi 1997).

Another confluence approach is Sternberg and Lubart's (1992, 1995, 1996) investment theory, also known as the "buy low and sell high" concept. In this theory, the creative person is one who follows ideas that are unpopular when they are raised, but are likely to grow. In other words, she/he "buys" ideas with "low" prices, nurtures them and then "sells them high". Then, she/he moves to a new unknown idea and repeats the process again (Sternberg and Lubart 1992, 1995, 1996).

For this theory, Sternberg and Lubart (1992, 1995, 1996) list six resources for creative thinking:

1- Intellectual ability: this consists of three factors that affect creativity when they come together: a) selective encoding, which means having a different and new vision for problems; b) selective combinations, the ability to put these aspects together in new ways to choose worthy ideas; c) selective comparison, which means finding novel connections between the problem and knowledge and "selling high" the ideas to other people.
2- Knowledge in the field: this is also essential for guiding an individual in a creative production. However, researchers believe that knowledge can sometimes prevent a person from thinking beyond the boundaries and thus limits creative thinking (Sternberg and Lubart 1992).
3- Thinking style: an individual must also think in a judicial way, meaning they are able to decide which questions are needed and which are not and think both globally and locally.
4- Personality: there are five main personality attributes that are necessary to be a creative thinker. These are enthusiasm to grow, willingness to take sensible risks, desire to overcome obstacles, tolerance of ambiguity and self-confidence (Sternberg and Lubart 1992, 1996).
5- Motivation: Sternberg and Lubart (1992, 1996) referred to Amabile's (1983) concept of the importance of task-focused and intrinsic motivation. In this regard, Amabile explained that instinctive motivation is supportive of the individual's creativity (Amabile 1983, Amabile and Collins 1999) .
6- Environment: finally, the sixth resource of creativity is the supportive environment; without this source, the other five sources could be useless. The environment can help foster the individual's creative talent in three ways: by sparking ideas that are creative, supporting them, and evaluating the best ideas (Sternberg and Lubart 1992, 1996).

The first five resources are known as stable components, which are personal and individual characteristics, while environmental factors relate to contextual conditions that can foster an individual's creativity (Sternberg and Lubart 1991, Sternberg and Lubart 1992, Kandler, Riemann et al. 2016).

Sternberg and Lubart (1996) provide three reasons for why this approach to creativity is more promising. First, due to its multidisciplinary nature, the approach overcomes

the single-dimensional vision of creativity used by other approaches. Secondly, the approach explains the process of creativity as ordinary in aspects such as psychological processes and extraordinary in other processes such as the confluence process, resulting in creativity. Finally, this approach to creativity merges the different perspectives on the theory and links them to research in different aspects of psychology as a whole.

2.3.8 Thinking Processes and Related Assessments in Creativity

There are two general thinking processes, namely divergent thinking and convergent thinking. Divergent thinking is the ability to grow as many ideas and solutions for solving a problem as possible, so it is associated with quantity of ideas. Convergent thinking is the ability to combine various ideas in new original ways, so quality of the final idea is the most important (Sternberg and Lubart 1991, Sternberg and Lubart 1992, Barbot, Besançon et al. 2011).

Related to these two thinking processes, there are two main arguments in creativity theories. On the one hand, many theorists such as Guilford (1950) in his PAP presidential address and Torrance (Torrance 1966, Torrance 1968, Torrance 1998, Kim 2006a, Kim 2006b) in his creativity assessment tests, suggest that divergent thinking is part of the creative thinking process, while convergent thinking is often seen as part of the Intelligent mode of thinking. This vision of creativity was later continued and referred to by many other researchers. Most of the tests designed to assess creativity are built on this concept (Runco and Acar 2012, Oncu 2015). They mainly aim to measure the four factors of fluency, originality, flexibility and elaboration; however, most of them only measure fluency as an indicator of divergent thinking as it is easier to measure (Lubart, Besancon et al. 2012, Runco and Acar 2012, Hoicka, Bijvoet-van den Berg et al. 2013, Robson 2014, Barbot, Besançon et al. 2016).

Treffinger et al. (2002), in an article titled *Assessing Creativity: A Guide for Educators,* discuss some of the most commonly used creativity tests for children. However, as mentioned, these mainly assess divergent thinking processes. The first is the Torrance Test of Creative Thinking (TTCT). This test was designed in 1966 by Torrance (1968) for those aged over nine years, and has been re-normed four times (Torrance 1966, Hocevar 1980, Kim 2006, Kim 2006b). The measuring criteria are the four factors of

divergent thinking identified by Guilford, namely fluency, flexibility, originality and elaboration (Torrance 1968, Kim 2006a, Zachopoulou, Makri et al. 2009).

In 1986, when the third edition of the test was developed, while the criteria of the test remained the same, the scoring procedure changed in order to simplify it (Torrance 1988, Kim 2006a). In the fourth edition, fluency and flexibility were merged, as they often collaborated, and two new parameters were added, namely Abstractness of Title – the degree beyond labelling a title given to a picture – and Resistance of Premature Closure – psychological openness. In addition, 13 criterion-referenced measures called creative strength were added(Torrance 1988, 1990).

The TTCT has two different versions, the TTCT-Verbal and the TTCT-Figural, and each test consists of two forms, A and B (Kvashny 1982, Kim 2006). Torrance tests are widely used; they are the most famous of all the creativity tests that have been developed (Kvashny 1982). Torrance believes the major studies that have used TTCT are an indirect but strong reason for the validity and confidence in the tests (Kvashny 1982). Treffinger (1985) believes that for research and group use, TTCT is a reliable test to use.

The second test is Thinking Creatively in Action and Movement (TCAM) which was also designed by Torrance and was based on TTCT; however, it is aimed at children with limited verbal and drawing skills. It was designed for children from the age of three to six, and, like TTCT, mainly focuses on divergent thinking (Reisman, Floyd et al. 1981, Zachopoulou, Makri et al. 2009).

Hocevar (Hocevar and Michael 1979, 1979a, 1979b, 1980) examined Torrance's creativity tests; they believed they were single-dimension tests and only measured the fluency factor in creativity. Researchers such as Treffinger (1985), Dixon (1979) and Abernathy Tannehill (1998) also believed there was a high similarity between originality and fluency, and that Torrance's tests could only be used as a measurement tool for fluency. Other researchers (Chase 1985, Hassan 1986, Heausler and Thompson 1988, Runco and Mraz 1992) have also pointed out that Torrance's tests do not cover all creativity aspects, and point to the similarity of the method when fluency, flexibility, elaboration and originality are scored.

A third test is the Cornell Critical Thinking test. This test was designed by Ennis (Ennis, Millman et al. 1985, Ennis 1993) for those over the age of ten; it assesses critical thinking. Another test is Guilford's Structure of the Intellect Model, which also aims to measure fluency, flexibility, originality and elaboration in children's drawings (Guilford 1959, 1988).

More recently, Sternberg (2001) agreed with this theory; however, he added that there is a third type that includes both divergent and convergent thinking ability, called wisdom. However, Lubart et al. (Barbot, Besançon et al. 2011, Lubart, Barbot et al. 2011, Lubart, Besancon et al. 2012, Barbot, Besançon et al. 2016), in their recently designed creativity assessment test known as the Evaluation of Potential for Creativity, suggest that creative thinking includes two processes that occur in cycles, the divergent-exploratory and convergent-integrative thinking processes. They believe that the ability to think convergently comes from a creative mind. Other theorists, such as Csikszentmihalyi (1997), have also listed convergent thinking ability as a characteristic of creative people.

2.3.9 Creativity: Domain-General or Domain-Specific

There have been different suggestions with regards to creativity being a general cognitive process where a person has creative abilities overall, or a domain-specific ability where an individual can be creative in a specific field and not creative in another. Some researchers, such as Amabile (Conti, Coon et al. 1996) and Ward (Smith, Ward et al. 1995) among others (Cheng, Msel et al. 2006), believe creativity is an overall cognitive process, while others such as Han (Han and Marvin 2002, Han 2003) and Lubart (Lubart and Sternberg 1995, Lubart, Besancon et al. 2012, Barbot, Besançon et al. 2016) believe it is a domain-specific capability. Finally, some researchers believe people have general creative abilities that can foster in specific fields based on the environments and training they encounter (Plucker and Beghetto 2004, Simonton 2007, Kaufman, Cole et al. 2009).

As none of the researchers on either side have very strong proof of whether creativity is totally domain-specific or a general cognitive ability (Mottweiler and Taylor 2014), it can be concluded that by fostering creativity in children's play, there is a possibility that the individual will eventually become more creative overall.

2.4 Summary

2.4.1 Summary of Outdoor Play Environments

Play is essential for children's cognitive development as well as their emotional, social and physical wellbeing (Titman 1994, McCune and Zanes 2001, Isenberg and Quisenberry 2002, Ginsburg 2007, Lester and Russell 2008, Beunderman 2010, Kopp 2010, Cole-Hamilton 2012, Gleave 2012, Wilson 2012, Mayesky 2014).

There are different types of play (Hughes 1996, 2002, 2013) with each encouraging some aspects of child development. Some may be more associated with children's creative play, such as object play, imaginative play and mastery play, while others mostly encourage motor skill developments, such as rough and tumble play and locomotor play.

Research shows that some play types are highly associated with creativity. These include pretend play, dramatic play, constructive play, exploratory play. Loose parts in play spaces are found to highly encourage these types of play.

There are different categorisations for outdoor play environments. One categorisation (Hayward, Rothenberg et al. 1974) divides them into three types: traditional, which includes individual play equipment such as slides and swings, specially designed for specific physical activities; contemporary, which includes multi-function play structures such as climbing frames; and adventure playgrounds, also known as loose parts or junk material play settings. Loose materials can be divided into manufactured materials and natural materials. Research shows there are many benefits from providing both sets of loose material play settings for children's learning and development, even in regard to creativity.

Another categorisation (Cosco 2006) divides play settings into manufactured, mixed and natural environments. There are also many research findings showing the positive impact of natural environments on children's wellbeing from different angles and cognitive developments.

There are various aspects that designers take into account when designing outdoor settings for children, such as educational aspects, social aspects and creativity. These may vary depending on the type of outdoor setting and location (Cram 2001).

School outdoor environments are especially important compared to other outdoor play settings. This is due to several reasons such as being universal, children having regular visits to these settings, the duration of time spent in these outdoor settings, being accessible, providing ownership and community access.

'Kindergarten' is the German word for 'garden for children' and was designed based on connecting the children with nature. Forest School and Outdoor Classroom are other education concepts that focus on encouraging children to play and learn in the natural contexts and the outdoor settings.

There are various recommendations for pre-school and school outdoor environmental design such as Ledermann's (1968) recommendation, The Preschool Outdoor Environment Measurement Scale (POEMS) and the Early Childhood Knowledge and Learning Centre (ECKLC) Play Space Assessment.

POEMS contain five domains namely 1-physical activity, 2- interaction, 3- play and learning setting, 4- programme, 5- teacher/caregiver role.

The ECKLC points to 11 factors namely 1-Key features, 2-Movement opportunities, 3-Flexibility and play, 4-Shelter and shade structures, 5-Natural features, 6-Welcoming atmosphere, 7-Sensory elements, 8-Accessibility and inclusive play, 9-Risk and challenge, 10-Surfacing and 11-Enclosure and safety features.

2.4.2 Summary of Children's Educational Methods

Studying Piaget's (1896-1980) child development stages, it can be understood that the second cognitive development stage – the Preoperational stage, from age two to six – is a crucial age for nurturing children's creativity. At the start of this stage, if the child is provided with a supportive setting, they can learn to use their imagination and abstract thinking (Piaget 1962). Some of the creative play types, such as pretend play, fantasy play and sociodramatic play, form during this stage (Hughes 1996, 2013)

In terms of education methods, there are some methods developed around the world that focus specially on creativity aspects. This not only relates to teaching methods; they specifically underpin the importance of physical environment aspects to children's learning and creativity. These include Montessori and Reggio Emilia. The Montessori method notes several environmental characteristics that a school should have, such as access to outdoor gardens, children's freedom and movability of

furniture (Montessori and Simmonds 1965, Röhrs 1994, Edwards 2002, Montessori 2013, O'Donnell 2014).

One of the six main factors in the Reggio Emilia approach is the environment, known as "the third teacher", which shows how the environment can influence children's behaviour. This education method also identifies several environmental characteristics that should be taken into account such as openness, movability, multi-functional furniture and multi-sensory materials in the setting (Edwards 1993, Valentine 1999, Abbott and Nutbrown 2001, Giudici, Rinaldi et al. 2001).

Another approach, by Fredrich Frobebel Kindergartens, is to use loose parts in educational settings in order to support cognitive development skills. Frobebel's loose parts play equipment designs later inspired others to design toys and games with educational value (Klar, Winslow et al. 1933, Shea 1973, Weston 1998).

The National Advisory Committee on Creative and Cultural Education (NACCCE 1999) also highlights the importance of creativity in children's education, pointing out that it is needed in different fields of learning. They count four main parameters for a creative process: imagination, purpose, originality and value. They also state the importance of "teaching for creativity" as well as" teaching creatively".

The Curriculum for Excellence (Executive 2004, Executive 2006, Henderson 2010, Kidner 2013), which is part of the Scottish education system, also highlights "creative thinking abilities" as an expectation of children in the Scottish educational setting. In this education system, environmental characteristics are also known as features, which can support learning.

2.4.3 Summary of Creativity

Creativity is crucial for fostering individuals' creativity from a young age. Even though the theory of creativity has only been studied as an individual human feature since 1950, there are over 100 definitions of the topic. One of the more recent definitions, which was adopted for this research, is the individual's ability to produce original ideas and work (i.e. new, different from that which we can usually see) that are appropriate to the context and constraints of the situation (Lubart 1994, Lubart and Mouchiroud 2003, Lubart, Besancon et al. 2012, Runco and Jaeger 2012).

It was found that for children, there are four levels of engagement in experience that should be taken into account, namely curiosity, exploratory, play and creativity (Cecil, Gray et al. 1985).

Creativity occurs within the brain as a cognitive behaviour, and the frontal cortex is the central part of the brain involved in creative thinking.

Although there are various techniques used in cognitive neuroscience to explore human cognition such as EEG, they can't be used for this research as background brain activity or rapid movements while using the equipment confuses the signals processing which results to inaccurate data.

Although human-centred conative and cognitive aspects are important when it comes to influencing human creativity, it is understood that physical-centred environmental aspects are also influential (Lubart, Zenasni et al. 2013, Berlin, Tavani et al. 2016). Thus, designing appropriate physical contexts for fostering children's creative behaviours is essential.

When exploring how to design children's educational outdoor play spaces to foster their creativity in play, it is essential not only to choose an appropriate definition, but also to understand the main factors involved in the creative process. This helps to understand what to expect from children in terms of creative play, as well as the way the space should be developed according to these factors.

According to the study of the different approaches of creativity, the mystical, pragmatic and psychoanalytic approaches do not have an appropriate scientific background and are thus not suitable for this research.

The psychometric approach is the most well-known and used definition in scientific theories. However, it does not cover all aspects of creativity and only focuses on divergent thinking. It could be used in this research to help understand the aspects of divergent thinking as part of creativity.

Both the cognitive approach and the social-personality approach only show certain aspects of creativity. These factors, however, are important in this research. This is because they provide knowledge of which types of motivation nurture creativity and which ones prevent it, and how to encourage flow in order to motivate a child towards

creative behaviours. Also, these approaches help to understand which personality characteristics must be valued when designing an environment that will result in creative production in children, and how the environment can affect creative thinking. These factors needed to be considered in the research; however, they do not cover all aspects of creativity.

The last approach, the confluence approach, is the most up-to-date and multidimensional vision of creativity. Psychologists have tried to include as many aspects that result in creativity as possible, without omitting anything. Based on the different thinking processes, Barbot et. al (2011) supported the theory that creativity includes both divergent and convergent thinking processes and that these occur in cycles through creative thinking (Barbot, Besançon et al. 2011, Barbot, Besançon et al. 2016, Berlin, Tavani et al. 2016). As such, this research is based on their theory of creativity, which covers all aspects of creative behaviour.

CHAPTER 3 RESEARCH DESIGN AND METHODS

This chapter presents the design and methodologies used to conduct the research project. It starts by introducing the research questions (Section 3.1) and the aims and objectives (Section 3.2). Then it introduces the theoretical framework for this research (Section 3.3). It then gives an overview of the research strategy (Section 3.4), which shows what the whole research study has set out to do. Then, in Section 3.5, it explains the research approach and how it starts as a deductive approach and then moves to an inductive approach. Following this, the qualitative and quantitative methods used for each stage of the research are explained in detail (Section 3.6). Then the research design, which explains the experimental research method, is presented (Section 3.7).

Section 3.8 presents the site selection process and introduces the two sites used in this study, as well as the research phases. As an important issue, the chapter explains the ethical considerations for this research. This includes the University of Edinburgh ethical procedure, the consent forms and the data management process (Section 3.9).

Section 3.10 is where the three main data collection methods – observation, focus group discussions and the Leuven Wellbeing and Involvement Scale – are explained. Then, in Section 3.11, the data collection process for each of the stages of the research are presented (the pilot study, Study Site One and Study Site Two). Then, the chapter presents the method of data analysis (Section 3.12). This chapter ends with a summary in section 3.13.

3.1 Research Questions

Q1. How can children's creative play behaviours be categorised and measured?

Q2. What is the influence of different outdoor play contexts on children's creative play behaviours?

> **Q2.1.** How does fixed manufactured play context influence children's creative play behaviours?
>
> **Q2.2.** How do play contexts facilitated by loose manufactured play equipment influence children's creative play behaviours?

Q2.3. How do play contexts facilitated by loose parts and junk material influence children's creative play behaviours?

Q2.4. How does natural play context influence children's creative play behaviours?

Q3. What design principles should be considered when designing children's educational outdoor environments in order to nurture their creative play behaviours?

Q4. Are there different levels of creative play behaviours between different genders?

3.2 Research Aim and Objectives

One of the aims of this research, which was an answer to the first research question, was to:

Design a taxonomy that can classify children's levels of creativity while they are engaged in play.

The second research question, which formed one part of the second contribution of this research, aimed to:

- Outline the role of fixed manufactured play context in children's creative play behaviours.
- Outline the role of play contexts facilitated by loose manufactured play equipment in children's creative play behaviours.
- Outline the role of play contexts facilitated by loose parts and material in children's creative play behaviours.
- Outline the role of natural play context in children's creative play behaviours.

Accordingly, the third aim which addressed the third research question and was another part of the second contribution of this study was to:

Develop design principles for nurseries' outdoor environments in order to nurture children's creative play.

A final aim, which answered the fourth research question, was to understand whether different genders' creative play behaviours varied in different play contexts.

Overall, the present study is an attempt to understand the role of educational outdoor environmental design in children's levels of creativity. The findings are intended to guide landscape architects, children's educationalists and playground design professionals to produce informed design decisions based on the framework of creativity, in order to nurture children's creative thinking abilities and to influence school policy. The findings about the children's creative play measurement tool could be used by child educationalists, schools, child psychologists and designers of landscapes to assess children's creative play behaviours in various settings.

3.3 Theoretical Framework

Neuman (2004) defines social theory as "a system of interconnected abstractions or ideas that condenses and organizes knowledge about the social world" (p.57). Studies that are not theory-based rarely involve high-quality research (Neuman 2004). A theoretical basis for research will assist the researcher in expanding and developing the understanding of the topic in order to expand knowledge in the field (Neuman 2004).

As creativity is a difficult concept to define and assess (Amabile 1996a) this research needed to be based on a theoretical framework related to the concept of creativity in order to provide an understanding of the topic and the aim of the research in terms of final outcome. This also helped to recognise the ways in which creativity amongst children could be observed and assessed in the play contexts.

Due to the importance of this aspect to the current research, Chapter Four describes the assessment tool, which is based on the chosen theoretical framework of creativity for this study. The theoretical framework is informed by the creativity test designed by Lubart et al., the Evaluation of Potential for Creativity (EPoC) (Lubart, Besancon et al. 2012). It was one of the most recent creativity assessment tests available when this research was undertaken. According to this framework, creativity includes both divergent-exploratory and convergent-integrative thinking processes (Barbot, Besançon et al. 2011, Barbot, Besançon et al. 2016, Berlin, Tavani et al. 2016), and is a multifaceted and domain-specific concept involving various factors (Lubart, Besancon et al. 2012).

Chapter Four gives a detailed explanation of the reasons why this theoretical framework and its measurement test were chosen for this study. It sets out why the measurement test was not used in its usual format, and why it needed to be modified for the use of this research. It then presents the modification steps taken, which resulted in a final version of a Creative Play Taxonomy, based on the theoretical framework upon which EPoC was built.

3.4 Research Strategy

A research strategy is an overall plan of the way a research study is conducted (Johannesson and Perjons 2014). It offers an overview of the research and high-level guidance. There are three main aspects that should be considered when choosing the research strategy. First, it should answer the research questions and help to achieve the aims of the research. Secondly, it should be made feasible by gaining access to data and setting out the duration of the study. Thirdly, it should consider ethical aspects in relation to the research (Johannesson and Perjons 2014). In order to achieve the aims of this research, the following steps were taken:

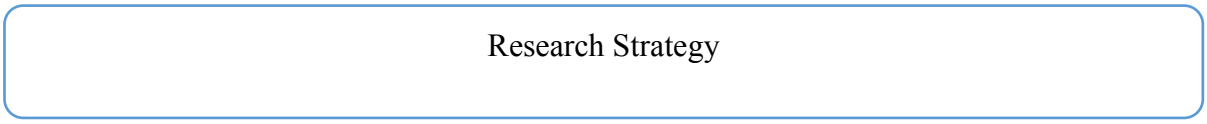
1) Pilot study: this was the initial step, which helped to reach the first (Creative Play Taxonomy) and second (Design Principles) goals of the research.

2) Taxonomy development: based on the pilot study, this step achieved the first goal of this research, which was to design a taxonomy that could classify children's levels of creativity while they were engaged in play.

3 and 4) Experimental research at Study Site One and Study Site Two: Both steps were taken in order to achieve the second, third and fourth research aims, which were: to gain an understanding of the environments that support children's creativity in play; to develop design principles for educational outdoor environments in order to nurture children's creative play; and to ascertain which contexts are more supportive of particular genders for creative play.

5) Data analysis: the final step taken to achieve the last three aims.

The following diagram shows the steps taken in this research:



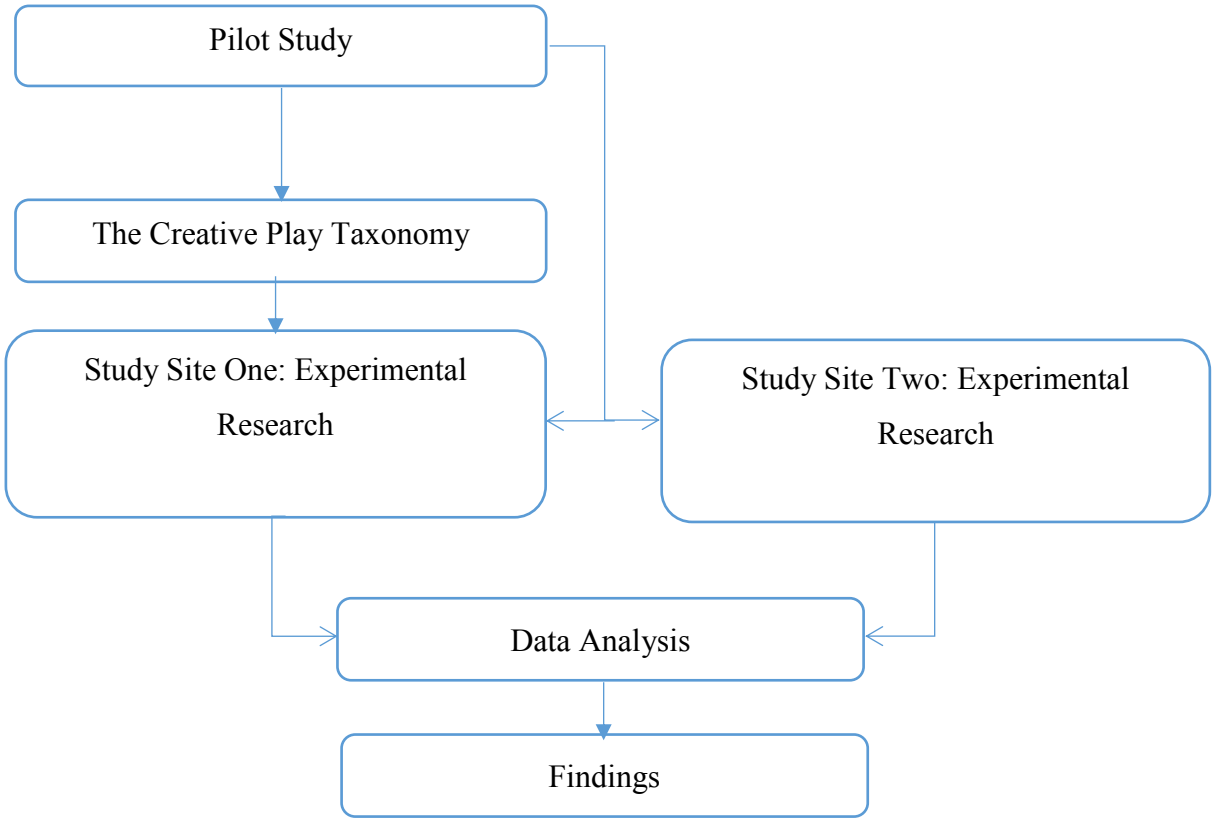


Figure 3-1: Research Strategy

3.5 Research Approach

Babbie (2010) argued that "scientific inquiry in practice typically involves alternating between deduction and induction. Both methods involve interplay of logic and observation. And both are routes to the construction of social theories" (p.53).

A deductive research approach refers to testing objective theories in order to examine the relation between different variables that can be measured with different tools. It usually results in numeric data analysed using systematic procedures (Creswell 2013). The data in this approach are less subject to bias and can be generalised, and the findings may be replicated (Goddard and Melville 2004).

An inductive research approach refers to the process of exploring and understanding individuals' behaviours within a flexible structure, with the researcher making

interpretations of the data (Creswell 2013). In this approach, the researcher is searching for patterns (Bernard 2011), thus it is based on the researcher's observations, and theories are developed towards the end of the research (Goddard and Melville 2004). As described by Neuman (2004), in an inductive research, experimental generalisations and initial connections are developed and identified by the researcher, and are then refined and elaborated towards abstract thinking.

This research employed a mixture of inductive and deductive approaches. It first used a deductive approach by selecting a theory on which to base the development of the research. Accordingly, a theory of creativity was chosen. This helped to conceptualise an initial understanding of the topic of creativity and the factors that are involved in a creative thinking process, based on a valid theoretical framework.

Secondly, it used an inductive approach. As the test that had previously been developed based on the chosen theory was incapable of capturing children's creativity during play, it was modified based on the researcher's observations in the pilot study. This resulted in the development of a taxonomy that aimed to classify and measure children's creative behaviours in play. The taxonomy was then used as a coding system to analyse children's creativity in different play contexts and find out which creative behaviour patterns occurred more often in each context, as well as which play contexts are more supportive of creativity in play.

3.6 Research Method

Research methods are either qualitative, quantitative or mixed (Goddard and Melville 2004, Creswell 2013). A qualitative method covers subjective, humanistic and interpretive methods (Kotler 2012). According to Corbin and Strauss (2014), it refers to "any type of research that produces findings not arrived at by statistical procedures or other means of quantification" (p.10). This method is usually used for research about people's emotions, feelings and behaviours, as well as social activities, cultural studies and interactions between different nations (Corbin and Strauss 2014).

Quantitative methods are known to be objective, scientific and experimentalist (Kotler 2012). However, researchers can do statistical analysis on human-centred data such as people's feelings and perceptions using quantitative methods. Using this method, a

phenomenon is treated statistically. The process employs some type of measurement of the data, which provides numeric models and theories based on statistical and percentage data (Bryman 2015).

Mixed method is when the research adopts both qualitative and quantitative research methods. In human and social sciences, using mixed methods has gained popularity. This is because, first, the research can benefit from the strengths of both qualitative and quantitative methods. Secondly, using both qualitative and quantitative methods helps gain a better understanding of the research problems. Finally, due to the complexity of the interdisciplinary nature of research in social research and humanities, it is inadequate to use only qualitative or quantitative methods as they fail to address complex problems (Creswell 2013).

This research used a mixed research method. The research started with a qualitative research method followed by a quantitative approach. A qualitative method was chosen due to the need to understand the nature of people's experiences in relation to various issues (Corbin and Strauss 2014). Through this approach we learn about the details of the emotional and behavioural aspects of people, as it is difficult to understand these through quantitative methods (Corbin and Strauss 2014). Thus, this research initially used a qualitative research method, behaviour observation, in the pilot study, as well as at one of the study sites (Study Site Two) in order to gain a broad understanding of children's play behaviours in different play contexts. In the pilot study, the findings were supported by a quantitative method, the Leuven Wellbeing and Involvement Scale (Laevers 2006). At Study Site Two, focus group discussions, another qualitative research method, were also used in order to help achieve a better understanding of children's play behaviours in different play contexts.

In order to benefit from the strengths of quantitative data as well as qualitative data and to validate the results of the research, this study also adopted quantitative research methods. Accordingly, the observation sessions held at one of the study sites (Study Site One) were coded with the taxonomy, which was developed based on the theoretical framework and according to the observation session in the pilot study. This resulted in quantitative findings for the amount of time children spent engaging in different creativity levels in different play contexts.

3.7 Research Design

Creswell (1994) defined research design as "a detailed outline of how an investigation will take place, including how data is to be collected, what instruments will be used and the means of analysing the data" (p.1). It ensures that the researcher can ascertain the research problems as clearly as possible (Creswell 1994). In other words, it is a plan of investigation considered so as to address the research questions. In this research, an experimental design was used to observe and record children's play in different settings, and classify them according to their contribution to creativity, for which a Creative Play Taxonomy was needed. Initially this taxonomy was developed, and then an experimental design was adopted for the two study sites.

3.7.1 Experimental Research

There are two different types of experimental research: laboratory experiments and field experiments (Bryman 2015). Experimental research can be conducted in real life environments, with a well-focused research question, on a small number of people (Neuman 2004). There are two main components which form experimental research: the independent variable and the dependent variable. In this method of research, the researcher attempts to define whether one variable (the independent variable) causes changes in another variable (the dependent variable) (Goddard and Melville 2004). Although experimental studies are rarely used in social sciences due to the difficulty of controlling the independent variables, they are known to be very strong in terms of validity (Bryman 2015).

This research used an experimental research method at two study sites. This is because it is suggested that two different groups are used in experimental research in order to make more generalisable conclusions about the findings of the research (Bryman 2015). At Study Site One, which was a nursery, 15 children were observed in four different play contexts, while at Study Site Two, which was a primary school, 32 children were observed in four different outdoor settings and took part in focus group discussions. At both study sites, the same children participated while their play contexts changed, so the effect of the play contexts on their creative play behaviours could be assessed. Thus, the dependent variable was children's creative play behaviours, while the different play contexts were the independent variables. By using

the same group of children and only changing their play context, any differences in outcome are likely to be attributable at least in part to the play context.

3.8 Site Selection

Gardner (2008) describes the preschool years of a child as the "golden age of creativity" (p.86). These are the years when the child is very creative and artistic (Gardner 2008). It is even said that, at that age, children are the embodiment of human creativity (Glăveanu 2011). Alfonso-Benlliure et al. (2013) have pointed to different arguments on whether children's creativity increases or decreases with age. Gardner (2008) argues that children's creativity decreases as they enter school, due to the conformity of the learning system. However, it is clear that any level of creative practice in preschool children highly influences their creative development later on (Alfonso-Benlliure, Meléndez et al. 2013).

Due to the importance of younger children's creative development, this research chose nursery children, aged between three and five, as the target group. Accordingly, Study Site One, where the main data collection took place, was a nursery.

Urban (1991) believes preschool children's creativity is recognisably high; however, it is difficult to evaluate their level of creativity under the age of six as most of the creativity tests use verbal and graphical (drawing) skills that are not yet developed in children of preschool age (Urban 1991). Kamakil (2013) argued that he had found different results in the level of creativity between four-year-old and six-year-old children; the four-year-olds gained lower scores. He referred to Piaget's (1967) theory of cognitive development and explained that the results were due to the fact that the younger children did not have the same level of verbal and drawing abilities as the six-year-olds, so their scores in verbal and drawing creativity tests were lower.
Hence, this research also chose a primary school with children aged from five to eleven as the second study site to collect verbal data (via focus group discussions) in order to support the observation data. Accordingly, the reasons for the selection of each of the case studies are described below.

The main criteria for selecting the study sites for this research were that they either had access to different outdoor environments or had the potential to provide different play contexts in the available outdoor setting.

Study Site One's outdoor environment had the potential to be modified for three different play contexts, and also had access to a fourth context outside the main playground. Study Site Two included four different settings where the children were observed.

3.8.1 Study Site One: Bilston Nursery

Study Site One was Bilston Nursery. This nursery is part of a primary school that caters for classes in the first two years of school and is located in Bilston, Loanhead, a small town south of Edinburgh in Midlothian, Scotland. This site was selected as the pilot site and as one of the two main study sites[10].

The Scottish Index of Multiple Deprivation (SIMD)[11] is the Scottish Government's official tool to identify areas of multiple deprivation in the different areas of Scotland. The data collected by SIMD in 2012 was the latest data collected before this research was undertaken. In this index, the most deprived areas are in the 0%-20% range, and the least deprived zones in the 80%-100% range.

According to SIDS 2012, Bilston village was in the 40%-60% range of deprivation. This means that Bilston village is in an average rate of deprivation. This is while in the Housing, Education and Crime category, it is in the 20% - 40% range which indicates a fairly deprived community.

As the teacher also explained, most of the children in the nursery came from unemployed families living in Bilston Village, unlikely to have the opportunity to go to any leisure clubs. This point was considered in choosing the study sites for this research as the researcher wanted both study sites to be in the same level of

[10] http://roslin.mgfl.net/information/school-handbook/

[11] http://www.sns.gov.uk/Simd/Simd.aspx

deprivation. Having no access to any leisure clubs meant that the nursery's play area is the only space children have access to for play.

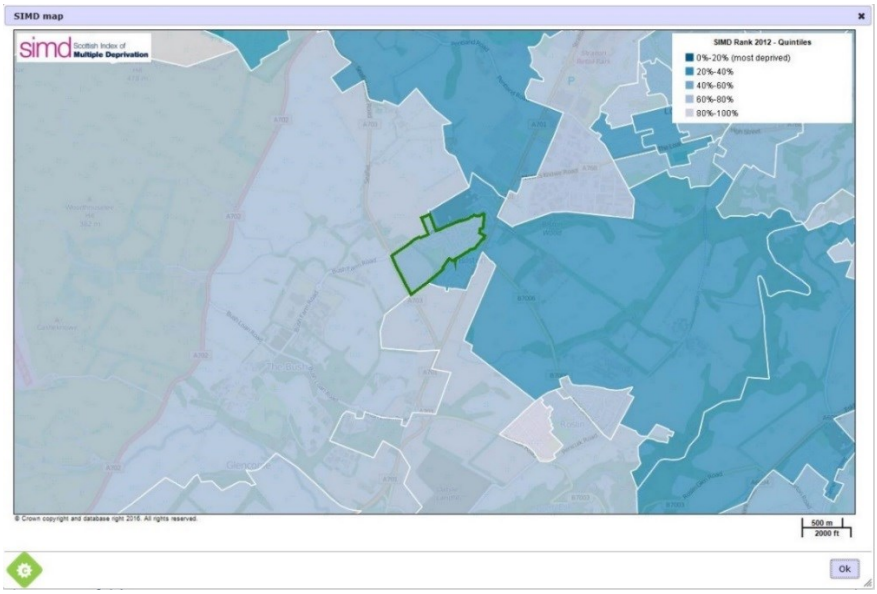


Figure 3-2: Scottish Index of Multiple Deprivation Rank 2012, Bilston Village ranked in the 40% - 60% which indicates average deprivation

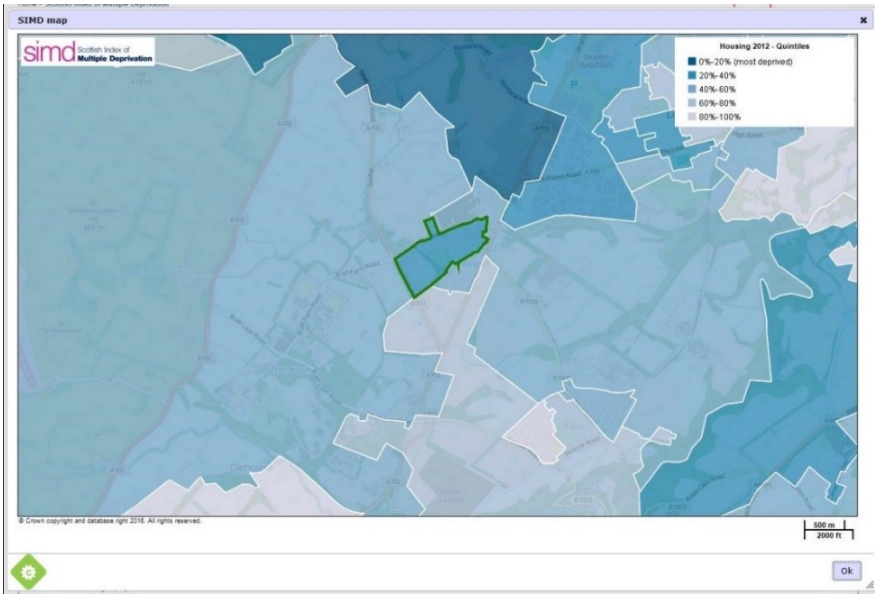


Figure 3-3: SIMD Housing Rank 2012, Bilston Village ranked in the 20%- 40% which indicates a fairly deprived area

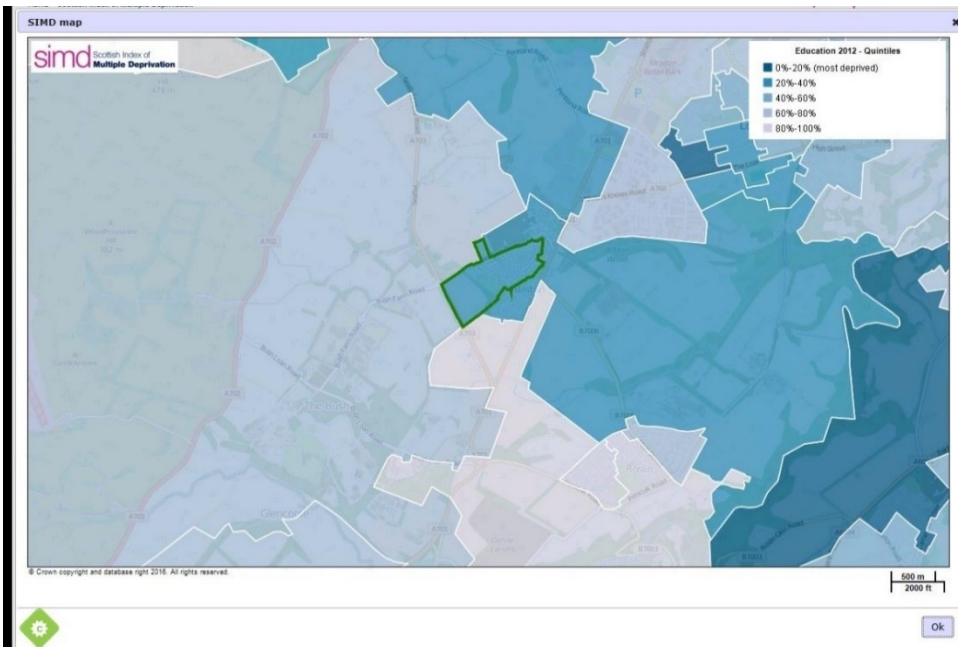


Figure 3-4: SIMD Education Rank 2012, Bilston Village ranked in the 20%- 40% which indicates a fairly deprived area

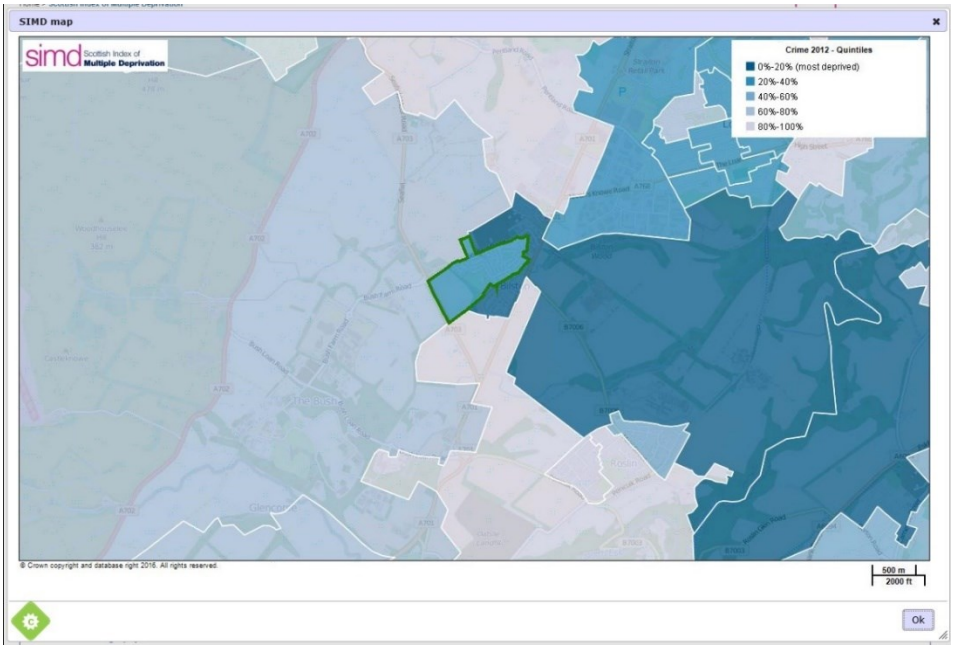


Figure 3-5: SIMD Crime Rank 2012, Bilston Village ranked in the 20%- 40% which indicates a fairly deprived area

This study site was chosen for several reasons. Firstly, according to the literature as mentioned earlier, any procedures that can result in nurturing children's creativity at preschool ages will influence the individual's creativity later (Alfonso-Benlliure, Meléndez et al. 2013). Therefore, nursery children were chosen for this research.

Secondly, Bilston Nursery was selected as its environment and geographical location provided the opportunity to create and make use of four different play contexts for assessing children's creative play behaviours in a wide range of settings. Accordingly, the first play context was the nursery's usual outdoor play space, which has a fixed timber climbing frame in the centre, accompanied by two benches and a sandpit on one side. The second play context was in the same environment as the first play context; however, it was provided with other manufactured play equipment to play with such as barbeque toys, bikes and cars and musical instruments. The third pal context was also in the nursery's play space; however, on this occasion, it was facilitated with junk materials and loose parts such as boxes, logs, pipes and pieces of carpet. The fourth play context was a woodland near the nursery. Apart from the natural elements available in woodland such as trees, leaves and logs, some supporting materials were also brought to this setting such as water, clay, bowls and brushes.

Thirdly, an important issue in collecting data from a school environment is that the researcher not only works with the participants – the children – but also with their parents and the school staff. Out of several places that were contacted, Bilston Nursery's staff and parents were the most cooperative and showed enthusiasm for this research.

3.8.2 Case Study Two: Prestonfield Primary School

Prestonfield Primary School in Edinburgh was the second study site. According to the most recent Scottish Index of Multiple Deprivation (SIMD) before the data collection which was in year 2012, Prestonfield Primary School is located in a fairly deprived area in Edinburgh. In fact, the school was in the 20% to 40% range while the most deprived range is the 0% to 20%. However, as shown in Figure 3-6, the school's catchment area exceeds the SIMD sections and a small area from less deprived settlements is also in the catchment of the school. Craigmillar area, which is one of the most deprived areas as per SIMD, is also near the school. In the Education category, the school is in the 60% to 80% range, in the Crime category it is in the 40% to 60% range which is better than the overall deprivation range of the school's area, however in the Health category it is in the 0% to 20% range which is most deprived.

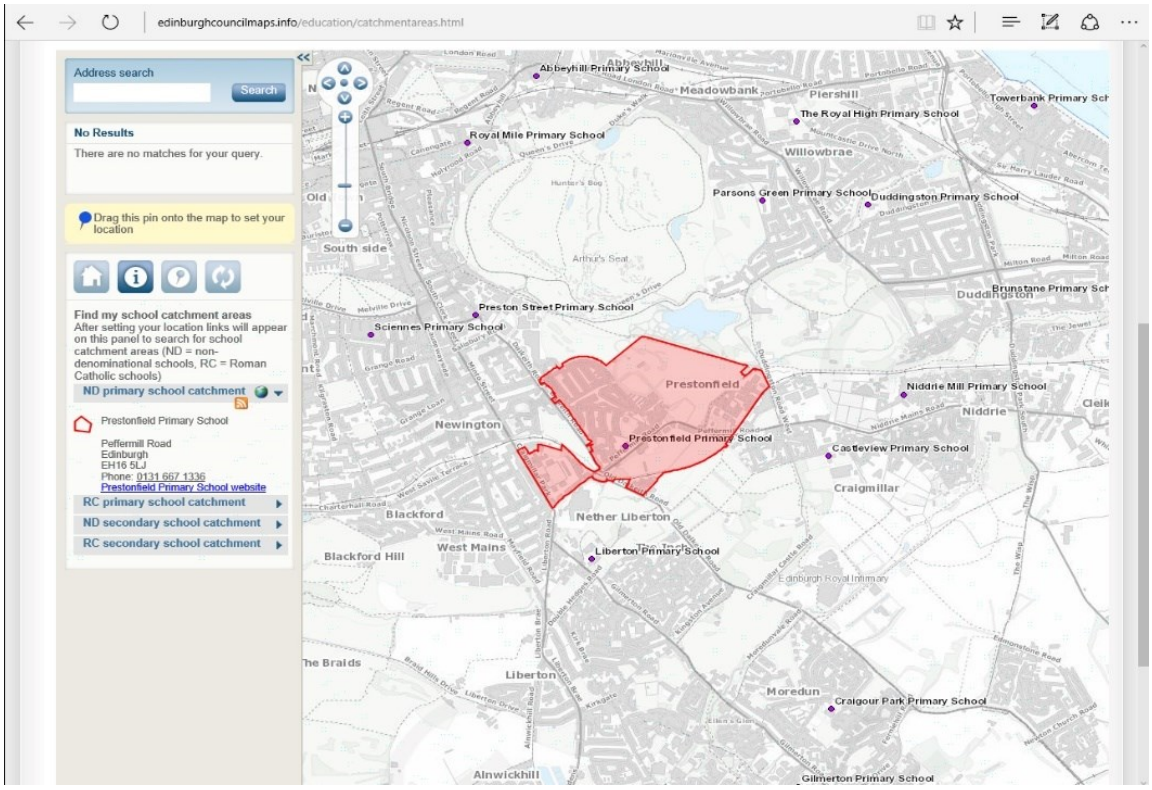


Figure 3-6: Prestonfield Primary School Catchment Area[12]

[12] http://www.midlothian.gov.uk/consultations/Catchment_areas_of_schools_along_the_A701_corridor/2015-07-01_A701_Schools_(existing).jpg

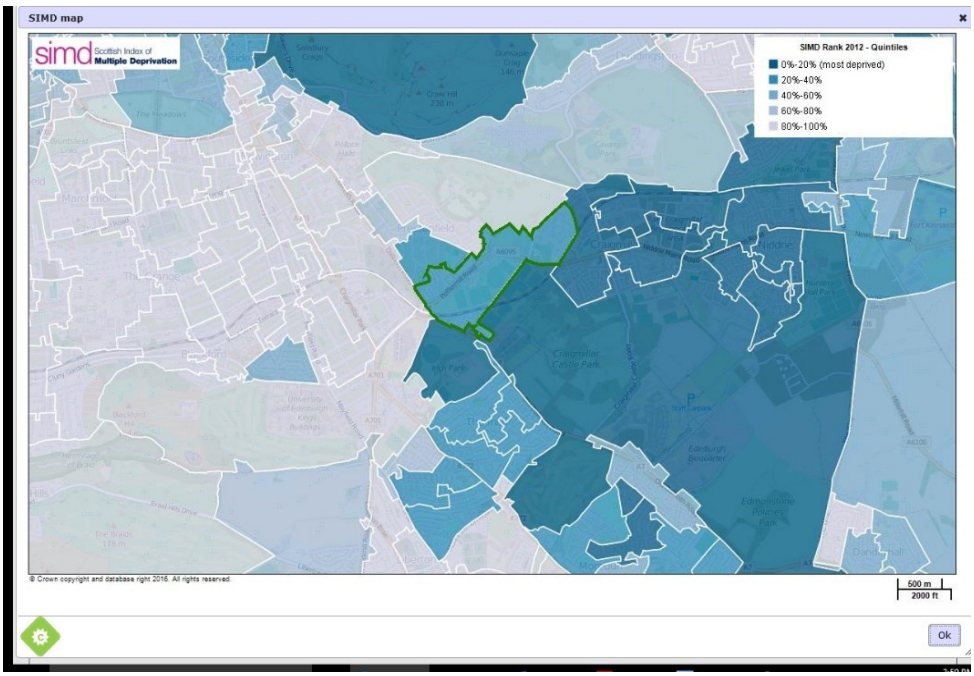


Figure 3-7: Scottish Index of Multiple Deprivation Rank 2012, Prestonfield ranked in the 20% -40% which indicates a fairly deprived area

Figure 3-8: SIMD Education Rank 2012, Prestonfield Area ranked in the 60%- 80% which indicates a low level of deprevation

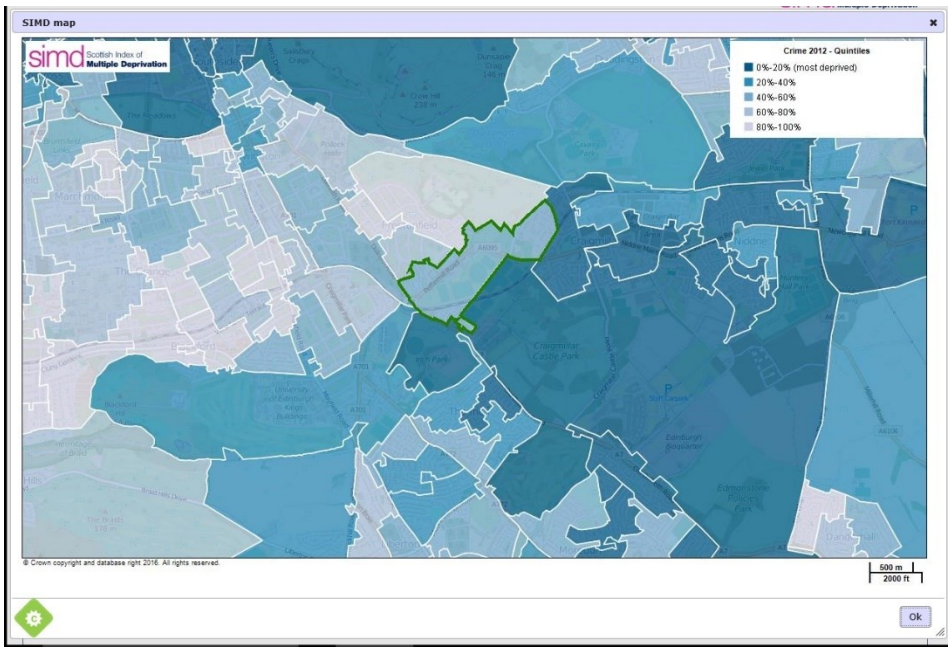


Figure 3-9: SIMD Crime Rank 2012, Prestonfield Area ranked in the 40%- 60% which indicates a moderate level of deprivation

Figure 3-10:SIMD Health Rank 2012, Prestonfield Area ranked in the 20%- 0% which indicates the most deprived area

The main aim of conducting research at this study site was to have a wider age range for data collection and to complement the findings from Study Site One by having

children explain their activities and preferences. Therefore, the main criterion was primary school children who were able to describe their play behaviours and feelings.

Secondly, the school's playground had several different environments where the children could be taken so that their creative play behaviours could be observed. First was a large tarmac playground that was facilitated with some football goals, basketball nets, painted games on the ground and play equipment boxes such as balls and ropes, which the children brought outside during playtime. The second environment was a hilly area covered with grass. The third was a fenced wildlife garden on one side of the playground to which children could have supervised access. The fourth space was located at the centre of the school complex and included paths, grassy spaces, willow tunnels, a pond and fountain, benches and other design features. This space was usually used for outdoor classes. Except for the tarmac playground, the children were not allowed to use the other three outdoor spaces during normal playtimes. The access to these potential outdoor play environments was a key reason for the selection of this school.

Thirdly, access to this school was valuable because of their support for the research. At the time of this study, the school was applying for a funding award to improve their outdoor play environment, so they were willing to use the knowledge and results of this research for the redesigning process. This encouraged them to allow access to their school and support the data collection process.

3.8.3 Research Phases

The following figures show the experimental research at each of the study sites:

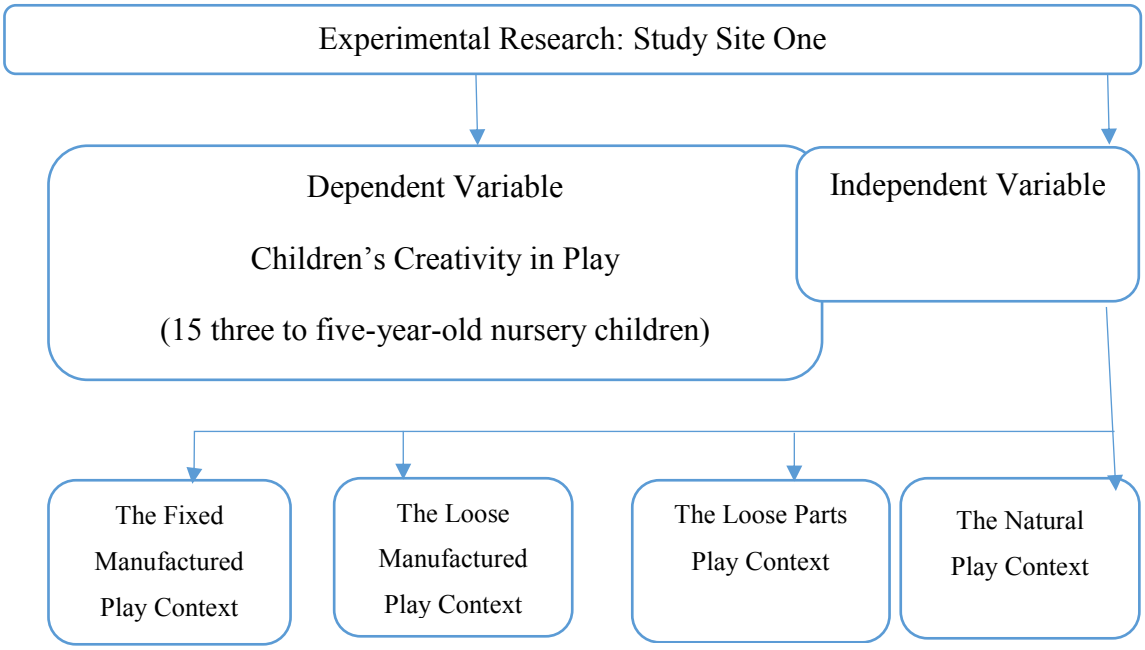


Figure 3-11: Study Site One Experimental Research

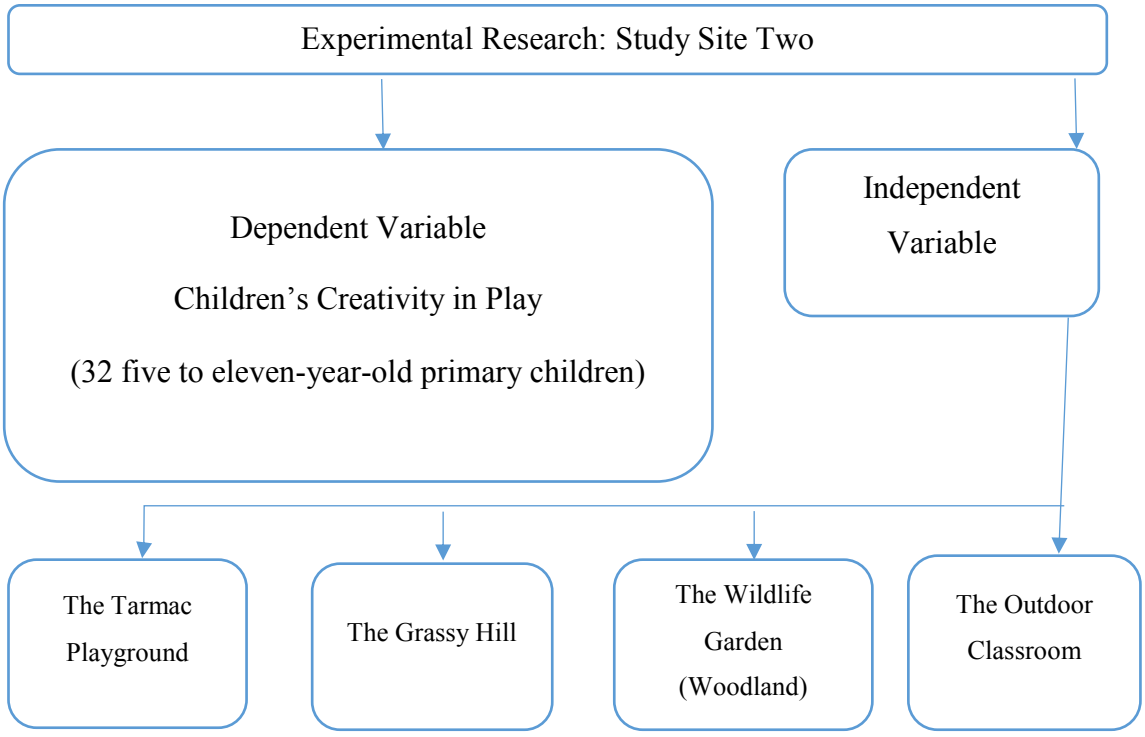


Figure 3-12: Study Site Two Experimental Research

The following diagram shows the research phases of this research:

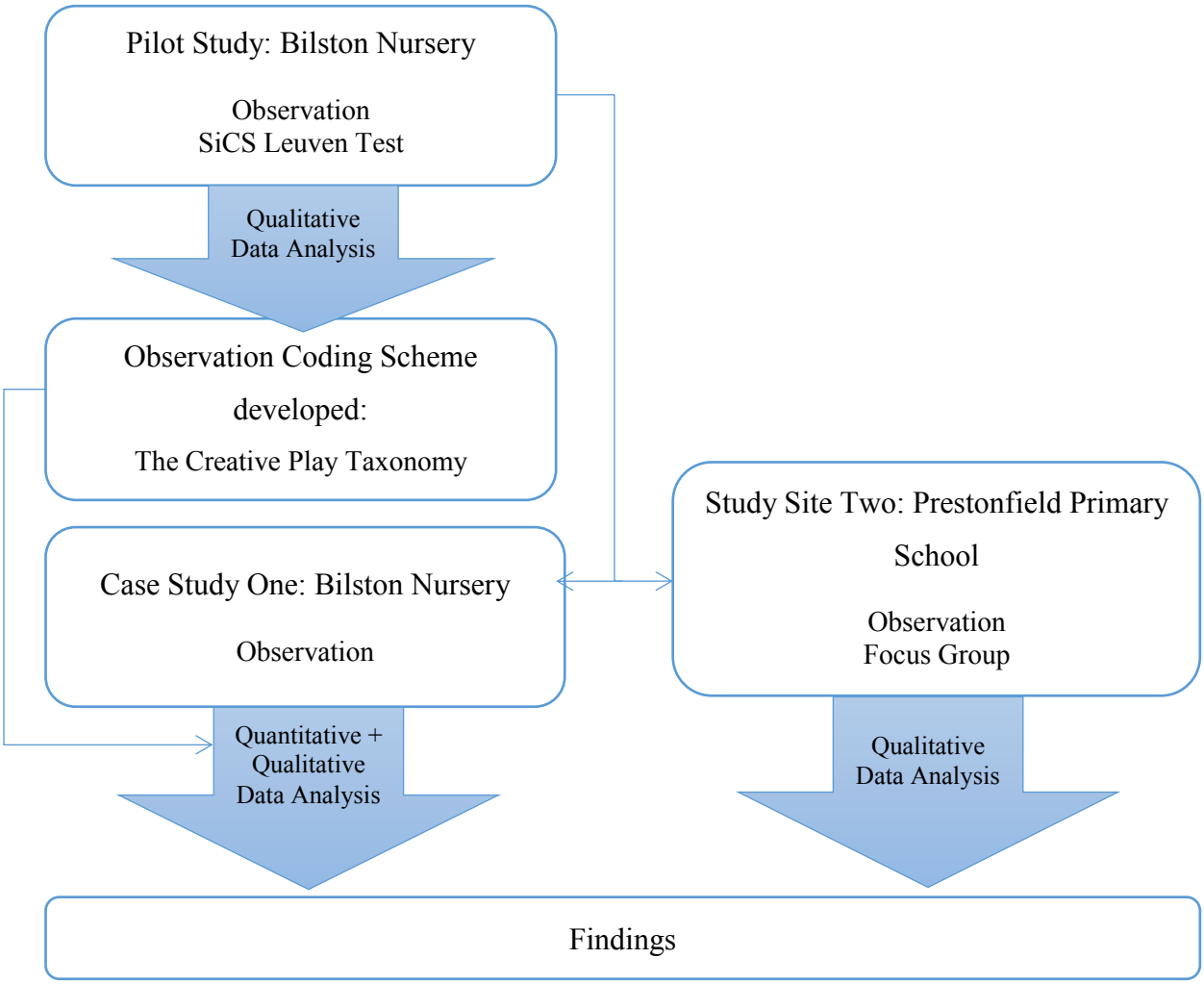


Figure 3-13: Research Phases

A pilot study was conducted within the nursery setting. This assisted in designing a taxonomy that was used as a coding scheme to assess children's creative play behaviours, as well as gaining an understanding of children's play activities and their verbal communication skills.

Once the creative play coding scheme was developed based on the pilot study, observation sessions were held at Study Site One (Bilston Nursery) within four different play contexts. Every child's play was observed and recorded, later to be

coded according to the coding scheme. This was in order to understand the level of engagement in creative play behaviours in each context. A piece of software called The Observer was used to assist with analysing this set of data afterwards.

In order to support the observation data gathered at Study Site One, focus group discussions were designed for Study Site Two, Prestonfield Primary School. Focus groups were held with primary school children as they have better verbal communication skills than nursery children and could recall what they played and how they felt when in each setting. At this study site, four different play settings were discussed, and after the focus group discussions, the children were taken to each of the settings for a play session in order to observe their play behaviours.

3.9 Ethical Considerations

3.9.1 University Ethical Committee

Research that involves children's participation is highly focused on ethical considerations, especially regarding consent forms and privacy in data management (Alderson 1995, Dockrell, Lewis et al. 2000, O'Kane 2000). As part of the university's regulations for undertaking data collection with potentially vulnerable participants, approval by the university's ethical committee was required. As the participants in this research were children, it was necessary to satisfy ethical checklist requirements at levels two and three in addition to level one.

3.9.2 Consent Forms

When doing research with children, ethical issues should be considered, focusing on informed consent and confidentiality (Stanley, Sieber et al. 1992, Alderson 1995, Morrow and Richards 1996, Thomas and O'kane 1998, Dockrell, Lewis et al. 2000). In order to involve children in research, researchers can gain permission through the local authorities, headteacher/teacher or the children's parents (Morrow and Richards 1996, Mauthner 1997, Punch 2002).

For this research, initially several meetings were held with the headteacher and administrators of the schools to gain permission to start the research. Then, consent forms were distributed to the children's parents via the relevant teachers. Through the consent forms, the researcher and the project were introduced, as well as an

explanation of the data collection process using the children. The parents were then asked if their children would be allowed to participate in research where they would be photographed and videotaped (see APPENDIX A).

3.9.3 Data Management

The data collected for this research were mainly in digital format. In order to keep the data secure, several issues were considered regarding the use and storage of the data.

First of all, all of the children participating were titled with codes instead of their names, so none of the imagery documents of the children had any names attached to them and all of the children were recognised via their codes. In addition, there was always up-to-date anti-virus software on the office computer where the data coding was done, as well as the personal computer where the analysing and writing-up of the thesis was undertaken.

Secondly, for the issue of storing the data, all the digital data were kept on two devices. One was an external hard drive that was used as a back-up folder and stored in a personal locker at all times. The second was a USB drive that was taken to the office to do the coding, which was also secured in a locker when not in use. All the data will be kept for several months after the end of the research for publication purposes; after that they will be destroyed.

Some of the data were in paper format. This included the Leuven Test data, which were collected on three sheets of A4 paper. In addition, there were some notes made during the observation and focus group discussions. Furthermore, all the consent forms from the three sets of data collection (the pilot study and both study sites) were included in the secured paper materials. All these documents were stored in a personal locker throughout the research, and the data were destroyed when the research was over. However, the consent forms were kept for a longer time, for reassurance in relation to further publication of the developed (and anonymised) data.

3.10 Data Collection Methods

Skinner et al. (2000) categorised behaviours as public or private. Public behaviours are those that can be observed by the public, while private behaviours are those that happen “within the skin” in an interior way. These private behaviours include

emotional and cognitive behaviours. They are difficult to assess as they are not directly observable (Skinner, Rhymer et al. 2000). Creativity also has the same difficulty, as it is a cognitive behaviour; thus, as a private behaviour, the researcher cannot fully observe it.

One method that is said to overcome the limitation of these difficulties is to use multiple assessment tools together. The initial idea was to use observation methods in parallel with technological devices, as they can measure the inner and physiological aspects of behaviours (Skinner, Rhymer et al. 2000). Accordingly, electroencephalography (EEG) was chosen as a tool for ascertaining these inner psychological behaviours while the children were engaged in play. EEG is a brain imaging technology that has been successfully used in landscape architectural research (Mavros, Coyne et al. 2012). In this research, the use of EEG while the children were playing in different contexts in order to detect their brain functionality during play was considered. However, it was deemed inappropriate. This was because the signal sensors of the mobile equipment are quite sensitive to movement, and in this research, as the children made a lot of movement while playing in the outdoor environments, the signals would have been affected and could not have shown accurate results. Accordingly, this tool could not be used for this research.

Therefore, in order to gain information that was difficult to acquire through observation, as creativity was a private behaviour, focus group discussions were used to ask the children what they had thought and done in each setting, in their own words.

Accordingly, a combination of focus groups with observations were used to collect data from the study sites. Initially, focus group discussions were held at Study Site Two in order to gather the children's perceptions and thoughts of what they liked and did in different play settings. Then they were taken to the four play settings and observed while engaged in play. Secondly, observations were held at Study Site One and the children's creativity was assessed using the creative play coding scheme while engaged in play.

3.10.1 Observation

Observation is a research method that helps to understand what people do in various settings. Bechtel and Zeisel (1987) counted five dimensions for observation: behaviour, environment, time, observer and record of observation.

There are two main issues that should be considered when choosing an observation method: first, how the researcher aims to observe the participants, and secondly, how to record the observation.

3.10.1.1 *The Observing Method*

The researcher could become a "secret outsider". In this method, the observer will not be seen by the participants (Zeisel 2006). Moore (1973) used this method for observing children's play in a primary school. The method was used so that the participants would not feel they were being observed and would act as naturally as they usually did. However, Moore realised that he had missed many of the individual behaviours through recording from an overview, and also missed the words they used while playing. Furthermore, he realised that adults had been involved in children's play in some instances. He then decided to take the camera down to the observation area to record their behaviours as a "recognised outsider".

Other observation methods, such as marginal participant observer and full participant observer, were not possible for this research. This is because as a marginal participant observer, the observer merges into the setting and is seen as another person in the environment. In fact, she/he observes people who do not know she/he is doing so (Zeisel 2006). This is beneficial because the participants will act as they normally would. However, it could not be used in this research because a school and nursery's outdoor settings are enclosed spaces, so it is unusual for any person other than the children and the staff to be in the environment.

A full participant observation is when the observer acts as one of the participants. This method is very beneficial as no one knows they are being watched at all, as the observer is actually one of them (Zeisel 2006). However, it cannot be used in research where the participants are of a special situation, skills or appearance. In this research, the participants were children and so the researcher, as an adult, could not act as one of them.

With a "recognised outsider", the participants are aware that they are being observed by the observer as part of the research; this is the main disadvantage of this method, because participants' way of behaving may be affected (Zeisel 2006). However, researchers suggest that the effect can be minimised over a longer period as the participants become used to the researcher in the field. The more the observer tries to blend into the setting, the more naturally the participants will act (Zeisel 2006).

In this research, being a recognised outside observer (Zeisel 2006) was more beneficial, firstly because the children's behaviour needed to be observed from a close distance and all the behaviours needed to be recorded, and secondly because there was no possibility of being a marginal observer or full participant observer due to the participants being children in the secured environment of the nursery's playground. In order to overcome the possible effects of this type of observation, there were several visits to the nursery before starting the main observations. This helped the children become used to the researcher's presence and even perhaps to consider her as one of the play supervisors.

3.10.1.2 ***Observation Recording Procedure***

Narrative Recording for Study Site Two and Pilot Study

For Study Site Two – Prestonfield Primary School – and the pilot study at Bilston Nursery, the most suitable recording method was narrative recording.

Narrative recording is when the observer writes narrative descriptions of behaviours and the environment in which the behaviour is taking place (Skinner, Freeland et al. 2003). This recording is often used to gather general information about a child's behaviour. As Skinner et al. (2000) explained, it is a useful method for primary observations in order to: 1) recognise and confirm target behaviours, and validate a specific behaviour that is happening; 2) develop general ideas of behaviours and form a general understanding of how and how often the behaviours occur; and 3) start detecting the variables that are supporting the targeted behaviours in order to identify the parameters that allow a certain behaviour to take place. As an example, in this research, through narrative recording, the researcher was, first of all, able to gain an understanding of the way children played in the different contexts. Secondly, the researcher was able to develop a more detailed categorisation of children's creative

play behaviours, as well as when and where these specific creative play behaviours occurred. Thirdly, studying the contexts in which these creative play behaviours took place helped to understand which elements in the contexts were supportive of creative play and which were not.

This method is useful because it develops a flexible overview of children's behaviour. Narrative recordings can be used to view changes in children's behaviour and whether a specific behaviour is increasing, decreasing or remaining steady in various environments (Skinner, Freeland et al. 2003).

As in the pilot study, the main aim of the observation sessions was to attain an overview of children's creative play behaviours and develop a coding scheme for the main set of observation sessions at Study Site One. For this reason, narrative recording was chosen. It helped to understand children's play behaviours in different play contexts. By helping to understand the main aspects of children's creative play behaviours, the coding scheme was developed. Narrative recording was also used at Study Site Two to record children's play as they were observed playing in different contexts.

Empirical Duration Recording for Study Site One

For Study Site One, empirical recording was chosen as it was a more accurate and detailed recording method that would give more reliable data. Empirical recording covers a more precise measurement than narrative recording and the data can be verified individually (Skinner, Rhymer et al. 2000).

Empirical recording can be divided into event recording and duration recording. In event recording, a specific aspect of behaviour is selected and noted every time that it occurs over a period of time. In this method, the frequency is counted in order to understand the presence or absence of a single behaviour (Skinner, Rhymer et al. 2000). There are some disadvantages to event recording. A discrete behaviour that is due to be counted might occur only once but continuously. In another situation, the behaviour might happen twice but in short durations. In event recording, the number of instances of the behaviour is counted and not their duration, so in this situation the data will not be reliable.

In duration recording, unlike event recording, the amount of time for which the behaviour occurs, from start to finish, is recorded. This method is best used if the observer wants to understand the duration of a behaviour that is of interest (Skinner, Rhymer et al. 2000). One of the difficulties of this method is its timing. As children may move very fast from one activity to another, it is hard to understand the accurate start and finish time of many of their behaviours. Also, this method is very difficult when the observer wants to collect data on various children's behaviours at one time, as it is difficult to track each behaviour's duration separately.

For Study Site One, duration recording was chosen as it would give reliable data on the length of time each child was engaged in the different levels of creative play behaviours, in all four play contexts. As it was difficult to track each child, children's play was video-recorded for all the play sessions, in order to be able to take time coding them later. All the coding was undertaken using behaviour coding software and each recorded video was reviewed several times if needed, in order to track all the children and note all the behaviours, no matter how fast they occurred and how short they were.

3.10.2 Focus Group

"Focus Groups are group discussions exploring a specific set of issues" (Barbour and Kitzinger 1998, p.4). This is a useful method for learning about people's experiences, desires and concerns, and helps the researcher to understand different people's perceptions of a case (Barbour and Kitzinger 1998). It involves in-depth group discussions with selected participants from a specific group of people of similar social characteristics and age range, who can comfortably speak on the given topic (Rabiee 2004).

Therefore, in order to gain information that was difficult to acquire through observation, as creativity was a private behaviour, focus group discussions were used to ask the children what they had thought and done in each setting, in their own words.

The focus groups were designed to support the findings in the observation sessions. In fact, as there was only one play session in each of the play contexts in Study Site Two, the focus groups gave the children the chance to present what play activities they engaged in within each of the environments in their normal play times throughout the

year. The activities that they raised for each setting was then analysed based on the parameters of the Creative Play Taxonomy.

In addition, as mentioned in Chapter 2 (section 2.3.6) various aspects are involved in stimulating human creative abilities (Lubart, Zenasni et al. 2013, Berlin, Tavani et al. 2016, Kandler, Riemann et al. 2016). Instinctive Motivation (Feist 1998, Lubart and Mouchiroud 2003, Batey and Furnham 2006), is a conative factor which is highly associated with creativity (Berlin, Tavani et al. 2016). In the confluence approach to creativity, Sternberg and Lubart (1992, 1995, 1996) also name motivation as one of the six resources for creative thinking. Instinctive motivation includes behaviours such as involvement in the task and enjoyment and interest in the work (Amabile and Collins 1999). Csikszentmihalyi (1997, Csikszentmihalyi and Nakamura 2002) also believes high intrinsic motivation where the person is highly enjoying the activity results in creativity.

Accordingly, apart from asking the children what play activities they get involved in within each of the play environments to analyse them later based of the Creative Play Taxonomy, they were also asked about which of the environments interests them most and they enjoy playing in most. Due to the link between motivation and creativity, the findings from the focus group could help understand which environment can be more supportive to creativity in play.

Accordingly, a combination of focus groups with observations were used to collect data from the study sites. Initially, focus group discussions were held at Study Site Two in order to gather the children's perceptions and thoughts of what they liked and did in different play settings. Then they were taken to the four play settings and observed while engaged in play. Secondly, observations were held at Study Site One and the children's creativity was assessed using the creative play coding scheme while engaged in play.

The nursery children in this project were aged between three and five. According to the literature, children of this age have some limitations in expressing themselves with vocabulary (Ireland and Holloway 1996, Boyden and Ennew 1997). Research shows that children under the age of six do not have well developed verbal skills, so they are unable to communicate and express themselves fully in conversations (Piaget 1967,

Urban 1991, Kamakil 2013). This was also found in the pilot study when trying to make conversation with the children; they were not able to communicate or express their play behaviours well in words. For this reason, the focus groups were only held with the primary school children. These focus group discussions helped, as the children were encouraged to explain what they did in the different play settings and how they felt about it.

3.10.3 The Leuven Wellbeing and Involvement Scale

The Leuven Wellbeing and Involvement Scale, a process-oriented Self-Evaluation Instrument for Care Settings (SiCS), was designed by Laever (2005). The tool measures two indicators: children's "wellbeing" and "involvement". Wellbeing consists of feeling at ease, being spontaneous and free of emotional tensions and is overall considered good "mental health". It is linked to self-confidence, self-esteem and resilience. Involvement, on the other hand, involves being strongly engaged in activities and is necessary for a high level of learning and development (Laevers, Moons et al. 2005, Laevers 2006). The Two tables below show the five-point scale for each of the two indicators, wellbeing and involvement (Laevers, 2006):

Table 3-1: Leuven Scale for Well-being

The Leuven Scale for Well-being		
Level	Well-being	Signals
1	**Extremely low**	The child clearly shows signs of discomfort such as crying or screaming. They may look dejected, sad, frightened or angry. The child does not respond to the environment, avoids contact and is withdrawn. The child may behave aggressively, hurting him/herself or others.
2	2 **Low**	The posture, facial expression and actions indicate that the child does not feel at ease. However, the signals are less explicit than under level 1 or the sense of discomfort is not expressed the whole time.
3	3 **Moderate**	The child has a neutral posture. Facial expression and posture show little or no emotion. There are no signs indicating sadness or pleasure, comfort or discomfort.
4	**High**	The child shows obvious signs of satisfaction (as listed under level 5). However, these signals are not constantly present with the same intensity.
5	**Extremely high**	The child looks happy and cheerful, smiles, cries out with pleasure. They may be lively and full of energy. Actions can be spontaneous and expressive. The child may talk to him/herself, play with sounds,

		hum, sing. The child appears relaxed and does not show any signs of stress or tension. He /she is open and accessible to the environment. The child expresses self-confidence and self-assurance.

Table 3-2: Leuven Scale for Involvement

The Leuven Scale for Involvement		
Level	Well-being	Signals
1	**Extremely low**	Activity is simple, repetitive and passive. The child seems absent and displays no energy. They may stare into space or look around to see what others are doing.
2	2 **Low**	Frequently interrupted activity. The child will be engaged in the activity for some of the time they are observed, but there will be moments of non-activity when they will stare into space, or be distracted by what is going on around.
3	3 **Moderate**	Mainly continuous activity. The child is busy with the activity but at a fairly routine level and there are few signs of real involvement. They make some progress with what they are doing but don't show much energy and concentration and can be easily distracted.
4	**High**	Continuous activity with intense moments. The child' activity has intense moments and at all times they seem involved. They are not easily distracted.
5	**Extremely high**	The child shows continuous and intense activity revealing the greatest involvement. They are concentrated, creative, energetic and persistent throughout nearly all the observed period.

In this test, the assessment is simple and similar to scanning. Accordingly, the child or the group of children are observed for two minutes and are then scored based on the above five-point scales for well-being and involvement. Although the test explains that it is unrealistic to expect the children operate high and extremely high throughout the whole day, however if they score lower than 4 based on the scale, their learning is limited (Laevers, 2005).

As instinctive motivation includes involvement in the task and interest and enjoyment in the work (Amabile and Collins 1999), and one of the aspects which can result to creativity is motivation (Lubart, Zenasni et al. 2013, Berlin, Tavani et al. 2016, Kandler, Riemann et al. 2016), the Leuven test which measures children's wellbeing and involvement was used in the pilot study in order to understand children's level of involvement and wellbeing in the different play contexts. The results from the test helped gain an initial understanding of how the children behave in each of the four

play contexts and to see if the researcher's observations are in line with the findings from the test. Although the application of the test was simple, qualification was required to use it. At the time of the pilot study, one of the teachers was trained to use this test, so it was used in the pilot study. Although the pilot study was held over four play contexts, the test was only used in three of these play contexts, as the teacher who was trained wasn't available for the fourth play context.

3.11 Data Collection Process

Table 3-1 shows each of the data collection stages, including information on the overall number of sessions and durations and the overall number of children in each stage, as well as the time of year and weather condition:

Table 3-3: Data Collection stages' information's

Site	Data collection Method	Total Duration HH: MM	Number of Sessions	Number of children	Time of Year/ Temperature	Weather Condition
Pilot Study	Observation SiCS Test	02:00	4	17	March-May 6-10°C	Mainly cloudy, partly sunny, dry conditions in all sessions
Study Site One	Observation	05:00	18	15	March-June 6 -13°C	
Study Site Two	Focus Groups	04:00	8	32	December 5°C	
	Observation	02:40	4			

3.11.1 Pilot Study: Bilston Nursery

For the pilot study in Bilston Nursery, there were four main observation sessions. At the time of the pilot study, the nursery's playground was a tarmac area, so, for the first observation session, junk material and loose parts were provided in the existing tarmac playground for the children to play with. For the second observation session, some play equipment such as traffic signs and building blocks were brought to the same

setting. For the third observation session, the children were taken to a woodland near the nursery in which to play. After two months of the pilot study, the nursery installed a timber climbing frame in the middle of the playground. Accordingly, the fourth play session in which the children were observed was after the timber climbing frame had been installed in the playground.

Additionally, the Leuven Wellbeing and Involvement Scale (Laevers, Moons et al. 2005) was used in the pilot study to measure children's wellbeing and involvement in each of the settings. This test was carried out by the teacher, who was available for the woodland, loose parts material and climbing frame play contexts. Unfortunately, she was not available to do the test in the play equipment session. The nursery teacher carried out the test while children were engaged in play, as she had been trained in scoring and using the test. The test was used to attain an understanding of the way children engaged and felt in each of these settings.

3.11.2 Main Data Collection for Study Site One: Bilston Nursery

For the Bilston Nursery study, there were 18 different observation sessions scheduled: one session in Fixed Manufactured Play Context, six sessions in Loose Manufactured Play Context, six sessions in Loose Parts Play Context and five sessions in Natural Play Context. Except for one of the play sessions in each of the four play contexts, the sessions mostly had different lengths (see Chapter Five, Study Site One).

It was planned to have the same number of play sessions with identical durations, with the same number of children, in all four play contexts; however, this was not possible in practice. First, there was only one chance to have a play session in Fixed Manufactured Play Context as the children were behaving dangerously (see Chapter Five, Study Site One), so the teacher refused to hold any other play sessions in this context.

Secondly, as Natural Play Context was in the woodland area near the nursery, many factors had to be taken into account by the teacher when organising the play sessions there. Firstly, she required the woodland area to be completely dry in order to reduce risk, so the weather conditions had to be dry for several days before the play session. Secondly, she had to inform the school's headteacher, gather the required permissions and fill in the related safety forms to be able to take the children out. Thirdly, the

parents needed to be informed a day in advance. Finally, she required at least four adults to accompany the children in the woodland for supervision. These were either the assistant teachers, some of the children's parents or someone that the researcher could take along to help in the supervision. All these issues made it difficult to organise more play sessions in Natural Play Context; however, as many as possible were organised by the end of the year.

The third reason why the 18 play sessions were of different lengths was because of the nursery's schedule. There were many days when the school had scheduled assembly gatherings, which the nursery children also attended, so their play time was reduced. There were other times when snack time or reading time exceeded their usual duration. Also, on some days there were too many children absent so the play session was cancelled. These issues happened quite regularly in the nursery and in some cases not even the teacher had control over them.

A final issue that made it difficult to keep all the sessions the same length was weather conditions. There were days when observations started, but after several minutes it started raining so all the children were taken inside. There were also many days when, after reaching the nursery and setting up the observation session, it started raining, so the session was cancelled.

Overall, 18 play observation sessions were carried out, and except for Fixed Manufactured Play Context, the same overall duration of observation was recorded for all contexts to make the findings as reliable as possible for comparison. Also, one play session with the exact same length of twelve minutes and 30 seconds in all four play contexts was organised with the same eleven children, which was used as the main comparison data.

In each play observation session, at least two cameras were used to catch all the play behaviours in the play contexts. One was fixed on one side of the play context, in order to record all the activity throughout the whole context, and the second camera was moved within the space by the observer to catch more details of the children's play. At the same time, the observer made small notes of anything that seemed important for later study. For instance, if a child put different loose parts together and called it a plane or a boat, this was all noted down to refer to later on during analysis. In addition,

the observer also made important observation notes by speaking into the camera whenever needed. These notes helped to understand what was happening in more detail when analysing the videotaped observations.

3.11.3 Main Data Collection for Study Site Two: Prestonfield Primary School

Study Site Two had two main data collection stages: focus groups and observation sessions. Firstly, semi-structured focus group discussions took place with children from Primary 1 to 7. The focus group was carried out first in order to scope out the likely activities and behaviours before attempting behaviour observation on site. Also, it was a good opportunity for the researcher to introduce herself to the children and explain the observation schedules to them.

The sample consisted of 32 children from across all classes, so they were divided into eight groups, each with children from one of the year groups. Each focus group was approximately 30 minutes in length. Children were invited to talk about their playground and were guided to the following questions within the discussions:

What sorts of things do you currently do in your playground?

What sorts of things do you do in the Wildlife Garden/ Grassy Hill / Central Garden?

What do you like about the playground/Wildlife Garden/Grassy Hill/Central Garden?

What don't you like about your playground/Wildlife Garden/Grassy Hill/Central Garden?

How could the playground be better/what would you like to add?

Overall, which part of the playground is your favourite part?

Secondly, the children were taken to each of the four outdoor play settings to play freely. They were observed and video recorded with two cameras; one was fixed in a part of the setting to catch as much as it could, and the other was moved around within the space by the observer to catch more details in play. The children were observed in each of the four play settings only once, each for approximately 40 minutes. Apart from videotaping, photography and writing notes, there were other methods used in order to undertake a narrative recording of what was going on in the play settings.

3.12 Methods of Data Analysis

The method of analysing data depends on the form of data and whether it is qualitative or quantitative (Neuman 2004), even though forms of data can be analysed using both qualitative and quantitative methods (Bernard 2011).

For qualitative data, the most common method is qualitative analysing. As the data is usually in the form of words, actions or images, the data is analysed in non-standardised forms where the researcher identifies common patterns by looking deep into the responses and analyses them critically in order to achieve the research aims (Neuman 2004). Hence, the main method of analysing qualitative data is interpretation (Corbin and Strauss 2014). In fact, this method of analysis draws on the researcher's critical thinking as well as creative thinking (Patton 1990).

However, qualitative data can also be analysed with quantitative methods. Using this method, the visual or verbal data is turned into numbers (Bernard 2011), which involves critical analysis of numbers and charts. This helps to present standardised concepts (Neuman 2004). In other words, in this method of analysis, the researchers are "quantifying qualitative data", which allows them to analyse the data statistically (Corbin and Strauss 2014).

For this research, both qualitative and quantitative analysis methods were used. Qualitative analysis methods were used for the observation data collected in the pilot study, as well as the data collected via observations and focus group discussions in Study Site Two through interpretation.

However, in order to strengthen the findings and develop a categorisation of the different play contexts in relation to children's creative play behaviours, the observation data in Study Site One used a quantitative analysing method. In order to do so, the Creative Play Taxonomy was developed and used as the coding scheme in The Observer, and the children's creative play behaviours were measured accordingly.

Strauss and Corbin (2014) believe a coding scheme can:

1. "Build rather than test theory.
2. Provides researchers with analytic tools for handling masses of raw data.
3. Helps analysts to consider alternative meanings of phenomena.

4. Be systematic and creative simultaneously.
5. Identify, develop, and relate the concepts that are the building blocks of theory."

Using a coding scheme in this research resulted in numbers and charts that showed the length of time each child engaged in creative play in each of the play contexts, and the quantity of creative play behaviours on different levels that occurred in each of them.

3.12.1 The Coding Scheme: The Creative Play Taxonomy

A Creative Play Taxonomy (described in more detail in Chapter Three) was developed in order to categorise children's creative behaviours during play. This taxonomy introduces eight different possibilities for a child's play, based on creativity. These eight possibilities are based on four levels of creative play behaviours: a) the highest level of creativity; b) a relatively high level of creativity; c) a low level of creativity; and d) no level of creativity in the play.

In order to analyse the observation sessions in Study Site One, each child's play was coded according to this taxonomy. Accordingly, each child's recorded play session was repeatedly watched and each of their play behaviours were coded with one of the eight different possibilities based on its level of creativity.

3.12.2 Video Tracking System: The Observer Software

In order to code the children's creative play behaviours in the play contexts in Study Site One, the software The Observer (Noldus 1991) was used. This software is designed to collect, code, analyse and present observational data. In this research, the observations were videotaped offline and then imported into the software for coding. In order to code the data, a coding system must initially be designed by the researcher based on the research project.

Each coding scheme includes independent variables that are defined throughout the whole coding process. The "Subjects", who in Study Site One were the 15 children, were listed with anonymised coded names. The "behavioural classes" included "behaviours" as subgroups. The behavioural class explains the main behaviour the researcher was interested in assessing, while the behaviour constitutes the various possibilities within the behavioural class. In this research, the behavioural class was children's creative play, while the behaviours were based on the Creative Play

Taxonomy that was developed as part of this research (see Chapter Three). Each of the behaviours were linked with keyboard codes to use during coding. Also, a colour was allotted to each of the behaviours, used for analysing the data.

Behaviours are defined as "events" or "states", based on the research project. "Events" are behaviours that happen in an instant, so the focus is on the occurrence and not the duration. "States" are behaviours that have a start and end, where the duration of the behaviour is important. In this research, the behaviours were identified as "state" behaviours, because the duration of a child being engaged in each of the behaviours was important. In addition, the behaviours were "mutually exclusive", which meant that only one behaviour in the behavioural class could occur at a time (i.e. a child could either be in no creative play behaviour, or flexible creative play; these two states could not happen at the same time).

After designing the coding scheme for this research, the coding of the data began. In each observation, up to two videotaped observations could be watched simultaneously. This helped to catch all the behaviours as they occurred immediately.

Every observation was watched repeatedly in order to code one child at a time. During the first stages of the coding, the process was very slow for several reasons. First, even though the eight different behaviours were well distinguished, it was difficult to determine the category in which each child's play behaviour should be listed. The observations had to be paused and some parts re-watched several times in order to decide which key elements happened in a specific play behaviour. Secondly, memorising the keyboard codes for each of the subjects and the behaviours took some time as well. However, these difficulties lessened as the coding moved on.

3.13 Summary

This research employed a mixture of inductive and deductive approaches. A deductive approach helped to gain an understanding of the concept of creativity and the factors involved in the creative thinking process. An inductive approach helped to design the Creative Play Taxonomy, which was then used as a coding scheme to analyse the findings.

This research used an experimental research design to observe and record children's play in different play contexts, and classify them according to their contribution to creativity, for which a Creative Play Taxonomy was needed. This experimental design was adopted for two study sites. At Study Site One, 15 three to five-year-old nursery children were observed in four different play contexts. Fixed Manufactured Play Context was the nursery's playground, which included a fixed climbing frame; Loose Manufactured Play Context was in the same setting facilitated with manufactured play equipment; Loose Parts Play Context was in the same setting facilitated with loose materials; and Natural Play Context was a woodland.

At Study Site Two, 32 children aged between five and twelve were observed in four different outdoor settings and took part in focus group discussions. The outdoor settings were the tarmac playground facilitated with loose manufactured play equipment, a grassy hill, the wildlife garden and an outdoor classroom.

In this research, behaviour observation was one of the data collection methods. The pilot study used observation methods (qualitative data) along with the Leuven Wellbeing and Involvement Scale (quantitative data). This pilot study helped to gain an understanding of children's creative play behaviours and to develop a coding scheme for the main set of observation sessions at Study Site One. Accordingly, it resulted in the development of the Creative Play Taxonomy, which answered the first research question about how to categorise and measure children's creativity in play.

Study Site Two also adopted behaviour observation methods, along with focus group discussions as a second method of collecting data (qualitative data). For Study Site Two and the pilot study, narrative recording was used and the data was analysed through interpretation, which resulted in an understanding of children's creative play in each of the play contexts (qualitative methods).

Observation methods were also used in Study Site One. In order to ascertain the length of time each child spent in each of the creative play stages, duration recording, which is a type of empirical recording method, was used. The data were then coded with the Creative Play Taxonomy using The Observer. This resulted in numeric findings in the form of charts (quantitative data analysis). Accordingly, the children's creative play behaviours were categorised and measured in each of the play contexts.

The findings from both study sites were analysed in order to achieve the study's aim of developing design principles for educational outdoor environments in order to nurture children's creative play, and accordingly the role of each play context in children's creative play behaviour was outlined. The last aim of this research, which was to understand whether different genders' creative play behaviours vary in different play contexts, was met using the data gathered from Study Site One.

CHAPTER 4 THE CREATIVE PLAY TAXONOMY

When studying various theories and approaches of creativity in order to choose the most complete definition of the concept, an important issue is to find a suitable assessment tool. As Amabile (1996) suggests, "Creativity is a concept that is difficult to define and even more difficult to measure."

When it comes to preschool children, the task becomes even more difficult. The majority of the tools designed for assessing creativity are not appropriate for younger children (Mottweiler and Taylor 2014). As a result, there are not many studies on preschool children's creativity (Ward 1968, Busse, Blum et al. 1972, Manosevttz, Fling et al. 1977, Mottweiler and Taylor 2014) This is because children at that age have limited drawing and verbal skills (Reisman, Floyd et al. 1981, Zachopoulou, Makri et al. 2009).

Torrance's "Thinking Creatively in Action and Movement" (TCAM) test (Reisman, Floyd et al. 1981) is designed for preschool children, as it does not require verbal communication skills. However, as mentioned earlier, it only focuses on divergent thinking and does not cover convergent thinking as the second process in a creative behaviour.

As this research was based on Lubart, Barbot and Besancon's (Barbot, Besançon et al. 2011, Lubart, Besancon et al. 2012, Besançon, Lubart et al. 2013, Barbot, Besançon et al. 2016) theory of creativity, their creativity assessment test, the Evaluation of Potential for Creativity, was studied in more detail.

4.1 Evaluation of Potential for Creativity (EPoC) Description

Based on the confluence approach to creativity, Lubart, Besancon and Barbot (Besançon, Lubart et al. 2013, Barbot, Besançon et al. 2016) developed a creativity measurement test, namely the Evaluation of Potential for Creativity (Lubart, Besancon et al. 2012). The Evaluation of Potential for Creativity (EPoC) was one of the most recently developed tests that measured creativity at the time this research was undertaken. This test is designed for children and includes verbal and graphic subtests that measure the two micro-processes of creative cognition, divergent-exploratory thinking and convergent-integrative thinking. It measures creative abilities and can

monitor progress, using pre-tests and post-tests, in educational programmes and environments that are designed to enhance creativity.

In this tool, creativity is a multifaceted and domain-specific concept, involving various factors (Lubart, Besancon et al. 2012). The definition of creativity in this test states: "creativity is the ability to produce work that is both: novel; and context appropriate". In other words, it is "the capacity of an individual to produce work that is original (i.e. new, different from that which we can usually see) and adaptive to the context and the constraints of the situation". Accordingly, a creative process is defined as "the sequence of thoughts and actions leading to the production of novel, context appropriate work" (Lubart, Besancon et al. 2012, p15).

The main aspect that separates this measurement tool from other tests is that it measures both divergent-exploratory and convergent-integrative thinking processes (Barbot, Besançon et al. 2011, Barbot, Besançon et al. 2016, Berlin, Tavani et al. 2016). Divergent-exploratory thinking is "the ability to produce many, varied elements based on a stimulus" (Lubart, Besancon et al. 2012, Oncu 2015, Barbot, Besançon et al. 2016). Convergent-integrative thinking is "the ability to articulate or integrate several elements into a cohesive unit" (Lubart, Besancon et al. 2012, Runco and Jaeger 2012, Oncu 2015). It involves "making a single production, the most original possible, starting from several elements". In fact, in this perspective on creativity, both of these thinking abilities are equally important to the creative process (Lubart, Besancon et al. 2012).

EPoC is one of the most recent creativity tests designed, and unlike previous approaches, can be used in diverse domains (Barbot, Besançon et al. 2011, Lubart, Zenasni et al. 2013, Berlin, Tavani et al. 2016). It is able to estimate the child's creative thinking process in graphic and verbal domains (Besançon, Lubart et al. 2013, Barbot, Besançon et al. 2016).

Divergent-exploratory thinking is a quantitative factor said to be highly associated with fluency – number of ideas generated – thus, similarly to other divergent tests, in this test it is calculated by counting the number of different ideas produced.

Calculating the level of convergent thinking is, however, more complicated because it is related to the quality of the production and no absolute standard exists for assessing

the creativity of a product. Amabile (1996) suggests the use of Consensual Assessment Techniques (CAT) for assessing creativity. She notes: "Consensual assessment is a technique used for the assessment of creativity and other aspects of products, relying on the independent subjective judgment of individuals familiar with the domain in which the products were made" (p.347).

The test uses this method for training the users of EPoC. The user goes through online training where she/he learns how to score convergent-integrative productions (verbal and drawings); the expert judges also score the tests, and the scores are then compared. After the training, for the application of the test, it is only the researcher who judges and scores the individual's results (Lubart, Besancon et al. 2012).

The validity of EPoC was tested by Lubart, Besancon and Barbot by measuring children's creativity with EPoC as well as the Torrance Test of Creative Thinking (Torrance 1962), which showed significant correlation with the divergent-exploratory results from EPoC (Berlin, Tavani et al. 2016).

4.2 Pros and Cons of EPoC for the Current Research

During the first stages of this research, after studying the different creativity tests available, this test was chosen for assessing children's creativity in different outdoor environments.

The main reason that this test was initially chosen was that, unlike other tests such as the Torrance Test of Creative Thinking (Torrance 1968, Torrance 1998) – the most widely used test in creativity (Treffinger, Young et al. 2002) – or Guilford's Structure of the Intellect Model (Guilford 1959, Guilford 1988), both of which mainly focused on divergent thinking parameters as indicators of creativity (Guilford 1956, Torrance 1966, Hocevar 1980, Kim 2006a, Kim 2006b, Lubart, Pacteau et al. 2010), this test covered both aspects of creativity, namely divergent-exploratory and convergent-integrative thinking (Barbot, Besançon et al. 2011, Lubart, Besancon et al. 2012, Lubart, Zenasni et al. 2013, Barbot, Besançon et al. 2016).

Secondly, EPoC was one of the most recent creativity tests in use in the field (Barbot, Besançon et al. 2011, Lubart, Zenasni et al. 2013, Berlin, Tavani et al. 2016) at the time this research was undertaken.

Finally, this test was designed especially for children, taking into account their abilities, which makes it an appropriate tool for assessing their creativity.

However, after starting the training of this test with Professor Taisir Subhi Yamin, the developer of the English version of EPoC, it became clear that there were several deficiencies with the test in terms of its suitability for the proposed research of this study.

First, it is designed to measure long-term creativity, and so children being tested should remain in the same environment for at least three months so that the test can give accurate results (Lubart, Besancon et al. 2012). In other words, the test would not show any significant change in children's creativity as a result of short-term moves from one play context to another, over the course of a few hours or days.

Secondly, the test is designed for primary and secondary school aged children (Lubart, Besancon et al. 2012, Barbot, Besançon et al. 2016), and the participants of this research were nursery aged children who would not have had a sufficient level of skill to do the test.

Finally, the test only measures children's creativity in the verbal and graphical domains (Lubart, Besancon et al. 2012, Barbot, Besançon et al. 2016), and as creativity is believed to be domain-specific (Barbot, Besançon et al. 2016, Berlin, Tavani et al. 2016), it would not be able to evaluate children's creativity as a whole or only while they were engaged in play, as is the case with this research.

Due to the above reasons, the test could not be used for this research. However, as EPoC is a recent test for measuring creativity, based on a theory that covers both divergent-exploratory and convergent-integrative thinking and designed especially for children, a decision was made to design a creativity test that could assess children's creativity while they were engaged in play by developing a taxonomy of creativity in play, based on the theory that EPoC had adapted. Accordingly, the process of designing the taxonomy was as follows.

4.3 The Creative Play Taxonomy Development Process

4.3.1 STAGE 1: Interpretation of Children's Play according to Divergent and Convergent Thinking

In order to categorise children's play activities in relation to creativity, a matrix that included the two main aspects of creativity, namely divergent thinking and convergent thinking, was initially developed. This was then expanded into the factors that, based on the literature presented in Chapter Two, were related to divergent thinking, such as flexibility, openness and originality, and convergent thinking, such as willingness to take risk, associative thinking and selective combination. Previously, the observations of children's play behaviours recorded during the pilot study had been studied. During this process, the recordings were watched, each play activity was written down in the matrix and personal interpretations of each of the thinking process factors included in that activity were made.

The initial attempt aimed to give each activity a score from 1 to 5 in relation to the factors of divergent and convergent thinking. These marks were given based on the researcher's own perception. However, it became clear that they were too subjective, and, in many cases, it was impossible to relate activities to creativity factors logically. Table 3-1 shows the design for the Creative Play Taxonomy and two examples of how the activities were initially scored:

Table 4-1: Stage 1 of the Creative Play Taxonomy Development Process

Environment	**Play Activity**	Divergent Thinking:							Convergent Thinking							**CREATIVITY**
		Flexibility	Fluency	Originality	Elaboration	Task-focused	Intrinsic Motivation	Selective Encoding	Openness	Associative thinking	Selective Comparison	Selective Combination	Tolerance of Ambiguity	Willingness to take risk	Perseverance	Achievement motivation	
Activity	Sliding																0
	mixing sand with stick		2	2													4

4.3.2 STAGE 2: The Two Thinking Processes in Children's Play

The process was redesigned, this time starting from the creativity thinking process definition, and watching the videos with the aim of finding expressions of these processes in them. Personal interpretations were then made in relation to each activity and reasons given why each one may have been perceived to be creative play.

Table 4-2: The Baseline of Stage 2 of the Creative Play Taxonomy Development Process

CREATIVITY														
Divergent exploratory thinking: The ability to **grow as many ideas** and **solutions** for solving a problem								Convergent integrative thinking: The ability to **combine various ideas** in **new original** ways						
Flexibility	Fluency	Originality	Elaboration	Task-focused	Intrinsic Motivation	Selective Encoding	Openness	Associative thinking	Selective Comparison	Selective Combination	Tolerance of Ambiguity	Willingness to take risk	Perseverance	Achievement motivation

The definition of each thinking process was set out to relate to children's play activities and environmental aspects. In this case, each of the thinking processes were defined as follows:

Divergent-Exploratory Thinking (DIT):

> Definition: the ability to GROW AS MANY **ideas** and **solutions** for solving a **problem.**
>
> Revised Definition: Coming up with VARIOUS **things to do/ things to make/ ways to play/ ways to engage** with an **equipment/ material/ environment**.

Convergent-Integrative Thinking (CIT):

> Definition: the ability to **combine** VARIOUS **ideas** in NEW ORIGINAL **ways.**
>
> Revised Definition: **Combining/ building/ making/ mixing/ imagining** VARIOUS **items/ materials/ spaces/ equipment/ techniques** to make/ build a NEW/ ORIGINAL/ WELL DEVELOPED **thing/ way/ solution/ game/ opportunity**.

Based on these two definitions, the videos of children's play behaviours were watched repeatedly in order to find these two processes in children's play. Whether the play activities were related to one or both processes were also noted. The next attempt was to link the activities to the sub-factors of each thinking process; however, this was not successful, and the play activities would not fit into the categories. Therefore, the sub-factors were omitted, and the work continued using only the main definitions. This was similar to the EPoC test, which also measured the two main processes.

Based on the revised definitions, the recorded observations were watched again to find play behaviours that related to each of these processes. Personal interpretations of the ways the play behaviour linked to each thinking process were noted. Some examples are given below:

In the Junk Environment:

CIT (Convergent-Integrative Thinking): using **stands** and **pipes** and **cones** and the **steps**: BUILDING a **path** by putting the PIPES on the STANDS from one side and STEP from the other, then sliding down the cones and feeling success.

CIT: BUILDING SOMETHING (maybe something that was not meant to be anything special) with small pieces of wood, could not be counted as a high-value CIT because the final product was nothing specific. (Good process, but no good finish).

DET (Divergent-Exploratory Thinking): the LADDER provided VARIOUS POSSIBILITIES for PLAY: building a climbing structure with plastic boxes and placing the ladder to climb up; resting it on the step, in front of the entrance door to climb up and run down the path and repeat, sometimes rolling down; putting the ladder beside the wall to climb and act as a fireman.

DET and CIT: Another child brought the bike, placed two big tyres around the bike's wheels, then tried to ride down the slabs with the big tyres. (DET: using the tyres in various ways, CIT: building a new game to play by adding other equipment)

In the Woodland:

CIT: Imagining that a tree trunk is the house for the stick-man family; one part is the living room, one hole in the trunk is the bedroom, and another hole is the kitchen. The child is **imagining/deciding** that a **tree trunk** (a part of the environment) is a **house**.

This is an original solution (none of the other children did this before her) to an issue (sheltering the stick-man family).

DET: The tree trunk gives children various play and imagining opportunities: a house for stick-men, a pool (by pouring water inside a hole), a surface to paint on with clay, a place to find creatures, experiencing various wood textures, tying strings around the trunk, searching for dead trees, or merely exploring the trees even with digging!

CIT: The child **imagined** that the **snail shell** was a **cup.** She used an **available material** in the nature for a **specific purpose**. Her idea was original, and she built a well-developed story based on it (the stick-man family making tea in the kitchen – tree bulk hole – and having an afternoon tea, and inviting teachers to have tea in the cup).

DET: Sticks allowed DET to occur:

1- Using sticks to make **various** signs, arrows and faces on the ground
2- Using them for **making** stick-men
3- To pick up creatures
4- Collecting all sticks in a place; making a camp (fire)

4.3.3 STAGE 3: Categorisation Based on EPoC's Scoring Logic

Following the above practice with the recorded observations from children in the different contexts, the next step was to categorise these activities. First, this was based on personal interpretations, and secondly, on the logic used in the EPoC test for scoring the results.

In relation to divergent-exploratory thinking, the logic of the EPoC test scores were based on the quantity of answers a child gave to a question. So, in relation to play behaviours, this referred to the number of activities and opportunities in which a child engaged within a context. Accordingly, each child was observed for a specific amount of time in a single context and the play and activity opportunities they had were counted as divergent-exploratory opportunities. This meant the various opportunities that a single element/piece of equipment/environment could give to the child. Therefore, the divergent-exploratory thinking measurement criteria in an environment was developed as:

0- Playing in the environment in a way similarly to the majority of the children

1-7 Using a piece of equipment/the environment in a number of ways (based on the number of activities)

For convergent-integrative thinking, the case was more complicated as it did not relate to numbers of activities, but instead the way the children were engaged and the quality of the play behaviour. In the EPoC test manual, there is a descriptive criterion for scoring children's drawings that consists of seven stages. These stages were modified in order to score children's play behaviours (instead of drawings), which resulted in the following scoring criteria:

1. **Copying what other creative children are doing**
2. **Combining two pieces of equipment to develop something original but meaningless**
3. **Combining more than two pieces of equipment to develop something original but meaningless**
4. **Imagining some piece of equipment as something meaningful**
5. **Combining two pieces of equipment to develop something original and meaningful**
6. **Combining more than two pieces of equipment to develop something original and meaningful**
7. **Building a story/developing play further based on what is imagined/developed**

One major issue with this categorisation was "how can one activity be interpreted as meaningful and the other as meaningless?" The judgment was actually based on the judge's own understanding of children's play while they were making things. This was unacceptable, because something that seemed meaningless to the judge may have been very meaningful to the child. Hence, this could have been influenced by a lack of knowledge of what children are thinking.

In order to overcome this deficiency, it was suggested that the researcher walk around the play contexts and talk to the children in order to gather as much information as possible about their thoughts in relation to their play activity. However, after trying this in the pilot study, similarly to what had been reported in the literature (Reisman, Floyd et al. 1981, Zachopoulou, Makri et al. 2009), it was found that it was impossible to attain the information that was needed, as nursery aged children were unable to express themselves adequately in words. Therefore, like in the EPoC test, the judgment was based on the judge's understanding and decisions. This is why, in EPoC training, the Consensual Assessment Technique (Amabile 1996a) is used to reduce the error of subjective judgments.

4.3.4 STAGE 4: Components of Creative Play

In order to develop the taxonomy further and overcome the deficiencies raised, two further steps were taken. First, the EPoC scoring criteria were explored in more detail in order to understand the exact factors that it measures.

In the EPoC manual (Lubart, Besancon et al. 2012) for divergent-integrative thinking, for Graphic-Divergent, "the only raw score calculation is fluency", which refers to "the number of drawings produced by the child". For Verbal-Divergent, first of all fluency is taken into account, referring to "the number of suggested endings or beginnings of a story". In the case that the child gives only three or fewer than three stories, an elaboration is calculated: "the total number of words" used for the endings and beginnings (p.37).

In divergent-integrative thinking, although it is believed that this thinking process includes originality and flexibility as well as fluency, the EPoC test highlights that originality and flexibility are not calculated in this test, "these scores being very strongly related to the score of fluency" (Lubart, Besancon et al. 2012). This was also noted by many other researchers when studying the Torrance Test of Creative Thinking as they believed it lacked the ability to measure flexibility and originality as well as fluency (Dixon 1979, Chase 1985, Treffinger 1985, Hassan 1986, Heausler and Thompson 1988, Runco and Mraz 1992, Abernathy Tannehill 1998).

In the EPoC manual, as mentioned earlier, in order to score convergent-integrative thinking, a seven-point scale has been designed. For both Verbal-Convergent and

Graphic-Convergent, the test's manual explains that integrative thinking involves "making a single production, the most original possible, starting from several elements" (p.100). Also, looking in depth at the seven-point scale clearly shows that the scoring criteria involve integration and originality. For instance, in the first stages of Graphic-Convergent, there are only low levels of integration in the child's drawings, whereas in the later stages there are more elements integrated and originality in the final drawing.

The second step was an online meeting with Professor Todd Lubart, the developer of EPoC. During this meeting, after presenting the research, the reasons for the researcher's decision that the EPoC test could not be used in its current format were explained, with which he agreed. Then, the process of designing the Creative Play Taxonomy and its aims were described. He was asked about the main factors included in the scoring criteria of the EPoC test in order to gain a better understanding of what it takes into account. He explained that they search for three main parameters in order to score creativity:

1- "INTEGRATION: number of items that are integrated together.

2- ORIGINALITY: What the child does with things, have others come up with this?

3- FLEXIBILITY: Items used in an unexpected way."

After the meeting, the EPoC manual was studied once again in order to understand the scoring criteria that supported his explanations. Accordingly, there are three main factors that were evaluated as indicators of creativity in the EPoC test, namely integration, flexibility and originality.

Therefore, the taxonomy was modified one more time to include these three factors. Similar to the EPoC manual and training, which provided drawing examples, at this stage play activity examples were added to the taxonomy in order to help understand each stage. The scoring system was also similar to EPoC, which was a seven-point scale with 1 being lowest and 7 highest:

Table 4-3: Stage 4 of the Creative Play Taxonomy Development Process

1- Engaged in physically based activities (No integration- no originality- no flexibility)	Running, Climbing, Walking, Sliding, Riding … (doing these acts on equipment that is designed for this purpose and it is their main and basic function
2- Imagining and playing with something differently to its usual function (No integration- no originality- flexibility)	Sliding, Climbing and Riding in a different way than its function
	Playing with only one material to make something different to its function but with no originality (such as sand to make castle)
3- Combining one or two types of equipment to develop something which is not very original (Integration- no originality- flexibility)	Building something based on teacher's suggestion (making stick man with some clay and stick)
	Building something based on other children's play (one child making a shelter, other children joining and copying)
4- Combining more than two types of equipment to develop something which is not very original (Higher Integration- no originality- flexibility)	More than two materials, based on teacher's suggestion (making creatures, but child uses more than one material around him)
	Copying other children but using more materials (using paint and brush to paint the trees)
5- Imagining and Playing with something originally and differently to its usual function (No Integration- originality- flexibility)	Using a piece of equipment to pretend it is something other than what it really is, but in an original way. (Using a pipe and pretend it is something other than a bare pipe, riding log)

6- Combining one or two types of equipment to develop something original (Integration- originality- flexibility)	Making something new and original and flexible with only one or two types of equipment (putting a few tyres together, making something with sticks, ...)
7- Combining more than two types of equipment to develop something original (Higher integration- originality- flexibility)	Building a plane, a ship, a car, or other things that are used in various ways

4.3.5 STAGE 5: Evaluation System and Abbreviations

This scoring system had three major issues.

First, the factors had been valued in a way that meant originality was valued higher than integration, and integration was valued higher than flexibility. For instance, when a child showed integration and flexibility in their play, they only scored 3, whereas if they showed originality and flexibility without integration, they were scored 5.

Secondly, there were no stages where the child could be original without being flexible. This was based on personal judgment, which concluded that in most cases, flexibility comes before originality and originality cannot happen without flexibility happening beforehand.

Finally, there was no category which included integrative play without originality and flexibility.

For the above reasons, the taxonomy was modified once more. On this occasion, the parameters were equally valued non-numerically, so they were grouped into the four levels of A, B, C and D, and all eight types of combinations for the three parameters were included.

Abbreviations were also designed for each of the eight possible stages of creative play opportunities. Also, illustrative examples of children's creative play behaviour for each of the stages were also provided in order to ease understanding of the examples. Thus, the Creative Play Taxonomy was now set out as follows:

Table 4-4: Stage 5 of the Creative Play Taxonomy Development Process

level	Stage	Abbreviations	Description	Flexibility	Integration	Originality
D	1	**NO**	Engaged in merely physical activities			
C	2	**INT**	Putting various elements together, as per the products function		■	
	3	**FLEX**	Imagining and playing with something differently to its usual function	■		
	4	**ORI**	Coming up with a completely novel idea to play with something			■
B	5	**FLEXINT**	Combining two or more types of equipment to develop something which is not very original	■	■	
	6	**INTORI**	The child has come up with an original idea by integrating two or more types of elements, but the items are not used in a flexible way		■	■
	7	**FLEXORI**	Imagining and Playing with something originally and differently to its usual function	■		■
A	8	**FLEXINTORI**	Combining two or more types of equipment to develop something original	■	■	■

4.3.6 STAGE 6: Presentations and Validity

At this stage, the taxonomy seemed to have covered all the types of creative play possibilities, so it was presented in different seminars and to various experts in order to hear further points of view in addition to testing it.

Two seminars were held at the University of Edinburgh. The first was organised by the Landscape Architecture Department in Edinburgh College of Art. Several professors and lecturers in architecture, landscape architecture and built environment, as well as various colleagues and PhD students from the department, attended the seminar.The second seminar was organised by the Education Department of the University of Edinburgh. At this seminar, several professors and lecturers in children's

education and developmental psychology attended along with some PhD students from the Department of Education.

One meeting was held with experts from NC State University and the Natural Learning Initiative. Another was held with a professor in Land Use Planning from Aalto University.

In all these presentations, after a brief introduction to the research, the Creative Play Taxonomy was presented with a focus on the three main factors, flexibility, originality and integration, in addition to illustrations of each of the eight stages. In the seminar presentations, some recorded observations of children's play behaviours in relation to each of the creative play stages were also shown in order to help the audience have a sense of what these play behaviours would be like in reality. These presentation were treated as very short training sessions of how the Creative Play Taxonomy works and how they can code a child's creativity in play based on the taxonomy.

After the short presentation and answering questions to clarify the different parts, a sheet of the Creative Play Taxonomy was handed out to the audience and small parts of children's video-recorded play behaviours in different play contexts were shown. The experts were asked to use the taxonomy sheet to say which stage they believed the observed play behaviour fits into, if it fits in any. This was to test: 1- whether the experts agreed that all the play behaviours link with one of the eight stages of the taxonomy, and 2- whether the different experts would code the same stage to each play after the short training. Each of the video-recorded play behaviours were shown few times to give the experts enough time to look carefully and study the taxonomy to find the relevant stage.

Going through each of the videos, all the academics that were engaged in the discussion agreed that each of the play behaviours do fit in one of the eight stages of the Creative Play Taxonomy, and there wasn't any play behaviour which couldn't be linked to one stage. However, as one of the parameters was originality which was a parameter that they had to recognise in the context of play by comparing the children with each other, some of the academics questioned if some of the play behaviours were only in that occasion or not. Thus, in that occasion they were told that "this was the

only child doing that activity" or "many other children were engaged in that play similar to this child".

The audience had the chance to ask questions, raise concerns or add any other comments that could improve the taxonomy further. One of the most repeated issues, raised in every presentation, was the difference between flexibility and originality. Also, many academics questioned why one child's play behaviour was seen as original and another child's play behaviour as unoriginal.

In addition to these issues – which mainly related to the scoring system, especially around originality – another set of questions were raised about the language used in the taxonomy. Some found it complicated or not straightforward. For instance, one professor suggested changing the phrasing by using as many similar words throughout the different stages as possible. As an example, instead of using "equipment" in one stage and "materials" or "elements" in the others, it was suggested that the researcher choose the best word and use it for all stages. It was also suggested that the researcher change the description for Stage One, which represents no level of creativity, as it seemed to be categorising physical activity as the opposite form of play to creative play.

4.4 The Final Version of the Creative Play Taxonomy

The issues regarding originality seemed valid. This showed that not only were there difficulties with measurement, as previous knowledge of children's play behaviours was needed, but the description was also inadequate. In order to overcome this issue, more explanation was added for flexibility, and even more for originality. Also, further information was given in relation to the way originality would be scored for children's play in a context.

It should be noted that, even in the EPoC test, when measuring the convergent-integrative thinking on which originality is evaluated, the judgment is still context-dependent and may vary amongst different judges (Lubart, Besancon et al. 2012). However, the more training and knowledge the individual has about children's drawings (or in the case of this research, children's play behaviours), the better they can judge and code it, and the lesser the likelihood of error or variation in coding.

However, there is always potential for error in coding such behaviours due to the difficulty of classification (Amabile 1996a, Lubart, Besancon et al. 2012).

With regards to the language used in the descriptions of the taxonomy, it seemed that using different words made it more difficult to understand. Therefore, the language was modified, in consultation with experts, and the latest version was presented at a seminar and eventually finalised.

Based on the above process, the final version of the Creative Play Taxonomy, followed by its explanation sheet, is as follows:

Table 4-5: The Final Version of the Creative Play Taxonomy

LEVEL	STAGE	ABBREVIATIONS	DESCRIPTION	FLEXIBILITY	INTEGRATION	ORIGINALITY
D	1	**NO**	Playing with one or no element, as per its function and similarly to others			
C	2	**INT**	Playing by integrating **various types of elements** as per their function		■	
	3	**FLEX**	Playing with an element in an **unexpected way**	■		
	4	**ORI**	Playing with an element as per its function, but **differently to others**			■
B	5	**FLEXINT**	Playing by integrating **various types of elements** in an **unexpected way**	■	■	
	6	**INTORI**	Playing by integrating **various types of elements** as per their function, but **differently to others**		■	■
	7	**FLEXORI**	Playing with an element in an **unexpected way** and **differently to others**	■		■
A	8	**FLEXINTORI**	Playing by integrating **various types of elements** in an **unexpected way** and **differently to others**	■	■	■

4.4.1 Description of the Creative Play Taxonomy Components

INTEGRATION: **Number of different elements integrated** (Besançon, Lubart et al. 2013). This is when a child integrates different types of play elements in a play. For instance, when a child uses bowl and pretends he is having a soup during his play, he is using two different types of elements- the spoon and the bowl- together, to develop his play. As another example, when a child uses a spade to dig a hole in the soil on the ground, he is integrating two different play elements to engage in play -the spade and the soil- thus Integration has taken place.

FLEXIBILITY: **Items used in an unexpected way**. This is associated with **elements' functionality**, and the way this can encourage the child to think differently about using them in play. Flexibility is noted when a child uses an element differently to its usual function (Besançon, Lubart et al. 2013). For instance, a chair is designed for sitting. If the child turns the chair upside-down and pretends he is driving a car by holding the two legs, he is using the chair differently to its usual function, therefore, flexibility has occurred. As another example, when a child clime up a tree, as trees are not functionally there for climbing purpose, the child has engaged in a flexible play behaviour. In this case, the tree has provided the opportunity for the child to be flexible.

ORIGINALITY: **The child acts differently to other children.** Originality is associated with **child's play behaviour** in the play context compared to the individual's peers. As it is only recognisable in play contexts and through comparison with others, it is only noted the first time a child is seen to do something that is novel. In other words, when all the children are playing with a certain element in a certain play context, the child who engages in the play activity in a different way for the first time and possibly only time is noted as original compared to others. In this case, other children who perform the same act after the first child does so are not noted for originality as they may have followed the first child's act. Also, as the coder needs to have some knowledge and experience of children's play behaviour before doing the coding, a part of the coding will be related to his/her knowledge of whether the activity is different and unusual, or something that many children may do later. For instance, all the children use a slide to slide down from it. Now in one occasion, a child decides to climb up the slide by holding the sides of the slide. As this is the only child who has come up with the idea to use the slide for climbing (instead of sliding), he is engaged

in originality. As another example, the observer sees all the children engaged in making a stickman by attaching small sticks into clay as the teacher has taught them. But there is only one child who comes up with the idea to use a feather as the stickman's hat and small rocks as its eyes. As he/she is the only child who makes a different and original stickman compared to others, he is scored originality during play.

4.4.2 The Application of the Creative Play Taxonomy

In order to use the Creative Play Taxonomy for coding the data, video-recorded visual data is required. This is because the play behaviours of all the participants in the play context needs to be coded one by one as they occur. Accordingly, a video-recorded observation allows the coder to have enough time to code the data and review the observation for each child and behaviour as required. As explained in detail in Chapter 3 (section 3.10), the data should be collected in the form of empirical duration recording as this method provides accurate and reliable data, and the amount of time which each behaviour occurs is accessible.

After providing the videos the coding process starts. The video is viewed repeatedly, aiming at one child at a time. In every occasion, one child's play behaviours are closely studied to be coded based on the eight stages of the Creative Play Taxonomy. Accordingly, when the target child engages in play that none of the three parameters of a creative play (flexibility, originality and integration) take place, the child is scored "NO". Until the child moves on to a play behaviour that is on another stage, her/his activity will continue to count as "NO". As soon as the child engages in a play that includes one or more of the three creative play parameters, "NO" will end and a new stage is scored. For instance, if the child engages in a play that engages both flexibility and integration, he/she will be scored FLEXINT for as long as she/he is engaged in that activity. As children move fast in play, sometimes the coder needs to rewind one part of the video several times. This process continues until the target child's play is fully observed and coded.

The same process will repeat to score all the children. So, for instance if there are 15 participants playing in one play context, the video will be observed 15 times to score all the children. After all the children are coded using the Creative Play Taxonomy, their scores can be analysed.

4.4.3 Reliability of the Creative Play Taxonomy

In order to test the Creative Play Taxonomy's reliability, inter-rated reliability test was done.

Accordingly, four children were randomly chosen in the four different play contexts with the same 12:30 minute duration. Another person, who was assisting the researcher in video recording children's play in some of the observation sessions, was asked to code these four children in the four contexts. It should be noted that he was not an expert in children's play; if he had been, it would have been helpful in his understanding of children's play behaviours and thus his judgment of them. However, as he had accompanied the researcher to many of the observation sessions, he did have a sense of children's play abilities and behaviours.

Before starting the coding, the aim of the study and the function of the Creative Play Taxonomy was explained to him. The three components of creative play, namely integration, flexibility and originality, were discussed. Then some examples of the eight stages of the different creative play behaviours were shown and explained to him. Most of his questions were about the coding of originality, as he believed it was different in nature (originality being context-dependent and comparing children with each other, and flexibility and integration being objective and related to children's relationship with the play context and elements). Hence, it was explained to him that the taxonomy was not supposed to compare these three factors with each other, but instead the factors were parameters that covered all possible aspects of a child's creative play behaviour alongside each other, and it was the result, which may or may not have included all three factors, that was important. For instance, the taxonomy did not aim to compare a child's flexible play behaviour with originality in play; instead, it was meant to measure whether the child displayed each of these factors in play, in order to measure his/her creativity.

The training process was fairly short in comparison to the EPoC training session and the assistant did not have any previous coding practice. Because of this issue, as well as the fact that he did not have previous knowledge about children's play, he had to ask the researcher when he needed assistance in scoring originality. However, this only happened in a few cases, because he was able to compare the target child with other children while he was coding. Hence, he was able to distinguish whether the child was

original and the only one performing that particular play behaviour or was copying another child from that play session.

The following charts compare the researcher's coding and the assistant's coding. There were two aspects that were of interest when comparing the two charts in all four cases. First were the stages found and coded in each of the play sessions; second was the percentage of engagement, which showed the duration the child spent in each of these stages.

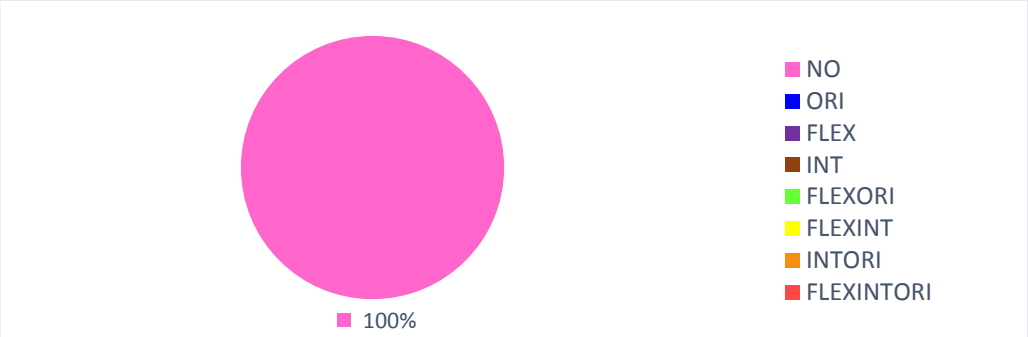


Chart 4-1: Child Two, One Session Creative Play Engagement in Fixed Manufactured Play Context (Researcher Coded)

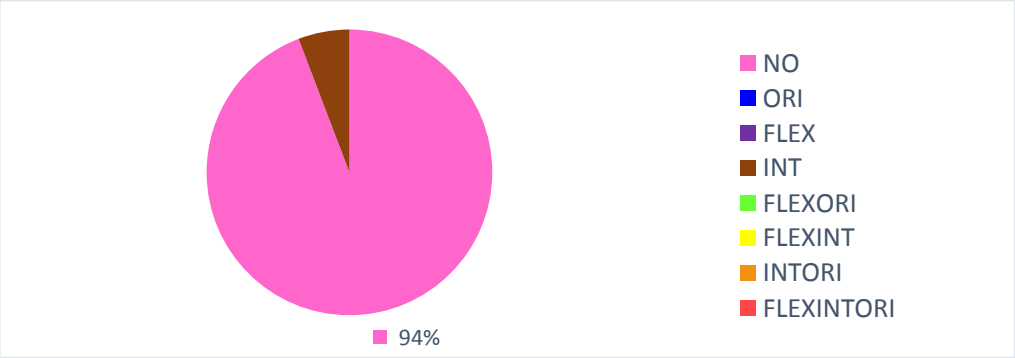


Chart 4-2: Child Two, One Session Creative Play Engagement in Fixed Manufactured Play Context (Assistant Coded)

The Fixed Manufactured Play Context coding was the only context in which the assistant coded a different stage (INT) to the researcher. Looking back at the video, integration was observed and coded by the assistant when a child started to wipe the slide dry with a towel. In this process, the assistant considered the child to be using the towel and the slide together. However, this was not noted by the researcher as it was

believed that during that time, the child was not engaged in any *play*, so it could be ignored as it was only a short activity to prepare the context for play.

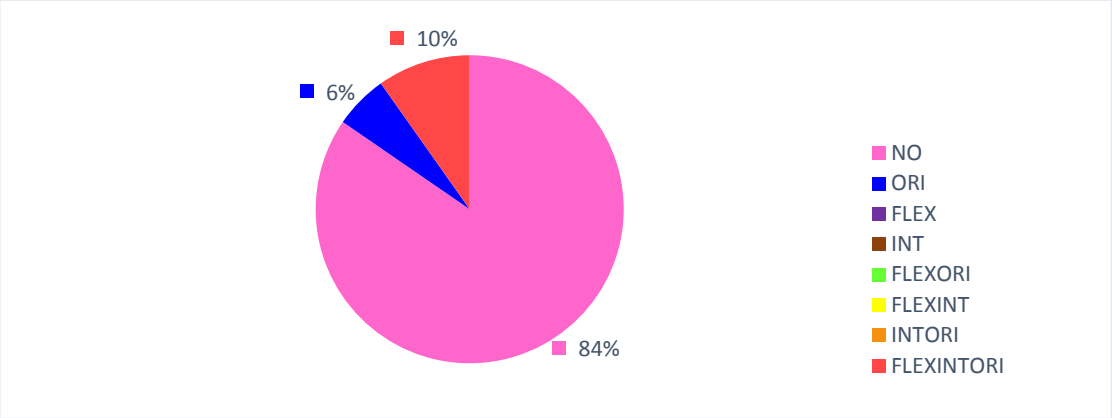


Chart 4-3: Child One, One Session Creative Play Engagement in Loose Manufactured Play Context (Researcher Coded)

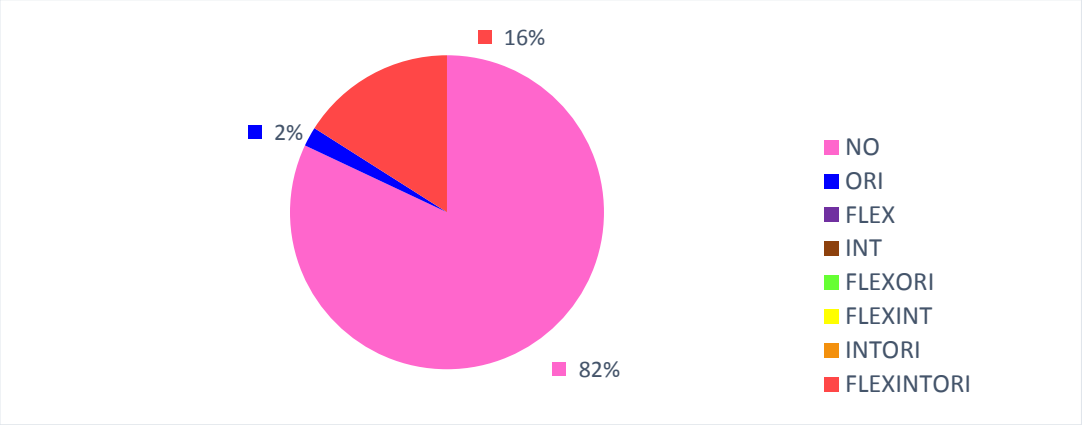


Chart 4-4: Child One, One Session Creative Play Engagement in the Loose Manufactured Play Context (Assistant Coded)

In this coding test, the stages of creative play behaviour noted by both coders are the same; however, the percentage of engagement differs slightly. For both coders, FLEXINTORI was coded when the child was riding a three-wheeled car in the opposite way to its intended purpose, and had placed two plastic ball throwers under the back wheels. Here, the assistant coder realised that the activity was original without having to ask the researcher. Equally, ORI was coded by both coders when the child was riding the same car the other way around, but was no longer using the plastic ball throwers.

When going through the video together, although the two coders agreed on the categorisations of the creative play behaviour, they had different opinions on when the child started and stopped each of the play behaviours. This resulted in scoring slightly different durations of engagement.

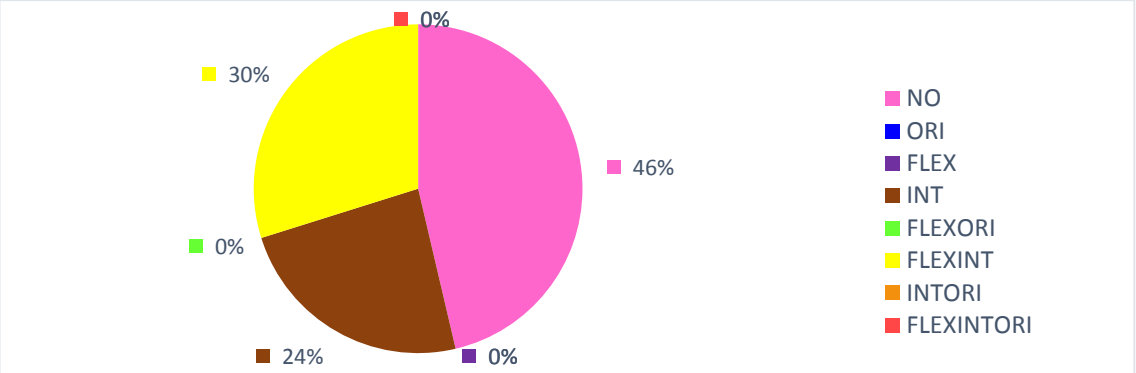


Chart 4-5: Child Three, One Session Creative Play Engagement in the Loose Parts Play Context (Researcher Coded)

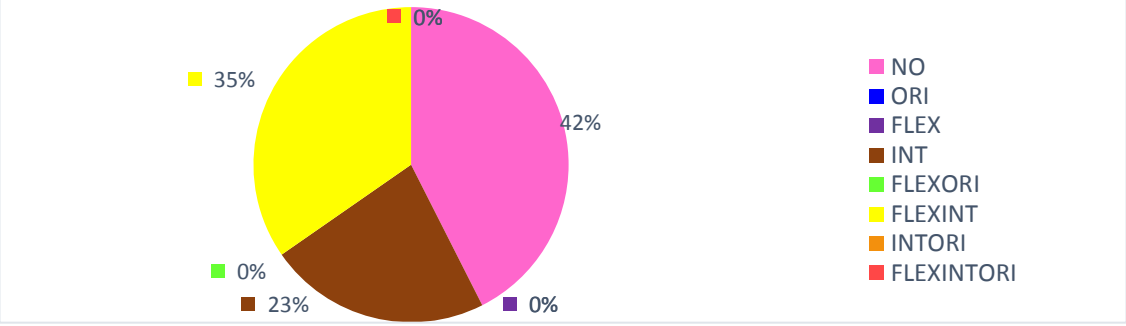


Chart 4-6: Child Three, One Session Creative Play Engagement in the Loose Parts Play Context (Assistant Coded)

In this coding test, similarly to the Loose Manufactured Play Context, the different play behaviours were coded as the same by both coders. However, again there was a slight difference between scoring the starting and ending point of each play activity, which resulted in fairly small percentage differences.

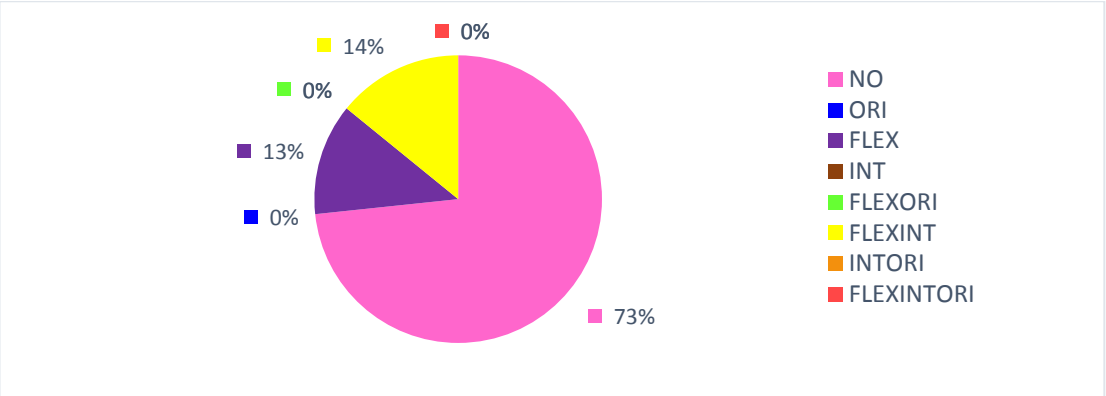


Chart 4-7: Child Four, One Session Creative Play Engagement in the Natural Play Context (Researcher Coded)

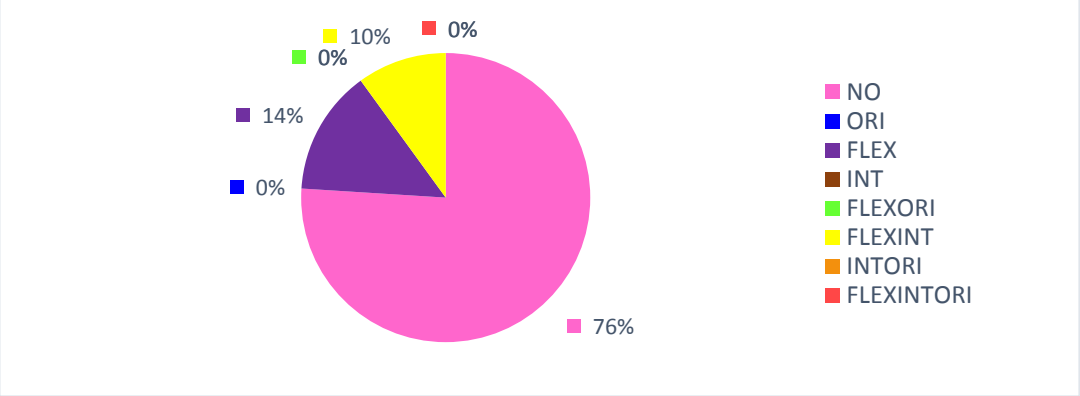


Chart 4-8: Child Four, One Session Creative Play Engagement in the Natural Play Context (Assistant Coded)

As with the previous coding tests, both coders coded the same categories within the Creative Play Taxonomy for the child's play behaviours. In both cases, when the child was engaged in climbing up the tree, they coded it as FLEX, and when the child was using the different materials in the context to make a stick-man, they coded it as FLEXINT. Here, the assistant coder asked if the researcher thought what the child had made was original, or fairly similar to the other children. As the researcher had previously made notes and had a separate recorded video of the children's stick-men, it was concluded that the stick-man this child had made was very similar to other children's stick-men.

Similar to the previous coding tests, it was only the percentage of engagement in each of these stages that differed slightly between the two coders.

4.5 4.5 Summary

The concept and scoring system of the Creative Play Taxonomy was based on the theory of creativity by Lubart et al. (2012), as well as Lubart's creativity test, the Evaluation of Potential for Creativity. In this concept, creativity is "the ability to produce work that is both: novel; and context appropriate".

The Evaluation of Potential for Creativity has three main advantages compared to other tests. First, it measures both divergent-exploratory thinking – "the ability to produce many, varied elements based on a stimulus" – and convergent-integrative thinking – "the ability to articulate or integrate several elements into a cohesive unit". Secondly, it is one of the most recent creativity tests; thirdly, it is designed especially for children (Barbot, Besançon et al. 2011, Lubart, Zenasni et al. 2013, Berlin, Tavani et al. 2016).

However, due to three reasons, it was not appropriate for this research: first, it is designed to measure long-term creativity, so it could not assess children's creativity during play in different play contexts taking place over the course of a few days. Secondly, it does not measure preschool-aged children's creativity. Thirdly, it only measures verbal and graphical domains of creativity. Thus, the Creative Play Taxonomy was designed in order to measure children's creativity when engaged in play.

The Creative Play Taxonomy is based on three main factors:

1. Integration, which is the number of different elements integrated with each other.
2. Flexibility, which is referred to when items are used in unexpected ways and is associated with the elements' functionality.
3. Originality, which is when the child acts differently to other children; this is associated with child's play behaviour in the play context.

The Creative Play Taxonomy was designed with four levels and eight stages. Level A is the highest level of creativity and includes FLEXINTORI as its only stage, where all three creative play factors occur together. Level B is a high level of creativity; however only two parameters of creative play occur together. It includes three stages, FLEXORI, FLEXINT and INTORI. Level C is a low level of creativity where only

one creative play parameter takes place; it includes the three stages ORI, FLEX and INT. Level D has no creativity in play.

The test was tested for its reliability by inviting a second person to score four examples of children's creative play in four different contexts. The discrepancies between the researcher's findings and the second person's findings were not major and did not exceed a few percentage points.

CHAPTER 5 PILOT STUDY: DATA COLLECTION AND FINDINGS

5.1 Pilot Study Implementation and Collection of Data

The pilot study was undertaken in March-May 2013 at Bilston Nursery, which is located in Bilston, Loanhead, a small town south of Edinburgh in Midlothian, Scotland.

At the time of the pilot study, the nursery's outdoor play space was a tarmac area separated from the rest of the school's play space with a fence. The children entered the play area through a sloping path to reach the tarmac play space. One side of the play area was a step higher, which provided different levels. The outdoor furniture and fittings within the space consisted of one bench and several flower boxes. There was a shed outside the play space filled with various items of play equipment and some loose materials. At the beginning of each play session, the teacher would select pieces of equipment and material for the children to play with during that session.

For the pilot study, data were collected in two ways. As the first method of collecting data, four observation sessions were held in four different play contexts in order to understand children's play behaviours. The first two play sessions were held before the timber climbing frame was installed in the outdoor play space. In play session one, the outdoor play space was equipped with loose materials for the children to play with. In play session two, unfixed manufactured play equipment was provided for the children to play with. For the third play session, the children were taken to a woodland area near their nursery. The fourth play session was held when the timber climbing frame had arrived in the outdoor play setting; it was the first day that the children were allowed to play in the play setting after its arrival.

This part of the data gathered in the pilot study were in the form of images and videos. This allowed the researcher to identify similar patterns of children's play behaviours in various play contexts. Having visual data helps to analyse the data in a critical (Neuman 2004) and creative way (Patton 1990).

The second method of collecting data involved the Leuven Wellbeing and Involvement Scale (Laevers, Moons et al. 2005), a process-oriented Self-Evaluation Instrument for Care Settings (SiCS). The test was used in the loose material play session, the woodland play session and the timber climbing frame play session. The tool measured two indicators: the children's "wellbeing" and "involvement". The nursery teacher had already gone through the Leuven test training, so she carried out the test in all three settings.

She observed each child in middle of each play session for approximately two minutes and scored their wellbeing and involvement in play as low, moderate and high, with some notes as needed.

Accordingly, the data from the pilot study were studied in order to understand: a) the range of behaviours likely to be exhibited in each of the play contexts; b) the effectiveness of different techniques to record the children's behaviours, and how to cover all children's play behaviours in one session; and c) the different stages of children's creative play, in order to develop the Creative Play Taxonomy (as described in Chapter Four). The pilot observation data were used to train the observer in the use of the Creative Play Taxonomy and to test its usability in practice.

When the pilot study was undertaken, the nursery consisted of 17 children: eleven boys and six girls. In the loose manufactured play session and loose material play session, ten children were present; in the woodland play session eight children were present; and in the session where the timber climbing frame had arrived, 15 children were present.

All of the play sessions were held in spring between March and May on partly sunny to cloudy days with no rain.

5.2 Pilot Study Observation Data

5.2.1 The Loose Materials Play Session

Figure 5-1: Loose Materials Play Session

When the nursery's playground was still a plain tarmac play area, some loose materials such as empty boxes, cartons, loops, strings and a ladder were provided for the children to play with. In reaction to these materials, many of the children – some of whom were said to be naturally more creative than their peers by their teacher – started playing with the material straight away. They engaged by putting various pieces of loose material together to make different things in various ways. They created their own play structures, spent time playing on them and then broke them down and built different play settings. Some children started to make a ship to sail with, while others just put the parts on top of each other to climb up.

A few of the children acted as followers; they watched the other children building new settings with the junk, and either helped them in the process or just watched and got involved in playing with what the others had made afterwards.

Figure 5-2: Children Playing with Loose Materials

Some of the children, however, did not seem to engage well in playing with the loose materials and appeared confused about what they could do with them. In fact, while the other children were enjoying the wide range of things they could do with the junk material and the different play opportunities they could build, this group found the material boring and confusing, and started looking for something more straightforward with which to engage.

Speaking to the teacher about the children's different reactions, she mentioned that some of the parents had expressed displeasure with the idea of their children playing with loose materials as they were not playing equipment, but rather junk material.

5.2.2 The Manufactured Play Equipment Play Session

Figure 5-3: Manufactured Play Equipment Play Session

In the next observation session, some play equipment for the children was provided, mainly related to traffic games and building blocks. Most of the children seemed to engage with playing with the traffic play equipment to some extent. Some started building roads and pathways with the building blocks while others attached the traffic-light parts together. A few of the children just preferred to ride the cars around the settings. In fact, all the children seemed to understand how they should play with this play equipment, and so it was mainly used as designed.

Figure 5-4: Children Playing with Traffic Play Equipment

Figure 5-5: Children Playing with Loose Manufactured Play Equipment

5.2.3 The Woodland

Figure 5-6: The Woodland

In the third observation session, the children were taken to the woodland area near their nursery. At the beginning of the session, the teacher gathered the children to read them the "stick-man family" story. This influenced the children's minds, so when they were finished with the story to start playing, many of them started picking up sticks and leaves from the ground to make a "stick-man" and his family. They used the trees as houses for their stick-man family with rooms and a kitchen. They used some clay

to make pots and cups so the family could have tea, and planned a holiday trip for the family.

What was observed overall was that children were using the materials and the natural environment to create their own games and getting involved with nature. Also, some of the children started making signs and arrows on the ground using sticks. Some drew pictures on tree bark using clay.

Many other children chose to explore nature in order to find insects. Some preferred to engage in physical activities such as jumping over the logs, small hills and water pools, climbing the trees or running around.

5.2.4 The Timber Climbing Frame

Figure 5-7: The Timber Climbing Frame

The timber climbing frame structure arrived at the school nearly two months after the observation sessions had started, and so the children's first reactions to the newly arrived frame could be observed. The climbing frame (as described in detail in Fixed Manufactured Play Context, Study Site One) consisted of some stairs and climbing ropes attached to a stage linked to another stage with a bridge. The second stage had two Plexiglas windows on two walls, and a slide at the other end.

The observations were rather different to what was expected. At first, all of the children were very excited to have the frame in their playground. The teachers had to control

the children so that they would not fight over who could go first and next. They all started climbing up the stairs and the ropes and sliding from the other side. After some time, a few of the children tried to climb up in other ways, such as twisting around the ropes and then going up, or even sliding down differently, hands first.

However, it seemed that the climbing frame engaged some children only for a short time, as they started walking away from it to find something else to play with. Even though it was the first day they could play with the frame, some children did not show much interest after a while and walked away from it. Some of them started collecting the small amount of sand that surrounded the frame after the installation process. They collected the sand in pots, made shapes with it on the ground or drew signs on it.

5.3 Pilot Study Leuven Test Data

5.3.1 Loose Materials Play Session

In this play session, eight out of ten children showed high levels of involvement when playing with the loose materials, but only six scored high in wellbeing. Referring to the notes made by the teacher, the six children who scored highly in both involvement and wellbeing were doing activities such as initiating much of the creative play, planting or building things with the material, climbing the ladder or playing with the tyres; overall, they were highly engaged in building projects.

Out of the ten children, four were scored as moderate in levels of involvement and two of these were also scored moderate in wellbeing. In all four cases, the children were not managing to play with the loose materials or faced communication difficulties with their peers while playing with these materials.

5.3.2 Woodland Play Session

In the woodland play session, six out of eight children scored high in both wellbeing and involvement levels. The teacher's notes indicated that these six children were engaged in activities such as digging, making things with clay and other natural materials such as sticks, finding "mini beasts", mixing water with clay in a bowl and painting the trees with a brush, making stick-man families, or walking on the ropes attached to the trees.

The other two children scored moderate in both wellbeing and involvement. One of them was noted to be happy while playing with nature in activities such as digging, but was unhappy and did not engage well when he was called to sit with the other children in the story discussion. The other child was also noted to be happy when playing with clay or on the ropes, but had some communication difficulties with the first child when they were digging together.

5.3.3 Climbing Frame Play Session

In the climbing frame play session, two of the children were not scored by the teacher at all because, as the teacher's notes indicated, they did not find the timber climbing frame engaging and found sharing difficult, so they chose to go inside the classroom at a very early stage of the play session.

Eleven out of 13 children were highly involved, with 10 of them also scoring highly in wellbeing. Apart from playing on the climbing frame, four of the children also played with the sand around the frame.

Out of the 13 children, one of the children scored low in wellbeing and moderate in involvement, while another scored low in involvement and moderate in wellbeing. These two children, as well as the one child who scored highly in involvement but moderate in wellbeing, were all noted to have difficulty queuing for their turn on the climbing frame.

5.4 Pilot Study Findings

Gathering the above in the pilot study helped in three ways. First, it helped to form the data collection process for the main observation sessions at the two study sites. Secondly, it helped in the development of the Creative Play Taxonomy. Thirdly, it helped in understanding children's creative play behaviours.

5.4.1 Observation Session Development Process

The pilot study helped with systematic decisions about the way the main observation sessions should be carried out. It was decided that two to three cameras were needed to record each observation session from different angles, so as to cover all of the children's play behaviours at a time. As such, it was decided to have at least one camera in a fixed position with a wide angle to cover the whole play setting, and

another camera that would be moved around the play setting in order to catch more detailed play behaviours and possibly children's verbal communications, which later helped in analysing the observations. To achieve this, an assistant accompanied the researcher when carrying out the recordings on site. This was especially important in the woodland play context, which had a wider area where the children often moved out of sight by playing behind the trees.

Secondly, in the pilot observations, it seemed that there was too much guidance from the nursery teacher on what to do and how to play within each setting. This was something that needed to be spoken about with the teacher so that it would be limited in the main observation sessions.

Thirdly, in the process of the pilot study, the researcher attempted to get into verbal communication with the children in order to elicit further explanation of what they were involved in and what they were making in the building activities. However, it became clear that, at this age, many children had difficulty in expressing themselves verbally. It was also impossible to speak to all of the children at the same time in each session, so having a reasonable judgment of what each child was thinking of in their play was impossible.

5.4.2 The Creative Play Taxonomy Development

All the recorded observations were used to understand children's play behaviours, which later helped to develop the Creative Play Taxonomy (as described in Chapter Four). This was done after the children's play in the various settings was studied, resulting in a clearer understanding of the range of play in which they might become involved in various play settings. Also, at every stage of the development of the taxonomy, the observations were studied again to see whether the taxonomy covered all the different play behaviours, and to ascertain whether the descriptions of each level matched the creative play behaviour that occurred. This process, which was one of the main purposes of the pilot study, has been explained in more detail in Chapter Four.

5.4.3 Children's Creative Play Behaviours

The pilot study helped to gain some initial findings from observing children's play behaviour in relation to each setting and the elements within them. The different play

contexts and the way children played in each context were studied. These are described below.

5.4.3.1 *The Loose Materials Play Session*

Studying the ten children in the loose materials play session, there were different responses resulting in different levels of creative play behaviour. A few of the children engaged in deep play from the beginning of the play session. They started integrating different materials such as the cardboard boxes, the ladder, a tyre and some plastic boxes together and said they had made a ship. They were obviously using these materials in a flexible way, and what they made together was original. This was where the three factors of integration, flexibility and originality happened simultaneously and were classified as FLEXINTORI.

Another instance of FLEXINTORI was when a child put a blanket inside a plastic box, squeezed inside and pretended it was a bed. Another child used the wooden slabs, leaning one side of the slabs on the step on the ground and rolling the tyres down the slope.

Some other children put several plastic boxes on top of each other with the ladder beside it and started climbing the structure. Actually, many of the children came up with doing this at different stages of the play session, so it was not seen as an original play. The ladder was also used as it was supposed to be used; it was climbed up. However, the plastic boxes were used differently to their usual function and were integrated with the ladder, so this play included both flexibility and integration, classified as FLEXINT.

As some of the children acted as followers and only watched others building the structures, and played with them after they were made, their play only included flexibility in the use of materials. In other words, they were not engaged in the original idea of building the structures, nor were they involved in integrating them together. Some other children went inside the cardboard boxes and sat inside. These were all classified as FLEX.

There was also an occasion where a child put the ladder by a bench and climbed up to sit on the bench. This was an original play behaviour, as none of the other children came up with this, and he was actually integrating the ladder with the bench. But as both the ladder and the bench were used as per their intended functions, the child was noted as engaging in an INTORI creative play.

Comparing the results from the Leuven test with the observations, there seemed to be a link between a higher level of involvement and wellbeing and higher creative play levels. In fact, the children who were mostly engaged in FLEXINTORI, which is the highest level of creativity, scored high in involvement and wellbeing as well. However, the children who were not engaged in high levels of creative play or in any creative play at all scored moderate either in involvement alone or in both wellbeing and involvement. The notes of the teacher showed that these children were unable to interact with the materials, which also resulted in poor communication with peers.

5.4.3.2 *The Play Equipment Play Session*

In the play equipment play session, all of the children seemed to be involved in some sort of play. Some of them engaged in playing with the traffic equipment. They attached the traffic sign to the poles, or made paths by putting the cones beside each other. In fact, they were engaged in integrating different parts of the play equipment together to build the play. However, all of the parts were used as they were designed to be used, so there was no flexibility. Also, all the children were doing the same sort of play activities and there was no originality in using the equipment.

It was the same scenario with the building blocks. All the children who were playing with them were integrating the fairly different-shaped blocks together to make a path; there was no flexibility or originality.

Some of the children preferred to ride the toy cars around the play area. When they were just riding the cars on the ground with no attention to the blocks or traffic equipment, they were not engaged in any level of creative play at all; however, those who decided to ride the cars over the paths made with the blocks were at least integrating different play equipment together. This resulted in a low level of creative play, classified as INT.

5.4.3.3 *The Woodland Play Session*

All of the children were engaged in at least some level of creative play at some stage of the play session in the woodland.

After the teacher read them the stick-man story, many of the children started picking up sticks from the ground, finding leaves and even feathers to attach to the stick to make stick-men. The teacher also guided them in making a head for each stick-man with the clay that she had brought from the nursery. Hence, they were already encouraged to integrate different natural materials to make something to play with. These materials were used in flexible ways; however, as the teacher had guided the making of the stick-men, most of the children were making fairly similar things with no original ideas of their own. Thus, this was a FLEXINT creative play.

Two of the children developed their play further. They chose some parts of the trees in the woodland and pretended they were different rooms in the stick-man's house. They made a family for him, and even used a snail shell as a cup when the stick-man family gathered in their tree-kitchen and had tea. They were very original in developing a whole story around the stick-man, thus they were classified as being engaged in the highest level of creative play, FLEXINTORI.

Another child used a few sticks and started making arrow signs on the ground. In fact, he was using the sticks in a flexible way and as he was the only child who engaged in this activity, he was also playing originally. Thus, he was scored as FLEXORI.

Some other children mixed clay with water in a bowl as the teacher guided them, and started drawing or colouring the trees. Although this was also led by the teacher and so was not original, it still showed flexibility in using the materials, and integrating them into play. Even the children who chose to engage in physical activities such as running and jumping were still engaged in low levels of creativity in this play setting. In fact, they were mainly jumping over the logs or even the hilly area, climbing the trees or jumping over the puddles. All of these were classified as FLEX.

Some other children used magnifying glasses to find creatures and insects; they put the insects on pieces of wood to see them closely. They were not actually using

anything differently to its function, but they did use different materials such as the magnifying glass, the trees, creatures etc.

In this play session, eight children were observed. Six of them, who were all engaged in the high stages of creative play according to the Creative Play Taxonomy, also scored high in the Leuven test. Two children, however, scored moderate in both wellbeing and involvement. Looking at the teacher's notes, the lower scores did not seem to have much to do with the play setting; one child felt unhappy when he had to sit and listen to the teacher's story at the beginning of the play session, while the other was noted to have faced communication difficulties while playing with the first child.

5.4.3.4 *The Timber Climbing Frame*

Children's play behaviours on the timber climbing frame mainly had no level of creativity. All of the children were running around the frame, climbing the stairs and ropes, walking over the bridge and sliding from the other side. In basic terms, they were doing the same sort of activities with no originality, and using each part of the frame as it was designed.

It was only when some of the children grew tired of the frame and stopped playing on it that there was some level of creativity observed. These children started collecting the sand left around the frame from the installation. They started making shapes on the ground by moving their fingers in the sand or putting sand in pots and pouring it on the ground to make more shapes. This was where some level of integration and flexibility occurred.

15 children were available at the beginning of this play session. However, two of them after only a few minutes on the frame that they left the play session. Three of the children who scored low or moderate in wellbeing and involvement seemed to have engaged in arguments while queuing for the climbing frame. The four children who spent the majority of their play time playing with sand around the frame, plus six other children, all scored highly in both wellbeing and involvement.

5.5 Analysis of Children's Play Behaviours in Different Setting

5.5.1 The Loose Materials Play Setting

The first setting, the setting equipped with loose materials, had interesting findings. Some of the children were engaged in very high levels of creative play. It seemed that they could find many different ways to combine the different materials together.

Looking at some of the materials, the less obvious their function, the more creative the children could be with them. For instance, the plastic boxes were used flexibly by being climbed on, sat in or even (pretend) slept in. They could also integrate well with other materials and on some occasions resulted in originality. Playing with the tyre had the same results.

By contrast, the ladder was mainly used as a ladder for climbing, so it did not result in any flexible play. However, it seemed to integrate well with other materials, was used very often, linked different parts of the materials together, which resulted in the other materials being used flexibly, and even supported original playing. This was also mostly the case with the cloth, which was mainly used by the children to cover themselves; however, it did integrate well with the other materials, and even supported them in being used in flexible ways.

It could be concluded that the materials that had a specific and clear function were not often used in flexible ways. However, when combined in a context with other loose materials, they were very supportive in providing integration and even original play behaviours, which resulted in higher levels of creativity. Materials such as the plastic and cardboard boxes and the tyres, which had no initial play function, did however offer more flexible opportunities.

Overall, the loose material seemed to provide a lot of creative play opportunities to some children, who engaged at the highest level of creativity. However, it seemed that they were very unclear for some other children, who could not really connect with them. These elements seemed to put a lot of responsibility on children themselves for developing the play, so the children who had the ability to come up with ideas were

very well engaged and creative, while others who were less capable of producing new opportunities seemed to have real difficulty in playing.

5.5.2 The Play Equipment Setting

The play equipment setting session was very different to the loose materials play setting. All the children seemed to engage in some play; however, there was only a low level of creativity every now and then. The play equipment had very clear indicators of the way it should be used and played with. There were bikes and toy cars, which were obviously designed to ride. There was also traffic play equipment, which was clearly designed to play traffic games with, and finally building blocks. All the children followed the instructions and never thought of any flexible ways of using the equipment. There was also no originality, as everyone was too aware of what they were expected to do. The only creative factor that was found in this setting was integration. For instance, the blocks were designed in different colours and fairly different forms, so the children could integrate them according to their own creative thoughts. This showed that even though some play equipment is too clearly designed for a specific use, it can still result in a low level of creativity if there is the possibility to integrate different parts together.

5.5.3 The Woodland Setting

The woodland might be considered a very supportive environment for children's creative play behaviours. The setting included trees and bushes in various forms, the ground had variations in level and there were some logs in the centre of the area. Even though these elements were fixed, they had various forms within them, so a tree's trunk could have a hole, or a branch could have grown vertically or horizontally. As such, while being harmonious in nature, they could be very different in detail. This seemed to give children the opportunity to think about the way all these details could be used to support their play; some children decided to climb up the trees that had supporting branches to stand on. Another child used a hole in the tree as her stick-man's house, and another smaller hole as a kitchen for him. A bog branch on the ground was used for different purposes; it was sat on, jumped over and even ridden on.

The woodland also had some flexible elements. These included small sticks and fallen leaves with different shapes and forms. These items seemed to support creative play

very well as the children could use them in flexible ways, integrate them together to make things or use them in imaginative and original ways such as when a child found a feather and used it as her stick-woman's hat.

The teacher had also brought some natural materials that supported children's play out in the woodland, such as water and clay. These elements were also flexible and seemed to be very supportive in assisting the children in coming up with more opportunities. For instance, the clay was a perfect material for integrating different natural elements together.

5.5.4 The Climbing Frame Setting

The climbing frame play session provided very little support for creative play. There was no way of using the fixed frame in flexible ways. It did not provide any original play behaviours either. Every part of the frame gave its message of usage so clearly, all the children just followed the instructions. They climbed up the stairs and slid down the slide. Due to the fixed parts, there was nothing to integrate either.

The only part of this play session where there was some creative play going on was when four of the children started playing with the sand on the ground. It seemed that, although this was not a planned part of the play setting, these children had been able to find further opportunities to integrate and make creative play with the sand. The sand was actually loose and could be made into any shape as it was flexible, so it did support creative play.

5.5.5 The Leuven Test Analysis

An interesting finding was the relation between the results from the Leuven test and the observations. It was found that when the children were engaged in more creative play behaviours, they also scored higher in wellbeing and involvement. For instance, on one hand, in the woodland session, all the children scored high in both parameters when they were engaged in playing in this setting. On the other hand, the only play setting where they scored low in both wellbeing and involvement was the timber climbing frame, which was the least supportive setting for creative play. The junk play setting had interesting results as well; those children who were able to engage in creative play in this setting scored highly in the Leuven test, while those who had difficulties in playing with the loose material scored moderate.

5.6 Pilot Study Summary

- For the pilot study, there were four different play contexts in which the children were observed, for one session in each:
  1. The tarmac playground, facilitated with loose materials
  2. The tarmac playground, facilitated with manufactured play equipment
  3. A woodland area near the nursery
  4. The tarmac playground, equipped with a timber climbing frame
- The data in the pilot study were collected via observation and the use of the Leuven Wellbeing and Involvement Scale (Laevers, Moons et al. 2005).
- In the playground facilitated with loose materials, some children engaged well by putting different parts together, building different structures. However, the material seemed confusing to some other children. According to the results from the Leuven test, the children who engaged better with the loose parts scored higher in wellbeing, while those who scored moderate in involvement were also moderate in wellbeing.
- In the playground facilitated with manufactured play equipment, the majority of the children engaged in some sort of play, whether it was riding the cars or putting the building blocks together.
- In the woodland, after the teacher read the "stick-man story" to the children, the majority of the children engaged in making a stick-man family using the natural materials in the environment. Some others also used the natural loose materials to make drawings of faces on the ground, while others explored the natural area to find creatures and insects. According to the Leuven test, all the children scored high in wellbeing and involvement in this play setting, except for one child who was having communication difficulties and another who was only unhappy when he was asked to sit; they were both scored moderate.
- In the observation session with the climbing frame, all the children were very excited at first and started playing on the frame. There were some arguments, which the teacher had to control. However, after only a few minutes, the climbing frame became boring to some children, who preferred to play with the sand around the frame left over from the installation of the frame.

According to the Leuven test, two children were not scored at all as they did not seem to like the frame. Eleven out of 13 scored high in involvement, and ten scored high in wellbeing, four of them being the ones who engaged with the sand. The other three children who scored low or moderate in either wellbeing or involvement were having difficulties with queuing, which resulted in some level of argument.

- The data gathered in the pilot study was used to develop: 1) systematic observation sessions at the study sites; 2) an initial understanding of children's play behaviours in different play contexts; and 3) the Creative Play Taxonomy.
- carrying out a pilot study at Bilston Nursery helped in three ways:

1- to design systematic observation sessions for the two study sites, including:
   a) using at least two cameras for recording all the children's play behaviours;
   b) speaking to the teachers beforehand in order to reduce their influence on children's play behaviours as much as possible;
   c) gaining an understanding of children's verbal abilities, which resulted in finding alternative ways for learning what they were thinking during play.
2- the design of the Creative Play Taxonomy
3- Initial findings from observing children's play behaviour in relation to each setting and the elements within them.

CHAPTER 6
CHAPTER 6 STUDY SITE ONE: DATA COLLECTION AND FINDINGS

6.1 Study Site One Implementation and Collection of Data

Study Site One was Bilston Nursery in Loanhead, Scotland, where the pilot study was also undertaken. The information about the site was provided earlier in Chapter 3, and the site description was provided earlier in Chapter 1.

At the time of data collection, there were 15 three to five-year-old children registered in the nursery: nine boys and six girls. All 15 children voluntarily participated in the research with their parents' consent. As there were 18 different observation sessions, some of the children were absent for some of the sessions, due to illness and other occasional absences, so the number of children observed varies for each session.

There was a total of 365 minutes of videotaped observations across the four play contexts. This number, multiplied by the number of children participating in every session, resulted in a total of 3383 minutes of individual child observation overall.

All of the 18 observation sessions were organised between the end of March and the end of June. This was the second half of the nursery term, when the children were already familiar with the setting, their teachers and classmates and the outdoor play setting. The most familiar play contexts to the children were the Loose Manufactured Play Context and Loose Parts Play Context. In other words, the children had no previous experience playing in the nursery's outdoor play setting without any other equipment – the Fixed Manufactured Play Context – or in the woodlands near their nursery building within school hours – the Natural Play Context.

The weather for all 18 play sessions was very similar, typical of spring and early summer. All of the days chosen for data collection were dry, with most being partly cloudy days with a fairly low temperature of between 6°C and 13°C when all the children had warm clothes on. The nursery hours were 8:30am to 11:40am. All of the play sessions were organised for between 10:30am and 11:40am.

6.1.1 The Fixed Manufactured Play Context

The first observation session was held in the Fixed Manufactured Play Context, which was the nursery's outdoor play space facilitated with a fixed timber climbing frame play structure. Only one observation session was held in this setting. This was because the children were creating a great deal of tension, and a lot of dangerous behaviours and arguments were occurring; the teacher could not tolerate the children playing in this situation for any longer so she would not allow the children to play in this context again. Because of this situation, the researcher had to stop the observation session immediately. Consequently, this was the only session where the children were allowed to play in a context without adding other play materials (as in the Loose Manufactured Play Context and the Loose Parts Play Context).

In this observation session, eleven out of 15 children were present and the observation's duration was 12:30 minutes. As each child was observed and their play behaviour was coded separately, there are 137 minutes of observation in Fixed Manufactured Play Context.

Table 6-1: The Fixed Manufactured Play Context Implementation

The Fixed Manufactured Play Context	**CF**
No. of Children	**11**
Duration	**12:30**
TOTAL	**137**

6.1.2 The Loose Manufactured Play Context

The Loose Manufactured Play Context was in the same environment as the Fixed Manufactured Play Context, but facilitated with other loose manufactured play equipment. Six play sessions were held in this play context. The sessions were of different lengths with different numbers of children taking part. A total of 105 minutes of observation took place. The minutes of observation multiplied by the number of children observed in each session makes a total of 1106 minutes (18 hours 26 minutes) of child creative play observations. In order to compare the children's amount of creative play behaviour in all four different play contexts, one of the observation sessions in each of the four play contexts was set at a similar number of participants and identical length. As such, there was a need to match the duration and number of

participants that had been observed in the single session in the Fixed Manufactured Play context. As a result, one of the sessions in the Loose Manufactured Play Context had eleven participants who were observed for 12:30 minutes, creating an overall total of 137 minutes of observation for this session only.

Table 6-2: Loose Manufactured Play Context Implementation

The Loose Manufactured Play Context	PE1	PE2	PE3	PE4	PE5	**PE6**	total
No. of Children	13	12	8	13	8	**11**	65
Duration	09:33	23:46	29:00	17:00	13:21	**12:25**	105
TOTAL	124	285	232	221	107	**137**	1106

6.1.2.1 *The Loose Parts Play Context*

The Loose Parts Play Context was also in the nursery's play space; however, on this occasion, it was facilitated with junk materials and loose parts. There were also six different play sessions in this play context, again of different lengths and with different numbers of children taking part in each of the sessions. A total of 99 minutes of observation took place, with a total of 63 child observations, making an overall total of 1069 minutes (17 hours and 49 minutes) of child creative play observations. One of the sessions in Loose Parts Play Context was also set to observe eleven participants for 12:30 minutes, for a total of 137 minutes' observation, in order to compare it with the other three play contexts.

Table 6-3: Loose Parts Play Context Implementation

The Loose Parts Play Context	JP1	JP2	JP3-1	JP3-2	**JP4**	JP5	total
No. of Children	11	14	9	9	**11**	9	63
Duration	29:00	19:00	7:30	13:00	**12:30**	18:00	99
TOTAL	319	266	68	117	**137**	162	1069

6.1.3 The Natural Play Context

The Natural Play Context was in a woodland near the nursery. As the nursery teacher had previously undergone a forest kindergarten programme, she took the nursery children to play in the woodland near their nursery several times a year. However, this

was not an everyday play space; therefore, compared to the Loose Manufactured Play Context and the Loose Parts Play Context, the children were less familiar with playing in this context. Five play sessions of different lengths, with a different number of children taking part in each of the sessions, were held in this play context. A total of 97:30 minutes of observation sessions took place. Overall, 55 child observations were made, making an overall total of 1083 minutes (18 hours and 3 minutes) of child creative play observations. Similar to the other three play contexts, one of the sessions in the Natural Play Context also had 11 participants observed for 12:30 minutes, for a total of 137 minutes' observation.

Table 6-4: The Natural Play Context Implementation

The Natural Play Context	WL1-1	WL2-1	WL2-2	WL3-1	**WL3-2**	
No. of Children	12	10	10	12	**11**	55
Duration	28	30:00	6:00	21:00	**12:30**	148
TOTAL	336	300	60	252	**137**	1083

6.2 Study Site One Findings

As described in the research method chapter, in order to analyse the data gathered at Study Site One, a coding scheme was developed. This helped to present the data in a systematic manner as well as allowing for qualitative descriptions to support the coding (Neuman 2004). Accordingly, the findings in Study Site One were analysed using a mixed method approach of descriptive statistics of coded behaviours illustrated in charts and graphs, which was a major part of this research, as well as qualitative interpretation.

The Creative Play Taxonomy (described in detail in Chapter Four), which was developed to categorise children's creative behaviours during play, introduced eight different possibilities for a child's play, based on creativity. These eight possibilities are distributed amongst four levels of creative play behaviours: A (the highest level of creativity); B (a relatively high level of creativity); C (a low level of creativity); and D (no level of creativity).

Table 6-5: The Creative Play Taxonomy

LEVEL	STAGE	ABBREVIATIONS	DESCRIPTION	FLEXIBILITY	INTEGRATION	ORIGINALITY
D	1	**NO**	Playing with one or no element, as per its function and similarly to others			
C	2	**INT**	Playing by integrating **various types of elements** as per their function		■	
	3	**FLEX**	Playing with an element in an **unexpected way**	■		
	4	**ORI**	Playing with an element as per its function, but **differently to others**			■
B	5	**FLEXINT**	Playing by integrating **various types of elements** in an **unexpected way**	■	■	
	6	**INTORI**	Playing by integrating **various types of elements** as per their function, but **differently to others**		■	■
	7	**FLEXORI**	Playing with an element in an **unexpected way** and **differently to others**	■		■
A	8	**FLEXINTORI**	Playing by integrating **various types of elements** in an **unexpected way** and **differently to others**	■	■	■

6.2.1 Comparison and Analysis of the Creativity Level of a Single Session in Each of the Four Play Contexts

Amongst the 18 different observation sessions, there was one session in Fixed Manufactured Play Context, six sessions in Loose Manufactured Play Context, six sessions in Loose Parts Play Context, and five sessions in Natural Play Context. One of the sessions in each of the four play contexts was set with the exact same length and same number of children, so they would be comparable with each other. Accordingly, there was a 12:30 minute observation session with eleven children in each of the four play contexts.

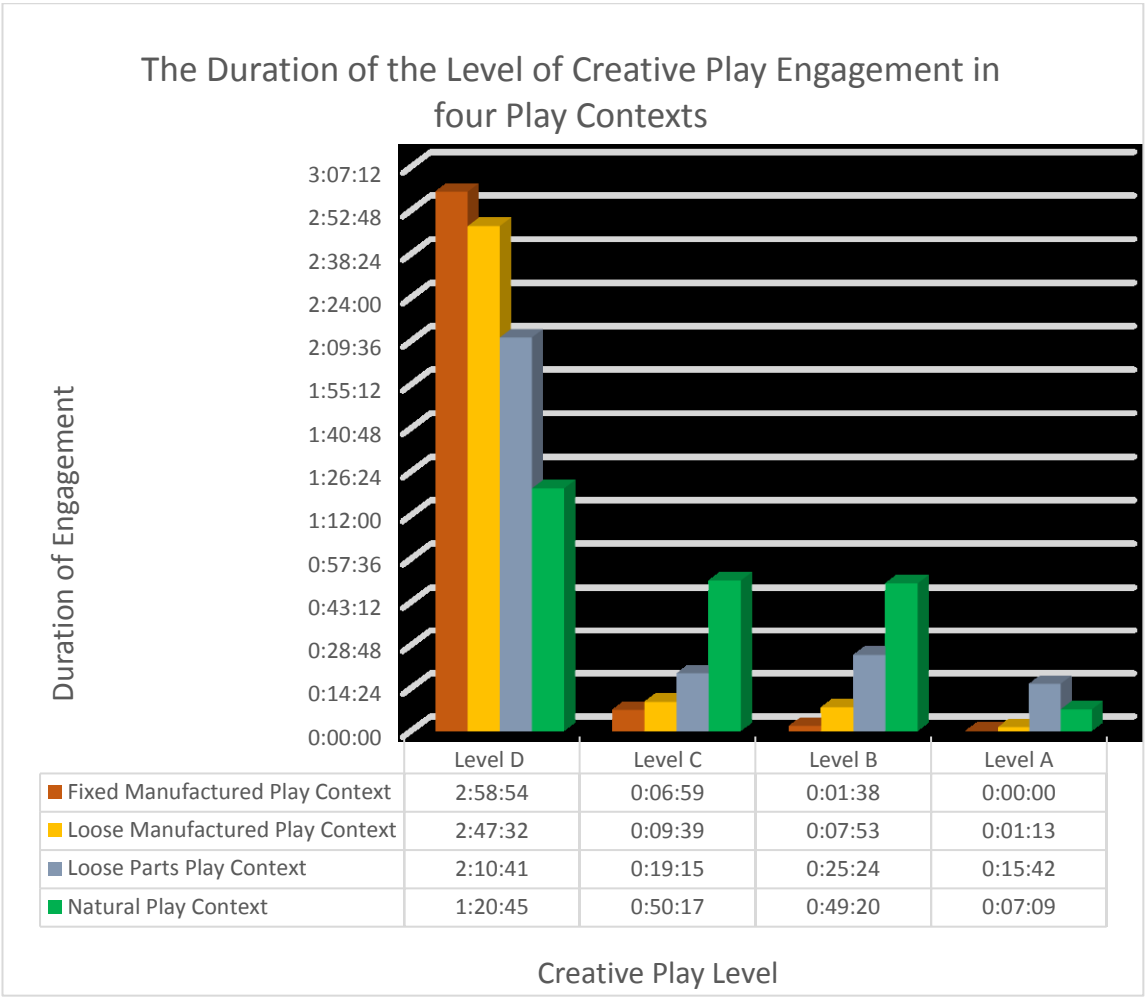


Chart 6-1: The Duration of the Level of Creative Play Engagement in One 12:30 Minute Session for Each of the Four Play Contexts (Sum Total of Eleven Children Observed in Each Context)

Chart 6.1 clearly indicates that there were major differences in the durations of children's creative play in the four contexts.

The findings suggest that the Fixed Manufactured Play Context is the least supportive play context for creative play as the majority of children's play is in level D of the Creative Play Taxonomy. Children spent the longest total engagement in level C and B of creative play in Natural Play Context. The findings suggest that the Loose Parts Play Context was the most supportive environment when it came to the highest level of creative play, level A, which included all three factors of a creative play behaviour at the same time.

6.2.1.1 *Creative Play Behaviour Analysis in the Fixed Manufactured Play Context*

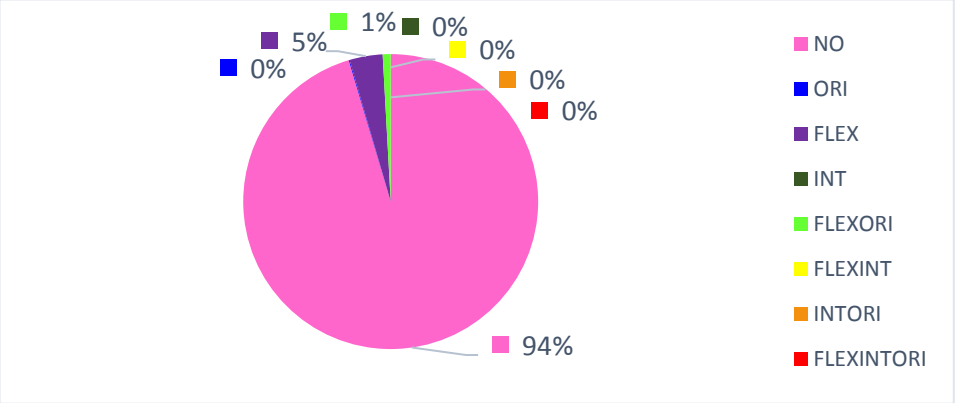


Chart6-2: Percentage of Engagement in Each Stage of Creative Play Behaviour in One 12:30 Minute Session in the Fixed Manufactured Play Context (Eleven Children)

Chart 6-2 clearly shows that the majority of children's play in the Fixed Manufactured Play Context achieved no level of creative play. In fact, 94% of children's play was in the first stage of the Creative Play Taxonomy which is classified "NO".

There were only three children who engaged in FLEXORI. One child, who was scored as demonstrating the highest levels of creativity in play, started climbing one side of the frame (which he was not supposed to) for approximately one minute. Therefore, his play included flexibility. Also, as he was the first child who did this and only one other child followed him on one occasion, the first child was noted to have originality and the second child only had flexibility. As the climbing frame was not designed to be climbed by its wall, the teacher became upset by these children doing so and stopped them from continuing.

Another child was engaged in FLEXORI for a few seconds only; he/she started hanging upside down from the bridge between the ropes. A third child also went underneath the bridge and started pushing it with his hands and legs as other children were standing on it.

Activities scored as FLEX were those such as climbing up the bridge instead of climbing the three paths designed for climbing, running up the slide or jumping down the sides of the bridge. Some children also tried to climb the circular Plexiglas windows on the frame.

6.2.1.2 *Creative Play Behaviour Analysis in Loose Manufactured Play Context*

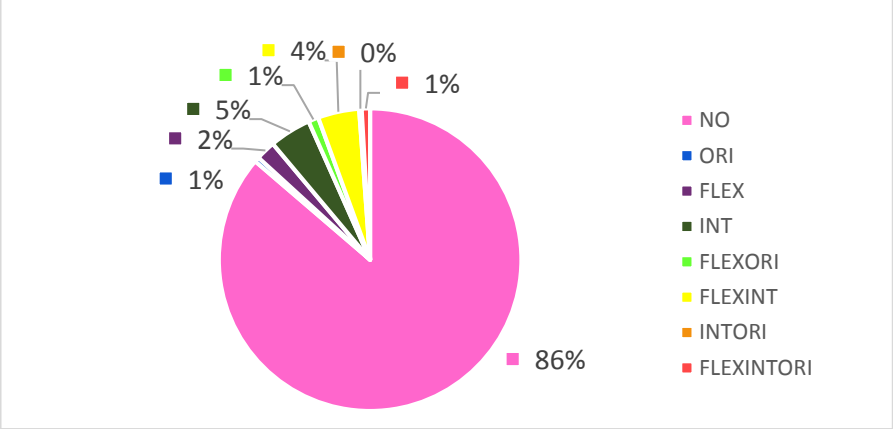


Chart 6-3: Percentage of Engagement in Each Stage of Creative Play Behaviour in One 12:30 Minute Session in the Loose Manufactured Play Context (Eleven Children)

Chart 6-3 shows that, similarly to the Fixed Manufactured Play Context, the majority of the play in the Loose Manufactured Play Context included no level of creativity. In this play context, 86% of the play was in stage one, level D of the Creative Play Taxonomy, "NO", and only 1% engagement was at the highest level of creative play, FLEXINTORI.

The FLEXINTORI play was a lone instance where one child put the ball thrower under the riding-car tyre, sat on it the other way round and tried to move it.

The FLEXORI play was a short occasion where one child stood on the outside edge of the climbing frame's bridge by holding the ropes and pretending she was falling, then another child came to rescue her. At another point, the same child sat on the walking-bike and tried to make it move. She tried to use it differently to its usual function, which was riding it by standing, and was the only child who tried to do so with this play equipment.

The majority of the children's play, which as the chart shows fits into level D of the Creative Play Taxonomy, included activities such as riding the cars and bikes, playing with musical instruments such as maracas, tambourines and xylophones as they were designed, playing with balls by throwing them around, playing on the climbing frame and running around.

6.2.1.3 *Creative Play Behaviour Analysis in Loose Parts Play Context*

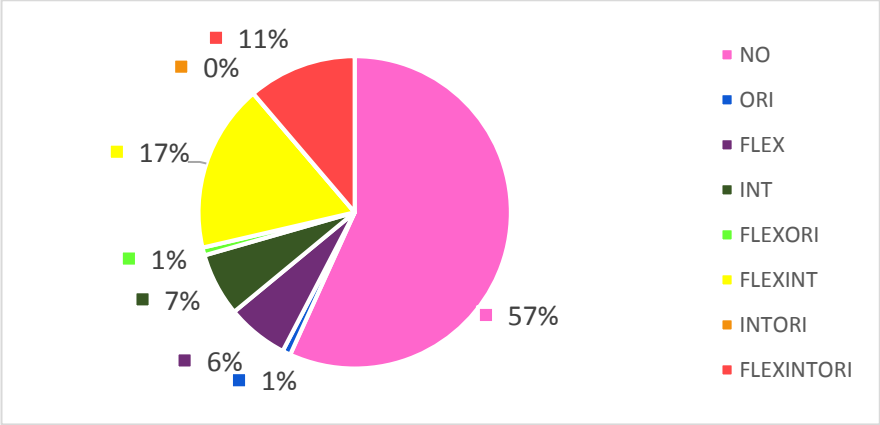


Chart 6-4: Percentage of Engagement in Each Stage of Creative Play Behaviour in One 12:30 Minute Session in the Loose Parts Play Context (Eleven Children)

This chart shows the percentage of children's engagement in each of the creative play stages in Loose Parts Play Context. Just over half of the play in this play context fell under stage "NO" of the Creative Play Taxonomy, and 43% had some level of creativity. The majority of the play in this context that had no level of creativity was very similar to the play activities in Fixed Manufactured Play Context. It included activities such as climbing the climbing frame and sliding on the slide, or running around the play area.

The findings in this play context show considerable differences in terms of the percentage of the highest level of creative play in comparison with the other play contexts. This is the highest percentage of engagement amongst all four contexts in FLEXINTORI: 11%.

One child took the three logs on the climbing frame and blocked the bridge; he then started kicking them down by the side of the frame. This activity involved integrating the logs with the frame structure, and using these differently to their usual function (of walking on the frame's bridge); as he was the only child who did this in the whole observation session, it was scored as original. Another child took a cloth up the frame and tried to build a shade by placing it over the second stage of the frame. One child tried to get onto the climbing frame by climbing up a structure that another child had made by putting three tyres on top of each other.

18% of the creative play was level B, which mainly consists of FLEXINT where flexibility and integration have occurred together but no originality has taken place, and only 1% was FLEXORI.

This included play such as colouring some of the pieces of wood with chalk that had been provided. The wooden pieces were used flexibly, and using the chalk with these different wood pieces involved integration. On another occasion, some children placed the plastic boxes by the sides of the frame, made a secured room underneath it and started playing with the wood pieces. There was a lot of different types of building going on with the different loose materials, such as putting plastic boxes and wooden slabs together by different children, which produced FLEXINT creative play.

14% of the whole session involved level C creative play.

Some of the level C creative play included a child wrapping a cloth around herself while climbing the frame (INT), placing a carpet under the frame to sit on (INT) or playing with the three logs together (FLEX).

6.2.1.4 *Creative Play Behaviour Analysis in Natural Play Context*

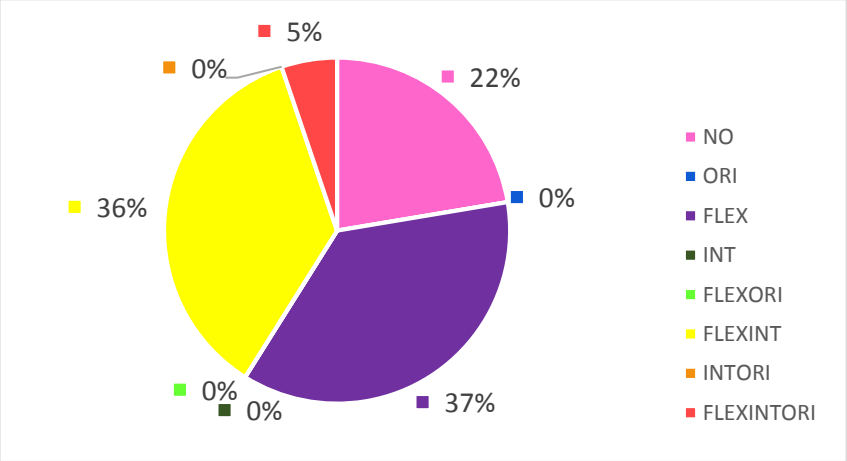


Chart 6-5: Percentage of Engagement in Each Stage of Creative Play Behaviour in One 12:30 Minute Session in the Natural Play Context (Eleven Children)

This context is different to the other three play contexts in different ways. Initially, more than three-quarters of the play session included some level of creative play, which differs from the other three contexts.

Only 22% of engagement in this context was stage "NO" (level D) of the Creative Play Taxonomy, which mainly included running or wandering around until the children moved on to the next activity.

The distribution of the creative play at levels C and B is fairly equal and considerably higher than for the other play contexts. In level C this only includes FLEX, which covered activities such as sitting on a log or climbing up some of the trees.

For level B, integration was the factor added to flexibility, making FLEXINT.

At the start of this session, the teacher gathered the children and read them the stick-man story. She then distributed clay and guided them in making a stick-man. This led to many of the children engaging in this activity. They used materials such as leaves and sticks with clay, and used them in flexible ways. However, as most of them were making fairly similar shapes and the initial idea came from the teacher's story, they were not original. Some children tied a long rope to the trees to make a climbing rope, while others picked up long sticks and hit the trees as they walked around the woodland.

There was 5% FLEXINTORI, 6% less than the percentage of FLEXINTORI in Loose Parts Play Context. This play session included a child who started sticking clay on a tree in a round shape and finding various leaves to add to it, by which he seemed to be making a face. Another child had made a very interesting Zumbi with clay, leaves and sticks.

6.2.2 Comparison of the Creativity Level of All the Observation Sessions in Three Play Contexts

The analysis of the differences between levels of creative play across different observation sessions in the same context explored the possibility that the children may play very differently on different days, even in the same play context. Other personal or environmental issues such as their personal mood or their school schedule might have had high influences on their creative play activities. In order to understand if there was any change due to these uncontrolled issues, the children were observed in each of three of the play contexts for five to six sessions. The exception was Fixed Manufactured Play Context, where the teacher could not set another play session due to the children behaving dangerously.

The children's creative play behaviour was analysed and compared for each of the three play contexts separately.

6.2.2.1 *Comparison of the Creative Play Behaviour Levels in Six Observation Sessions in Loose Manufactured Play Context*

In Loose Manufactured Play Context, approximately three-quarters of the play across all six play sessions was spent in level D with no creative play. The percentages differed slightly amongst the six play sessions; however, all of them saw most of the session classified under the "NO" stage of the taxonomy. Children's play included climbing up the frame or running around the space playing tag. Other children were riding the different types of bikes and cars which were provided for them. Many of them played with the different musical instruments, but as per their function and similarly to each other. Some children also threw balls or ran around the space with the balls.

A similarity amongst the Loose Manufactured Play Context play sessions was that, in the part of the play that was at level C, most of it only engaged integration. As an example, in session one, out of the 24% creative play that fell under level C, 21% of it was INT with only 1% ORI and 2% FLEX.

The INT stage of the taxonomy was mainly related to the sessions where children were provided with picnic toys. Many of them started integrating different parts of the picnic equipment together and pretended they were having a real picnic. Also, some children played with balls and ball catchers; on a few occasions, a few of the children were seen playing with the musical instruments as they were riding the cars. FLEX play was noted when some children used the ball catchers as shields in play, or when they tried climbing the side of the climbing frame.

It was play session five that had the most engagement under 'NO', with 91% in that classification, and only 9% distributed amongst the creativity stages. This seemed to be because most of the play equipment in this session was different types of cars and bikes, along with some musical instruments. It seemed that these did not encourage even lower levels of creativity. The items that most supported some level of creativity in this play session were a few pieces of chalk and three logs. Some children put the three logs on top of each other and started kicking them for a while, which was scored

as a FLEX play. FLEXINT was scored when a few of the children engaged in writing numbers on the tarmac, and one child engaged in a FLEXINTORI activity for a short period by hitting the chalk against the fence to make marks and sounds at the same time. As he was the only child who came up with this idea, which was a flexible use of the chalk (making sound with it) as well as integrating the charcoal and fence into play, he was scored as original.

The percentages of engagement in level B were less than one-fifth of the whole session in all six contexts. This was an average of 12% over the six sessions. The majority of all engagement in level B in all six sessions was FLEXINT. This had an average of 9% across all sessions, while only 2% was FLEXORI and 1% INTORI.

A lot of the play in FLEXINT occurred when the children combined the picnic toys with some wood pieces. Some of them pretended that the wood pieces were also food, such as lettuce, and pretended to eat them, while others mixed different wood pieces with some of the toys in a bucket to make a pudding.

Also, some children engaged in FLEXINT play while they were playing with different trucks or spades and buckets in the sandpit.

FLEXORI was noted when a child was pretending that the ball catcher was her pudding and that she was eating from it, or when another child was spreading sand out of the sandpit.

FLEXINTORI did not occur very often in Loose Manufactured Play Context.

There were only a few occasions, mainly in play sessions one and three, which featured the sandpit, picnic toys and a few wooden pieces. One of the children started filling the trucks with sand, then moving them and making a “beep beep” sound, and finally pouring the sand to build the house. Another child started mixing different picnic pieces together to make a bowl of soup and some juice to invite others to the picnic. A third child was seen to play with a musical instrument, banging it on a bucket filled with wooden pieces to produce a new sound.

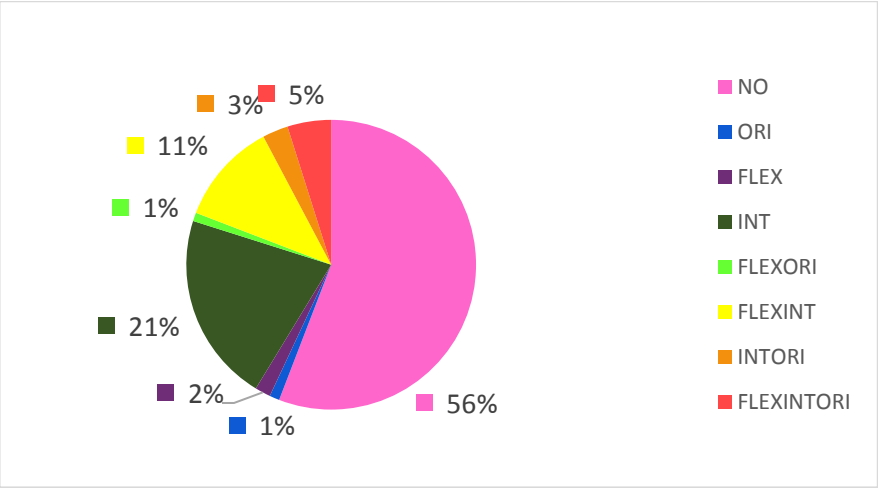


Chart 6-6: Loose Manufactured Play Context, Session One

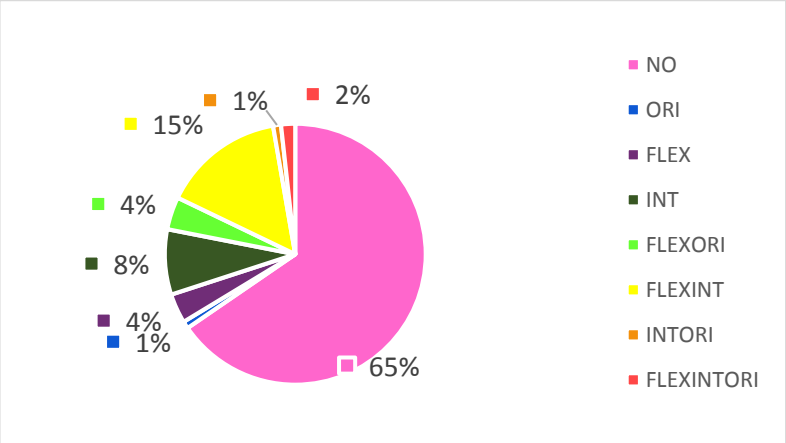


Chart 6-7: Loose Manufactured Play Context, Session Two

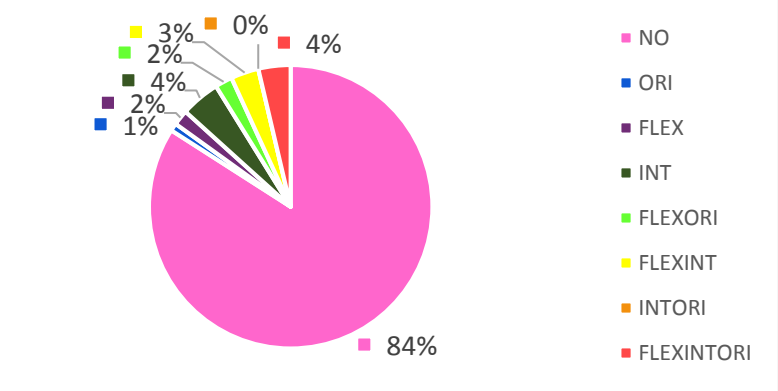


Chart 6-8: Loose Manufactured Play Context, Session Three

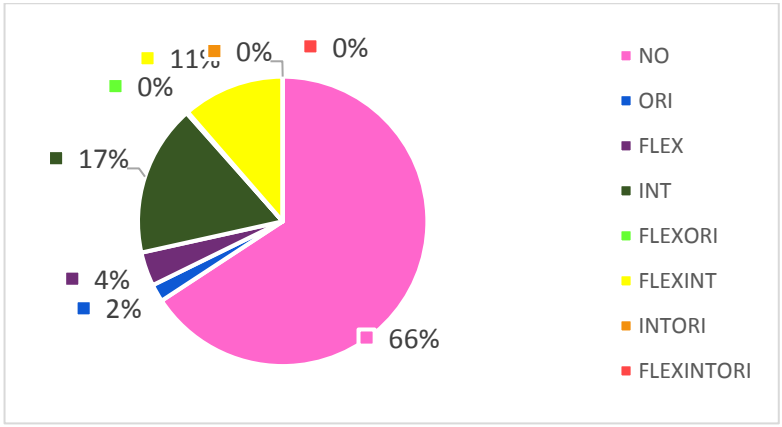


Chart 6-9: Loose Manufactured Play Context, Session Four

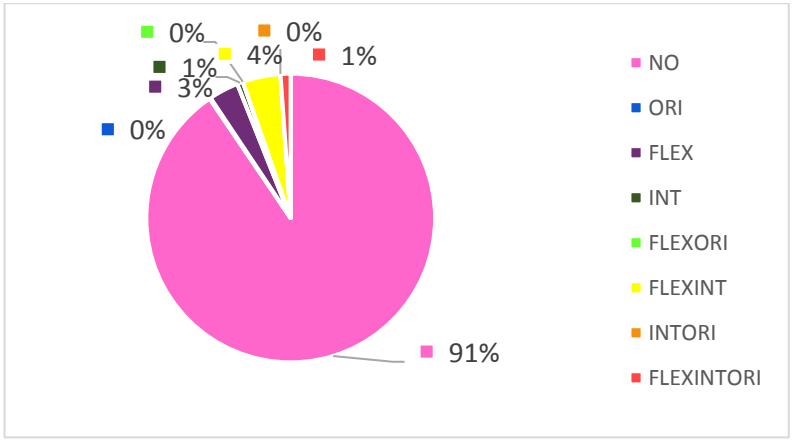


Chart 6-10: Loose Manufactured Play Context, Session Five

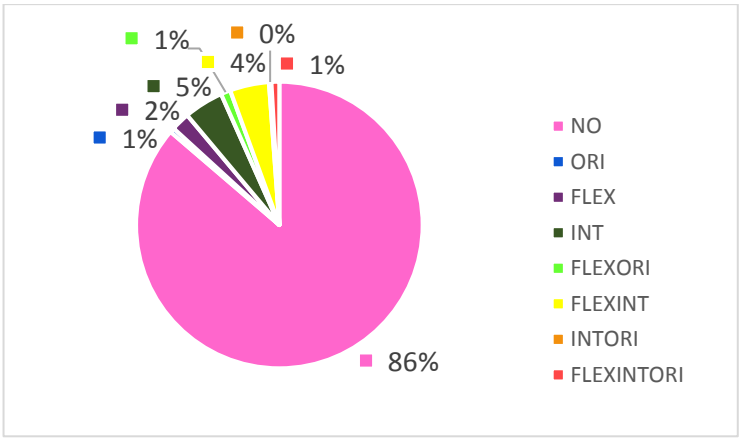


Chart 6-11: Loose Manufactured Play Context, Session Six

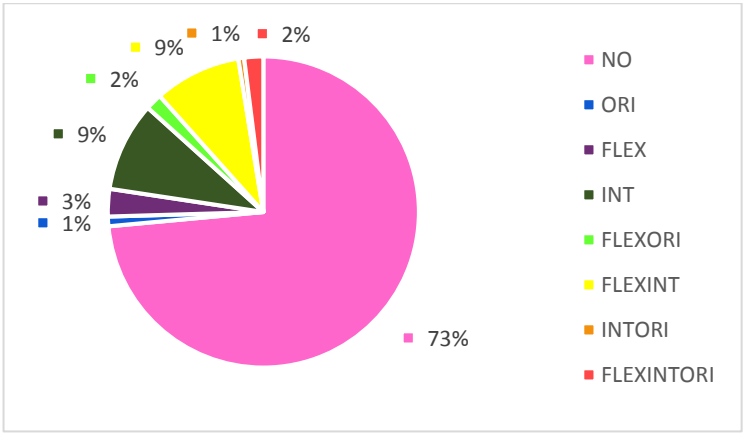


Chart 6-12: Loose Manufactured Play Context, Average of All Six Sessions

6.2.2.2 *Comparison of the Creative Play Behaviour Levels in Six Observation Sessions in Loose Parts Play Context*

In all of the play sessions in Loose Parts Play Context, approximately half of the play session had no level of creative play. Similar to the other two play contexts, which were held in the same setting (the nursery's playground), here it also included climbing up the frame, sliding on the slide or running around the frame and playing tag. Hence, there was a near-identical percentage of level of creative play in all of the six sessions in Loose Parts Play Context.

The average percentage of the level of engagement in level C creative play was 22%. The majority of the level C behaviour engaged in FLEX in all of the sessions, and a small portion of each was INT, with only 1% of ORI in three of the sessions.

Some of the examples of play that only included flexibility were when the children used the plastic and cardboard boxes to sit inside, or when they used the brooms to ride on or pretend they were flying around space as witches. Many of the children just enjoyed walking on the junk material that other children had previously put next to each other and used it as a path.

The average 5% engagement in INT included putting different parts of a loop together, or when some of the children put a carpet underneath the climbing frame and a cloth around them and sat on the carpet. These materials were used together, but they were all used as per their usual function.

The average of the percentage of engagement in level B across all six sessions was 25%. The session with 40% engagement in level B had the least percentage in level C

amongst all sessions, 11%. This showed that, in the majority of the creative play in this session, flexibility occurred alongside integration. Session three, which had the highest percentage of no creative play, had the least engagement in level B with only 9%.

Most engagement in level B was FLEXINT, which is the stage of creativity where integration and flexibility occur together.

There was a lot of building in this context. Children put together the plastic boxes, wooden slabs, bricks, carpet pieces and other loose materials and made many different structures. Some children sat on the plastic boxes holding the broom and started singing songs. Some of them also placed loose materials such as tyres or plastic boxes beside the climbing frame to make a more secure space under it and played there.

The sandpit was also used in some of the sessions, and the children started making things with sand and wooden pieces. In some sessions, chalks were also provided, and some children used them to colour the small wooden pieces and mix them in a metal bucket with other materials such as strings or tiny stones and feathers that they found, making an interesting mixture.

An example of INTORI was when one of the children sat inside a boat that others had made, got some pieces of paper and a pencil and started making tickets to sell to the other children. Here, flexibility was not noted, because the paper in that context did not have a specific function and was there to be used to support children's play, as it did. But as only this child came up with the idea of using pencil and paper to make tickets, she was scored as original.

For level A of creative play, the percentages were much lower, with different varieties. Three sessions had less than 1% FLEXINTORI, while the other three sessions had 8%, 6% and 11%.

One of the examples of FLEXINTORI play was when a child started making a ship by putting three plastic boxes beside each other with some wooden bricks inside it. He then started sailing the boat and others joined his ride.

Another child started making a very developed structure by putting together bricks and slabs with plastic boxes. He was also successful in making a small shed with slabs and

plastic boxes. In one of the sessions, one child started individually putting the different loose materials on and around the slide and finally said he had made an aeroplane, which was unique. Another child started placing the wooden logs beside the climbing frame to close a path and make a den underneath the stage of the frame. In all of these examples, there was only one child making the structure, so it was scored as original. The materials were used differently to their usual function, so it was scored as flexible, and finally there were different elements integrated with each other, which scored as integration. Accordingly, they were classified as FLEXINTORI.

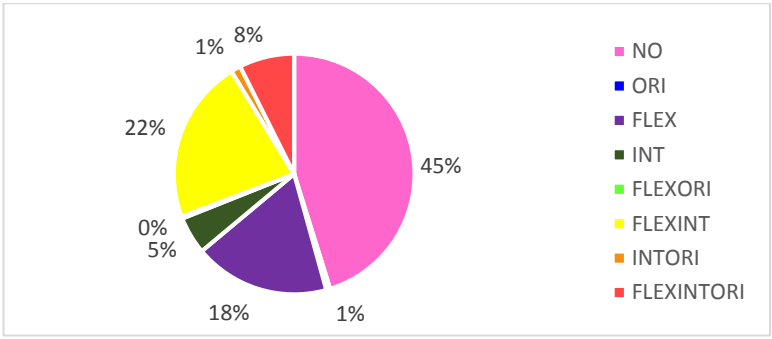


Chart 6-13: Loose Parts Play Context, Session One

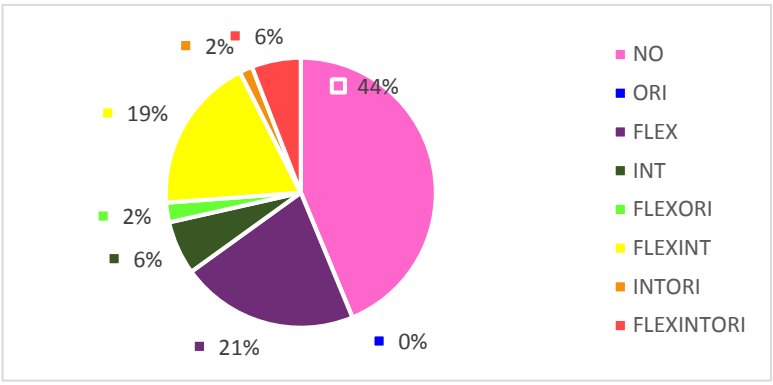


Chart 6-14: Loose Parts Play Context, Session Two

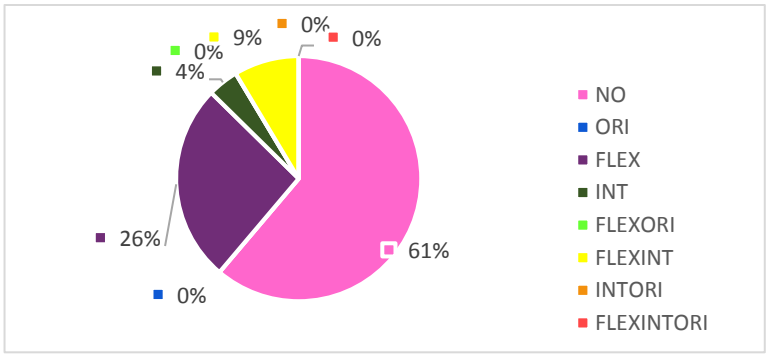


Chart 6-15: Loose Parts Play Context, Session Three

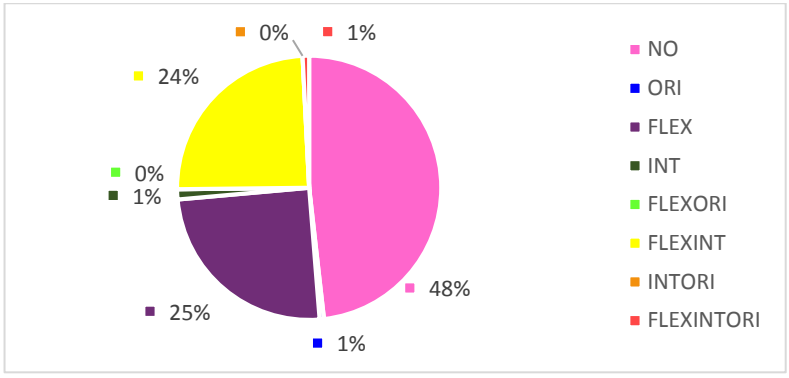


Chart 6-16: Loose Parts Play Context, Session Four

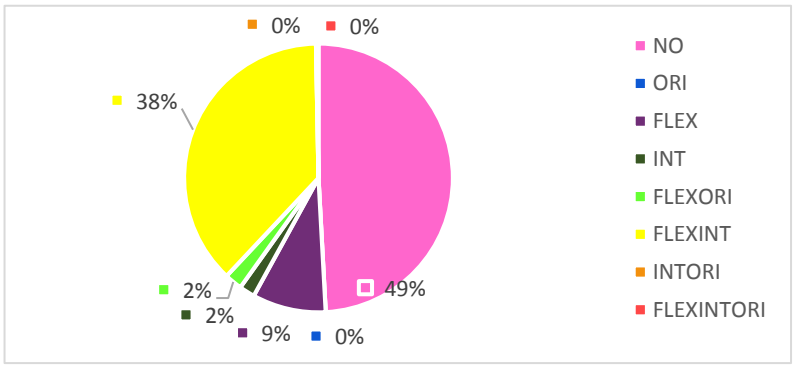


Chart 6-17: Loose Parts Play Context, Session Five

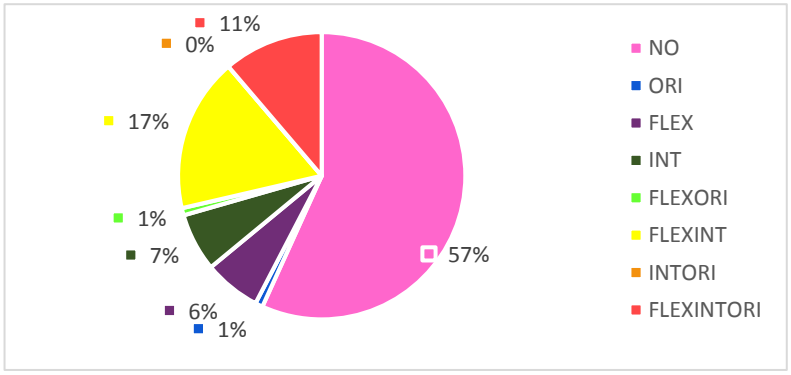


Chart 6-18: Loose Parts Play Context, Session Six

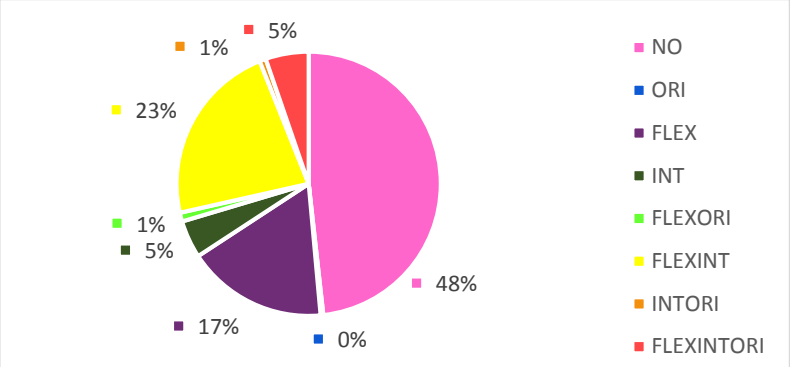


Chart 6-19: Loose Parts Play Context, Average of All Six Sessions

6.2.2.3 *Comparison of the Creative Play Behaviour Levels in Five Observation Sessions in Natural Play Context*

Looking at the different play sessions in Natural Play Context, we can see some similarities across all sessions. The percentage of engagement in level D – where there was no creative play engagement – across the five sessions showed that four out of five of the sessions resulted in less than one-third of play classified as no level of creativity. This is much lower than the other play contexts; level D was mainly scored when the children were walking or running around, sitting on the ground with the teacher or wandering around before starting another activity.

The percentage of engagement in level C creativity was fairly similar, with an average of 39% across all sessions. ORI did not take place at all, while FLEX happened often in all five sessions. FLEX included a lot of climbing up the trees, using the logs as a seat or jumping on them, or children forming clay with their hands to make a creature (without integrating the clay with any other material).

INT was, however, different across the sessions. In three of the sessions it was scored as 24%, 17% and 12%, while in two sessions there was no INT at all. The two sessions which had no integration happening on its own were the two sessions where the teacher started by giving guidance or suggestions of what to do. In session three, she told them the stick-man story and taught them how to make a stick-man, while in session five she taught them how to make creatures using clay and other natural materials in nature. As such, most of the children engaged in that activity, which involved integration alongside flexibility.

Sessions one, two and four, which all included integration on its own, included activities such as: putting sticks together to make a large nest; using spades to dig the soil or push leaves away in order to find creatures or just to dig; and looking at different creatures with a magnifying glass.

The percentages of level B creativity were fairly close in all five sessions, and the majority of this engagement was FLEXINT. Only 1% of sessions one and two and 3% of session four was FLEXORI, and only 1% in session one was INTORI.

The FLEXINT play included activities such as the process of making creatures or the stick-man by attaching different natural materials such as leaves, sticks, tiny flowers or even stones to the clay that they were given. Also, many of the children got a bowl of water from the teacher, mixed some clay inside it and started painting the trees and the sticks.

INTORI was scored once, when a child picked up a piece of wood that had some creatures on it and started taking them on a tour around the woodland. Also, FLEXORI was scored when a child started practising gymnastic movements on the logs.

In relation to FLEXINTORI, the percentage varied more across the different sessions. The overall percentage of FLEXINTORI in the Natural Play Context was 4%. Some very interesting play behaviours took place in this environment. A child used a spade to dig the soil, trying to find a prison or some treasure in the ground. Another child picked up a bucket and started looking for different shapes of wood and some soil to mix in it. Another child not only engaged in colouring the trees with his bowl of water and clay, but started painting the leaves of the trees as well. One child held a pan in one hand and tried to empty the soil inside a hole on a tree trunk, then took the soil to a small hill on the ground. In the sessions when all the children were invited to make creatures, while most of them were scored as FLEXINT, only a few of the children scored FLEXINTORI. This was because the creatures they had made were very different and very well-developed, and they had used a big variety of plants and materials that the other children had not thought of.

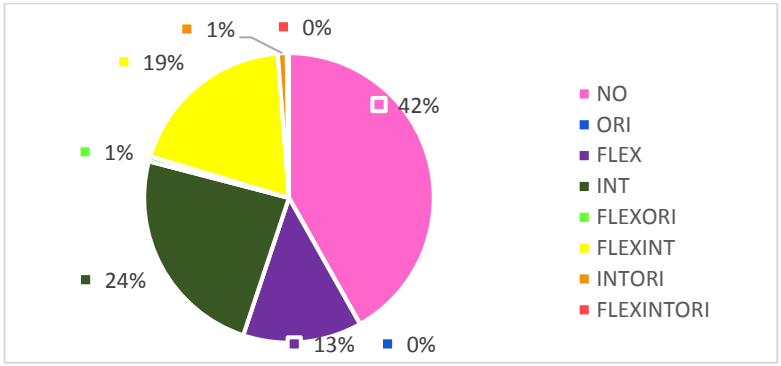


Chart 6-20: Natural Play Context, Session One

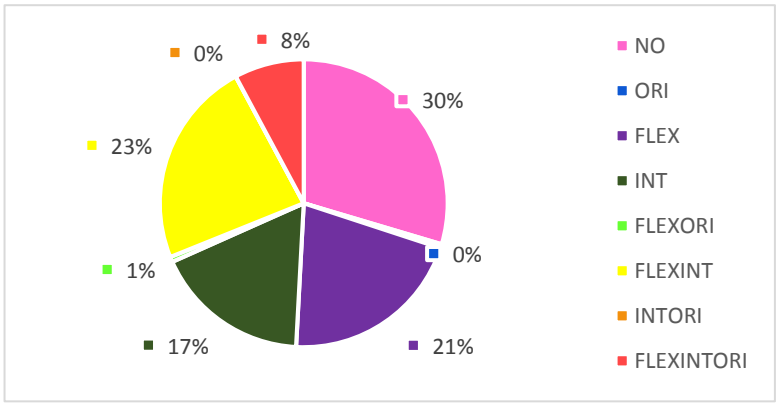


Chart 6-21: Natural Play Context, Session Two

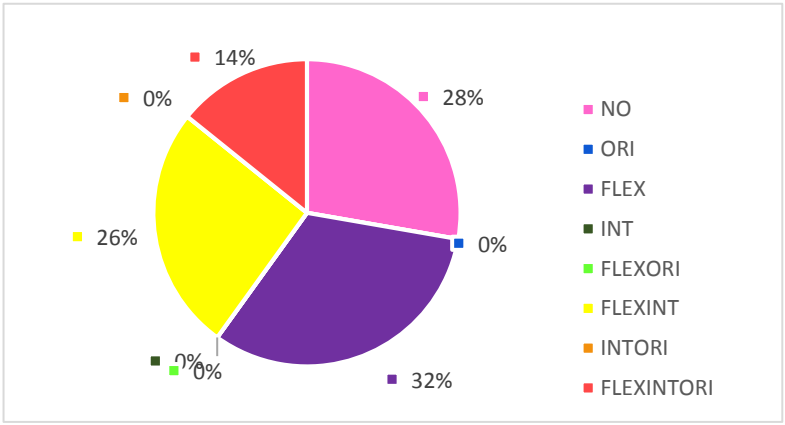


Chart 6-22: Natural Play Context, Session Three

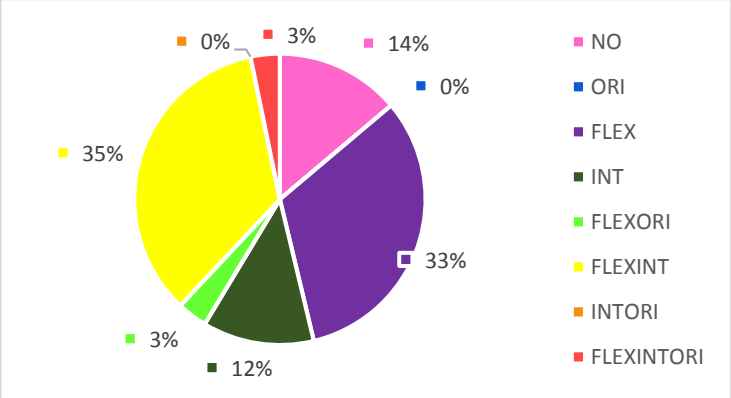


Chart 6-23: Natural Play Context, Session Four

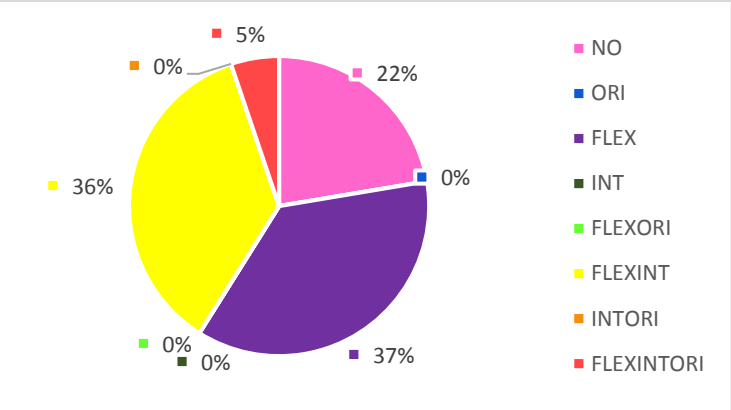


Chart 6-24: Natural Play Context, Session Five

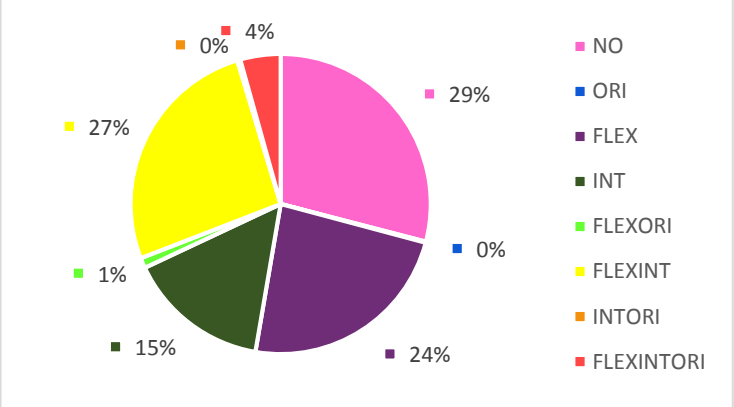


Chart 6-25: Natural Play Context, Average of All Five Sessions

6.2.3 Comparison of the 12:30 Minute Session Results with the Overall Session Results in Three Play Contexts

The results from the one 12:30 minute session in the three play contexts that had more than one play session held in them were compared with their overall results. This helped to understand whether the results from the one 12:30 minute session followed the same pattern as the overall result for each of the contexts.

There was a fairly similar pattern of children's creative play behaviours found when comparing the results, which is shown in the Tables 6-2, 6-3 and 6-4:

Table 6-6: The Percentage of Engagement in the Four Levels of Creative Play Behaviour in One 12:30 Minute Play Session and in the Overall Play Sessions in the Loose Manufactured Play Context

The Loose Manufactured Play Context	Level D	Level C	Level B	Level A
12:30 Minute Session	84%	8%	5%	1%
Overall Sessions	73%	13%	12%	2%

Table 6-7: The Percentage of Engagement in the Four Levels of Creative Play Behaviour in One 12:30 Minute Play Session and in the Overall Play Sessions in the Loose Parts Play Context

The Loose Parts Play Context	Level D	Level C	Level B	Level A
12:30 Minute Session	57%	14%	18%	11%
Overall Sessions	48%	23%	25%	5%

Table 6-8: The Percentage of Engagement in the Four Levels of Creative Play Behaviour in One 12:30 Minute Play Session and in the Overall Play Sessions in the Natural Play Context

The Natural Play Context	Level D	Level C	Level B	Level A
12:30 Minute Session	22%	37%	36%	5%
Overall Sessions	29%	39%	28%	4%

In both the single 12:30 minute session and the average of overall sessions, the Loose Manufactured Play Context had approximately only one-quarter engagement in some level of creative play, the Loose Parts Play Context had approximately one-half engagement and the Natural Play Context had approximately three-quarters engagement. The tables show that there is a similar pattern of distribution for the levels of creative play amongst the different play contexts when looking at the one 12:30 minute play session and the overall results. This indicated that the Fixed Manufactured Play Context would also result in similar findings if there were other play sessions held in it as well.

6.2.4 Comparison of the Levels and Stages of the Creative Play Taxonomy in Each of the Different Play Contexts

In order to analyse each of the play contexts in relation to their supportiveness of creative play behaviours, they were analysed separately based on each of the levels and stages of creativity. This helped to understand the level of creativity of which each play context was more supportive. For instance, the percentage of the highest level of creative play behaviour, FLEXINTORI, was compared when children were playing in each of the four play contexts. This revealed which of the play contexts was most encouraging for the highest level of creativity in children's play.

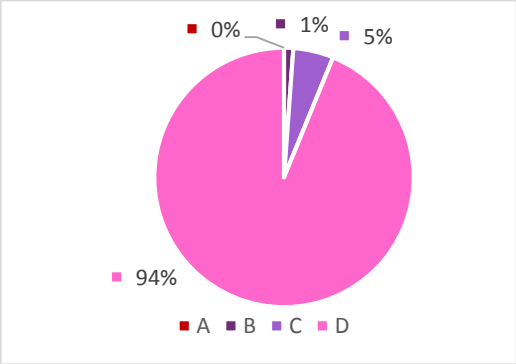


Chart 6-26: Percentage of Engagement in Levels of Creative Play in All Sessions in the Fixed Manufactured Play Context

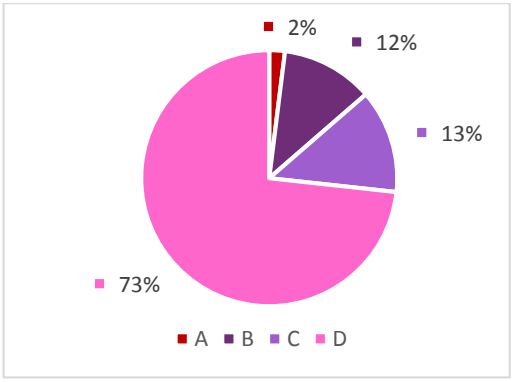


Chart 6-27: Percentage of Engagement in Levels of Creative Play in All Sessions in Loose Manufactured Play Context

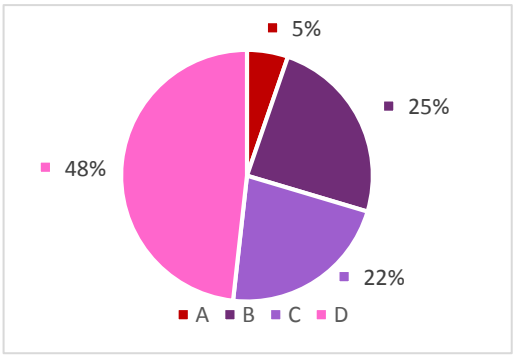


Chart 6-28: Percentage of Engagement in Levels of Creative Play in All Sessions in Loose Parts Play Context

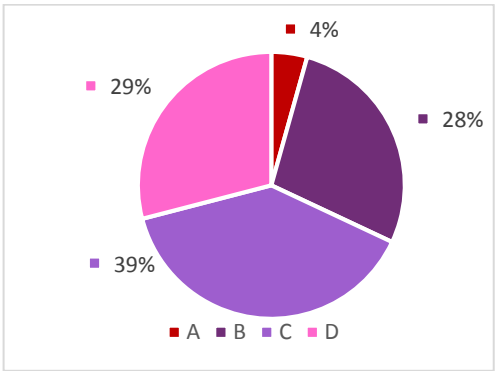


Chart 6-29: Percentage of Engagement in Levels of Creative Play in All Sessions in Natural Play Context

The above charts show the average percentage of children's engagement in all of the play sessions in the four different contexts. When comparing the percentage of

engagement in level D creativity in each of the play contexts, it is clear that the Fixed Manufactured Play Context has the highest percentage of engagement while the Natural Play Context has the least engagement in level D, which shows that the latter is the most supportive of some level of creative play happening.

The Fixed Manufactured Play Context had 5% engagement in the lowest level of creativity, only 1% in level B and no engagement in level A. In the Loose Manufactured Play Context, there was only 2% of engagement in level A of creative play, while this was greater and fairly equally spread in the Loose Parts Play Context and the Natural Play Context. With regard to levels B and C of creative play, in all three contexts, nearly half of the engagement was in level B and the other half in level C.

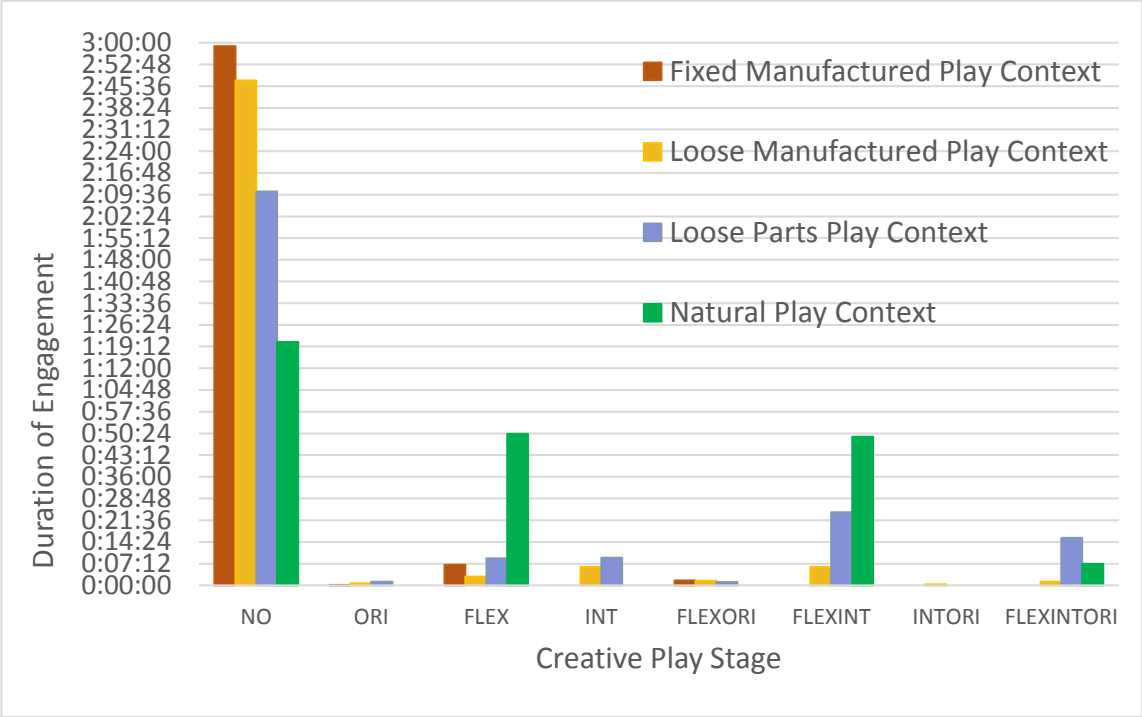


Chart 6-30: The Percentage of Engagement in Each Stage of the Creative Play Taxonomy in All Sessions of the Four Contexts

From this chart, it is interesting to see that children seem to experience different stages of creativity in Natural Play Context, more so than in all the other contexts. They spent approximately 40% of their time in level C creativity, just over 25% in level B creativity and just over 25% with no level of creativity.

The findings of the data show that, amongst the three parameters of creative play according to the Creative Play Taxonomy, flexibility occurs more than the other two parameters, while originality happens only in a minority of sessions across all play contexts. For example, in Natural Play Context, nearly 25% of engagement in level C was in FLEX, 15% was in INT and there was no ORI in this level at all. In Loose Parts Play Context, just over 15% was in FLEX, 5% was in INT and again there was no engagement in stage ORI. In Loose Manufactured Play Context, however, the highest level C behaviour was in INT (10%), ORI was second with 3% and FLEX was last with 1%.

Considering level B of creative play, although the other three contexts had higher levels of creative play overall, they were not as high in FLEXORI as Fixed Manufactured Play Context, which had the highest percentage of FLEXORI. However, this was only 2%, which is very low.

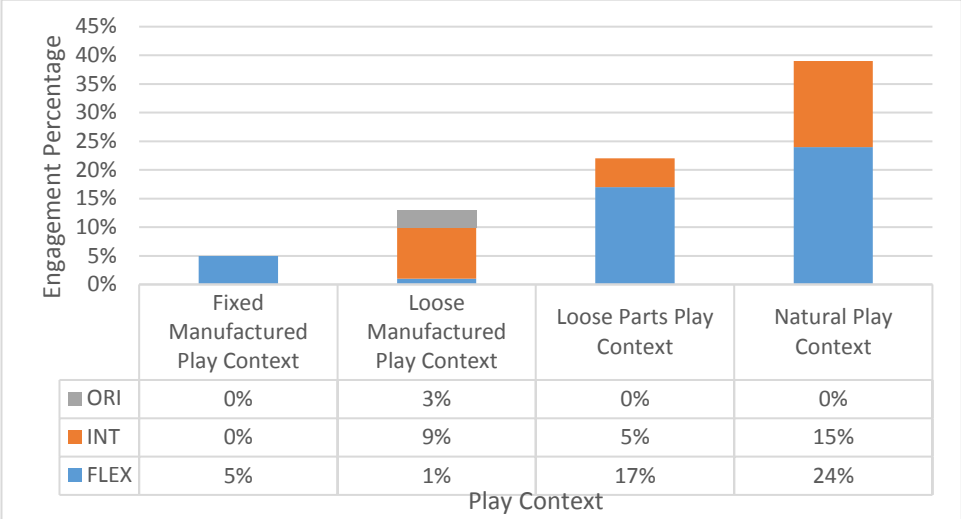
With regard to FLEXINT, the percentages were very different for the four contexts. The Natural Play Context had the highest percentage of engagement, 27%; the Loose Parts Play Context had 23%; the Loose Manufactured Play Context had 9%; and finally, the Fixed Manufactured Play Context had 1% of engagement in this stage.

With regard to INTORI, there was only 1% of engagement in the Loose Manufactured Play Context and 1% in the Loose Parts Play Context, with no engagement in this play at all in either the Fixed Manufactured Play Context or the Natural Play Context.

An interesting finding is that, even though the Loose Manufactured Play Context only engages about one-quarter of the whole play session in some level of creativity overall, it seems to have the highest level of originality taking place, followed by the Loose Parts Play Context and then the Natural Play Context. Amongst these three play contexts, this is the opposite pattern to what is found in relation to the overall level of creative play.

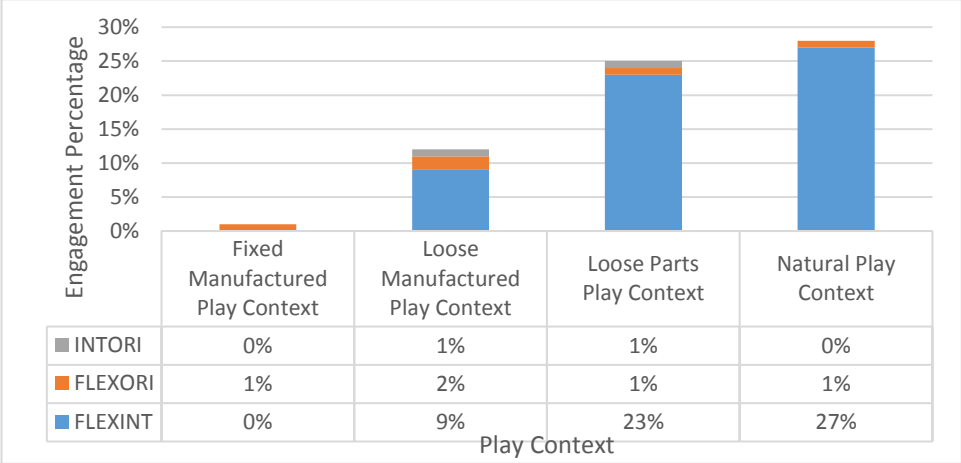
For level C creative play (Chart 6-31), as well as in level B, the majority of the play combined flexibility and integration. Accordingly, 27% (out of the 28% of level B play) in the Natural Play Context was engaged in FLEXINT, and the Loose Parts Play Context had only 4% less than this (23% out of 25% in level B). However, as expected,

the Loose Manufactured Play Context had only 9% (out of 12% in level B) and the Fixed Manufactured Play Context had no engagement in FLEXINT at all (Chart 6-32).



	Fixed Manufactured Play Context	Loose Manufactured Play Context	Loose Parts Play Context	Natural Play Context
ORI	0%	3%	0%	0%
INT	0%	9%	5%	15%
FLEX	5%	1%	17%	24%

Chart 6-31: Percentage of Engagement in ORI, INT and FLEX in All Sessions of the Four Play Contexts



	Fixed Manufactured Play Context	Loose Manufactured Play Context	Loose Parts Play Context	Natural Play Context
INTORI	0%	1%	1%	0%
FLEXORI	1%	2%	1%	1%
FLEXINT	0%	9%	23%	27%

Chart 6-32: Percentage of Engagement in FLEXINT, FLEXORI and INTORI in All Sessions of the Four Play Contexts

6.2.5 Comparison of the Amount of No Creative Play Behaviours (Level D: NO) in Each of the Four Play Contexts

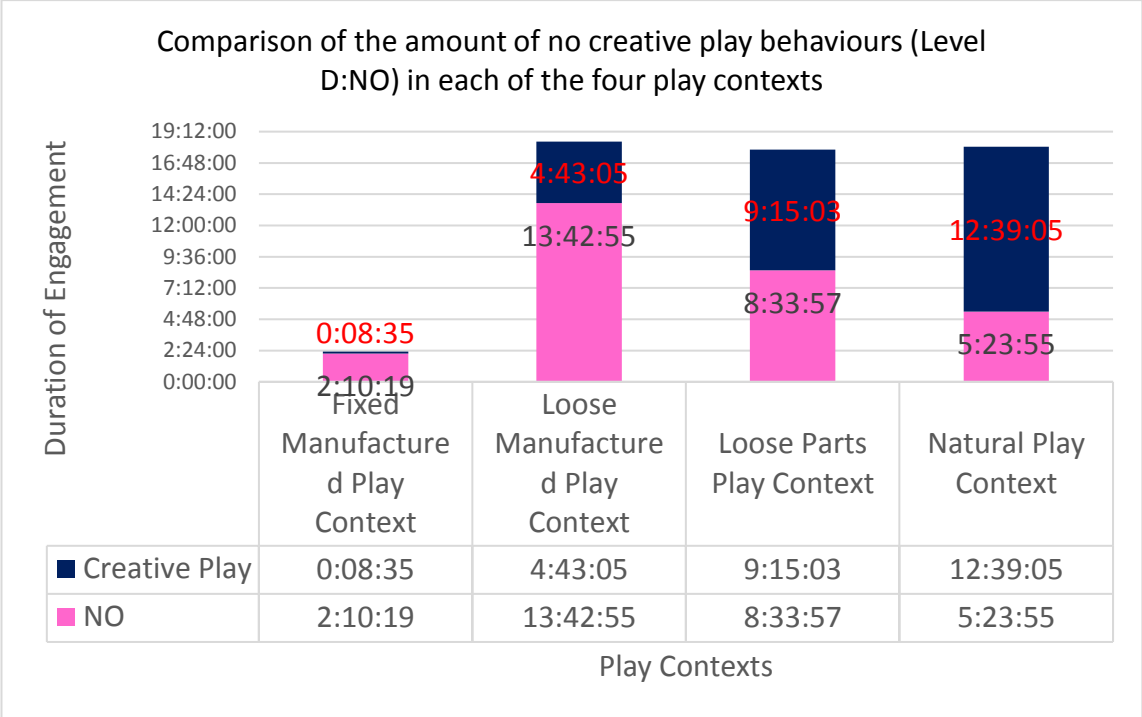


Chart 6-33: Comparison of the Amount of No Creative Play Behaviours (Level D: NO) in Each of the Four Play Contexts

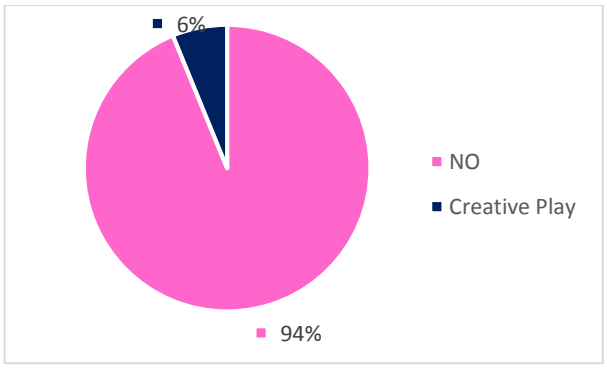


Chart 6-34: Percentage of Engagement in No Creative Play and Some Level of Creativity in Fixed Manufactured Play Context

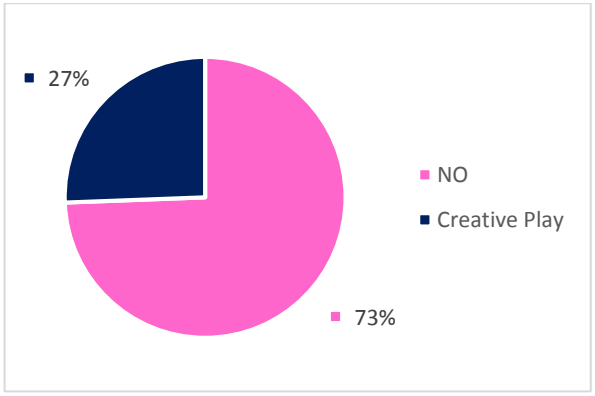


Chart 6-35: Percentage of Engagement in No Creative Play and Some Level of Creativity in Loose Manufactured Play Context, All Sessions

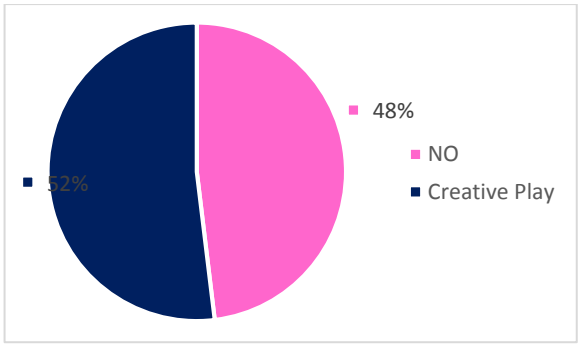


Chart 6-36: Percentage of Engagement in No Creative Play and Some Level of Creativity in Loose Parts Play Context, All Sessions

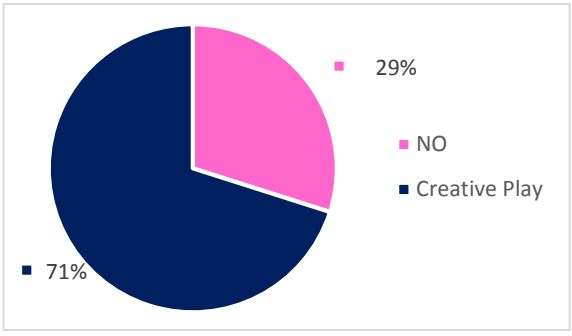


Chart 6-37: Percentage of Engagement in No Creative Play and Some Level of Creativity in Natural Play Context, All Sessions

The above charts (6-33 to 6-37) show the duration and percentage of engagement in some level of creative play or no creative play in all four play contexts. The different

percentages of engagement in some level of creativity amongst the four play contexts show that the Natural Play Context was the most supportive of creative play, the Loose Parts Play Context was partly supportive, the Loose Manufactured Play Context was very low in supportiveness and, finally, the Fixed Manufactured Play Context was not supportive at all.

6.2.6 Comparison of Level A Creative Play, FLEXINTORI, in Each of the Four Play Contexts

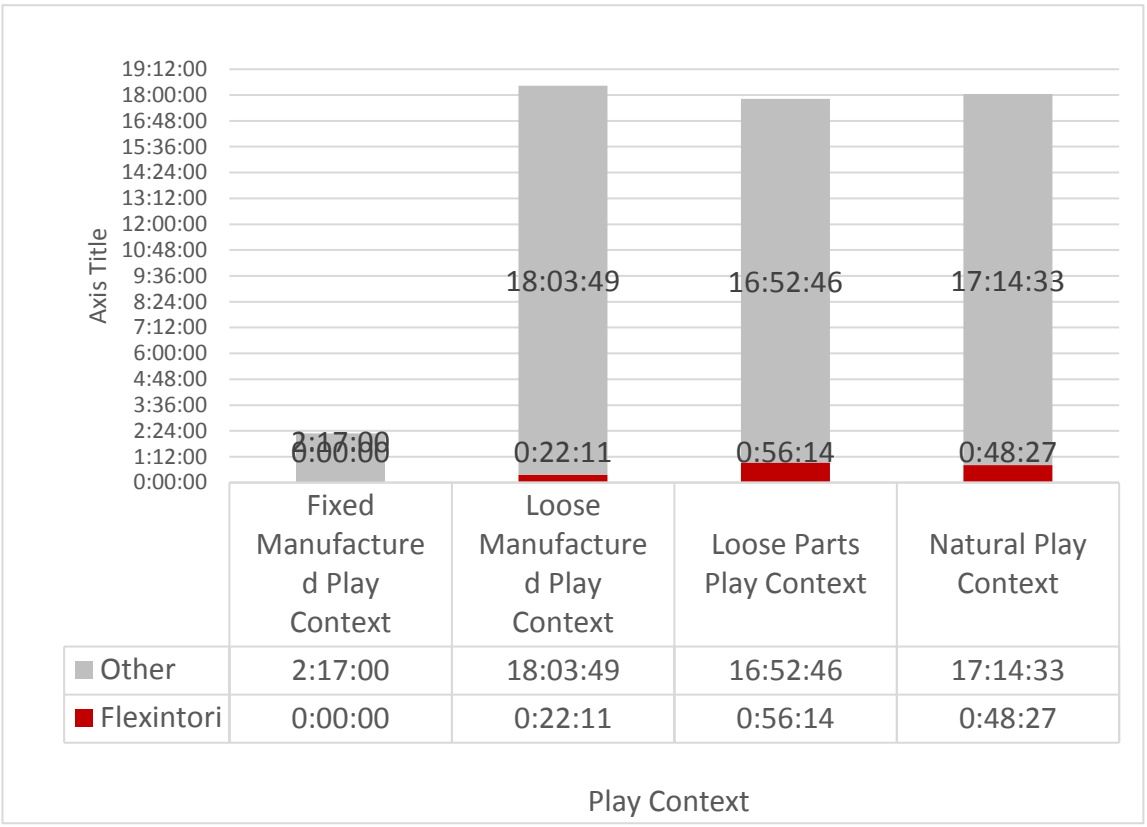


Chart 6-38: Comparison of Level A Creative Play, FLEXINTORI, in Each of the Four Play Contexts, All Sessions

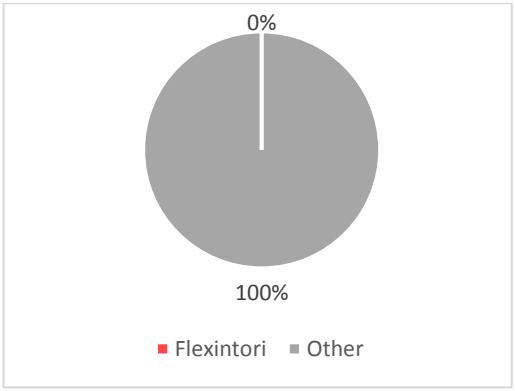


Chart 6-39: Percentage of Engagement in Level A Creative Play (FLEXINTORI) in Fixed Manufactured Play Context

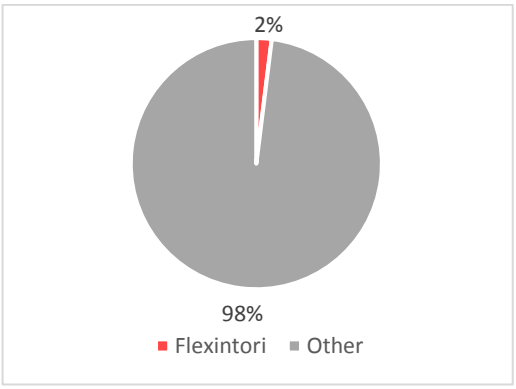


Chart 6-40: Percentage of Engagement in Level A Creative Play (FLEXINTORI) in Loose Manufactured Play Context, All Sessions

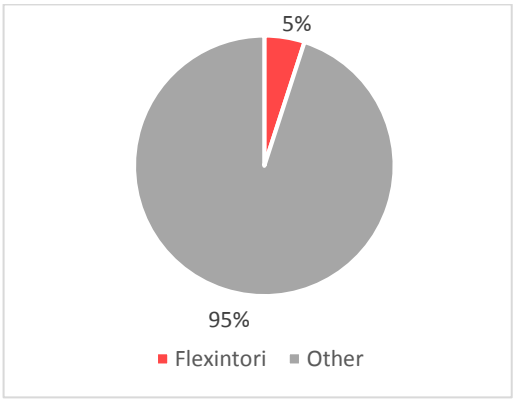


Chart 6-41: Percentage of Engagement in Level A Creative Play (FLEXINTORI) in Loose Parts Play Context, All Sessions

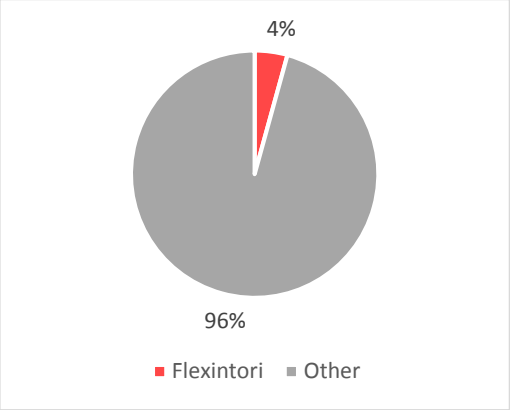


Chart 6-42: Percentage of Engagement in Level A Creative Play (FLEXINTORI) in Natural Play Context, All Sessions

The above charts show the duration and percentage of engagement in FLEXINTORI, which is the highest level of creative play as it combines flexibility, integration and originality. Overall, only a small percentage of the play in three of the play contexts reached level A of creativity. Although the percentages were very low, they were still studied, as this is the highest level of creativity.

When comparing all the different levels of creative play amongst the four play contexts, the percentage of engagement in level A in the Fixed Manufactured Play Context and the Loose Manufactured Play Context was as expected; the former provided no engagement in level A of creative play, and the latter provided only 2%.

An interesting result was found when comparing the Loose Parts Play Context and the Natural Play Context. Although, overall, the latter supported creative play more than the former, when it came to the highest level of creativity, the Loose Parts Play Context had 5% engagement in level A and the Natural Play Context had 4%. The percentages are very close, but considering that the Natural Play Context achieved 71% of play at some level of creativity and the Loose Parts Play Context achieved 52%, this shows that it did not follow the same pattern when it came to the highest level of creativity.

6.2.7 Individual Children's Creative Play Behaviour Analysis in Each Play Context

Some children seemed to be engaged in a high quantity of creative play behaviours across most of the play sessions. In contrast, other children seemed to have very low levels of creativity or none at all. This was seen in all of the different play contexts, suggesting that some children are, either inherently or as a result of home and family

background, more creative than others. This raised the question of whether there are certain play contexts that are supportive of both groups of children in terms of creativity, or a context that encourages the creative play behaviours of one group and not the other.

In order to understand how each of these four play contexts supported each of the groups, some of the children were analysed in more detail individually. One child (ChA), who was engaged in the highest levels of creativity amongst all the children, was chosen for this purpose. He spent 70% of the play sessions across all four contexts engaged in some level of creative play. Another child, who was in second place in terms of overall levels of creativity, was also studied. ChB spent 63% of her play sessions engaged in some level of creative play. In addition, one child who was moderately engaged in some level of creativity compared to other children was also selected (ChC). He spent 47% of time engaged in some level of creative play. Two more children who were less engaged in creative play behaviours compared to other children – respectively, they spent only 41% (ChD) and 42% (ChE) of their play sessions engaged in some level of creative play – were also selected.

These children's play behaviours were studied and analysed in detail in each context in order to ascertain which ones supported their creativity more, and which elements in each of the contexts were more encouraging of creative behaviour for both the most and least creative children.

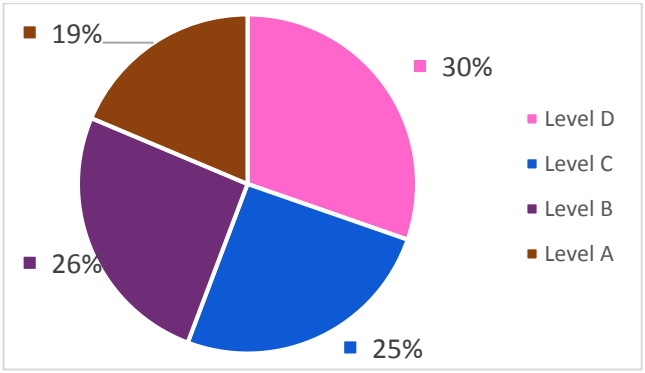


Chart 6-43: ChA Creative Play Engagement in All Sessions

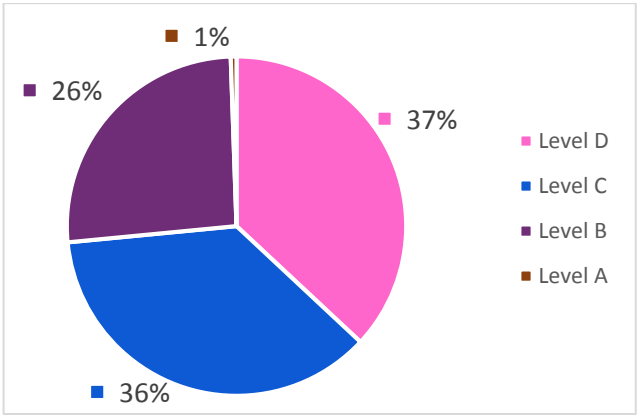


Chart 6-44: ChB Creative Play Engagement in All Sessions

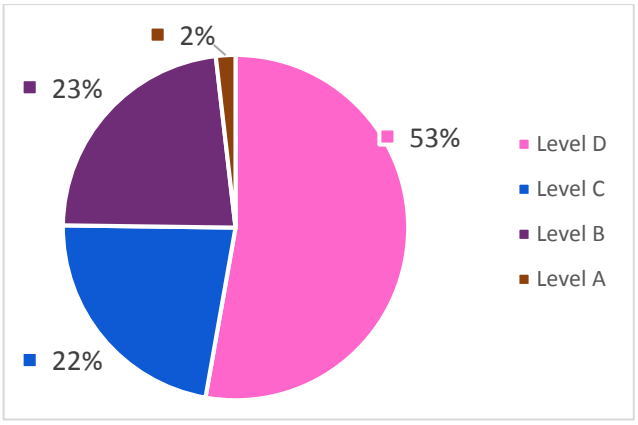


Chart 6-45: ChC Creative Play Engagement in All Sessions

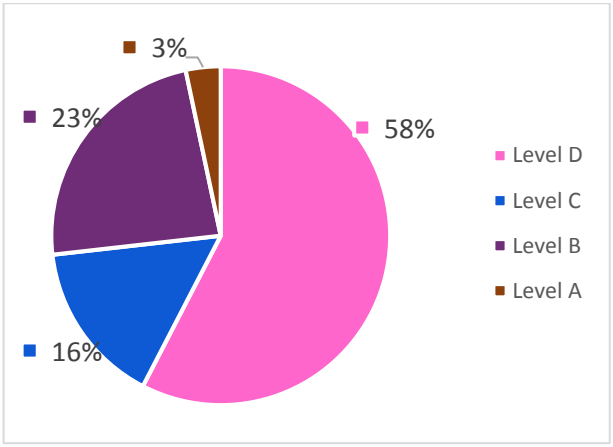


Chart 6-46: ChD Creative Play Engagement in All Sessions

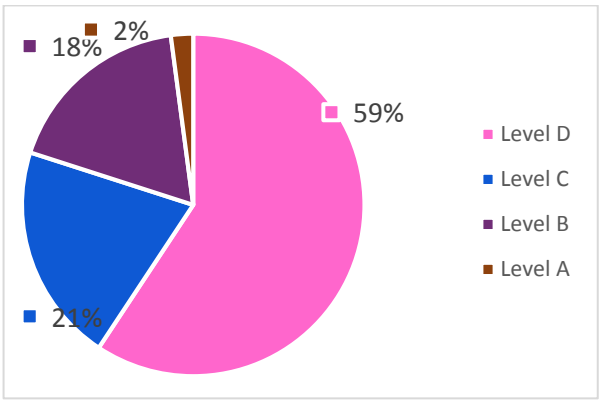


Chart 6-47: ChE Creative Play Engagement in All Sessions

6.2.7.1 *ChA: analysis in four play contexts for child who scored highest overall in creative play behaviour*

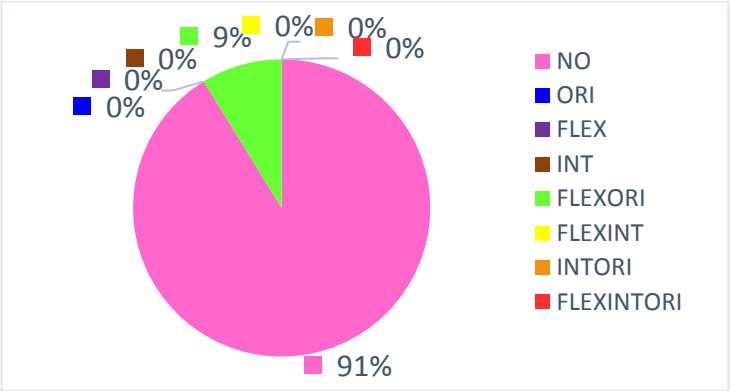


Chart 6-48: ChA, Creative Play Engagement in Fixed Manufactured Play Context, One Session

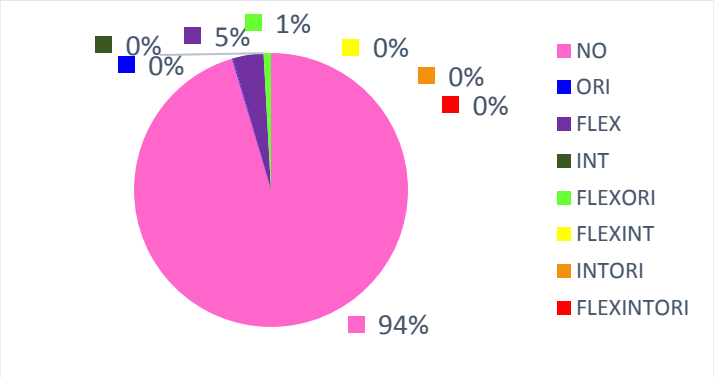


Chart 6-49: All Children's Creative Play Engagement in Fixed Manufactured Play Context, One Session

Chart 6-48 illustrates ChA's creative play behaviours in Fixed Manufactured Play Context. Similarly to the other children (Chart 6-49), this child spent the majority of his play without achieving any level of creativity at all. In fact, even though he was scored as the most creative child according to the Creative Play Taxonomy, he only spent 3% more time on creative play than the average of all children. However, unlike the overall average, where 5% of play is FLEX and only 1% FLEXORI, ChA spent the rest of his play session (9%) in FLEXORI. He was using the climbing frame in a flexible and original way compared to his classmates. ChA was seen to climb the frame, but not from the usual sides. He tried to climb up from the bridge or hang over it, or even climb the sides of the stage ending in the slide, and walked all the way round or entered via the frame's slide. Although these play behaviours did have some level of creativity, the teacher was not happy about it as she found it dangerous.

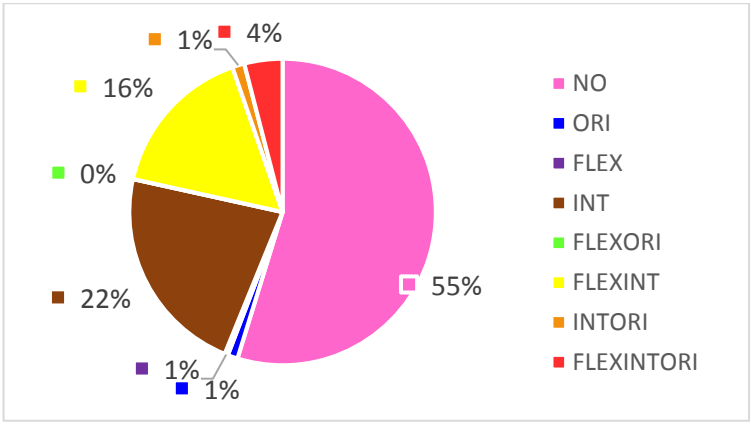


Chart 6-50: ChA, Creative Play Engagement in Loose Manufactured Play Context, All Sessions

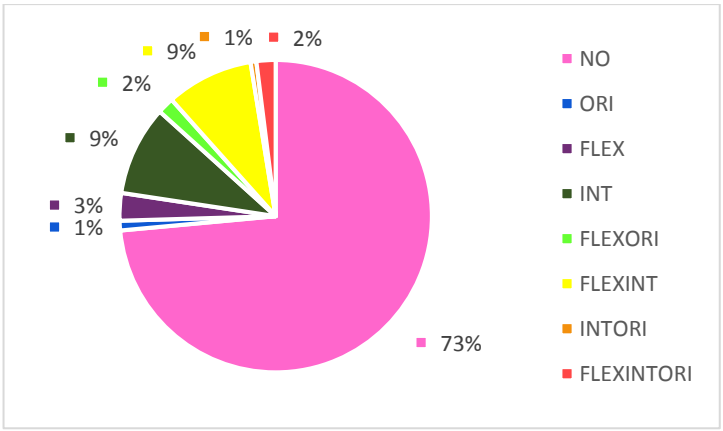


Chart 6-51: All Children's Creative Play Engagement in Loose Manufactured Play Context, All Sessions

Moving on to Loose Manufactured Play Context, ChA spent 55% of his play sessions at no level of creativity. Even though he spent more time engaged in some level of creativity in this context than the average for all children, this was his second least creative environment. Although the percentages were higher, the distribution of the different levels and stages of creativity amongst his play behaviours followed a fairly similar shape to the overall average of all children's engagement in Loose Manufactured Play Context.

A lot of this child's time was spent riding the toy car around the play space. During this play, he had many arguments with others as they also wanted to ride the car and he was not willing to give it away. He showed only a small amount of ORI, when he

tried to ride the car sitting on it backwards. FLEXINTORI also took place when he placed a ball catcher under one of the car tyres and continued trying to move the car while sitting on it backwards.

The INT creative play behaviours were mainly associated with the picnic toys; similar to other children, he sometimes used the wooden pieces alongside the picnic toys and developed FLEXINT play.

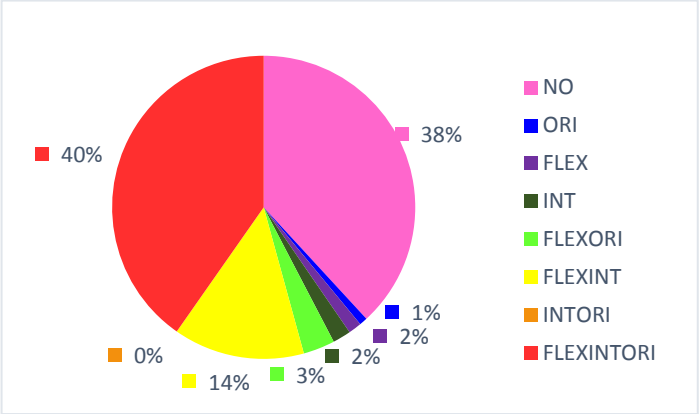


Chart 6-52: ChA, Creative Play Engagement in Loose Parts Play Context, All Sessions

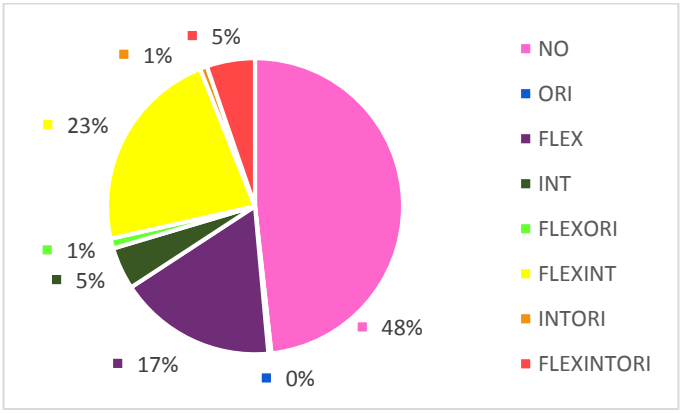


Chart 6-53: All Children's Creative Play Engagement in Loose Parts Play Context, All Sessions

Chart 6-52 shows that ChA's creative play was just 10% more than the average creative play in Loose Parts Play Context. However, what is most noticeable when comparing these charts is the large percentage of ChA's engagement in FLEXINTORI in this context. The Loose Parts Play Context seems to be very supportive of the highest level of creativity for the child who appear to be inherently creative.

For ChA, only 5% of his play achieved level C creativity, with 17% in level B and 40% of the whole session in level A, FLEXINTORI. This showed that the majority of his play involved integrating various loose parts together in flexible ways. He was scored FLEXINTORI during these play behaviours many times, as a lot of what he was making was very original and well-developed compared to other children. He also seemed to be very focused and concentrated on what he was doing. His structures actually resulted in others also becoming engaged in play and even helping him with the building process a lot of the time.

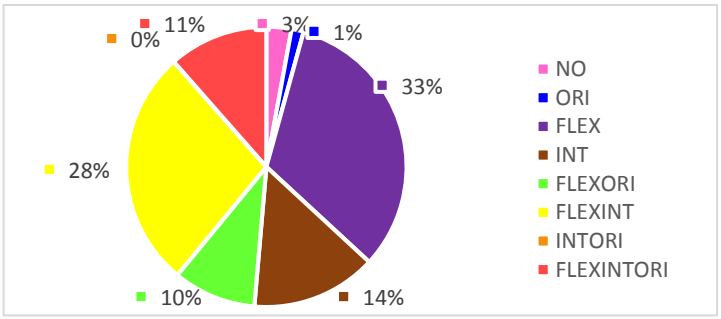


Chart 6-54: ChA, Creative Play Engagement in Natural Play Context, All Sessions

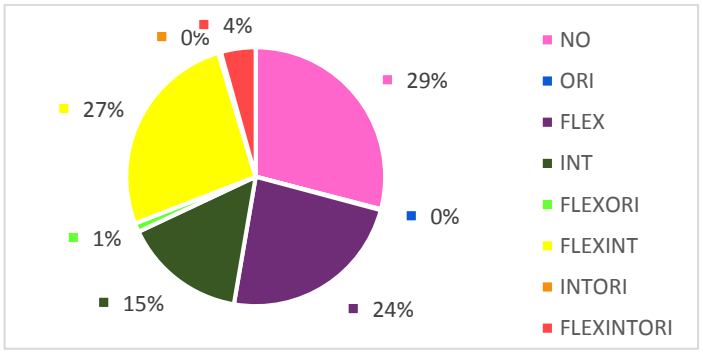


Chart 6-55: All Children's Creative Play Engagement in Natural Play Context, All Sessions

Chart 6-54 clearly shows that the Natural Play Context was very supportive of creative play behaviour in the case of ChA, as only 3% of his play lacked any creativity. Although nearly all of the play session involved some level of creative play, the distribution amongst the three levels, C, B and A, was very different to those of Loose Parts Play Context. Approximately half of the play session achieved level C of creativity. Second in frequency was level B (38%), with only 10% of play spent in level A, FLEXINTORI.

The majority of ChA's engagement in FLEX was when he was climbing up the trees. On an occasion where he was scored FLEXORI, he climbed up really high on one of the trees, sat on a branch and started pretending he was a monkey by making monkey sounds. FLEXINT was also noted on different occasions. Sometimes he attached ropes to trees; at other times he made stick-men by integrating clay, sticks and leaves. He was also engaged in some level of FLEXINTORI. For instance, in the play session where the teacher told them to make creatures, ChA started making a very well-developed creature combining a variety of materials from nature; what he was making was very original in comparison to most of the other children. On another occasion, he started attaching the rope to higher branches on a tree to make a climbing rope. Another example of engagement in FLEXINTORI was when he made a face on a tree trunk by sticking clay to it, and attaching various types of leaves and small sticks as parts of the face.

In ChA's case, although the Natural Play Context was very supportive of some level of creative play throughout the whole session, the Loose Parts Play Context seems to have been more supportive in terms of higher levels of creativity when there was creative play in place.

6.2.7.2 *ChB: analysis in four play contexts for child scored high overall in creative play behaviour*

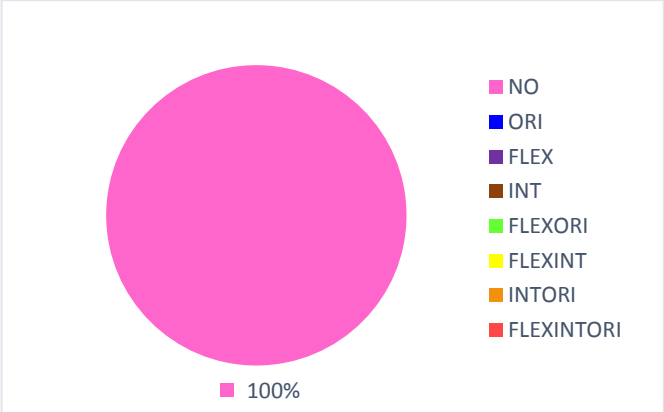


Chart 6-56: ChB, Creative Play Engagement in Fixed Manufactured Play Context, One Session

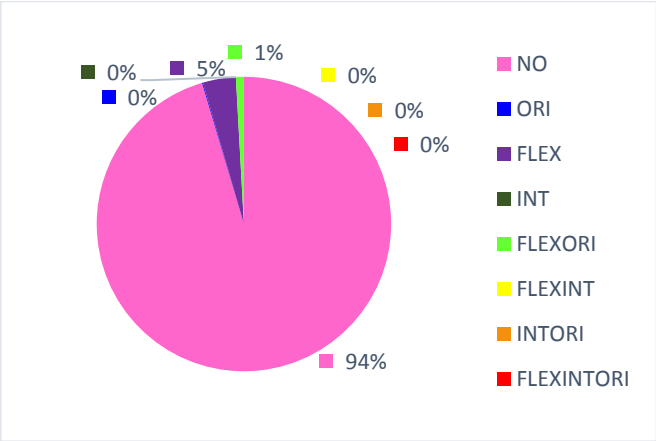


Chart 6-57: All Children's Creative Play Engagement in Fixed Manufactured Play Context, One Session

ChB showed the second highest level of creativity in play amongst the children studied. However, in Fixed Manufactured Play Context, she was engaged in no creative play at all. In other words, this context had nothing that encouraged her to play creatively. In fact, she seemed unhappy and barely engaged in any play at all. She did spend some time playing on the frame as usual; however, most of the time she struggled to climb up the climbing side of the frame. She spent a lot of her time just walking around and talking to friends, and on some occasions, she looked upset and spoke to the teacher.

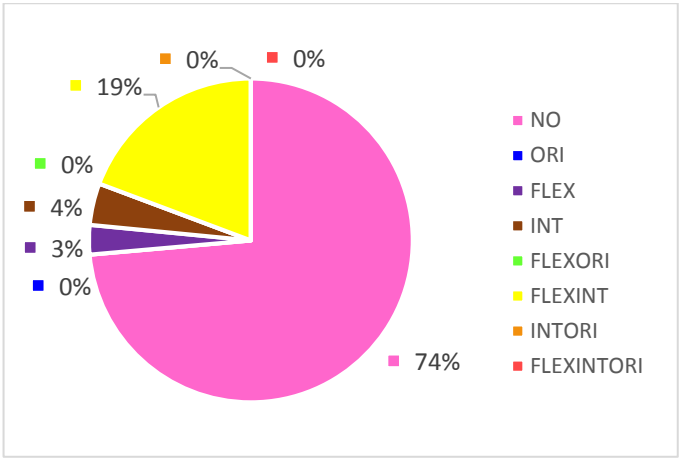


Chart 6-58: ChB, Creative Play Engagement in Loose Manufactured Play Context, All Sessions

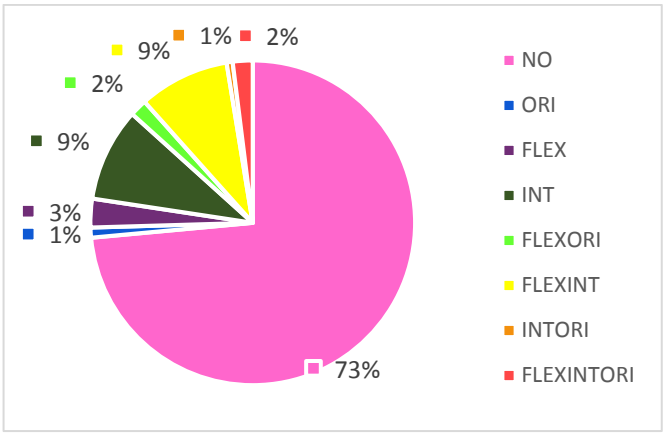


Chart 6-59: All Children's Creative Play Engagement in the Loose Manufactured Play Context, All Sessions

ChB spent 26% of the total sessions in the Loose Manufactured Play Context in creative play, which is fairly similar to the average. This shows that this context did not seem to offer much support even for this child, who was one of the more creative children. The only notable difference was that she engaged in more level B creativity, especially in FLEXINT, than the average percentage.

In this play context, she was also seen to be upset and talked to the teacher on many occasions. She had arguments with some of the other children over the bikes.

FLEX was scored when she played with the small wooden pieces in some sessions. She was also scored as FLEXINT for play such as playing in the sandpit with the spades and buckets.

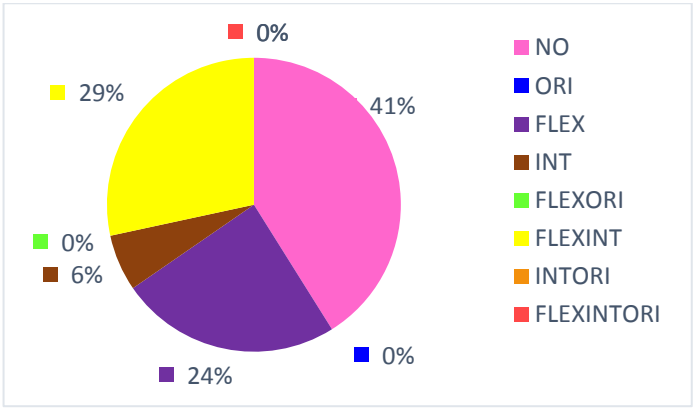


Chart 6-60: ChB, Creative Play Engagement in the Loose Parts Play Context, All Sessions

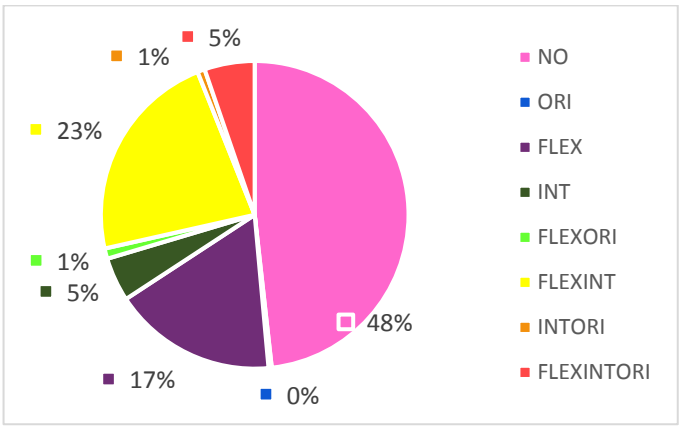


Chart 6-61: All Children's Creative Play Engagement in the Loose Parts Play Context, All Sessions

ChB spent 7% more time engaged in some level of creative play than the average percentage. The distribution of the stages of creativity in her play were fairly similar to the average percentages. The only notable difference was that she spent no time in FLEXINTORI; overall, children did engage in this level of creativity in this context, and it was actually the most supportive context of this level of creativity for the children overall.

ChB was scored NO for engaging in a lot of wandering around in many of the sessions as she entered Loose Parts Play Context. It seemed that she was looking for ways to engage and understand the materials. She also played with the climbing frame. She was scored FLEX on occasions when she tried to climb the Plexiglas window on the frame, although many other children were seen to try that in various play sessions. She

was also scored INT for taking a piece of carpet and placing it under the frame or by the side of the frame to sit on it. An example of FLEXINT play was when she placed cloth over the climbing frame's second stage. She did also engage in playing with the other loose parts; however, she seemed to prefer the smaller items such as the wooden pieces, which she put together.

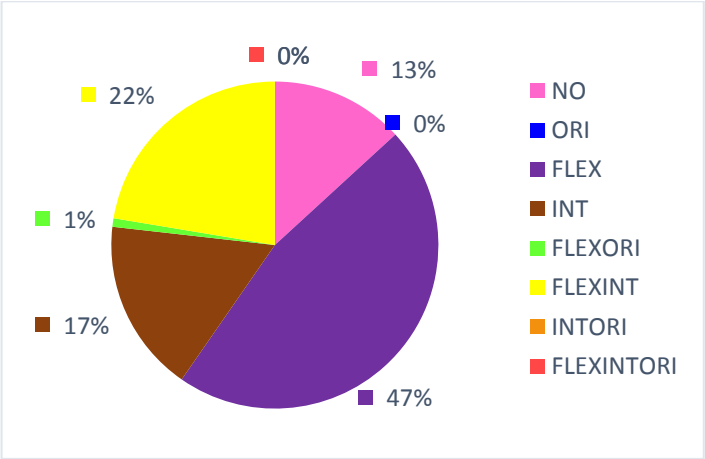


Chart 6-62: ChB, Creative Play Engagement in the Natural Play Context, All Sessions

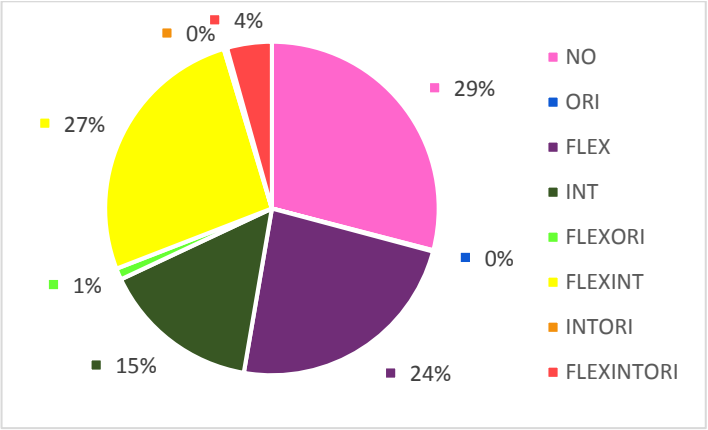


Chart 6-63: All Children's Creative Play Engagement in the Natural Play Context, All Sessions

The Natural Play Context seems to have been the most encouraging context for ChB to engage in creative play. Similar to ChA, who was the most creative child, ChB also spent less time on play without any creativity in the Natural Play Context than she did in the other three contexts.

Of the 87% of time spent in creative play, there was no engagement in level A, and only 23% in level B, with the remainder in level C. This was lower for levels A and B than the average for all children.

A notable point about this child was that, no matter which play context she played in, she rarely demonstrated originality. All of her engagements in levels B and C of creative play included only FLEX, INT and FLEXINT. The FLEX included climbing up the trees, like many other children. She also sat on the tree trunk with friends on some occasions. Her engagement in FLEXINT, again similar to many other children, involved making a stick-man after the reading of the stick-man story, or painting the trees with the mixture of clay and water in the bowls the teacher brought from the nursery.

6.2.7.3 *ChC: analysis in four play contexts for a child who scored moderate overall in creative play behaviour*

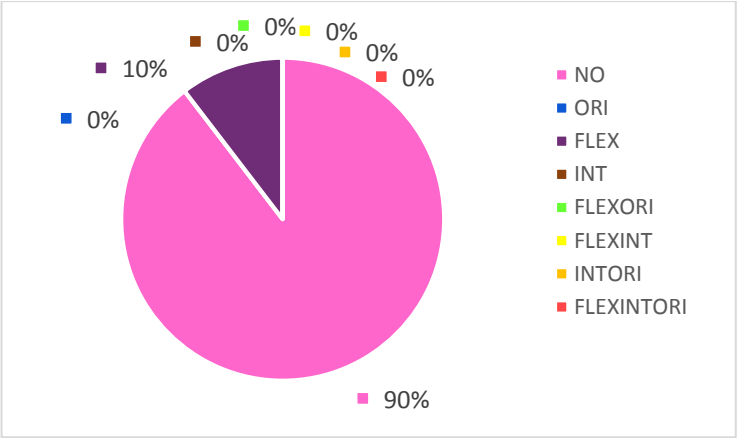


Chart 6-64: ChC, Creative Play Engagement in Fixed Manufactured Play Context, One Session

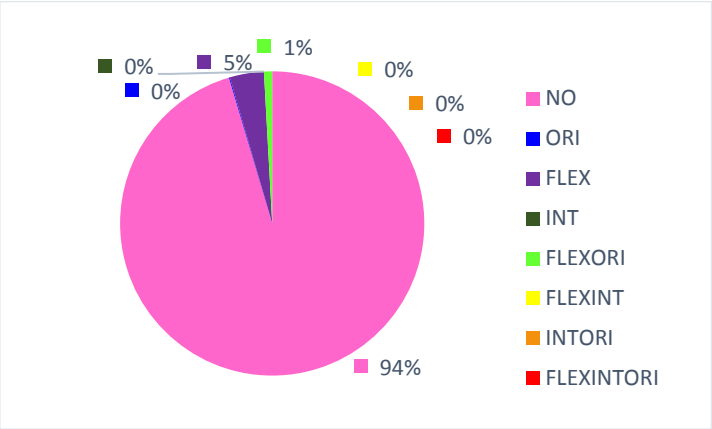


Chart 6-65: All Children's Creative Play Engagement in the Fixed Manufactured Play Context, One Session

Similar to the other children, ChC spent most of his time in the Fixed Manufactured Play Context engaged in no level of creativity; however, this was 4% less than the average. He spent 10% of the play session engaged in a low level of creativity, FLEX. While climbing and sliding down the frame, he also fought a lot with other children, which resulted in crying. The activities where he was scored as FLEX were those such as jumping down the bridge or kicking the bridge by lying underneath it.

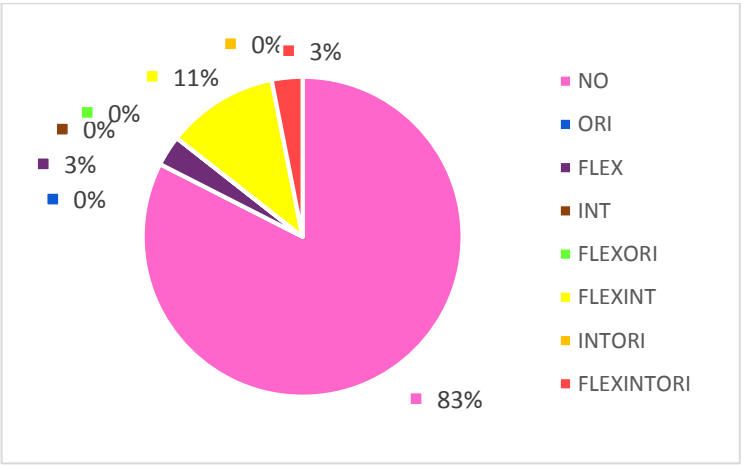


Chart 6-66: ChC, Creative Play Engagement in the Loose Manufactured Play Context, All Sessions

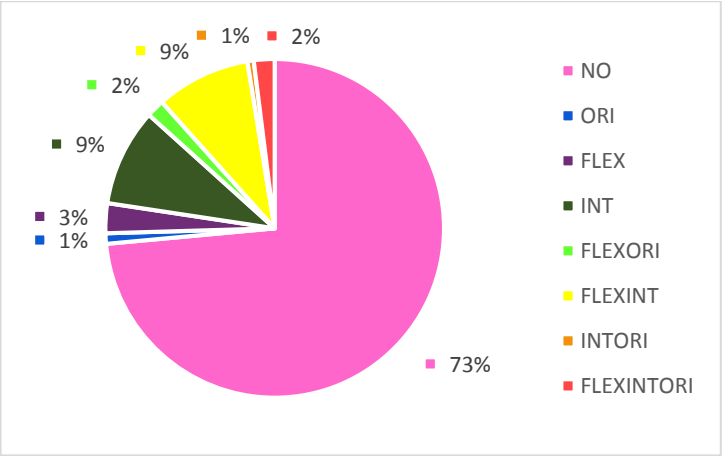


Chart 6-67: All Children's Creative Play Engagement in the Loose Manufactured Play Context, All Sessions

For ChC, the Loose Manufactured Play Context was not very encouraging of creativity either. Even though his percentage of engagement in creative play was low compared to the average for all children, the majority of it involved higher levels of creative play: 11% in level B and 3% in level A.

His play in level D of the Creative Play Taxonomy involved a lot of running around. He also started playing with a toy phone, using it as it was designed. On one occasion, he took the phone off the loop that it was attached to, and started blowing through it into the sandpit in order to move the sand. He then also used it as a fire engine hose and pretended he was putting out a fire on the climbing frame, which was very original. Hence, both of these play activities were scored as FLEXINTORI. FLEXINT was also noted when he played in the sandpit with the toy cars.

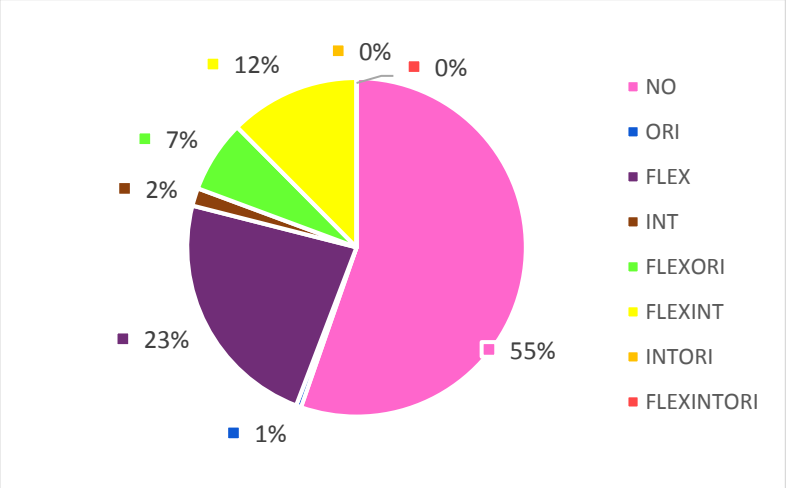


Chart 6-68: ChC, Creative Play Engagement in the Loose Parts Play Context, All Sessions

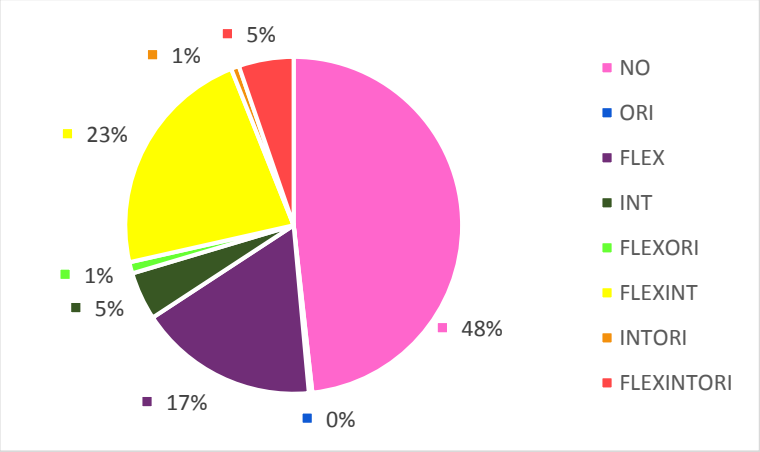


Chart 6-69: All Children's Creative Play Engagement in the Loose Parts Play Context, All Sessions

The Loose Parts Play Context was not the most supportive environment for ChC's creative play. First, he spent just over half of his play sessions without any creative play. Secondly, even though the overall children's average showed 5% engagement in level A creativity, ChC had no engagement at that level whatsoever. Thirdly, the distribution of play across levels B and C were different from the average distributions.

Nonetheless, compared to the other three contexts, the Loose Parts Play Context seems to have encouraged ChC to be original in play: 8% of his play involved originality (7% FLEXORI and 1% ORI). This was only 1% more than the average percentage of originality in this context amongst all children (7%, which included 5% in FLEXINTORI, 1% in INTORI and 1% in FLEXORI).

Some of his activities included walking on the wooden slabs that had been put between the wooden blocks as paths, or placing some plastic boxes under the frame to sit on (FLEXINT). He also started colouring the small wooden pieces of wood while he was sitting in the plastic box and putting them together in different ways, which was scored as FLEXINT play.

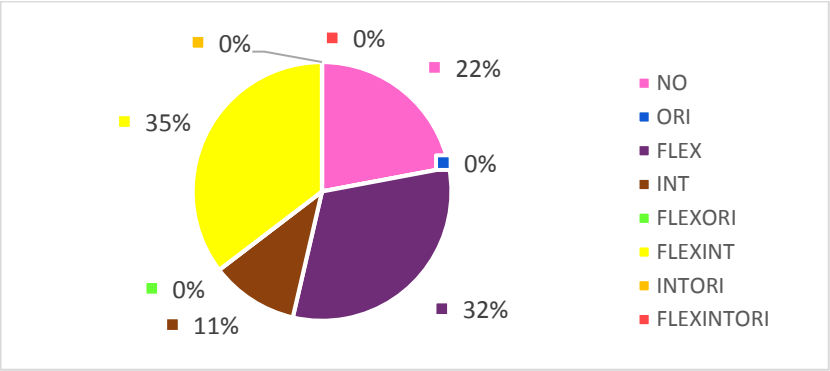


Chart 6-70: ChC, Creative Play Engagement in the Natural Play Context, All Sessions

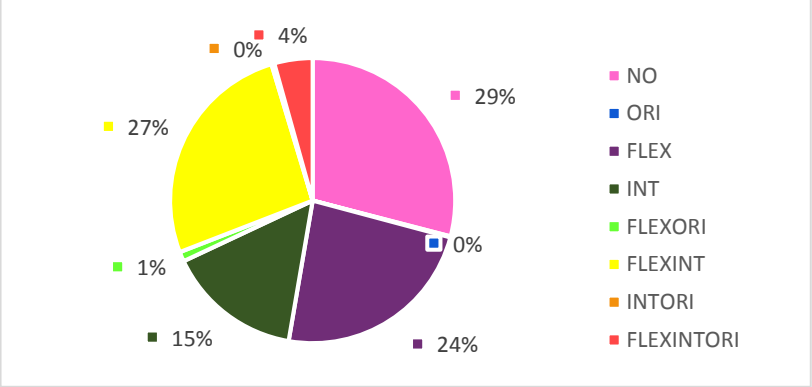


Chart 6-71: All Children's Creative Play Engagement in the Natural Play Context, All Sessions

The Natural Play Context seemed to be encouraging for ChC in terms of creative play. He spent 78% of his play sessions in this context engaged in some level of creativity. The distribution amongst levels B and C in creative play was fairly similar to the average percentage for all children. The only major difference was that, as in Loose Parts Play Context, ChC engaged in no level of FLEXINTORI. In fact, he had no originality in play in Natural Play Context, as the stages he engaged in were either FLEX (32%), INT (11%) or FLEXINT (35%).

His creative play in INT included gathering sticks together to make a large bird's nest. He also engaged in a lot of FLEX, which included climbing up the trees. He scored FLEXINT when he started digging a hilly part of the ground for exploration. Making a stick-man was another FLEXINT activity in which he engaged.

6.2.7.4 *ChD and ChE: analysis in four play contexts for children who scored lower overall in creative play behaviour*

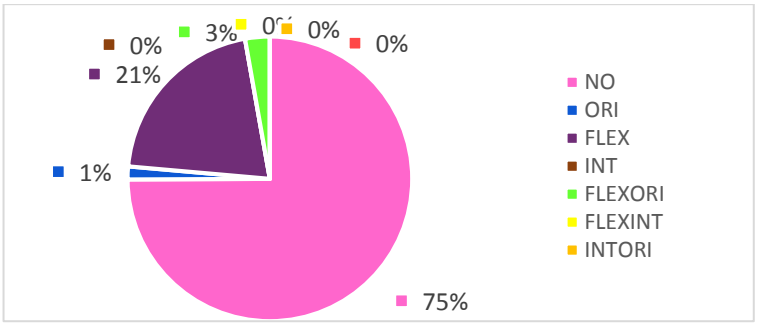


Chart 6-72: ChD, Creative Play Engagement in the Fixed Manufactured Play Context, One Session

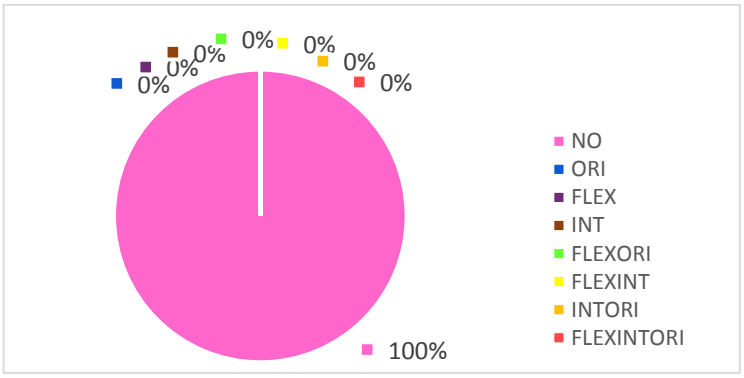


Chart 6-73: ChE, Creative Play Engagement in the Fixed Manufactured Play Context, One Session

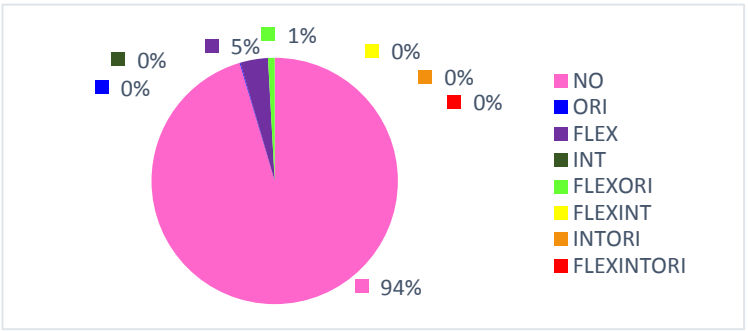


Chart 6-74: All Children's Creative Play Engagement in the Fixed Manufactured Play Context, One Session

ChD's and ChE's creative play levels were fairly different in Fixed Manufactured Play Context. ChE spent the whole play session engaged in no creative play of any kind, while ChD spent 25% of time in some level of creative play. Interestingly, although originality was not common amongst children overall in this context, ChD spent 4% of play engaged in originality (1% ORI and 3% FLEXORI).

His ORI creative play included sliding on his stomach, while FLEXORI included activities such as sitting on the side of the frame and banging his feet on the ropes or trying to move the bridge with his hands. His FLEX play also included climbing on the side of the frame, but the teacher was not happy about this at all. He also tried to climb the Plexiglas window on the side of the frame.

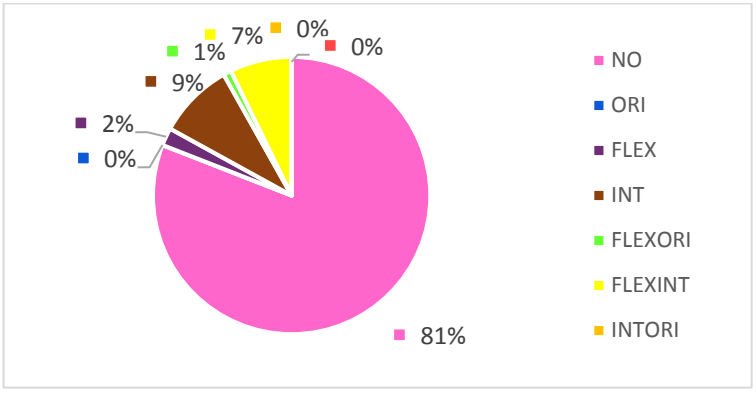


Chart 6-75: ChD, Creative Play Engagement in the Loose Manufactured Play Context, All Sessions

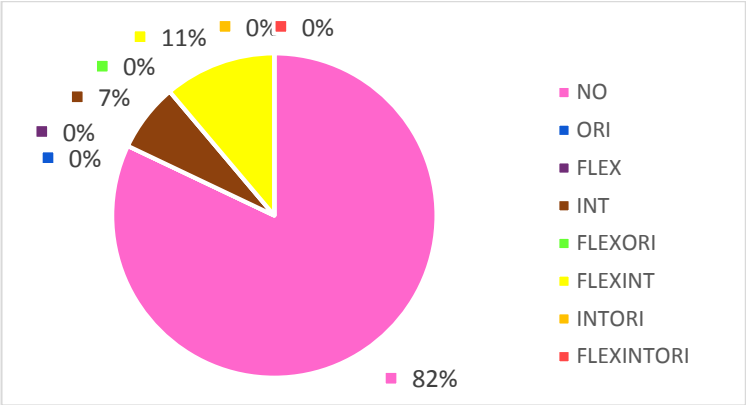


Chart 6-76: ChE, Creative Play Engagement in the Loose Manufactured Play Context, All Sessions

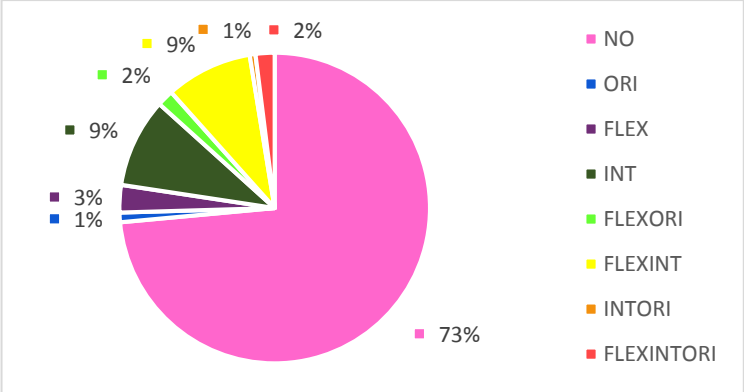


Chart 6-77: All Children's Creative Play Engagement in the Loose Manufactured Play Context, All Sessions

In the Loose Manufactured Play Context, both children's play behaviour followed a similar outline. They both spent just over 80% in level D of the Creative Play Taxonomy, which was more than the average. The distribution of the different stages of creative play, as seen in Charts 6-75 and 6-76, also followed a similar pattern. Even though there was not much creative play opportunity in this context, integration occurred more often than flexibility or originality. This can be seen in all five children's pie charts as well as the overall pie chart.

Apart from running around, playing tag or just walking around, a lot of both ChD's and ChE's time was engaged in arguing. For instance, in one session, ChD was fighting over the riding-car that ChA would not give to him, and he just kept following ChA

wanting to get on, and at one point sat on the back of the car. ChE was also seen fighting over the phone; at one point, he pulled it out of another child's hand and started running away, so the teacher had to intervene. Some of their time spent in FLEXINT took place in the sandpit, where they played with the cars, moved them about in the sand and poured sand about. INT also included playing with the ball and a wall game.

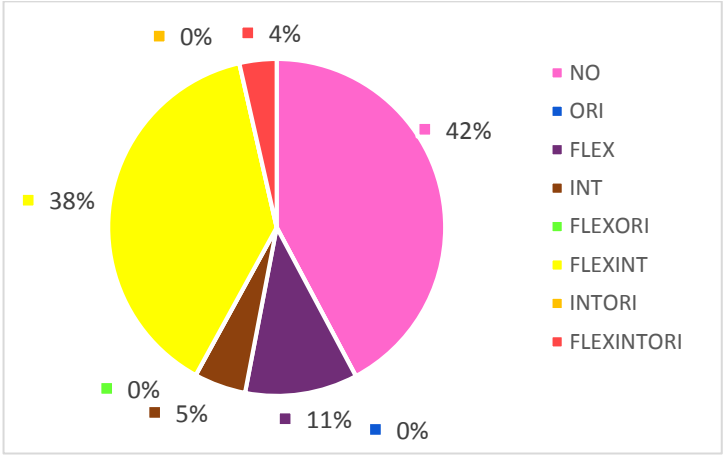


Chart 6-78: ChD, Creative Play Engagement in the Loose Parts Play Context, All Sessions

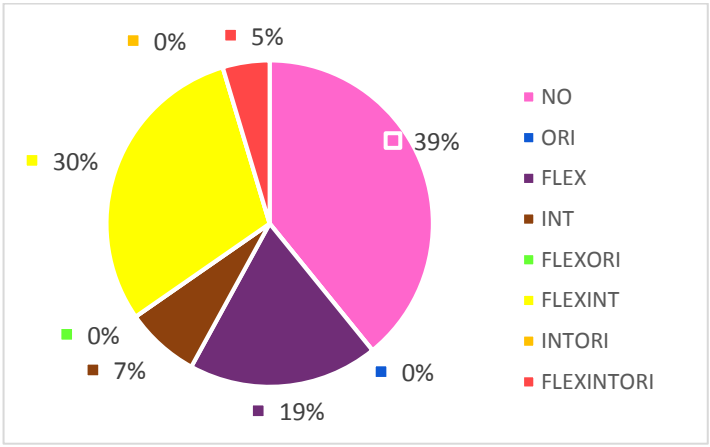


Chart 6-79: ChE, Creative Play Engagement in the Loose Parts Play Context, All Sessions

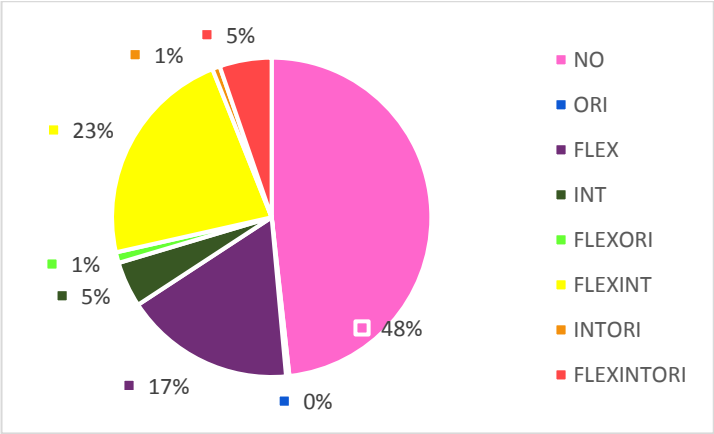


Chart 6-80: All Children's Creative Play Engagement in the Loose Parts Play Context, All Sessions

The Loose Parts Play Context seems to have been encouraging of creativity in these two children's play. While the average creative play in this context was 52%, ChD's creative play was 58% and ChE's was 61%.

Both children spent the majority of their creative play engaged in FLEXINT. They were also engaged in FLEX as the second most frequent creative play type. Although they did not score highly overall for creative play, they both spent a similar percentage of time in the highest level of creative play, FLEXINTORI. This clearly shows that the Loose Parts Play Context provided a creative play environment for less creative children.

Both ChD and ChE engaged in a lot of building with the different loose parts, which was scored FLEXINT. Although they spent a lot of time following the children who were scored more creatively as per the taxonomy, and their construction did not include originality, there was still a lot of integration and flexibility in their play. There were some occasions when they started building their own structures, which were scored as FLEXINTORI, such as when one started integrating the ladder with some loose parts and the wall and then walked on the ladder and climbed up the materials to reach the wall.

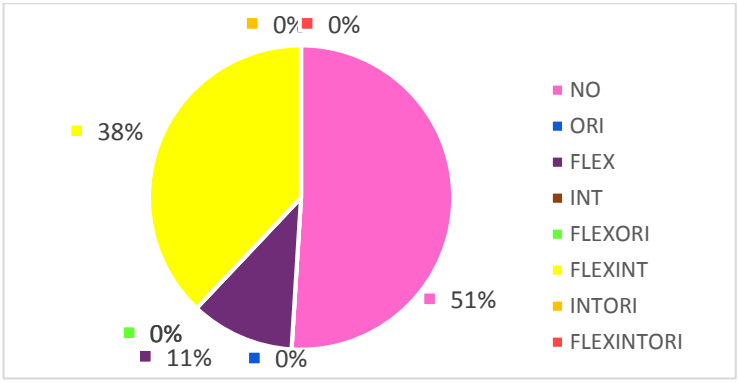


Chart 6-81: ChD, Creative Play Engagement in the Natural Play Context, All Sessions

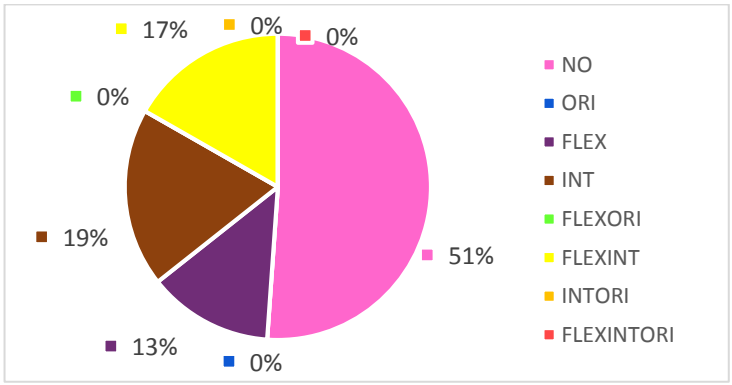


Chart 6-82: ChE, Creative Play Engagement in the Natural Play Context, All Sessions

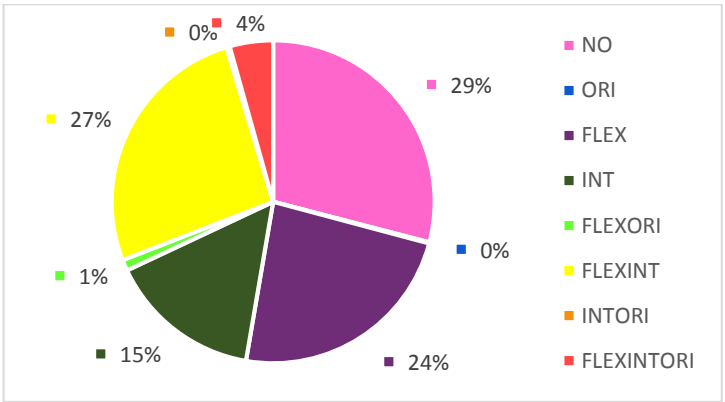


Chart 6-83: All Children's Creative Play Engagement in the Natural Play Context, All Sessions

Interestingly, although the Natural Play Context was the most encouraging context for creative play as a whole, these two children only spent about half of their play session

engaged in creativity and the rest in no creative play. They were seen just walking around the play context in some of the sessions. They were more engaged in creative play in the Loose Parts Play Context than they were in Natural Play Context. This was one of the most notable points in studying the two less creative children.

In 49% of their creative play, they were engaged in flexibility and integration, and there was no originality in their play at all. ChD was engaged in a higher level of creativity as he was engaged in 38% FLEXINT, whereas ChE had only 17% engagement in FLEXINT.

Neither child had any level A creative play.

INT for ChE included bringing a large trunk and several smaller ones to the centre of the woodland to build a bird's nest. FLEX, in which both engaged, involved a lot of climbing up the trees, similarly to many other children. FLEXINT for ChD included digging the hilly part of the ground and looking at the soil or creatures inside with a magnifying glass, or touching the trees with a stick in his hand. ChE's FLEXINT included attaching a rope to a tree and painting the trees with a brush and a bowl of mixed clay and water. He also made a stick-man.

6.2.8 Comparison of Different Genders' Creative Play Behaviours in the Four Play Contexts

One of the aims of this research was to find out whether one gender was more creative in play than the other gender overall, and whether there was a different pattern of creative play behaviour amongst the different genders. In order to understand this, all boys' and girls' play behaviours in all of four contexts across all sessions were initially scored separately. There were 15 participants at Study Site One: nine boys and six girls. Different participants may have been absent during the 18 different sessions in the four play contexts, but overall there were 135 observations of boys and 68 observations of girls in all sessions across the four contexts.

In order to find out whether the two genders behaved differently in terms of creativity when playing in the four different contexts, each gender was also compared based on the Creative Play Taxonomy in each of the contexts.

6.2.8.1 *Comparison of Creative Play Behaviour Percentages in All Four Contexts between Girls and Boys*

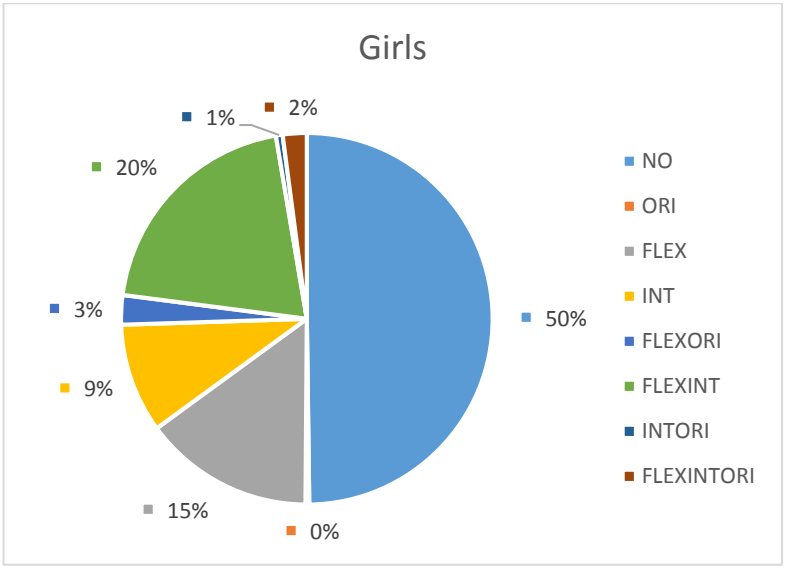


Chart 6-84: Girls' Overall Creative Play Percentage, 68 Observations

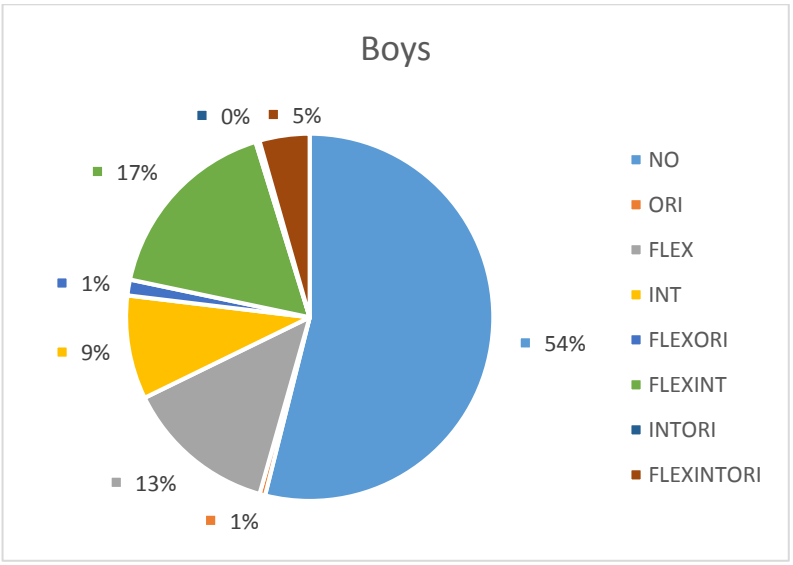


Chart 6-85: Boys' Overall Creative Play Percentage, 135 Observations

Charts 6-84 and 6-85 illustrate the distribution of the girls' and boys' engagement in different stages of creative play behaviours in all sessions across the four play contexts. Interestingly, both charts show very similar patterns of creative play behaviours amongst boys and girls, with only a few percentage points of difference in each stage. The only part of the charts that can be considered different amongst the two genders

is that girls spent 4% more engagement in some level of creativity overall than boys, while boys spent 3% more engagement in level A creative play than girls. Both genders spent nearly the same percentage of time in level C creativity, while girls spent 5% more time in level B creative play than boys.

Looking at the overall engagement percentages for each of three factors of creative play (originality, flexibility and integration), girls were engaged in flexibility 40% of the time compared to 36% for boys. A fairly similar percentage of engagement was seen amongst both genders in relation to integration, with girls at 32% and boys 31%. For originality, it was 6% for girls and 7% for boys.

6.2.8.2 *Comparison of Creative Play Behaviour Percentages in the Fixed Manufactured Play Context between Girls and Boys*

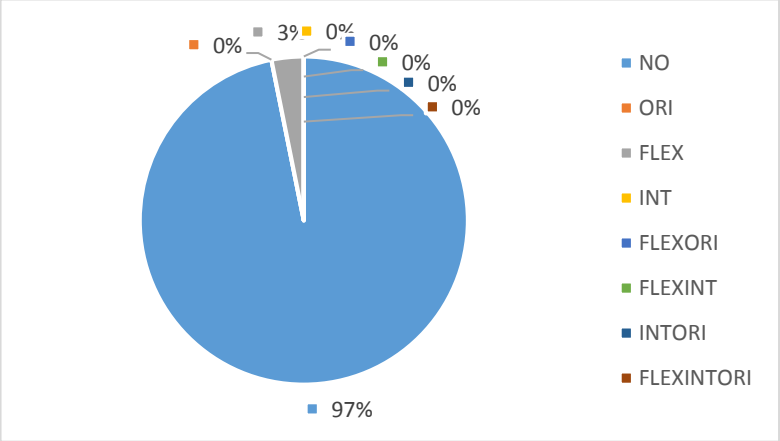


Chart 6-86: Girls in the Fixed Manufactured Play Context, Four Observations in One Session

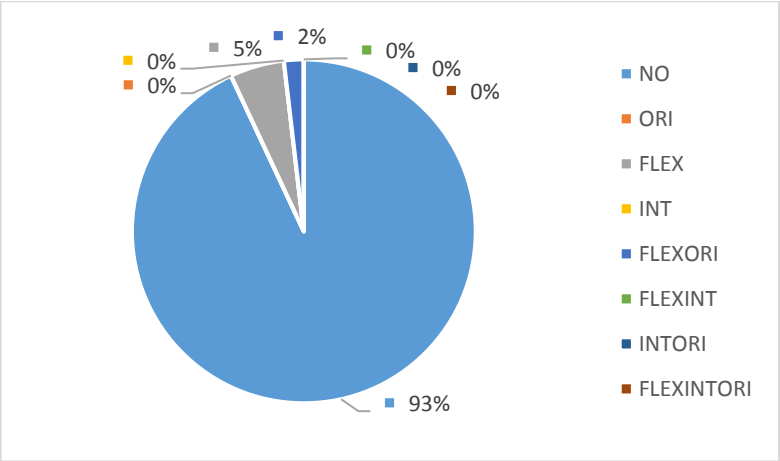


Chart 6-87: Boys in the Fixed Manufactured Play Context, Seven Observations in One Session

In the Fixed Manufactured Play Context, the charts show fairly similar patterns of creative play behaviours amongst both genders. Both genders spent the majority of their play with no creativity engaged, and girls only spent 3% in FLEX while boys spent 5% in FLEX and 2% in FLEXORI, which combines flexibility and originality together.

6.2.8.3 *Comparison of Creative Play Behaviour Percentages in the Loose Manufactured Play Context between Girls and Boys*

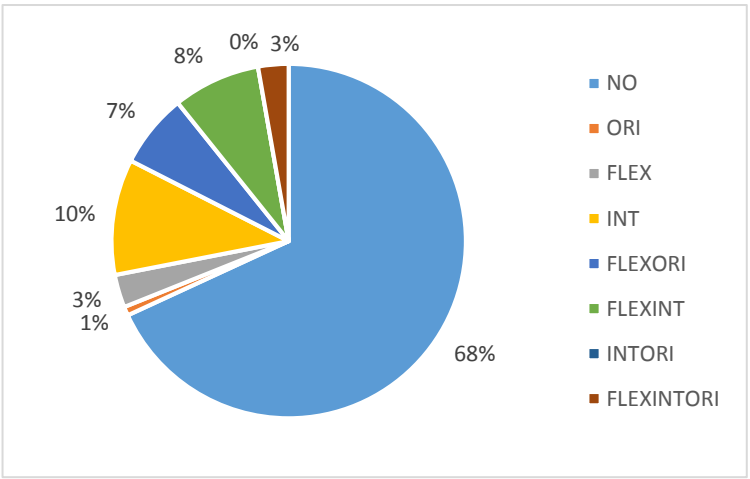


Chart 6-88: Girls in the Loose Manufactured Play Context, 24 Observations across All Sessions

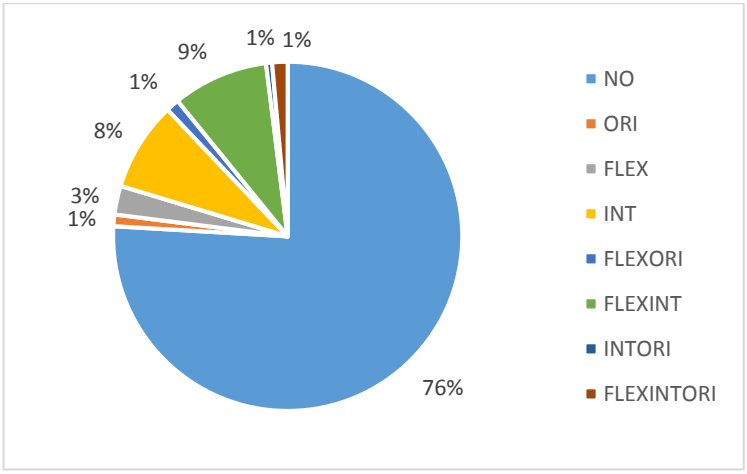


Chart 6-89: Boys in the Loose Manufactured Play Context, 43 Observations across All Sessions

In the Loose Manufactured Play Context, however, girls showed 8% more engagement in some level of creative play than boys. Overall, they were seen to be able to engage in more original play behaviours than boys as they had an average of 11% engagement in play that included originality, while boys only had 3% engagement in originality. For flexibility and integration, girls had 21% engagement in each, while boys had only 14% engagement in flexibility and 19% engagement in integration.

6.2.8.4 *Comparison of Creative Play Behaviour Percentages in the Loose Parts Play Context between Girls and Boys*

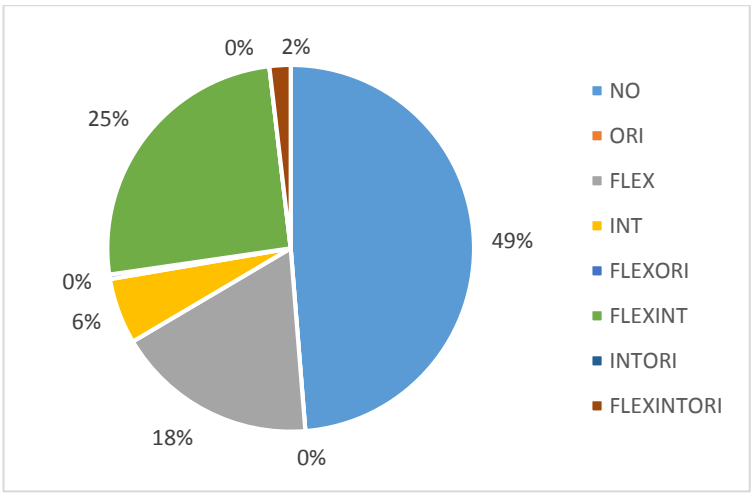


Chart 6-90: Girls in the Loose Parts Play Context, 17 Observations across All Sessions

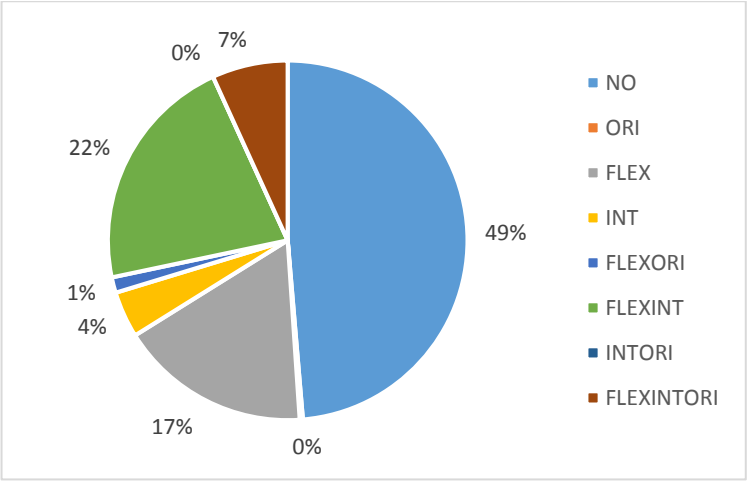


Chart 6-91: Boys in the Loose Parts Play Context, 46 Observations across All Sessions

In the Loose Parts Play Context, both genders had exactly the same percentage of engagement in some level of creative play. However, the interesting finding was that, in this context, it was the boys who had more engagement in original play than the girls. While girls only had 2% engagement in FLEXINTORI and no other engagement in any stage of creative play that included originality, boys had 8% engagement in originality, 7% of it at the highest level of creative play. This showed that the Loose Parts Play Context was a suitable context for fostering originality as a factor of creative play amongst boys, which resulted in them being engaged more at the highest level of creativity than girls.

6.2.8.5 *Comparison of Creative Play Behaviour Percentages in the Natural Play Context between Girls and Boys*

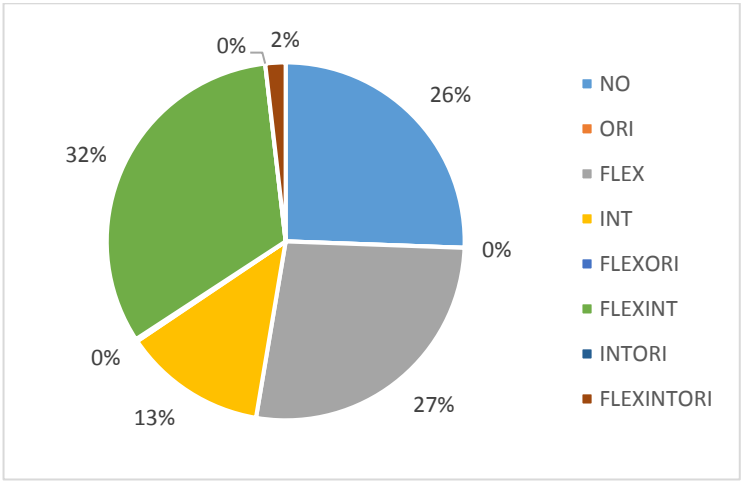


Chart 6-92: Girls in the Natural Play Context, 19 Observations across All Sessions

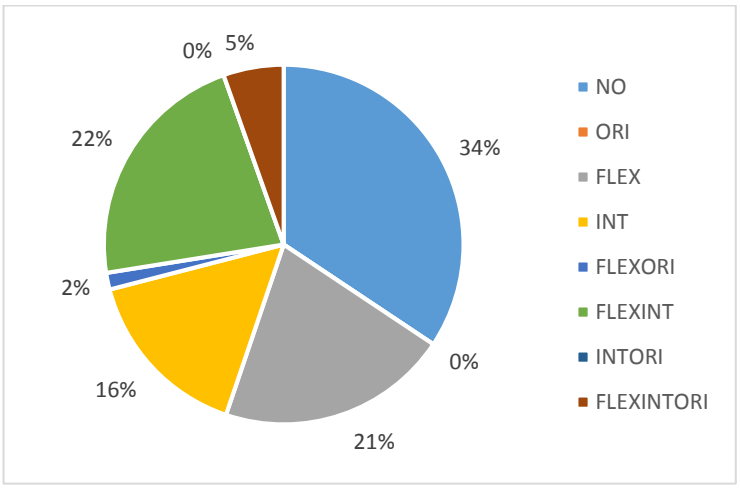


Chart 6-93: Boys in the Natural Play Context, 39 Observations across All Sessions

Similar to the Loose Manufactured Play Context, the Natural Play Context also saw girls behaving slightly more creatively (8%) overall than boys. However, similarly to the Loose Parts Play Context, boys were engaged more at the highest level of creative play than girls. This showed that, although this play context encouraged integration and flexibility in girls more than in boys, when considering originality, boys were 5% more engaged in original play behaviours than girls (5% in FLEXINTORI and 2% in FLEXORI).

After ascertaining the different groups of children's creative play behaviours in different play contexts, another factor of interest was understanding which creative play factors occurred most often overall. Accordingly, the next section analyses the duration of engagement in flexibility, originality and integration in all play sessions in each of the play contexts.

6.2.9 Flexibility, Originality and Integration in Each of the Four Contexts

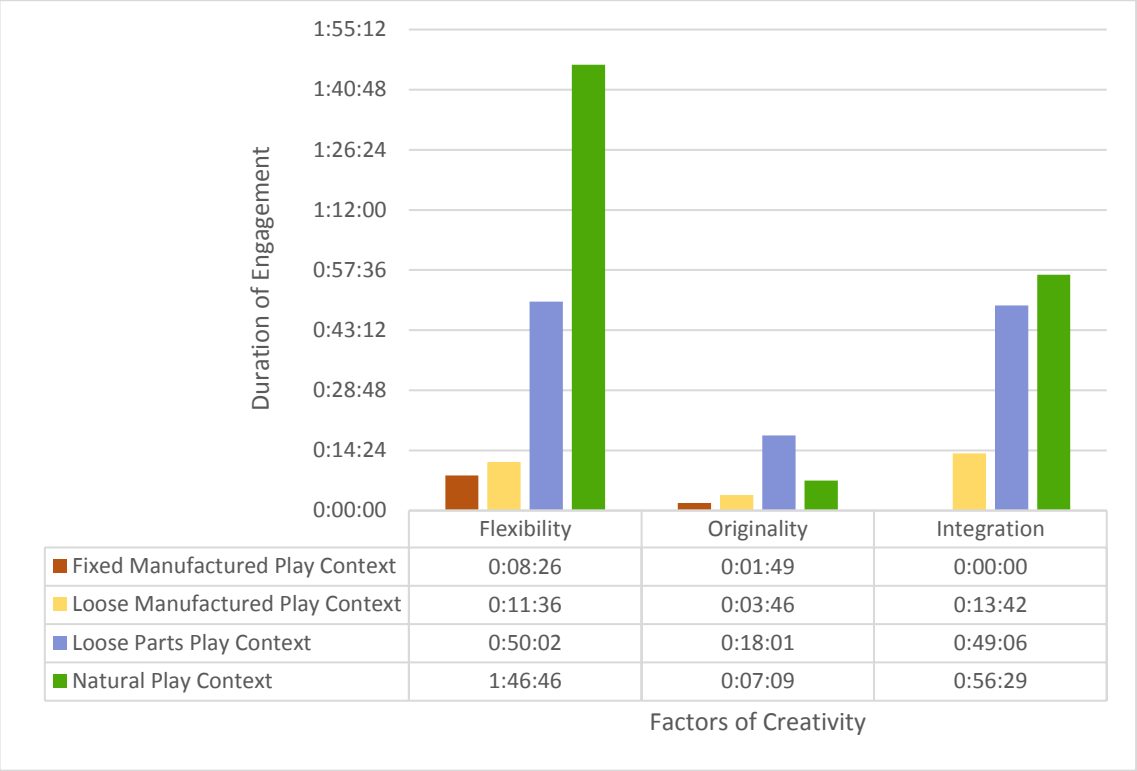


Chart 6-94: Flexibility, Originality and Integration in One Session in each of the Four Contexts

The above chart shows the duration of engagement in each of the three creative play factors in the 12:30 minute sessions in each of the four contexts. It clearly shows that flexibility was the most common creativity factor in all contexts; as expected, it happened most in the Natural Play Context and least in Fixed Manufactured Play Context. Integration was the second highest creativity factor in the Loose Parts Play Context and the Natural Play Context, with nearly the same amount of integration taking place. Originality, as we saw in the different contexts' charts, was much lower in all contexts, but the Loose Parts Play Context was most supportive of it.

Chart 6-96 compares the duration of engagement for each of these three factors in the Loose Manufactured Play Context, the Loose Parts Play Context and the Natural Play Context only, across all of the sessions. The distribution is similar to the 12:30 minute session chart above, except that here flexibility is highest in the Loose Manufactured Play Context, as well as in the Loose Parts Play Context and the Natural Play Context.

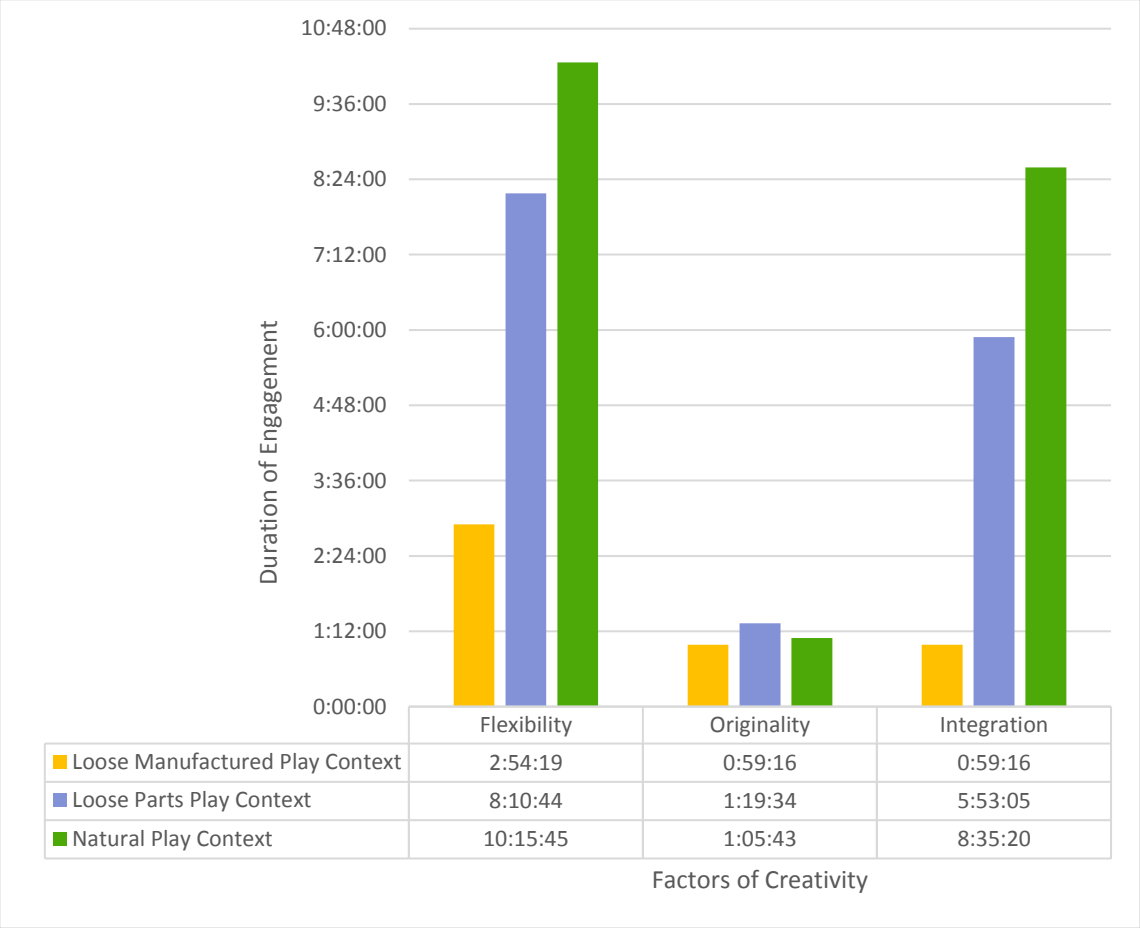


Chart 6-95: Flexibility, Originality and Integration in All Sessions in the Loose Manufactured Play Context, the Loose Parts Play Context and the Natural Play Context

6.3 Study Site One Summary

- Study Site One was also Bilston Nursery, with 15 participants – nine boys and six girls. It included four Play Contexts:
  1. The Fixed Manufactured Play Context was the nursery's playground setting, facilitated by the timber climbing frame at its centre.

2. The Loose Manufactured Play Context was held in the same nursery playground, but facilitated with manufactured play equipment such as cars, musical instruments and barbecue and picnic sets.
3. The Loose Parts Play Context was held in the same nursery playground, but facilitated with loose materials such as plastic boxes, tyres, wooden slabs and bricks, logs and chalk.
4. The Natural Play Context was held in a woodland within walking distance of the nursery. Apart from the natural elements in the setting, the teacher also brought some other natural loose materials and facilitating items such as clay, water and magnifying glasses and buckets.

- In the Fixed Manufactured Play Context, only one session of 12:30 minutes was held, with 11 children.
- In Loose Manufactured Play Context, six sessions totalling 105 minutes were held, with 65 participations observed overall.
- In the Loose Parts Play Context, six sessions totalling 99 minutes were held, with 63 participations observed overall.
- In the Natural Play Context, five sessions totalling 148 minutes were held, with 55 participations observed overall.
- Comparison of the creativity level of a single session in each of the four play contexts shows that the Natural Play Context was the most supportive context of overall creative play taking place, while the Loose Parts Play Context was the most supportive context when it came to the highest level of creative play.
- The Fixed Manufactured Play Context was found to be the least supportive play context for creative play.
- When comparing the 12:30 minute sessions with the overall sessions' results for children's creative play at different levels in each of the contexts, a similar pattern could be seen.
- In the Fixed Manufactured Play Context, children spent only 1% engagement in level B and 5% engagement in level C creative play. The rest of the session involved no level of creative play.

- In the Loose Manufactured Play Context, children spent most of their time in no level of creative play (73%), 13% in level C, 12% in level B and only 2% in level A of creative play.
- In the Loose Parts Play Context, children spent just over half of their play session in some level of creative play, with 22% in level C, 25% in level B and 5% in level A.
- In the Natural Play Context, children spent the majority of their play engaged in some level of creativity (71%), with 39% in level C, 28% in level B and 4% in level A.
- Overall, amongst level C creative play, FLEX occurred more than INT and INT occurred more than ORI. There was a similar pattern in each of the play contexts except for the Loose Manufactured Play Context, in which INT occurred more than ORI and ORI occurred more than FLEX.
- Amongst level B creative play, FLEXINT occurred a lot more than FLEXORI and INTORI. This pattern applied to all four contexts.
- The Fixed Manufactured Play Context was similarly unsupportive of all children's creative play, no matter whether they scored higher in creative play than other children or moderate or low overall.
- Children with different creative play scores showed the same pattern of creative play in the Loose Manufactured Play Context.
- In the Loose Parts Play Context, except for the highest scoring child in creative play, the other four children who were studied in detail showed a similar pattern to the average for children's creative play behaviours.
- In the Loose Parts Play Context, the highest scoring child in creative play had less engagement in overall creative play (38% compared to 48%); however, he had 40% engagement in the highest level of creative play, FLEXINTORI.
- The Natural Play Context was overall more supportive of some level of creative play amongst the two highest scoring children in creative play, compared to the average score. The moderately creative child's score in this context was similar to the average score amongst all children.
- In the Natural Play Context, the two children who scored lowest in creative play only spent half of their play time engaged in some level of creativity. This

showed that it was not as supportive of the lower scoring creative children as it was of the average children's results.

- Comparing the four play contexts, flexibility happened most often in the Natural Play Context.
- Comparing the four play contexts, originality happened most often in the Loose Parts Play Context.
- Comparing the four play contexts, integration happened most often in the Natural Play Context.
- Overall, girls were 4% more engaged in some level of creative play than boys, while boys were 3% more engaged at the highest level of creativity than girls.
- In the Fixed Manufactured Play Context, neither girls nor boys engaged much in any level of creative play. Boys were only 4% more engaged in some level of creativity than girls; this included 2% more in FLEX and 2% in FLEXORI.
- In the Loose Manufactured Play Context, girls were 8% more creative in play than boys.
- In the Loose Manufactured Play Context, girls had 7% more engagement in originality and 7% more engagement in integration than boys.
- In the Loose Parts Play Context, although both girls and boys were engaged in the same percentage of some level of creative play, when it came to level A of creative play, boys were 5% more engaged than girls.
- Boys' percentage of engagement in originality was 6% higher than girls in the Loose Parts Play Context.
- Girls were engaged in some level of creative play more than boys in the Natural Play Context (8% more).
- Boys were more engaged in the highest level of creative play than girls in the Natural Play Context.
- Boys were engaged in more originality (overall 7%) in the Natural Play Context than girls (overall 2%).

CHAPTER 7 STUDY SITE TWO: DATA COLLECTION AND FINDINGS

7.1 Study Site Two Implementation and Collection of Data

The data collection for Study Site Two was scheduled for November and December 2013 at Prestonfield Primary School in Edinburgh, Scotland. 32 children from across all the year groups took part in the research: 22 girls and 10 boys. Accordingly, there were children aged between five and twelve in the data collection. Their participation was voluntary, with their parents' consent. The selection of children was randomly done by the school's administration officer, with the intention of gathering children from all year groups.

As discussed in Chapter Two, at Study Site Two, two main data collection methods were used: the semi-structured focus group discussions held in the last week of November, followed by four observation sessions held in the second week of December where the children were taken to each of the four outdoor play settings.

For the focus groups, two focus group discussions were held every day for four days of one week. The children were organised into eight groups based on their year group and each focus group lasted approximately 30 minutes. Table 5-5 shows the number of girls and boys in each focus group discussion.

Table 7-1: Case Study Two Focus Group Schedule

Year Group	Age	Boys	Girls	Time/Minutes
P1	5-6	2	2	30 minutes
P1/2	5-7	1	3	30 minutes
P2	6-7	2	3	30 minutes
P3	7-8	1	4	30 minutes
P4	8-9	1	2	30 minutes
P5	9-10	0	3	30 minutes
P6	10-11	1	3	30 minutes
P7	11-12	2	2	30 minutes
Total		**10**	**22**	

Amongst the different play settings, other than the tarmac playground, which was the children's usual play area, the other three spaces were not usually used for play by the children. In fact, they were not allowed to go on the grassy hill at playtime because of the slipperiness and chances of it being muddy due to rain. They were occasionally allowed to go to the wildlife garden if it had not rained for a few days and the ground was totally dry, but even in that case, only one class could go at each playtime, so the chances of a particular child being able to go were reduced even more. Also, the children were not allowed in the central garden at playtime either; it was only used for outdoor classroom sessions during class under the teacher's supervision and guidance.

In order to minimise the interruption of children's class times, it was decided to carry out the observation during their usual playtime. Therefore, the participants were separated from their classmates in the tarmac playground and taken to the other settings for the observation sessions. Accordingly, there was a 15-minute observation session from 10:15am to 10:30am, and another 25 minutes for the children's lunchtime break, sometime between 12:30pm and 1:15pm. However, as the researcher could not video record and photograph the participants alongside their other classmates at playtime in the tarmac playground, the observation session for this particular setting was held 15 minutes before morning playtime and 25 minutes before lunchtime break. Table 5-6 shows the observation session schedule.

***Table** 7-2: Case Study Two Observation Schedule*

Environment	Date	Morning Time	Lunch Time	Duration
Main Playground	09-12-2016	10:15-10:30	12:05-12:30	40 minutes
Grassy Hills	09-12-2016	10:30-10:45	12:30-1:15	40 minutes
Wildlife Garden	10-12-2016	10:30-10:45	12:30-1:15	40 minutes
Central Garden	11-12-2016	10:30-10:45	12:30-1:15	40 minutes

The weather for the four play sessions was very similar. All days were dry but cloudy with a fairly low temperature of about 5°C, and all the children had warm clothes on.

7.2 Study Site Two Findings

7.2.1 The Tarmac Playground

The questions about the playground experience started in this space, as all the children were familiar with this area as their playground. When asking questions about their playtime in this area, none of the groups seemed to be very excited; they simply listed some of the activities in which they engaged. These mainly included running games such as “tag, piggy in the middle and hide and seek”, or playing with equipment such as hula hooping, throwing bouncy balls and running after them, skipping with ropes, or “playing with a cone and a ball and throwing Frisbees to each other”. Some children also mentioned using string to playing “cat's cradle, where we stretch a string to make things with it”(Figure 7-1).

Figure 7-1: Girls Playing Cat's Cradle with String

In addition, many of the children said they engaged in sports such as “football, basketball and dodgeball”. In fact, quite a few of the boys were very happy about having the chance to play football during playtime, while some girls from Primary Five stated: "It's not fair the boys get a football pitch, but the girls don't get much". A more interesting game that two of the girls mentioned was playing as "ice-girls, we make ice and the boys slip on it!” However, this seemed to be very occasional and only happened on snowy days. Only a few children mentioned playing on the painted games on the tarmac such as hopscotch, which did not seem to be among their top activities (Figure 7-2).

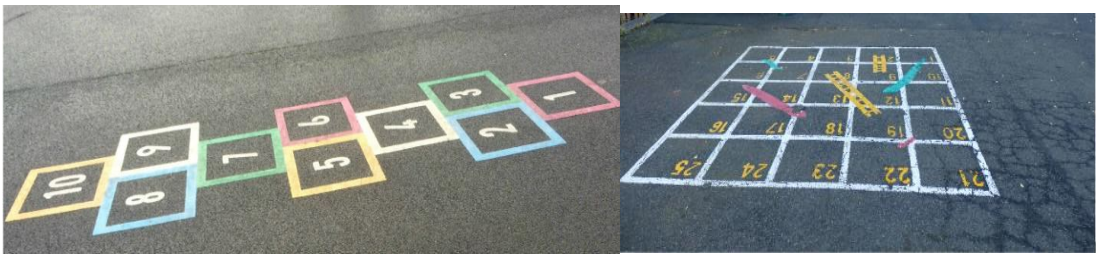


Figure 7-2: Painted Games on the Tarmac Ground

There were a few other activities that the children said they engaged with in this area, which were not related to the facilities in the space. For instance, they brought paper and pencils from their classroom and played noughts and crosses, and some girls said

“we made tattoos by cutting a shape out of stick and then using lipstick to colour the shape”. Over all, talking to the children about the tarmac play space, nearly all the children mentioned the same sort of activities, which to many seemed to be "very unoriginal games and they are boring". Some mentioned that they “sit and talk to friends, but gets boring”, or “play tig but get bored and start figting”. Also, some other complaints raised were about the hard surface of the tarmac, where "you fall and hurt yourself".

In the observation session in the tarmac playground, children engaged in the same type of play behaviours that they had mentioned. The smaller children spent nearly the whole playtime playing tag together, running around and tagging each other (Figure 7-3). This sometimes resulted in arguments and upset some of them, which required the teachers to become involved. Some of the older children started playing football right from the start and seemed to be happy with this, just like they had mentioned in the focus group discussions (Figure 7-4).

Figure 7-3: Children Playing Tag

Figure 7-4: Children Playing Football

Other older children, mainly the girls who didn't like football, started looking in the play equipment basket to find something with which to engage, mainly the items they had mentioned in the focus groups (Figure 7-5). However, they only played for a few minutes with each piece of play equipment and kept shifting to another item, which showed that these items did not really satisfy their desire to develop good quality play. Some of them, just as had been mentioned earlier, left the play equipment alone, preferring to walk around the playground talking to their friends.

Figure 7-5: Children Playing with Play Equipment in the Tarmac Playground

Overall, similarly to their opinions in the focus group about the plain tarmac playground, most of the children did not experience much excitement in this area and

engaged in repetitive games every playtime. In fact, akin to their statements in the discussions about this space and their play opportunities, their faces did not show much excitement when they were engaged in play in this environment either.

7.2.2 The Grassy Hill

When the children were asked about their play experience in this area, unfortunately they did not have that much to say. This was mainly because they were not allowed to play in this area at all. Some of the children seemed to play on the grassy hill before and after school hours while waiting for their parents to pick them up. Most of the children listed games such as tag, running up the hill and catching each other or "zumbee run" for this space. Some of the girls from Primary Six said "we like to sit on the grass, take paper from indoors and draw things" or "we sit and talk with friends". A more different experience that two friends had was when they explained "we made a bird's nest in the grass by cutting bunches of grass, placing berries in it and sometimes pieces of bread for them to eat". Some of the complaints about the grassy hill were brought up by the Primary Four discussion groups, aged eight to nine. First, they were not happy that they were not allowed to use this space as it was usually wet. Some mentioned "Grass aren't allowed because its slippery" and said, "wish we could go on the grass more often". The children had been forbidden by their parents too as one said, "mums won't be happy because you get muddy". Secondly, they mentioned getting hurt playing in this area by saying "If you roll down you might get hurt, you don't see rocks while rolling". Finally, they spoke about it being a mess. One boy from Primary Four said, "There are too many leaves on grass, so many that you can't even count them".

When the group of children were taken to the grassy hill to be observed, many of them asked to leave and join their peers in the tarmac area. The grassy area did not seem to be very appealing to them, especially as they did not have the chance to play with their classmates. The ones who stayed were the older children. Similar to what most children had mentioned in the focus group discussions, they started running and catching each other at first. There was a small tarmac stage on top of the grassy hill area. After a while, the children who tended to play football in the main tarmac playground used this tarmac stage on the grassy hill to do gymnastics. Some girls asked

if they could bring some play equipment, so they played with the Frisbee and hula hoops for a while. A few other girls, as had been mentioned, sat on the grass to talk.

Figure 7-6: Children Playing on the Grassy Hill

The observation on the grassy hill showed that it was not a very attractive area to the children without their classmates, and it did not seem to give them much opportunity compared to the tarmac area.

7.2.3 The Wildlife Garden (Woodland)

In the discussion regarding the wildlife garden, most of the groups seemed to have lots to say. In fact, they got excited about the different experiences and all seemed to enjoy talking about the fun they had had there. The children from Primary One and Two started talking about their experience of the wildlife by listing activities such as catching bugs, finding different leaves and sticks, finding plant seeds and squashing berries. Another child from Primary Three said he liked the creatures in the wild: "there was a little spider who was a mum and was about to born a baby" (Figure 7-7).

Figure 7-7: Children Finding Creatures in the Wildlife Garden

They were also excited about being able to climb up the trees or just run between them. Apart from the wildlife experience, they spoke about more creative play activities that they had done. One child from Primary Two expressed enjoyment about making a bird house with string and sticks. Another child from the same year group explained how they made a tree by breaking sticks, sticking them into the ground and attaching a leaf on top. Making autumn pictures by taking the leaves and other natural materials into their classroom was another exciting activity the Primary Two group spoke about.

Interestingly, as the focus group age increased, the sort of play activities the children spoke about seemed to become more creative and varied from the usual physical activities. A boy from Primary Three (age seven to eight) said "you can make a limbo bar, pick a long stick and put them on two trees", and another explained the whole scenario of a game they played: "We did a museum and we did it on a big tree and there was like a little hole here and we put honey and berries and there was a big part and we made a bed. We had two leaves we put on the bottom and then we had two cushions and the next day we saw a squirrel inside it".

The children from Primary Four and Five started by discussing some physical activities such as playing hide and seek in the wildlife garden or fighting with sticks. They also explained how they enjoyed playing once with saying “we made a fireplace, we put

sticks together and we rubbed them together to make fire". They also liked the logs and said " you can sit on them or swing on them".

The Primary Six group seemed to be even more creative in this play space. They spoke about making shops in the garden, selling sticks as swords or as brushes. They also made a "bed-and-breakfast" and explained there was a whole game around the idea of having security people as well as cleaners. They spoke about the parties they had, in which they used the leaves and other natural materials as decorations. "We make cocktails and put sticks in it and a leaf at the top and pretend it's like a fruit cocktail or something," said a Primary Six child. In addition, they "made Kingdoms" and used specific leaves as "passes" and "money", so the players had to give five leaves as the entrance cost. They also spoke about their "den fight", making dens in two corners between the trees and bushes and "fight[ing] over stuff and sticks". A Primary Six child finally said that they "just have lots of fun in it". The Primary Seven group had similar exciting stories of what they did in the wildlife garden. They also had the bed-and-breakfast story: "First me and … got lots of long sticks and used them as a bed so it was like two branches and a bush and we put it up and it looked like a bed…" and spoke about how they used the logs: "Pick them up and use them as furniture... Turned it into a bed-and-breakfast...". They also had fights: "There was a war going on in it, we were the dark assassins, and we fight the robbers", and explained how they designed a penthouse: "We had a penthouse, we made it out of tree bits and bushes, we added some sticks on…". Another common game for the Primary Seven group was playing "I'm a Celebrity", where they challenged each other to do scary or fun things.

Apart from all the excitement that the children had when expressing their experiences in the wildlife garden, some groups also had complaints. These complaints were mainly raised by the Primary Four and Five groups. They mentioned it as being messy, muddy and having so many leaves. There comments were such as, "Got so much leaves, should clean them!!", or "You can't find much wildlife because there is so many leaves," and "I think there should be less leaves, and more life in to the wildlife garden." Someone said, "Kind of like this one, but like all the others don't like it because it's got mud and leaves everywhere" while another child said, "When it rains it gets quite muddy and parent get annoyed". Someone from the same group also said,

“If you don't wash your hands from wildlife garden they get ill”. A Primary Five child complained about people throwing litter into the garden at weekends from outside, while a Primary Four child was unhappy that “When you make something, next time its broken”.

Some children were unhappy that “you’re not allowed to climb the trees”. This was while the younger ones said “wish we could go to the garden more”. A child from Primary Two seemed to have had a bad experience of tripping over a root, while a Primary Six child was excited about jumping up and down on a root that had come out of the ground.

The observations were quite similar to what the children had expressed themselves in the focus group discussions. Unlike in the grassy hill session, all of the children were very happy to leave their classmates and join the playtime in the wildlife garden. As soon as they entered the garden they all became engaged in playing with each other and the environment. Interestingly, different aged children played together, and sometimes the older children helped the younger ones to enjoy themselves. Many of the younger children were highly excited to climb the trees or jump on the logs (Figure 7-8). Some of the children went inside the bushes and pretended they were riding a horse (Figure 7-9).

Figure 7-8: Children Climbing the Trees and Playing on the Logs

Figure 7-9: Children Climbing the Bushes Pretend Riding a Horse

Some of them started finding creatures or small pieces of leaves to feed the insects. Tag was also going on, but other activities were very popular too. Overall, all the children were very much involved in interesting activities similar to what they had described in the focus group discussions.

7.2.4 The Central Garden (Outdoor Classroom)

As mentioned earlier, the designed garden was mainly used as an outdoor classroom space and children were not allowed to play in it very often. This resulted in them not having that much to say about their activities there, even though they all really liked the idea of having the opportunity to access it; a Primary Six child said, "I think we should play in the central garden", and another boy from the same age group said, "We only do teachers' stuff like gardening, we like doing these though".

Just like all the other pupils, a Primary Two child seemed to be really interested in the space, saying "it's got gorgeous stuff", while a Primary Four girl said, "I like the flowers, bushes and the green tunnel". Another said, "When it is autumn you can take leaves off and put them in your basket and make autumn pictures with them". Another child from Primary Two spoke about other creative activities, saying "There are apples, you can make autumn pictures with them as well, you can eat them too".

Even though they had not had much play experience in this area, when they were taken there for observation they were all highly engaged from the very first minute. Some of

the smaller children started running around the willow tunnel, imagining each part of it was a room in a house and building a family story around it, which seemed very interesting and engaging (Figure 6-10). Some other children went to the messy vegetable gardening corner, where they found creatures and autumn leaves with different colours (Figure 7-11).

Figure 7-10: Children Playing in the Willow Structures

Figure 7-11: Children Finding Leaves and Creatures in the Vegetable Corners

Some were excited to look into the pool and investigate the different parts of the garden as they ran around. Some of the boys, who usually played football during normal playtimes in the tarmac playground, were also highly engaged in doing gymnastics on the wooden stage, while some girls started jumping on the logs around it (Figure 7-12).

Figure 7-12: Children Playing Gymnastics and Jumping on the Logs

In one corner of the garden, a few of the children started picking up sticks, and tried to make a house with them by placing them in between the paving slabs of the ground. The process was very richly imaginative, and even though the sticks kept falling, they continued trying. Another girl also started picking different natural materials from the garden with some friends and started mixing them to make a soup for the wildlife creatures. These activities were very engaging and motivating, and many other children started to join them as they went along (Figure 7-13).

Figure 7-13: Children using Natural Materials to Build a House and Soup for Bugs

This space had been able to provide various play opportunities for all the children with different interests, and they did not even want to go inside for their lunch break.

7.3 Study Site Two Data Analysis

7.3.1 The Tarmac Playground

Comparing the four environments based on children's play behaviours in the observation sessions, it seemed that the tarmac playground area supported creative play less than the other three play settings.

The different play activities in which the children were engaged within the tarmac area were mainly ball games, group running games and playing with the equipment in the boxes.

The ball games, which were mainly played by boys from Primary Three and up, were either football or basketball, football being more favoured. There were two goal nets on one side of the tarmac playground, and the children made teams and played football throughout the playtime. Based on the observation and the comments in the focus groups, they seemed to be happy spending all their time doing this. However, according to the Creative Play Taxonomy, football does not support any level of creativity. In fact, all of the children were trying to do the same thing, i.e. shoot the ball into the goal, as per the game rules (no originality or flexibility) with a single ball (no integration).

Figure 7-14: Children Playing Football in the Tarmac Playground

The second set of games were the group running and chasing games. These included games such as tag and "piggy in the middle". These games did not involve any specific elements and were just played by running around and running after each other, so there was no integration in the play. Also, all of the children were doing the same thing (no originality) and as per the game rules (no flexibility). Most of the younger children, which included Primary One and Two, just engaged in the group running games as they did not have access to balls and play equipment on their side of the tarmac playground.

Figure 7-15: Children in the Tarmac Playground

The third set of games, mostly played by the children from Primary Three to Seven, involved play equipment. These included hula hoops, bouncy balls, skipping ropes, cones and balls, Frisbees and string. As per the observation supported by the focus group discussions, they used most of this play equipment separately and as per its usual

function. For instance, they threw the Frisbee to each other and caught it, or bounced the bouncy ball to each other (Figure 7-16).

Figure 7-16: Children playing with a Frisbee in the Tarmac Playground

Most of this play equipment was very basic and straightforward, so it did not encourage the children to think of anything different to do with it (flexibility), use it differently to others (originality) or even use it in conjunction with other play equipment to come up with a new game (integration).

Although most of the equipment supported basic games, some of the items provided more diverse play opportunities than others. For instance, the number of different things the children could do with the hula hoops was considerable: they spun them around their body; held each other's hands and added several hula hoops so they had to move their bodies between them one by one or all together; placed them on the ground and jumped over them; or rolled them along the ground and ran after them. Thus, the hula hoops provided flexible play opportunities for the children. The skipping rope was another piece of equipment that offered the children more opportunities. They not only used it for skipping, but also spun it around for their friends to jump over or held the two ends for others to jump across.

Figure 7-17: Children Playing with the Loose Manufactured Play Equipment in the Tarmac Playground

"Ice-girls" was a game that only two of the girls mentioned as a game that they made up themselves (originality). For this game, they made ice with the snow on the ground and the boys slid over it (flexibility). However, this was very occasional and was only possible when it snowed, so it was not something that was directly linked to the tarmac playground.

Some of the children from Primary Four to Seven preferred just sitting in a corner on the tarmac playground or walking around with a small group of friends. The play context had nothing that engaged them, so they preferred watching others play or chatting with friends rather than engaging in any sort of play, with or without creativity involved.

None of the children were seen playing on the painted games on the tarmac such as hopscotch or snakes and ladders. Only a few mentioned these games in the focus groups. These games did not engage any level of creativity either.

Overall, the tarmac area seemed to engage a few of the children in some sort of play, but even those who were engaged in play hardly ever had the opportunity to be involved in play behaviours with any level of creativity.

7.3.2 The Grassy Hill

The second observation session was held in the grassy hill area. Only a few minutes after the beginning of the observation session on the grassy hill area, many of the children asked if they could leave this play context and join their friends in the main playground. These were mainly children from Primary One to Three. Less than half of the group were left for the observation: the children from Primary Four to Seven. They initially engaged in running up and down the hill or playing tag, activities that involved no level of creativity according to the Creative Play Taxonomy.

Figure 7-18: Children Playing on the Grassy Hill

Three of the boys then decided to use the tarmac stage to do gymnastics, as they were getting ready for the school games. This activity did not include any level of integration, as they were only doing gymnastic movements on the ground without integrating any elements together in the context. Neither did it engage any flexibility as there were no elements engaged in the play that could be used in an unexpected way. However, as it was only those three children that came up with the idea to do gymnastics on the tarmac stage of the grassy hill, they were engaged in some level of

originality compared to the other participants. In other words, the availability of a small tarmac stage on the top of the grassy hill area gave a few of the children the opportunity to engage in an original play behaviour.

Figure 7-19: Children doing Gymnastics on the Tarmac Stage

At one point, two of the girls decided just to sit and look at the other children playing in the tarmac playground. They said they did not really know what to do. This clearly showed that they could not come up with any play opportunities on a grassy hill context where there were no elements to facilitate them, thus the level of creative play was very low.

Interestingly, they chose to sit on the edge of the tarmac stage on the top of the grassy hill as it had a small distance from the grassy ground. In other words, they were using the edge of the stage in a flexible way as a place to sit, and what they did was original as no other children came up with this idea throughout the whole observation session. This showed that even the smallest diversity in height and materials encouraged some level of creativity in a play session.

Figure 7-20: Children Sitting on the edge of the Tarmac Stage

A few of the children asked if they could bring some of the play equipment from the tarmac playground, so they brought some hula hoops, skipping ropes and a Frisbee. They used all three pieces of play equipment as per their function and separately, similarly to any other child playing with them. In other words, even this play equipment in the grassy hill play context did not provide any flexibility, integration of elements or originality in play behaviours.

Figure 7-21: Children Playing with the Play Equipment of the Grassy Hill

The comments about the grassy hill area in the focus group discussions did not add any other creative play experiences to what was observed in the play session except for one. This was when one child said that they had made a bird's nest in the grass by

cutting bunches of grass and placing berries and small bread pieces in it for the birds to eat. That was the only creative play experience mentioned by one of the children. This experience included the three parameters of creative play, as that child, alongside her friend, were the only ones who did this (originality), and made the bird's nest by using grass as the nest itself (flexibility) with berries and bread inside to feed the bird (integration).

Some of the children also mentioned rolling down the hill during out-of-school time. This involved flexibility as they used the hill in an unexpected way. However, they were not formally allowed to do so by the school and parents, as it was believed they may get muddy or harm themselves.

Apart from these, the children did not mention any other play activity that had any level of creativity.

Overall, the grassy hill play context did not provide many creative play opportunities for the children. The main reason seemed to be because it was not facilitated with any materials or equipment that would give them the opportunity to engage in any games.

7.3.3 The Wildlife Garden (Woodland)

The third observation session was held in the wildlife garden, also known as the woodland space due to its natural setting. Although the children who participated in the research were separated from their classmates during playtime, the wildlife garden seemed so pleasing that none of them wanted to leave, and they engaged in some sort of play activity straight away. In fact, it was interesting to see that the children from different year groups were playing together, and the older ones could be seen helping the younger ones to interact with the environment and create their own play. The wildlife garden seemed to provide a lot of creative play opportunities for the 26 children from across the different year groups. This was also supported by their comments in the focus group discussions.

At the start of the play session, a few of the children started running around or playing tag with each other. This was only for a short time, as the play context seemed to have other more interesting things for them to do. This running and playing tag was no different from what they did in the grassy hill area or the tarmac playground, although

they had the opportunity to run between the trees. However, according to the Creative Play Taxonomy, there was still no level of creativity engaged.

Figure 7-22: Children Running in the Wildlife Garden

Quite a few of the children started climbing up the trees or hanging over the branches. This play activity included flexibility, as the trees were not grown for climbing, but they did give the children the idea to use them for climbing or hanging on. There was no originality in this activity as most of the children seemed to do it and even pointed it out in the different focus group discussions.

Figure 7-23: Children Climbing up the Trees in the Wildlife Garden

The wildlife garden also had some logs that were laid on their side in a circle. These logs provided various play opportunities for the children. Some of the children from different year groups used them to balance on; they put their feet on two sides and, as the log gently wobbled, they tried to control their balance. This play activity only engaged flexibility due to the use of a tree log to play balancing on; the log was used on its own so there was no integration of elements in the play, and many children played with it the same way. Accordingly, it was a level C creativity play, classed as FLEX.

Figure 7-24: Children Balancing on the Logs

Some children used some of the branches around them to place their hands for support as they were balancing on the logs, so they could move more and have better balance at the same time. As they were using two different elements of the play context, namely the tree branches and the log at the same time, their play activity included integration as well as flexibility. Accordingly, they were engaged in FLEXINT, which is a higher level of creativity classed in level B.

Figure 7-25: Children Using the Branches for Balancing on the Logs

The logs were also used by the children to find creatures, or as a space to place the insects they found in order to show each other and look at them more closely. They

also used other elements such as leaves that they found on the ground to see how the bugs would react as they moved on the log. This space was used in different flexible ways, either as a surface on which to place the different creatures and materials, or a display to show things to friends. Hence, there were levels of FLEX and FLEXINT occurring.

Figure 7-26: Children Finding Creatures on the Logs

The circled placement of the logs also provided more opportunities for play. It provided a space for the children to gather around to show each other things they had found in nature or to sit together. There were a few more logs in the garden; however, they did not seem to play the same role as the focused area, where the circular placement of a group of logs together seemed to have successfully provided a play space. Some of the children started jumping on them, from one to the other.

The logs' placement provided opportunities such as jumping from one to the next, sitting or gathering together, all of which were flexible uses of the circular placed logs.

Figure 7-27: Children Sitting on the Logs

Another favourite place of the children for play was a bush that was fairly hollow in the middle. The children went inside the bush, hid between its leaves, and moved between the branches as if it were a maze. Based on the Creative Play Taxonomy, all these play activities were classed in level C of creativity, with flexibility taking place.

While all of the children in the bush seemed very engaged in one of these activities, one of them started doing something different. She found a branch that was rather horizontal and put her legs around it. As the branches were narrow and could move easily, she started jumping up and down and making sounds as if she were riding a horse. As only this child came up with the idea to ride the bush branch as a horse, her play not only included flexibility (due to the flexible use of the bush's branch) but was also original compared to her classmates. Therefore, she was engaged in a FLEXORI

creative play activity, which is a level B creative play. Later, two other children saw her riding the branch and joined her on the ride, so they also became engaged in a FLEX play activity.

Figure 7-28: Children "Riding" the Bushes

The wildlife garden had a lot of space for investigation. Many of the children from different year groups started looking for insects. Apart from the learning points of this activity, it did not include any level of creativity in particular. However, one of the older children started building a house for the insects that a smaller child had found. She found a small knot on the tree trunk where she put the insect as if it were her new house, and then she started finding some leaves and berries to put in the house to feed it. This play activity was a level A creative play, FLEXINTORI, as it included a flexible use of the tree trunk's knot and leaves, the integration of the insect, tree, leaves and berries, which were all found in the context, and finally originality, as no other child was developing similar ideas in their play with the insects.

Figure 7-29: Children Finding Creatures in the Wildlife Garden

Some other children engaged in finding different elements such as leaves and sticks in the wildlife garden and playing with them by creating different things. All of this type of play included flexibility of use of these elements. When they used several different elements together, it also included integration of materials, which moved it into a higher level of creativity.

Figure 7-30: Children playing with the Natural Elements in the Wildlife Garden

One girl from Primary Five picked up a stick and pushed the leaves away, making a clear path from the garden's door. She was using the stick as a broom, which was a flexible way to use a stick, and what she was doing was very original as no one else thought of doing so. As her activity was built upon the use of a stick and the leaves on

the ground, it also included integration of elements. Therefore, she was engaged in a FLEXINTORI activity, which is level A of the Creative Play Taxonomy.

Figure 7-31: Child Using a Stick as a Sweep

As mentioned in the data gathering chapter, the children were occasionally allowed to use the woodland area during playtime, so in the focus group discussions, there was a lot of interesting comments about this play context. When they were asked about the sort of things they had done in this space, nearly all of what they reported had some level of creativity in it, some of which even went into level A of creativity, FLEXINTORI.

Making a bird house by integrating string and sticks together, making a tree by sticking some sticks into the ground and attaching leaves on top of it and even taking the leaves and other natural materials into their classroom to make autumn pictures were some of the FLEXINT play activities that the children from Primary Two reported. In all three activities, the play context had offered them natural elements such as sticks and leaves and even the soft clay in the ground, so that the children could make whatever they thought of themselves using their creativity. These natural elements did not carry a specific function that guided every child to use them in a certain way; therefore, they could be used in various flexible ways. They seemed to have the potential to be integrated with each other, especially when they had softer textures like the soil, into which the children could easily push sticks, or the leaves, which could be slightly torn

in order to pass through the stick. These features in the play context seemed to support the children's creative play behaviours further.

The older children seemed to have even more creative play experiences in the woodland play context, according to what they said in the focus groups. For instance, a child from Primary Three explained a whole play scenario about making a bed by putting two leaves into a hole in a tree trunk as its cushions, and putting berries and honey from the trees into a smaller hole, then finding a squirrel inside it the next day; there was a lot of flexibility in the use of materials and integration of various materials of nature together, as well as originality, in this play. Another example of FLEXINTORI play was when another child explained how he made a "limbo bar" by using two different elements of nature together: a long stick and two trees to hold it.

The two different play scenarios, the squirrel's house and the limbo bar, were each built up with the natural elements in the natural play context. The elements were either loose, movable objects such as sticks, leaves and berries, which could be picked from the trees and bushes or from the ground, or fixed elements such as tree trunks, which, although fixed, had free and organic forms. It seems that the flexibility and diversity of forms and textures supported the children in thinking more flexibly and originally about what they would like to do with them.

The sort of comments made by the older children from Primary Four and Five showed lower levels of creativity. They started by listing games such as hide and seek, sitting on the logs or balancing on them, or even fighting with sticks. Even though using the sticks as swords to fight with or sitting on a log did have a low level of creativity, FLEX, compared to the other year groups, it was not much. They also spoke about making a fireplace by putting sticks together and rubbing them together to make fire. This play activity also had a low level of creativity, as many other children seemed to have had the same experience so there was no originality, and they had only used sticks without integrating them with any other element in nature. Therefore, their play only included flexibility.

Moving on to Primary Six and Seven, again, there seemed to be a rise in creative play behaviours and they had much more interesting things to say. They had many different

play scenarios, such as making a bed-and-breakfast with sticks and trees and bushes, and moving the logs and using them as furniture, with different children playing different roles such as cleaners who used sticks as brooms or security people who used sticks as weapons, all of which were sold at a shop, made in the play context with trees and bushes.

They also explained the parties that they had in the woodland, using leaves and other natural elements as decorations, and explained, "We make cocktails and put sticks in it and a leaf at the top and pretend it's like a fruit cocktail or something". In both these play scenarios, there is a lot of originality in what the children had come up with to build a whole game in a play context, and how they had integrated all the different elements in flexible ways to make various things. For instance, the process of making a fruit cocktail by integrating a stick as a straw with a leaf on the top is not only flexible, but highly original.

They also explained other play scenarios, such as the Kingdoms and how they used leaves as passes, and the way they used the small corners and holes available in the bushes and between the trees to play “den fight” and fight over swords and other equipment, all made from sticks and other elements in the woodland.

Most of the play activities in which the older children were engaged not only included flexible use of the different elements, materials and space features of the woodland play context by integrating them together, but also had very original play scenarios that built a well-developed play activity. It seemed that the flexibility and diversity in the woodland encouraged them to think creatively about what they want to do in their play time. In fact, the sort of play activities that they recounted were either in the FLEXINTORI level of creative play, or at least in level B of creativity, especially FLEXINT.

7.3.4 The Central Garden (Outdoor Classroom)

The central garden, which was in fact the only designed outdoor space in the school, was not used for children’s play, merely as an outdoor classroom under class teachers’ supervision and guidance. Accordingly, the children did not have much to say about the kind of play activities they did in this space in the focus group discussions.

Figure 7-32: The Different Parts of the Central Garden

This space, as described in detail in Chapter Five, included several different features such as vegetable boxes, a pond, a fountain with a mother and child statue, a stage, several benches, willow paths and natural features such as ornamental and fruit trees, bushes and grass.

When the children were taken to the outdoor classroom for the observation session, some of them started running around and playing tag or just jumping around the fountain. One of the younger children started playing on the loose paving slabs around the fountain. He started jumping on them and enjoyed the fact that they moved as he jumped. In fact, the paving slabs were clearly not meant to be loose or used for such play activity, but the looseness provided the opportunity for him to use them flexibly, and he was indeed doing something original. Therefore, a simple paving slab that could only move slightly enabled a child to engage in a FLEXORI creative play behaviour, which is level B in creative play. Later, his friend joined him and they started moving the slabs with their hand to see what they could find underneath. Some of the children were interested in playing around the fountain. They climbed up it or walked on the different ground levels around it.

This was interesting, as it showed how very small movements of the play context's elements or slightly different ground levels and shapes could encourage the children to explore and engage in a low level of creative play by using them flexibly.

Figure 7-33: Playing on the Slabs around the Fountain

There was a lot of exploring and looking for insects and wildlife in the central garden as the children arrived. A few of them gathered around the pool to find creatures, but after a short time when there was not much engagement other than looking, they left it and moved on to other play activities. The pool was only a square box filled with water, covered with sticks so that the children would not fall into it. The water was not clear and appealing, so overall it did not really give them much opportunity to play or anything to interact with.

Figure 7-34: The Pool and the Apple Tree

Some of the younger children in the focus group discussion spoke about making autumn pictures by cutting leaves, picking apples and sticking them on paper in the classroom. Although this was not an activity that took place during playtime in the

outdoor environment, it was useful to know that a supportive outdoor play space in a school could even facilitate creative activities within the classroom.

The willow tunnels were engaging for some of the children, especially the girls. They started moving around them, and built a story of a family life in a house where each of the willow rooms had a specific function such as a kitchen, bedroom or living room. In fact, the designer had thought of using the willows, which were a live plant, to make paths and small rooms, so the children were literally playing with them as they were designed. Hence, it could only be said that using each room as a specific room had any level of flexibility.

Figure 7-35: Children Playing in the Willow Tunnels

Many of the children from Primary Four and Five started playing on the wooden stage. The boys mainly did gymnastics while the girls jumped over the logs and the benches that were fixed inside the ground around the stage. There was no level of creativity there, as many of the children did the same thing (no originality) and the stage and the fixed logs seemed to be designed for such activities, so there were no flexible activities going on either.

Figure 7-36: Child Doing Gymnastics on the Wooden Stage

Behind the vegetable boxes, there was a neglected corner with a tall tree and overgrown plants, compost bins, paving, some sticks and a lot of leaves on the ground. Many of the children seemed to be attracted to this area. They started exploring it and found leaves with different shapes and colours, as well as worms and insects around the compost bins. Some of them picked up sticks to move the huge pile of leaves. They pushed around the leaves in order to look further underneath and enjoyed the whole process. This activity involved integration, as they were playing with the sticks and the fallen leaves together. It also involved flexibility, as they used the broken sticks for sweeping aside the leaves and finding creatures. Hence, some of the children were engaged in FLEXINT creative play, which is level B according to the Creative Play Taxonomy.

Figure 7-37: Children finding more Opportunities to Play

The most creative activity that went on in the central garden's play session was when one of the children found some small sticks and started putting them between the paving slabs and the bench's wooden slabs to build a standing house. Even though the sticks kept falling, she kept trying over and over again. She was engaged in FLEXINTORI, which is level A of a creative play process. In fact, she was making the house by using small sticks and paving slabs, and sometimes the bench, so it involved integration. She was using these elements in an unexpected way, and she was the first and only child who came up with this idea, although once she had started, some of the other children showed interest and gathered around her, some helping her every now and then.

Another child also engaged in a FLEXINTORI creative play. She started cutting some grass and finding some leaves, sticks, tiny stones and other natural elements in the garden. She mixed them together to make a soup for the wildlife creatures. As she was the only child who started this play activity, her play did include originality, even though other children joined her and started finding the different natural elements for her as well. She was using these elements in an unexpected way by making a soup with them, by integrating them together.

Interestingly, both of the activities that fell in the highest level of creativity were developed by using loose natural elements as the base. None of these elements were initially designed to be children's play equipment, but instead were natural and loose materials with organic forms. They were flexible, meaning they could change shape by being cut or torn or broken if needed. They had diverse textures and feelings. All of these parameters seemed to support children in integrating them together and using them in various and unexpected forms, and to encourage some of the children to think differently from their peers.

The focus of play with the paving slabs and the bench was the hole that was made in between them. This small hole seemed to provide an opportunity for the children to think differently about what they could do with it. It seemed to provide some sort of flexibility, and a small space for integration to occur.

Figure 7-38: Children Playing in the Autumn Leaves

7.4 Study Site Two Summary

- Study Site Two had 32 participants – 22 girls and 10 boys. It included four different play settings:
  1. The tarmac playground, facilitated with footballs and some manufactured play equipment.
  2. A hilly area, covered with grass and a small tarmac stage at the top. Some of the play equipment was brought to this setting as well.
  3. The wildlife garden, an enclosed woodland area in the school playground with trees, bushes, logs and other loose natural materials such as leaves and sticks.
  4. A central garden known as the outdoor classroom, the only designed outdoor space in the school, with different parts such as a fountain, vegetable boxes, a wooden stage, willow tunnels and a pool.
- The data from Study Site Two was collected via behaviour observation and focus groups. There was a total of eight focus group discussions across different year groups, each for 30 minutes. This was followed by eight observation sessions, two in each of the four play settings, with all the children observed at the same time.

The data gathered through behaviour observation in the pilot study and at Study Site Two were then described and analysed using qualitative methods. The data gathered at Study Site One was analysed using quantitative methods. Accordingly, the Creative Play Taxonomy, which was developed based on the data collected in the pilot study,

was used as the coding scheme. This resulted in quantitative findings in regard to children's creativity in play behaviour. The findings from the data collection from the pilot study and the two study sites are presented in the following chapter.

The tarmac playground was not an exciting play space for the children. They mainly engaged in three type of play activities: 1) sports such as football or basketball; 2) playing with equipment such as hula hoops, Frisbees or bouncy balls; and 3) group running games such as tag or "piggy in the middle". The painted games were not used by the children.

The grassy hill was less engaging than the tarmac playground as it did not have many facilities with which to engage, so some children left the space and others asked to bring along some of the play equipment. In this setting, they engaged in group running games such as tag and "zumbee run", played with the play equipment or sat on the grass or the edge of the tarmac stage to chat. A few of the children used the tarmac stage to practice gymnastic activities.

The wildlife garden was a very engaging play setting for all of the children from the different year groups, and they did not mind being separated from their classmates. They were very excited when talking about it in the focus groups as well. They engaged in a variety of building play settings such as building a bed-and-breakfast, a limbo bar and a museum with the sticks, logs and tree trunks. They also used the natural loose parts as different objects, such as a stick as a sword, or a leaf as money or a pass card. Other activities included investigating the natural setting to find creatures, and occasionally making a house for them with the natural elements.

The central garden had a variety of activities going on. Some children engaged in more physical activities such as doing gymnastics on the stage and on the fixed logs around them. Others played in the willow tunnels as they were designed, pretending the different parts were the rooms of their house. Some of the children started building different things such as a house or soup for creatures with the natural loose materials that they found in the space such as small sticks, leaves and grass and small stones. Overall, even though they did not have much to say about it in the focus groups, due to not having play experience in the setting, the children still seemed to engage well with it during the observation session.

The tables below show a summary of the findings gained through the observation sessions and the focus group discussions that took place in each of the four play settings at Study Site Two.

Table 7-3: The Tarmac Playground: Creative Play Engagement Summary

Study Site Two: THE TARMAC PLAYGROUND		
Creative Play Level	**Creative Play Stage**	**Play Behaviour**
A	**FLEXINTORI**	
B	**FLEXORI**	• Ice Girls
	INTORI	
	FLEXINT	
C	**ORI**	
	FLEX	• Hula hoops • Jumping over skipping rope
	INT	
D	**NO**	• Football • Basketball • Running • Tag • Piggy in the middle • Frisbee • Bouncy balls • Cone and balls • Walking • Sitting/chatting

Table 7-4: The Grassy Hill: Creative Play Engagement Summary

Study Site Two: THE GRASSY HILL		
Creative Play Level	**Creative Play Stage**	**Play Behaviour**
A	**FLEXINTORI**	• Making a bird's nest with grass, berries and small bread pieces
B	**FLEXORI**	• Sitting on the edge of the tarmac stage

	INTORI	
	FLEXINT	
C	**ORI**	• Gymnastics on the tarmac stage
	FLEX	• Rolling down the hill
	INT	
D	**NO**	• Running up and down the hill • Tag • Frisbee • Hula hoops • Skipping rope

Table 7-5: The Wildlife Garden: Creative Play Engagement Summary

Study Site Two: THE WILDLIFE GARDEN (WOODLAND)		
Creative Play Level	**Creative Play Stage**	**Play Behaviour**
A	**FLEXINTORI**	• Building a house for an insect on a tree trunk's knot with leaves and berries • Clearing the path of leaves with a stick as a broom • Making a bed for small animals by putting leaves as cushions in tree trunk with berries and honey as food • Making a limbo bar with a long stick between two trees • Making a bed-and-breakfast with trees and sticks and logs as the furniture and making a shop with sticks and trees in the setting • Using leaves and other elements as decoration for parties and making fruit cocktails with sticks as straws and leaves • Playing Kingdom with leaves as passes • Den fight in corners of the bushes and trees in the setting, fighting with swords and other imaginary equipment using sticks
B	**FLEXORI**	• Ridding a branch of the bushes as if riding a horse
	INTORI	

	FLEXINT	• Balancing on wooden logs by holding hand on tree branches • Displaying creatures on logs • Making things with sticks and leaves • Making a birdhouse with sticks and leaves • Making a tree with sticks and leaves • Making autumn pictures with different leaves on paper
C	**ORI**	
	FLEX	• Climbing up the trees • Balancing on wooden logs • Sitting on wooden logs • Finding creatures on logs • Jumping on the logs • Hiding in the bushes as a maze • Using sticks as swords • Making a fireplace with sticks • Sticks as weapons for the security people
	INT	
D	**NO**	• Running • Tag • Hide and seek

Table 7-6: The Central Garden: Creative Play Engagement Summary

Study Site Two: THE CENTRAL GARDEN (OUTDOOR CLASSROOM)		
Creative Play Level	**Creative Play Stage**	**Play Behaviour**
A	**FLEXINTORI**	• Building a standing house with sticks by putting them between the paving slabs and the benches • Making soap with leaves, small sticks or wooden pieces and tiny stones for the creatures
B	**FLEXORI**	• Jumping on the loose paving slabs
	INTORI	
	FLEXINT	• Making autumn pictures with leaves and apples from the apple tree

		• Moving the leaves with sticks as brooms behind the vegetable boxes
C	**ORI**	
	FLEX	• Climbing or jumping around the fountain • Playing in the willow tunnels and imagining the wider areas as house rooms
	INT	
D	**NO**	• Running around • Tag • Jumping on the fixed logs • Doing gymnastics on the wooden stage

CHAPTER 8 DISCUSSION AND CONCLUSION

The mixed method approach used in Study Sites One and Two as well as the Pilot Study not only provides a basis for making design recommendations that need to be considered in educational outdoor settings in order to nurture children's creativity but has also resulted in the development of a new taxonomy that can classify children's creative behaviours during play. The current chapter addresses the four research questions by drawing together the findings of this research and the available literature in the field.

Firstly, it addresses Question One, which discusses the process by which children's creative play behaviours can be categorised and measured, based on the Creative Play Taxonomy. Secondly, it addresses Question Two, which is about the influence of different outdoor play contexts on children's creative play behaviours. Accordingly, it explains the influence of each of the different play contexts on children's creative play based on the findings from the Creative Play Taxonomy and the available literature in the field. This also addresses the four sub-questions of Question Two.

By analysing the environmental characteristics of each context, it then addresses Question Three, which is "What design principles should be taken into account when designing educational outdoor environments in order to nurture children's creative play behaviours?" Accordingly, it presents a list of design recommendations that could influence children's educational policies and inform landscape architects, child educationalists and playground design professionals when making decisions while working in these environments, thus nurturing children's creative thinking abilities.

Finally, it addresses the last research question, adding knowledge on gender differences as one of the parameters that can be reflected in children's creative play behaviours.

After addressing the four research questions, it presents the challenges and limitations of the study, and then suggests future research directions.

The chapter ends with the conclusions of the study, presenting the main contributions of this research.

8.1 Discussion

8.1.1 Question One. How can children's creative play behaviours be categorised and measured?

As explained in Chapter Two, on the one hand, there have been a number of classifications of different types of children's play, some of which are related to creative play (Moyles 1989, Woolley and Armitage 2006, Woolley 2008, Hughes 2013). On the other hand, there have been different recommendations made by play-space designers and landscape architects for designing children's outdoor play settings (Ledermann and Trachsel 1968, DeBord, Hestenes et al. 2005, Casey 2007), of which some of the parameters point to factors that are said to encourage creative play.

However, there is no method for categorising and measuring children's actual creative play behaviours. Even the studies that aimed to study children's engagement in creative play behaviours either only referred to certain play types such as pretend play (Russ and Grossman-McKee 1990, Russ 2004, Maxwell, Mitchell et al. 2008, Sutton 2011, Hoffmann and Russ 2012) or measured only certain elements of creative thinking, mostly divergent thinking, by understanding children's preferences through interviews or observation (Yarrow, Rubenstein et al. 1975, Gibson and Pick 2000, Lepper and Henderlong 2000, Johnson, Celik et al. 2013, Oncu 2015, Szekely 2015). Accordingly, in the first case, these studies missed out on all the other types of play that could still show creativity, and in the second case, missed out on convergent thinking processes as part of a creative thinking process.

8.1.1.1 *Comparison of the Creative Play Taxonomy with Other Creativity Tests*

Although there are already some creativity tests available in the literature, many are only suitable for use with older children and adults and do not cover younger children's age range; this is because of these children's limited abilities in verbal communication, which was not considered when designing these tests (Torrance 1968, Ennis, Millman et al. 1985, Ennis 1993, Lubart, Zenasni et al. 2013, Barbot, Besançon et al. 2015). In contrast, the Creative Play Taxonomy can be used to understand any child's creative play behaviour, no matter how young they are or their verbal abilities. This is because it is only based on observing the child's play, so there is no need to communicate with the child or involve him/her in the process of answering a certain set of questions.

Some of the previously developed tests that measured children's creative potential focused on specific factors of creativity, especially divergent thinking factors (Guilford 1959, Torrance 1968, Ennis, Millman et al. 1985, Guilford 1988, Ennis 1993, Treffinger, Young et al. 2002). Further research has shown that most of these tests do not even measure all aspects of divergent thinking and can only measure fluency (Dixon 1979, Chase 1985, Hassan 1986, Abernathy Tannehill 1998, Treffinger, Young et al. 2002). The EPoC test (Lubart, Besancon et al. 2012) measures both thinking processes that relate to creativity, namely divergent-exploratory thinking and convergent-integrative thinking. As the EPoC was chosen as the theoretical baseline for the Creative Play Taxonomy, this taxonomy also follows the same principle and measures all related factors in a creative process. Therefore, adopting this taxonomy for measuring children's creativity in play helps to cover all possible creative play behaviours, which differentiates this research from studies that may only measure one aspect of creativity in play (Yarrow, Rubenstein et al. 1975, Gibson and Pick 2000, Lepper and Henderlong 2000, Johnson, Celik et al. 2013, Oncu 2015, Szekely 2015).

However, the EPoC also has its drawbacks. As well as the different versions of the Torrance Test of Creative Thinking (Torrance 1968), the EPoC (Lubart, Besancon et al. 2012) also measures creativity in specific domains, the verbal and graphical domains of creativity. None of the available tests focus on creativity in children's play. This is a unique aspect of the Creative Play Taxonomy developed here, which can categorise and assess children's creativity levels (without requiring verbal and graphical skills on the part of the children) while they are engaged in play.

According to the Evaluation of Potential for Creativity (EPoC) manual (Lubart, Besancon et al. 2012), the factors related to divergent-exploratory thinking are originality, flexibility and fluency. However, as originality and flexibility are difficult to assess in children's drawings and verbal responses, and the scores are highly related to the score of fluency, the test only measures fluency. For convergent-integrative thinking, the scoring system in the EPoC measures the integration and originality of the answers given by the children (Lubart, Besancon et al. 2012).

As the Creative Play Taxonomy used the EPoC as its framework, it also used the three main factors of the EPoC test, Originality, Flexibility and Integration. However, instead of relying on children's verbal and graphic skills, the children are observed, which means that their play behaviours can be categorised into eight different stages, depending on how many of these free factors are observed. Using this taxonomy covers all aspects of a child's creative play.

8.1.1.2 *Application of the Creative Play Taxonomy*

Amongst the three factors of the Creative Play Taxonomy, integration and flexibility are objective aspects of the child's play and relate to the way that play elements are used in the setting. As an example, as soon as two or more objects are integrated together to build a structure or generally to play with, integration is noted. Also, as soon as an object is used differently to its usual function, flexibility is noted.

However, when it comes to originality, the case is different. This is because originality is context-dependent and highly depends on the child's play behaviours in comparison to other children. The difficulty in understanding and noting originality in children's responses is also an issue when using the EPoC test. In practice, the score highly depends on the judge's personal interpretation of what she/he thinks is original and what is not, compared to the other children's drawings or verbal answers. This is why the EPoC uses Amabile's (1996) Consensual Assessment Technique (CAT), which is suggested for assessing creativity. Amabile believes this is an aspect that relies on the "subjective judgment of individuals familiar with the domain" for their training. In fact, in order to be able to use the EPoC test, the individual needs to go through hours of training. This helps the judge to become even more familiar with the domain, which in the EPoC's case is the verbal and graphical responses of children. It also helps the judge to score originality in a more reliable way, as they have seen more children's original responses before starting the actual scoring.

There is a similarity between the Creative Play Taxonomy and the EPoC. First, the person who wants to use the taxonomy needs to be familiar with the domain of children's play. She/he should have enough knowledge of the way the particular children under study play; the more they have observed children, the better they will know when a child's act is original compared to other children. However, the Creative

Play Taxonomy has an advantage over the EPoC. Although there is some subjective judgment to be made, however, it is objectively observable whether a child is doing something no other child has done before in that context, at that playtime.

Although the current research is the first study to have used the Creative Play Taxonomy to measure and categorise children's creative play behaviours, the same type of training used in the EPoC, based on the Consensual Assessment Technique, could be designed for this taxonomy as well. Accordingly, a group of experts in children's play can score some examples of children's play and note whether it was original or not. Then, the person who is willing to use the taxonomy can view these, score them and compare them with the experts' judgments. This would help him/her to be more consistent in deciding whether or not to note originality.

Although scoring flexibility and integration, due to their more objective nature, is much easier, it is recommended that a similar sort of training be used for them as well. This will aid as practice in coding children's play behaviours before the judge engages in the main coding.

8.1.1.3 *Summary of Question One*

The above findings show that the Creative Play Taxonomy could be used as a standard taxonomy to categorise and assess children's creative behaviours during play. This taxonomy can be used for any age range as it does not require children's verbal or graphical responses, and as long as the child is able to play, the researcher can code the child's behaviour via observation.

Similar to the other creativity tests, as Amabile (1996) points out, creativity is not an easy aspect to measure. The issues raised also explain why all available creativity tests carry a percentage of error. A part of this is related to the subjective nature of scoring factors in relation to creativity. While researchers (Amabile 1996a) suggest the use of CAT to minimise these errors, even the EPoC (Lubart, Besancon et al. 2012) test, which does use this technique for training its judges, still cannot eliminate some level of error.

This difficulty has been observed especially when it comes to originality in the Creative Play Taxonomy. Thus, this research also proposes that this taxonomy should be used for coding by individuals who have some knowledge of children's play

domains. In addition, similarly to the EPoC, coders should be trained in scoring children's activities before starting the main coding.

Another aspect, which was mainly visible when doing the reliability test with another coder, is the potential difference among coders in the percentage of engagement in each creative play stage recorded amongst children. As explained in Chapter Three, in this research, duration recording (an empirical recording observation method) was used as it gives more reliable data than other recording methods and the data could be verified individually (Skinner, Rhymer et al. 2000). Although this observation technique provides more accurate data, it is known to be difficult because children can move from one activity to another very fast and the start and end points of each activity are hard to define. This makes it difficult to track the exact length of each behaviour (Skinner, Rhymer et al. 2000). Thus, as the literature also explains, these issues are known and unpredictable problems that result in slight errors in percentages of engagement recorded for each stage of creative play. However, as the charts showed, the differences between coders were not very major and did not exceed a few percentage points, so on a larger scale, with more participants and more play sessions, such minor variations would become insignificant. Also, if all the observation sessions are coded by the same person, as there would be only one mind-set involved, the data would be more consistent.

8.1.2 Question Two. What is the influence of different outdoor play contexts on children's creative play behaviours?

8.1.2.1 *Fixed Manufactured Play Contexts*

Question 2.1. How does a fixed, manufactured play context influence children's creative play behaviours?

In Study Site One, the Fixed Manufactured Play Context was the nursery's usual playground, which included a fixed climbing frame at its centre, surrounded by artificial grass, with the rest of the area covered in tarmac. The climbing frame started on one side with three climbing paths, a one-metre square stage connected to another stage with a loose timber bridge, and finally a slide at the other end.

Studying the findings in the charts clearly showed that this play context was the least supportive context for children's creativity. Looking at the climbing frame, each side and part of it is clearly designed for a specific use. For instance, the slide was clearly

designed to slide on, and on the few occasions where the children tried to run up it and were scored FLEX, the teacher stopped them as this part of the frame was not designed for climbing and was known to be dangerous to climb.

In this context, everything was fixed in the ground and there were no movable elements, except for the bridge, which only moved slightly with children's movements. This part of the frame was one of the only parts that provided a few occasions of FLEXINT. It seems that even low movability in such a fixed environment can provide some creativity.

Overall, the fixed timber climbing frame did not provide any sort of creative play, and the majority of the 5% of play that had some level of creativity involved the children climbing parts or walking on areas where they were not actually allowed by the teacher. In other words, the whole structure was very inflexible and did not allow the children to engage in any play behaviours except for that for which it was designed.

Maxwell et al. (2008) believed that contemporary playgrounds, such as the one in this study that was provided for the children in Fixed Manufactured Play Context, do not lead to any level of constructive play behaviour. They argue that this is because the structures are "static" and do not offer much opportunity to "change". Although, in their study, they had seen children trying to add loose equipment such as ropes or ladders to the fixed structures, they were not successful in reconfiguring them (Maxwell, Mitchell et al. 2008). They found, however, that this play context can support some level of dramatic play as the children can play on these structures concurrently, resulting in social interaction (Maxwell, Mitchell et al. 2008).

Some researchers believe that many playground designers and landscape architects aim to design these manufactured climbing frames based on their perspective of children's play needs as well as their thoughts about the appropriateness of large play structures (Kylin 2003, Knowles-Yánez 2005). However, researchers such as Moore (1986) believe that children can benefit from, and prefer, wilder play contexts for play.

Many child educationists who have studied the importance of play in child development tend to organise children's play sessions in two ways. They either set specific rules for their play activities (e.g. tag, football), or provide play equipment that is designed to be used in a certain way (e.g. puzzles, riding-cars) (Wilson 2012).

Although these activities have their own benefits for children's development, they should not be over-focused upon and used instead of creative play. Children should have the opportunity to create their own rules and choose how they want to use play material, so open-ended materials that can be used in "a wide variety of ways" are highly supportive of creative play (Wilson 2012) compared to manufactured play equipment, which merely directs certain play activities.

Titman (1994) found that fixed play equipment did not support children's needs in play and the children found it to be "boring". The children showed more interest in playing with equipment that was adaptable, as they could "change" or "manipulate" it and "make new meanings around it" based on their own thoughts. Designed play structures are space-oriented and only have one way in or out (Maxwell, Mitchell et al. 2008), which again does not give the child the chance to engage in thinking processes, or to come up with their own way of using them.

8.1.2.2 *Loose Manufactured Play Contexts*

Question 2.2. How do play contexts facilitated with loose manufactured play equipment influence children's creative play behaviours?

In Study Site One, the Loose Manufactured Play Context was also in the nursery's playground and had the climbing frame in the middle of it. However, the children's play was also facilitated with different, loose manufactured play equipment. This included equipment such as bikes and toy cars, balls, musical instruments, dolls with a buggy, a barbecue and picnic set, a sandpit with buckets, spades and rakes and toy cars.

As the findings show, with all of this different play equipment provided over six different sessions, overall 27% of play had some level of creativity happening.

Amongst this different play equipment, the cars, the bikes and even the buggies did not result in any specific creative play behaviours amongst the children. Studying them in more detail showed that all three pieces of equipment were movable; however, their movement was based on a specific function and a certain way. They only moved on their wheels, and this was part of their initial function, which was transportation. In other words, they were not flexible enough in movement to give the children the

opportunity to think of using them creatively. Their function, which was riding, was so obvious that they did not support any creative play behaviours.

There was a scooter in some sessions as well. That was the one piece of riding equipment that did result in creative play on occasion, as a child sat on it to ride. This seemed to be because the design of it was not as straightforward as the bike or the car, which had seats and handlebars or a wheel, which showed the child where to sit and which way to move.

Another piece of play equipment in this play context was the picnic playset. This had different parts such as different fruits, plates and cutlery. The elements were not changeable, so each part was predetermined. Also, it was clear what each of the elements were, so the design was not flexible either. For instance, the plate was designed as a plate and the banana was designed as a banana, so this prevented the children thinking of flexible ways of using them as well. However, the set did have diversity in terms of shapes and elements, so it gave the children the opportunity to integrate them in different ways. Also, as they were movable, this helped the children to put them together in whichever way they could think up.

The sandpit and the two sets of play equipment inside it, the buckets, spades and rakes and the toy cars and trucks, were sets of elements that did provide some level of creative play. A lot of it seemed to be related to the flexibility, formability, movability and looseness of the sand. The children used the trucks and other toys in the sandpit to move the sand from one side to another. They also used the spades and buckets to move and build shapes with the sand. These play behaviours not only included integration of the use of different elements, but on some occasions resulted in flexibility and even originality. Even though the trucks and the spades and rakes were not flexible on their own, they were equipment that supported children's play with sand as they could move them in the sand.

In some of the sessions, the teacher also brought some chalk and some cut wooden pieces. A lot of the scoring that was given to some level of creative play in this play context related to children's engagement with these elements. The chalk provided the opportunity to create an effect when integrated with a surface. As it was movable, it was also used in different parts of the space, integrating with different surfaces.

The cut wooden pieces were also supportive to creative play. They were movable as well as flexible, so they did not convey a very clear function. Thus, different children could think of using them in flexible ways. Some made different shapes and statues with them while others integrated them with other elements in the playground, such as the picnic toys, to develop new things (such as soups or puddings).

One of the manufactured play equipment pieces that resulted in some creative play behaviour was the ball catcher. Although the ball catcher was designed to catch balls with its sticky surface, it seemed that, because of its simple shape, it gave the children another chance to think of different ways to use it. It was also movable, so the children could take it around the playground. Some of the children used it as shields, and one child used it in an original way by playing with it as a pudding.

The available literature argues that play contexts that include manufactured play equipment solely support physical play and, compared to adventure playgrounds that include loose materials, they are not very supportive of dramatic play (Hayward, Rothenberg et al. 1974, Frost and Campbell 1985, Maxwell, Mitchell et al. 2008). This is because they have pre-existing functions that guide children how to use them, and thus provide less constructive and dramatic play opportunities (Maxwell, Mitchell et al. 2008).

The book entitled "The Impossible Playgrounds" (Norén-Björn, Mason et al. 1977) presents the results of studies conducted in order to compare how different play contexts support children's play. The findings showed that the children were not interested in using the manufactured play equipment in playgrounds; in settings where they did have the option to engage with other play features such as loose materials, they preferred to use these features instead.

One of the least supportive play contexts for creativity at Study Site Two was the tarmac playground. The environmental features in this play context were the tarmac ground, a few painted games on the tarmac, some balls and two football nets, a basketball net and some play equipment such as hula hoops, skipping ropes, balls and Frisbees.

The play equipment such as the Frisbees, balls and other designed elements did not seem to encourage any level of creativity. In fact, as each of them had a design purpose

with a clear function (such as a football that was designed to play football games with), they did not leave any space for the children to think about other ways in which they could actually be used. In other words, they gave a very straightforward message that they were supposed to be used in a certain way. It was only the hula hoop that offered a few different play activities. This seemed to be due to its simple shape: the circular hoop had too few elements to guide towards a single function. Therefore, the children could put it on the ground to jump in and out, move through it in a chain with friends, or spin it around their waist. The same was true of the skipping rope, which the children could use for more than one play activity. Therefore, only these two elements allowed FLEX, which is a low level of creativity, to happen.

Apart from the very few occasions when FLEX took place with these two elements, none of the other elements in this play context provided any opportunity for originality and integration to occur. In fact, it seemed as if the facilities could not integrate with each other; every element had its own individual use, and they had no flexibility or looseness that would give the child the opportunity to assimilate them together. Even most of the play equipment that was movable and not fixed to the ground was rigid in its own shape. Due to the rigidity of each element and it having a very clear and individual function, the elements did not allow any INT to happen in play.

It was unfortunate that this play context was the main outdoor space where the children spent the majority of their playtime.

The children in Titman's (1994) study did not admire their tarmac playground either. A lot of the issues they raised were related to falling, getting themselves hurt or tearing their clothes on the hard surface. Hence, they found it a dangerous space for play. From the aesthetic point of view, they believed it was "ugly", grey and boring to look at. In regard to the play activities, similar to the current study, many of the boys and some of the girls only mentioned football. Some others spoke about the play equipment, which they still found boring, and as there was not much engagement in play, there was a lot of fighting in this environment instead.

Moore (1980, 1989) undertook a pre and post study on the way children's play experiences change when their play space is renovated from a tarmac playground to a well-designed play space based on children's real needs, which included different

environmental features. He found there was a remarkable difference in children's play behaviours and that they moved from a boring playtime to a fun, diverse range of play opportunities.

The grassy hill area in Study Site Two was also not very supportive of children's creative play. Studying the site, it was not facilitated with many different elements. It had a sloping ground covered with grass and a small, flat, tarmac stage on the top. The children also brought a skipping rope, Frisbee and hula hoops to facilitate their playtime.

Amongst these elements, it was only the flat tarmac stage that encouraged some level of creativity to happen. This seemed to be due to the contrast it had with the rest of the ground, which made it stand out and encouraged the children to do something slightly different on it. The tarmac being flat, when the rest of ground had a gentle slope, gave them the idea that they could do gymnastics on it. Also, the edge of the tarmac that created a step to the grassy ground encouraged flexible behaviour. This showed that even the smallest diversity, in ground level or surface or material and texture, can encourage some level of creativity.

In Titman's (1994) study, children preferred the grass rather than the tarmac playground. They believed it was suitable for lying down, touching and rolling, and was safer than tarmac. Some of the girls mentioned that they did not like the long grass as it made their legs itchy when they wore skirts. In the current study, the girls' discussions did not mention much about what they could do on grass either. Hence, it seemed their preference was based on it being more desirable aesthetically, and better from a safety point of view, rather than having much to do with their play activities.

8.1.2.3 *Loose Parts Play Contexts*

Question 2.3. How do play contexts facilitated with loose parts and junk material influence children's creative play behaviours?

The Loose Parts Play Context in Study Site One was also held in the nursery's playground with the climbing frame placed in the middle. However, many junk elements and loose materials were provided for the children to play with. These included materials such as plastic and cardboard boxes, tyres, wooden slabs and bricks,

cloth and carpet pieces, timber logs and small pieces of wood and a sandpit with spades and rakes.

The findings showed that this play context was far more supportive of creative play compared to the Fixed Manufactured Play Context and the Loose Manufactured Play Context. Nearly all the loose elements in this context had some characteristics in common, which seemed to support creative play. These elements did not have a specific function to them in the play setting, so they were flexible, which resulted in flexibility in play. For instance, a tyre did not suggest a specific use in the play context. It could be used to roll or sit on, or could be laid by the frame to make a den.

All of these loose materials were movable by the children, so they could be placed in different positions and be used in flexible ways; they could integrate with each other, which could even result in building original structures.

The loose elements had diversity in material and shape. This gave the children the opportunity to play with them in different ways. They could be integrated together based on their different shapes. For instance, the wooden blocks could fit well in the plastic boxes, and through this integration new structures were built. A long wooden slab was placed on the sides of some plastic boxes that were laid on top of each other and built a very original plane.

The findings show that, although the Loose Parts Play Context was the second most supportive context of some level of creative play overall after Natural Play Context, these loose materials seemed to play a particular role when it came to the higher levels of creativity. In other words, either they were not encouraging of any creative play and the children preferred to play activities with no creativity, or they played well with these elements and engaged in high levels of creative play.

Looking at the findings on individual children's play, the Loose Parts Play Context provided a very supportive creative play environment for ChA, who scored highest in the overall Creative Play Taxonomy. He spent over half of his total play sessions at the very highest level of creative play. The two children who scored lowest in the overall results of the Creative Play Taxonomy were also engaged in higher levels of creative play when they were in this play context.

These findings show that high levels of flexibility, movability and some level of diversity in shape amongst play elements could be supportive of creative play taking place.

While some research has looked at the relationship between loose parts and children's play behaviours (Maxwell, Mitchell et al. 2008, Sutton 2011), other research has mainly focused on the effects of the use of loose parts on children's creativity. Oncu (2015) promotes the use of loose materials for children's play activities as well as artwork, as he believes it can result in creative thinking and that the children are encouraged to engage in innovative thinking processes when deciding how to use the materials. Szekely (2015) has also found that providing loose materials in outdoor settings results in more creative play as well as fostering artistic abilities amongst children. He suggests moving from conventional playgrounds, including climbing frames, to adventure playgrounds where children can "interact freely" and have the opportunity to "choose for themselves what and how to play" (Szekely 2015).

Similarly to what has been found in the current research, Neill (2013) also suggests that loose parts encourage creativity due to their flexibility and because different groups of children can use them based on their own abilities and individual developments. He states, "When children have access to loose parts, it frees their creativity and imagination to change the world around them in infinite ways. The more flexible are the materials in their environment, the greater the level of creativity and inventiveness they express" (p.3).

Oncu (2015) also carried out a study exploring how loose parts can influence preschool children's divergent thinking abilities, and suggests that these materials encourage "flexibility" amongst children as they "could be used in a variety of manners". These materials are known to allow children to play with them based on their own interpretations; thus, instead of playing in structured play settings with designed play equipment with certain play rules, the children can decide what the object could be and how it could be used (Szekely 2015). According to Nicholson, who developed the theory of loose parts (Nicholson 1972), the level of creativity and inventiveness and the chance to discover are related to the number and type of elements in the environment.

Marshall (2011) believes that loose parts have a very positive impact on creative play as well as meeting educational goals. However, similarly to what was found in the Pilot Study, some schools do not use these materials for playing purposes (Wardle 2000). There are four main reasons for this: 1) some adults believe there is a "mess" left after the use of these materials (Hurwitz 1999, Nicolson and Shipstead 2002); 2) using loose materials in the play setting shows a lack of principles (Kylin 2003); 3) in free play, children often lack teamwork (Kylin 2003); and 4) some adults perceive that large play structures are more suitable and satisfying for children's play (Armitage 2005, Knowles-Yánez 2005).

8.1.2.4 *Natural Play Contexts*

Question 2.4. How does a natural play context influence children's creative play behaviour?

The Natural Play Context in Study Site One was in a woodland area near the nursery instead. So, first, it did not have the timber climbing frame that, in all three previous settings, had resulted in nearly no engagement in any level of creative play. Instead, the Natural Play Context had trees and bushes and various plantations. The ground was covered in soil and some of the parts were higher, which made a small hill, while the centre of the setting was narrow.

There was a large tree trunk lying on the ground and some small logs. There were also sticks and leaves of different shapes all around the area.

In addition to all these natural materials and elements in the setting, the teacher had also brought along some other elements to facilitate children's nature play. These included water, clay, bowls and brushes, spades, rakes, magnifying glasses and string.

Looking at the findings from the data collected in the woodland, it is clear that this context was the most supportive for creative play amongst all four settings. The elements in this context resulted in the highest level of integration and flexibility compared to the other settings, while originality was similar to that in the Loose Manufactured Play Context, but lower than in Loose Parts Play Context.

Studying the elements in this context, they had some similarities that seem to have resulted in high durations of flexibility and integration.

Except for the few materials that the teacher brought from the nursery, such as the bowls and spades, the rest of the elements in this context were from nature. This meant that, even when the materials were leaves, there was a diverse range of leaves available. So, apart from the diversity of different materials, there was diversity of shape and form and texture in each of the categories. This resulted in a lot of integration. For example, a child had the opportunity to integrate many different shapes of leaves to create a face with some clay.

Even though each of the natural elements had a specific function in nature, when the context was treated as a play space, children found very flexible characteristics. They seemed to have the opportunity to choose how they wanted to use the various materials, and this resulted to a lot of flexibility. In this play context, a tree was seen as a place to climb, a tree trunk was used as a seat or a surface to jump off from, and sticks could be the legs of a stick-man.

In this context, the elements were either fixed in the ground or were loose and movable. The sticks, stones and leaves could be picked up and integrated with each other in various ways. Even the trees or bushes, which were fixed, could have small movements initiated by children. This also provided flexibility.

The materials that the teacher brought also had similar characteristics. Due to their flexibility, movability and changeability, they provided many creative play opportunities by integrating with different materials and producing flexible play.

Looking at the individual children's creative play charts in Natural Play Context, it was interesting to find that the first two children who scored higher in creative play had even higher engagement in creative play in this context, while the two children who scored low performed even lower than average in this context. This showed that the elements and materials in this play context supported children who were overall more creative in play, but were not as supportive of the less creative children.

Natural play settings are spaces that have trees, bushes, or any other type of vegetation. They also have other loose natural materials such as stones and leaves (Wilson 2012). These settings are known to have a direct influence on children's cognitive development (Hart 1994) by improving their reasoning skills, observation abilities and alertness (Pyle 2002). Natural play contexts are known to nurture children's creativity

(McCoy and Evans 2002). They support the creative play's quality, frequency and duration (Louv 2006, Bilton 2010). In fact, the literature reveals that the use of natural materials rather than synthetic materials has a positive impact on creativity amongst children (McCoy and Evans 2002).

The wildlife garden in Study Site Two area seemed to be the most supportive play context for children's creative play. All of the elements in the woodland were natural, either fixed on some level such as the trees and bushes in the ground and the leaves on the trees, or loose in the environment such as sticks, logs, fallen leaves, mud and stones. The woodland was the environment about which, when the children were asked, all of them were excited and had many stories of the different things they had played with, all of which had high levels of creativity.

Similar to the findings in this study, children in Titman's (1994) study showed interesting responses to trees. Many of them also engaged in climbing the trees, which is a flexible way to use a tree. They also found the trees a good source for "bits" to do things and make things with. This could be the start of creative play.

Sand and mud were thought of as real fun for most of the children, while some disliked it as it was related to getting dirty. However, interestingly, they all seemed to like "gardening" as, during that process, they were "permitted" to get dirty. They had developed a distinction between "good dirty" and "bad dirty", which seemed to be associated respectively with being permitted to get dirty and facing trouble from their teachers and parents (Titman 1994).

Bushes were known as "dens" for the children in Titman's (1994) study, as all children believed that dens could not be provided but should instead be "found" or "made". This showed how children desired to be creative and to engage in making facilities themselves rather than having designed manufactured settings provided for them to use.

One of the characteristics that could be seen in most of these natural materials that facilitated creative play behaviours was flexibility. Unlike the rigid play elements in the tarmac playground, which had a prescribed use, these elements were flexible as a play context. In other words, they did not seem to force children to think of their use

as fixed. Hence, the children had the opportunity to think in a flexible way about elements, e.g. using a leaf as cash.

Diversity was another parameter of the natural elements. No two sticks looked exactly the same as they varied in length, shape and thickness. They had diverse textures, some being soft like the fresh leaves and some being rough such as the stones. These encouraged the children to look at them from different angles and think about the play opportunities they could form with them.

Another parameter that most of the elements had was movability. The children could move the natural elements to use them wherever and however they wanted. Even the natural elements that grew from the ground, such as the trees and bushes, had some level of movability, so for instance the children could freely move inside the bush or ride on a branch and jump up and down. This was unlike the willow tunnel in the central garden, where even the branches were tidily formed by the designer and the children could not make any further changes to it.

Most of the natural elements were also changeable in terms of form, so the children could change their forms as they wished, in order to integrate them together or use them in original ways. They could also cut them, tear them or break them to use them in different ways.

The Central Garden in Study Site Two had a variety of different types of elements. On the one hand, it had features such as the pond, which did not seem very attractive for the children to play around. It also had the stage and the fixed logs around it, which did encourage some sorts of play; however, these play activities did not involve any level of creativity.

The willow tunnels were also an engaging space to some of the children, but as they were stuck into the ground and formed in a certain way without much flexibility, little creative play took place in them. The only thing that did encourage a low level of creativity in the willow tunnels was related to the diversity of the size of the willow rooms; it gave the children the opportunity to think of them as the different rooms of a house. Hence, when they started to develop a play scenario around this, they engaged in a FLEX play process.

On the other hand, the central garden also had some natural elements and spaces that seemed to encourage more creative play behaviours. For instance, the corner of the playground had a tree with fallen leaves and overgrown bushes and sticks did encourage FLEXINT to take place. Also, the natural materials that were found around the garden, such as grass, small sticks and leaves, provided the opportunity to engage in FLEXINTORI play.

Even the built features of the garden that had some sort of movability, flexibility or any level of diversity (in height, shape and texture) seemed to support the children's creative play behaviours on some level. These included the fountain, which had different heights, the loose paving slabs, which were movable, and the distance between the paving and the benches, which allowed the children to integrate natural materials with them in order to engage in creative play.

8.1.3 Question Three. What design principles should be taken into account while designing nurseries' outdoor environments in order to nurture children's creative play behaviours?

8.1.3.1 *Children's Outdoor Environmental Design Characteristics*

Some of the tools that work as guidelines for designing children's outdoor environments list several characteristics for designing these spaces. For instance, one of the domains that is evaluated with the Preschool Outdoor Environment Measurement Scale (POEMS®) (DeBord, Hestenes et al. 2005) is the "play and learning setting". The measurement states that these settings should include loose materials (DeBord, Hestenes et al. 2005). Also, based on the Early Childhood Knowledge and Learning Centre (ECKLC) website,[14] several factors should be considered when designing a play space for children. For instance, the space should provide "diverse" opportunities. Play elements should have "flexibility" and "changeability" to encourage different ways of playing. "Variety" is a key point in many aspects, whether it is a variety of textures, shapes or heights and topography. Also, these spaces should include "natural" features.

[14] https://eclkc.ohs.acf.hhs.gov/hslc/tta-system/teaching/eecd/nature-based-learning/Create%20and%20Naturalize%20a%20Play%20Space/play-space-assessment-preschool.pdf

Although the focus of these guidelines is not creativity, when comparing them to the current study's findings, there are some similar suggestions in these categories that have been found to support children's creativity.

The current study suggests it is important to include diverse play features in children's outdoor play settings. As seen in the research, it was found that although some play contexts were more supportive of creative play overall, when they were studied in more detail, some of the other contexts seemed to support a certain group in a certain way. For instance, although the girls experienced more creative play in the Natural Play Context than in the other settings, it was found that they had higher levels of original play in the Loose Manufactured Play Context. Also, the least creative children were seen to engage in higher levels of creative play in the Loose Parts Play Context than in the other three contexts. Hence, this study also suggests that having a good variety of play features in children's outdoor play spaces alongside each other can help different groups of children to flourish in their creative play behaviours.

When looking at Study Site Two, it is also clear that the outdoor classroom, which had a different variety of play features, was far more supportive of children's creative play than the tarmac playground, which was only equipped with some manufactured play equipment, or the grassy hill, which was covered in grass and included little play equipment.

The third category focuses especially on "changeable" features that "can be used in different ways". This is exactly in line with the findings of this research, i.e. that changeable play elements and contexts highly encourage creative play, especially "flexibility", which is the ability to "use things in different ways and differently to their usual function".

Based on the findings of the current research, which showed the Natural Play Context to be the most supportive environment for some level of creative play to happen amongst children, it is interesting to see that one of the eleven categories described above focuses on providing natural features in children's spaces. At Study Site Two, many creative play behaviours and a lot of enjoyment were also seen amongst the children when in a natural setting.

Many of the categories, such as “flexibility and creativity”, “accessibility and inclusive play”, “risk and challenge” and even “surfacing”, all suggest a good “variety” of features, textures, materials and elements. Although the reasons in this categorisation may be different from the current research, from the creativity point of view, the findings strongly suggest that variety encouraged the children to integrate elements and think of more play possibilities and even original ways of playing.

As this research counts originality and flexibility as two of the three parameters in creative play, it supports the suggestion of the “risk and challenge” category, which encourages “open-ended” and “challenging” play features that are said to foster these parameters through encouraging children’s curiosity.

When studying Ledermann’s (1968) ten design recommendations for children’s educational play spaces (chapter two) it is very interesting to see that, although he is suggesting design aspects for educational environments, the first thing he points out is that the aim of designing these spaces should be playing. This supports the fact that playing has a crucial impact on children’s development, whether it is cognitive skills such as creativity or even learning. Apart from play, one of his categories specifically focuses on the importance of encouraging creative play.

As this research also found, the Fixed Manufactured Play Context and the Loose Manufactured Play Context, which were facilitated with designed manufactured play equipment, whether fixed or loose, were the two least supportive contexts for creative play. This shows that playground designers and suppliers do not always correctly consider children’s real needs. This research also supports the suggestion that they must consult with educationalists and researchers in order to develop settings that will actually support children’s needs. The current research suggests that this should result in less built and manufactured structures, and more natural and open-ended loose materials provided for children. A better example was seen at Study Site Two, where the outdoor classroom was designed. This setting had fewer fixed structures and more flexible and natural elements than the Fixed Manufactured Play Context and the Loose Manufactured Play Context at Study Site One, and it was clearly more supportive of children’s creative play. Ledermann also suggests providing “half-finished” play features rather than fixed manufactured structures in order to encourage creativity.

Similar to the findings in this research and the Play Space Assessment test, Ledermann also points to the importance of providing "varieties" of play features. The current research also suggests that play contexts and elements that are designed for "certain play activities" reduce the chance of a child becoming engaged in creative play. The play features guide the child in exactly what to do, and stop the individual from engaging in different thinking processes to come up with their own play ideas.

Providing a suitable setting for "pretend play" is also supported by the current research. This is because it is one of the types of play that is highly related to creative play behaviours.

8.1.3.2 *The Literature on Environmental Characteristics Nurturing Creativity in Play*

All children are born with creative potential (Johnson, Celik et al. 2013). It is important to provide suitable settings for them with the right characteristics to give them a chance to use their creative potential. The literature supports some of the suggestions that the current research offers as the characteristics of children's play environments that nurture creativity.

Providing "diverse play contexts and elements" for children's educational outdoor environments is one of the main recommendations of this research. This is based on the findings, which showed that some play contexts are supportive of a certain level of creative play taking place, while others are more supportive of higher levels of creativity. In addition, some of the play elements encouraged specific creative play parameters amongst different groups of children. Accordingly, facilitating educational play spaces with diverse elements can result in more creative play as well as higher levels of creative play amongst children. This was also seen at Study Site Two when comparing the outdoor classroom, facilitated with different features, with the tarmac playground.

In Nilda Cosco's (2006) PhD thesis, she found that children are more attracted to environments that have a diverse range of play features. Environments that encourage curiosity, discovery, exploration and creative play are known to foster children's learning experiences overall (Mayesky 2014). According to the model by Cecil et al. (1985) of the four levels of the "early childhood mosaic", the first three steps result in the fourth, which is creative play.

The literature has suggested the value of introducing new settings and combining materials in various ways to stimulate children's curiosity. However, there should be a balance between new and familiar items in order to convey trust to the child (Cecil, Gray et al. 1985). Children should be encouraged to explore the possibilities of what can be done. It is suggested that flexible settings be provided for children in order to nurture their exploratory senses (Cecil, Gray et al. 1985). Children's play can be supported by offering various roles for them and preparing multi-purpose equipment and situations, while their creativity in play can be encouraged by providing unusual, incomplete settings where they can think of new solutions and play opportunities with them (Cecil, Gray et al. 1985).

The literature also supports the fact that using the diverse features of children's play contexts is said to be highly influential on children's original play behaviours and exploration. Research shows that play elements and contexts that have "variety", "complexity" and "responsiveness" result in diverse and original play behaviours (Yarrow, Rubenstein et al. 1975). As an example, in this study, this was observed when comparing children's play on the grassy hill and in the outdoor classroom. Although both had some natural elements, the outdoor classroom had more variety in materials and textures so some of the children engaged in highly original play behaviours there such as making soup with different natural materials, or making a house for the creatures by putting sticks between the ground's slabs and even on the bench.

The "diversity" in textures, colours and responsiveness, as well as elements and contexts that give children the chance to engage in a higher variety of play opportunities, are known to be more motivating and thus more supportive of children's play than other settings (Gibson and Pick 2000, Lepper and Henderlong 2000).

This research found that natural settings were far more supportive of creative play than manufactured settings. In the study by Titman (1994), an important factor that was found to influence children's preference in choosing one space over another was related to the aesthetic appearance of the space. They showed strong interest in environments and elements with sensory stimulus. This included "natural colours" over "synthetic materials" such as tarmac, which they found "boring to look at". According to the children's perception, the colours used in manufactured play

elements, which were primary colours, were "babyish" (Titman 1994). Overall, natural environments were preferred due to their "intrinsic diversity" and "change" (Titman 1994).

With regards to different play contexts, the current research found that the Loose Parts Play Context was the second most supportive context for creative play, with approximately half of children's play time engaged in some level of creativity. It was also the most supportive play context when it came to the highest level of creative play, FLEXINTORI. Neill (2013) believes that using loose parts in children's play contexts encourages creative play, dramatic play and exploratory play.

According to this research, two of the three factors of creative play are originality and flexibility, and play elements should be chosen in order to encourage these factors to occur in play. Similarly to the findings of this research, the literature shows that loose parts that are mainly "open-ended", "re-usable" and "discarded materials" foster children's creativity through "curiosity", "flexibility" and "originality" (Johnson, Celik et al. 2013). Open-ended materials promote problem-solving skills, and there is no right or wrong way to use them (Almon 2003). They encourage "different ways of thinking", thus fostering creative and exploratory behaviours (Oncu 2015, Szekely 2015). As per the two thinking processes (Lubart, Besancon et al. 2012, Lubart, Zenasni et al. 2013, Barbot, Besançon et al. 2015, Barbot, Besançon et al. 2016), Oncu (2015), Szekely (2015) and Almon's (2003) findings suggest that loose parts are highly supportive of divergent thinking, where the quantity of different ideas and play opportunities is important.

When comparing the four play contexts, this research found that the Fixed Manufactured Play Context and the Loose Manufactured Play Context were the least supportive play contexts for children's creativity in play. Other research has also shown that children are more engaged and spend longer playing when using open-ended materials compared to play equipment that is designed for specific uses (e.g., dolls, trucks, picnic sets) (Bagley and Klass 1997). In fact, research shows that children do not need expensive play equipment and settings to play creatively, and children in some of the poorest countries have shown some very creative play behaviours when given access to loose materials (Berinstein and Magalhaes 2009).

In relation to educational methods, Reggio Emilia is a successful example of loose materials being used to create new products. In addition to their education system, which uses loose materials in children's learning processes, they have designed a project named REDIMA (Ferrari and Giacopini 2005) that "promotes the idea that waste materials can be resources. The centre collects, displays and offers alternative and reclaimed materials obtained from unsold stock and rejects of discard and scrap materials from industrial and handicraft production, with the aim to reinvent their use and meaning" (p.9).

Frost and Campbell (1985) did a comparison study on children's play behaviours in adventure playgrounds (with loose parts) and traditional playgrounds (with fixed play equipment). They found that children preferred to play with elements that were "movable" than with "statistic equipment", and preferred "multi-function" play elements to "single function" elements. This completely supports the findings of the current research, where children at Study Site Two clearly showed more desire and excitement when talking about the natural wildlife garden than the tarmac playground facilitated with manufactured play elements. This was even visible in the focus group discussions. The findings from both study sites suggests the virtue of "movable" and "multi-function" play elements over static, fixed and single-function play equipment. It also shows that children's motivation and desire is in line with creative play behaviours.

Oncu and Unluar (2010) did two studies comparing manufactured play equipment with loose materials in order to understand which of the two encouraged more creative play amongst children. In this study, they found that children preferred to play with manufactured play equipment, which is in contradiction with the findings of the current research and other studies mentioned. However, their second study also showed that children were not able to use this type of play equipment creatively. So they suggested that children need more time to learn how to engage with loose materials in order to develop good quality play, and should be encouraged and guided to use loose materials by their teachers, in order to engage in creative play behaviours (Oncu and Unluer 2010).

Other researchers have also found that loose parts encourage more flexibility than manufactured and fixed play contexts, as they encourage more construction in play than manufactured play equipment, which does not provide modification opportunities (Heerwagen and Orians 2002).

Comparing manufactured play settings with loose parts and natural settings, Hart (1979) found that natural play contexts and loose play materials encourage far more "flexibility" in children's play than manufactured play structures. This was also found in the current research, as creative play behaviours and flexibility in particular took place a lot more in the Loose Parts Play Context and the Natural Play Context than in the Fixed Manufactured Play Context and the Loose Manufactured Play Context. Some of the materials that the literature has found to be supportive of children's play are sand and water, as they result in manipulative play because of their "changeable", "reconfiguring" and "moulding" features (Maxwell, Mitchell et al. 2008), all of which are characteristics that this research suggests have shown encourages creative play behaviours.

In this research, at Study Site One, when comparing the Natural Play Context with the Fixed Manufactured Play Context and the Loose Manufactured Play Context, which had different types of manufactured play elements, it was clearly found that the natural play elements were far more encouraging of creative play. while in the Fixed Manufactured Play Context, children spent nearly all of their play in level D with "NO" creative play, and only a quarter of their play involved creativity in the Loose Manufactured Play Context. The Natural Play Context encouraged the children to spend around three-quarters of their time in some level of creative play.

Louv (2008) believes that while children mostly engage in physical play behaviours in manufactured play settings with fixed structures, when they have access to natural settings, their creative play behaviours grow and they engage in more inventive and fantasy play. Their focus on merely physical play decreases and moves to more social engagement, involving more social and language communications (Louv 2008).

Looking at the findings from Study Site Two, children not only expressed and showed many more creative play behaviours in the wildlife garden than in the tarmac playground with the manufactured play equipment, but they also spoke about the

natural settings with a lot more enthusiasm in the focus group discussions. This clearly showed that the natural setting was not only supportive of their creativity in play; it was preferred by them as well.

Kirkby (1989) conducted a study on children's play behaviours in natural and manufactured play contexts. She also found that children strongly preferred playing in natural settings to manufactured settings as they had more "manipulating" opportunities and the play elements gave them more "flexibility" during play.

In other research, children showed a preference for natural settings over manufactured and built play settings, regardless of their previous play experience in either of these environments and their home locations. Although they all preferred the natural settings, the children from rural areas, who usually had more freedom and access to nature, were more aware of the correct way to engage with these settings than children who lived in urban settings, who showed some level of fear of all external environments (Titman 1994). In that study, the children clearly expressed their belief that the spaces which were made specifically for their play did not fulfil their needs, and thus they highly valued natural settings over manufactured play spaces (Titman 1994). It was suggested that environments that offered "manipulation" on the part of the children and had "diversity" were seen as successful outdoor settings.

In a study where children and teachers were interviewed, it was found that natural play contexts provided a "variety" of play opportunities that encouraged free, undirected and creative play (Groves and McNish 2011). The observations in the study showed that these contexts encouraged "flexible" thinking in play. For instance, a wooden log was used for sitting as well as jumping (Groves and McNish 2011). Similar findings were made in the current research. For instance, at Study Site Two, children used the wooden logs for sitting areas, as a place where they could do gymnastic activities or as a stage to show their peers what creatures they had found in nature. At Study Site One, children used the trees flexibly to climb up, to pretend they were monkeys, as stick-man houses or even as surfaces to paint on.

The findings of this research were in line with the literate about the link between some play types and creativity. Russ's (2004) argues that pretend play engages creativity, and as per Fein (1987) it is defined as "one thing is playfully treated as if it were

something else" (p.282). According to the creative Play Taxonomy, this act carries "flexibility", where something is used and played with differently to its usual function, and when children engaged in this sort of play, they were scored some level of creativity. The child can also be original while engaged in pretend play.

Another type of play that includes creativity is dramatic play (Hughes 2013) is another play type that includes creativity. Sutton (2011) found loose parts in children's play environments involves them in dramatic play. The children engaged in thematic play where they could build a story by using these materials and then engage in dramatic play. This was also observed in the current research when children used the junk materials to build a structure, and then developed a play around it. For instance, at Study Site One, they integrated the plastic boxes and wooden slabs together and flexibly used them to engage in "sailing a ship".

In her study, Kirkby (1989) found that natural settings encouraged 68% dramatic play amongst children compared to 42% dramatic play in manufactured settings. A lot of examples of this were seen in the wildlife garden at Study Site Two.

8.1.4 Question 4. Are there different levels of creative play behaviours amongst different genders?

The literature in regard to gender revealed that there have been varying findings from different studies. While most research shows no significant difference in different genders' creativity (Kogan 1974, Rejskind, Rapagna et al. 1992, Balundė and Grakauskaitė-Karkockienė 2014), some studies have found female participants are more creative (Kogan 1976, Rejskind 1987), and some have found male participants are more creative in certain tests (Tegano and Moran III 1989, Stoltzfus, Nibbelink et al. 2011).

Accordingly, the literature does not seem to reveal a definitive pattern in relation to gender and creativity. It seems that the findings strongly relate to the way the study has been undertaken, the context of the study, the way creativity has been defined in that study or the factors of creativity that have been studied.

This study focused on different genders' creativity when they were engaged in play behaviours. It looked into all factors of creativity in play as a whole, but took a closer look at the three different factors of creative play separately as well.

Looking at the overall level of creativity in play, the difference between the two genders was not major, and both groups spent half (girls 50%) or just below half (boys 46%) of their whole play sessions engaged in some level of creative play. However, when looking at the highest level of creative play – level A – boys were marginally more engaged than girls. In fact, they engaged in 5% of FLEXINTORI overall, while girls spent 2% in FLEXINTORI. As the level of engagement at the highest level of creativity was low overall, the 3% difference may suggest that boys were more successful in engaging in this level of creativity.

Although the overall creativity results did not show much difference between the different genders, the different contexts supported the two groups' creativity in different ways.

Girls were more encouraged to engage in creative play behaviours in the Loose Manufactured Play Context than boys. This showed that, in response to the loose manufactured play equipment, girls could come up with more creative play ideas than boys. In fact, in this play context, the girls came up with more original ways of playing with the equipment and more integration took place amongst them, while boys had less engagement with these two factors of creativity.

However, boys showed more originality than girls when they were facilitated with loose parts and junk materials at Study Site One. So, in the Loose Parts Play Context, although the overall percentage of engagement in some level of creative play amongst both genders was exactly the same, boys were engaged in higher levels of creativity than girls. This suggested that boys can be more creative when playing with junk materials than girls.

In Natural Play Context, the results were more complicated. Girls were engaged in more creative play than boys overall, so boys spent more time running about with no creative play in this context. However, originality was the creativity factor in which boys were more successfully engaged in this play context. In other words, although the girls were more encouraged to engage in some sort of creative play than the boys, when the boys did engage in creative play, they showed more originality than the girls.

These findings support the importance of including different types of elements in children's play spaces. Accordingly, both boys and girls should be supported in order

to flourish in their creative play behaviour at the same time. By providing natural settings, both girls and boys can be encouraged to engage in more creative play, and this is even more supportive for girls.

For encouraging girls' originality, manufactured play equipment is more supportive than the elements provided in the other play contexts. In fact, girls showed only 2% originality in the Loose Parts Play Context and the Natural Play Context, while they showed 11% originality in the Loose Manufactured Context.

In the boys' case, similar to the overall children's pattern, the Natural Play Context was more supportive than the Loose Parts Play Context; the Loose Parts Play Context was more supportive than the Loose Manufactured Play Context and, finally, the Loose Manufactured Play Context was more supportive than the Fixed Manufactured Play Context. However, when considering originality in boys' play, loose parts and natural materials were more supportive than fixed and loose manufactured play equipment. So, while they had 4% engagement in original play in the Loose Manufactured Play Context, the figure was 8% and 7% respectively in the Loose Parts Play Context and the Natural Play Context. Although the percentages are all low, it should be noted that originality is a factor of creative play that rarely happens anyway, so small percentages can still be important.

8.1.5 Research Challenges and Limitations

This research had valuable findings and contributions to knowledge. The method of collecting and analysing the data used the Creative Play Taxonomy which was a measurement tool for children's creativity in play developed in the process of this research. This made the research being original both in terms of method and findings. However, several limitations and challenges were identified in the process of this research. These include the following.

8.1.5.1 *Access to Children in Educational Environments*

Using children as the participants of this study caused some challenges and limitations.

An important issue in collecting data from a school environment is that the researcher is not only dealing with the participants – the children – but also with their parents and the school's staff. The researcher initially needed to go through the school's

administration to gain permission for access to the school environment. After that, consent forms had to be distributed to the parents of the children who were chosen for the study. As the parents were not the participants, many of them forgot to send back the forms or were on holiday at the time, which required many follow-ups and made the process very time-consuming.

Another major issue that the researcher faced, especially when collecting data at Study Site Two, was that the participants had to be separated from their usual friends and class mates for the observation sessions. This may have influenced the way they played in each setting.

Another limitation was related to the school and nursery schedules. At Study Site Two, the data collection was just before the Christmas holidays, when the school was already very busy with other things. Accordingly, there were only limited observation sessions scheduled. Thus, it was impossible to schedule systematic observation sessions. For this reason, the data in Study Site Two was not analysed with the Creative Play Taxonomy and so quantitative findings were not gained from this study site. Also for this reason, the data was not used for addressing the fourth research question, which was in regard to the differences between genders.

At Study Site One, although the researcher had unlimited access to the nursery children, there were many days when observation sessions were cancelled due to a school-led programme that the nursery children also had to attend.

In addition, at both study sites, some of the children were absent for different sessions, so this resulted in different numbers of children in each observation session.

At both study sites, the researcher was a recognised outside observer, which may have influenced children's play behaviours. This was especially felt at Study Site Two, where the children were older and had previously heard explanations for why the researcher was there from the school. Also, their observation sessions were more scheduled and limited, which made it a one-off experience for them.

At Study Site One, however, the children were less influenced by the presence of the researcher. This was because, first of all, the researcher made many different visits to their nursery, so after the first few sessions, in which she attended only to study the environment and become familiar with the children, in the main observation sessions

the children seemed to play as usual and to see the researcher as one of the nursery assistants. Also, the nursery children were used to being photographed by their teacher.

Finally, this research only measured creative play behaviours in children up to the age of 11. Even though the Creative Play Taxonomy can be used for older children and their creativity can also be assessed, this research only covered this age range due to limitations in access and time.

8.1.5.2 *Access to Play Contexts*

Another limitation of this study was the fact that at Study Site One, three of the play contexts were held in the same setting, the nursery's usual playground. The negative issue with this was the presence of the manufactured climbing frame in the centre of the setting. As a result, the Loose Manufactured Play Context was not merely loose manufactured play equipment, and the Loose Parts Play Context was not only junk materials and loose parts, as both contexts also included the fixed manufactured play structure that was actually the only feature in the Fixed Manufactured Play Context. So, although there were many other elements in the Loose Manufactured Play Context and the Loose Parts Play Context, children still had access to the fixed manufactured structure. It would have been ideal if the children could have been taken to a completely different setting for each of the contexts, without any of the features from the other contexts.

Another limitation was related to the Natural Play Context. Unlike the other three contexts, which were in the nursery's usual outdoor space where the children had previous experience of playing with the elements, the Natural Play Context was not a setting that they could usually access. Hence, they were not familiar with this context at all. This may have influenced the way they responded to this play context.

One more limitation was that the researcher was only able to hold one observation session in the Fixed Manufactured Play Context. This was because the teacher believed the children were not behaving well there and there were a lot of arguments forming, so she was not prepared to hold any other sessions in this context. It would have been ideal to have more than one session in this context, like the other contexts. However, the findings suggest that in the other three play contexts, the children played fairly similarly amongst the different play sessions. For instance, the results of the creative

play behaviours in all six sessions in the Loose Parts Play Context followed the same pattern. Accordingly, it can be concluded that the findings in the Fixed Manufactured Play Context would also follow the same pattern if there had been a possibility of holding more sessions.

In addition, the play sessions in Study Site One were of different lengths, which was also unpredictable. This was due to the nursery's daily schedules, the weather conditions or just because the children came out more slowly on some days compared to other days. The weather conditions were also the reason that many of the observation sessions were totally cancelled.

8.1.5.3 *Limitations Related to the Creative Play Taxonomy*

There were some challenges and limitations in the use and development of the Creative Play Taxonomy. As explained earlier in the discussions for Question One, the fact that originality has a context-dependent nature makes it difficult to code. Accordingly, the final results may differ slightly when coded by different coders. However, as mentioned in the first section of Chapter Four, due to the nature of creativity, this error is difficult to control for and other creativity tests such as EPoC are identified as having some error as well.

Another limitation of this study in relation to the taxonomy is related to the implementation of the taxonomy. The coding process is a fairly time-consuming process and requires previous knowledge of children's play behaviours. Also, training is required on the way the taxonomy should be used. Although this is the same as with other creativity tests, where the researcher must have previous knowledge and related training, in this research, it resulted in the reliability test only being carried out on four observation sessions with four children. It would have been ideal if the researcher had access to more professionals in the field and could train more people adequately in order to test its reliability.

8.1.6 Future Research Directions

Further research is suggested in two different fields, one related to the Creative Play Taxonomy, and two in the field of children's creativity in play.

In relation to the Creative Play Taxonomy, due to the difficulties with the process of the collection of data, this research did not collect sufficient data to undertake

statistical tests for differences found in different contexts. However, further research is suggested in this field and testing for significance could be done with a larger survey of participants.

The Creative Play Taxonomy is a novel and original measurement test which was designed in the process of this research. As it is newly designed, it can benefit from further development which can make it even more usable. Accordingly, it could benefit from the development of a manual that includes detailed instructions on the way the taxonomy can be used. It could work as a full training guide that includes images and even video-recorded examples of children's play behaviours in relation to each of the creative play stages. Similar to the EPoC (Lubart, Besancon et al. 2012) training, this manual could also use the Consensual Assessment Technique (Amabile 1996a) to design a practice training session where the researcher can undergo training in coding some play behaviours and compare their responses with a number of judges, before starting the main coding scheme.

With the development of the Creative Play Taxonomy, this thesis also suggests further investigation in relation to children's creative play using this tool. The study could be conducted with a larger number of participants from different social and cultural backgrounds in order to understand whether the current findings apply to a wider group of child participants.

8.2 Conclusions

The current research makes two main contributions to knowledge. First, it contributes to existing knowledge on the understanding and assessment of children's creativity. This is provided by the development of the Creative Play Taxonomy.

Secondly, it contributes to the literature on children's play in educational outdoor play environments. It increases understanding of the play contexts that can support children's creativity in play, and the environmental characteristics that enhance these types of play.

8.2.1 Contribution One: The Creative Play Taxonomy

Due to the lack of knowledge in classifying and assessing young children's creativity during play, this research found it essential to design a tool that could do so. This resulted in the development of the Creative Play Taxonomy.

The Creative Play Taxonomy was designed based on two different fields, namely creativity and children's play. First, the different definitions and approaches to creativity were studied to gain an understanding of the field. Understandings of the two thinking processes – divergent thinking and convergent thinking – and the different theories on which process is involved in creative thinking were also studied. This revealed that both convergent and divergent thinking can happen in cycles and alongside each other in a creative thinking process (Sternberg and Lubart 1991, Sternberg and Lubart 1992, Sternberg and Lubart 1995, Lubart, Besancon et al. 2012).

- Divergent thinking is the ability to grow as many ideas and solutions for solving a problem as possible, with the quantity of ideas being important.
- Convergent thinking is the ability to combine various ideas in new original ways, with the quality of the finalised idea being important.

Accordingly, the Evaluation of Potential for Creativity (Lubart, Besancon et al. 2012), which was based on this concept, was chosen as the theoretical framework for developing the Creative Play Taxonomy. Studying this tool in detail resulted in the finding of the three parameters associated with creative thinking, which cover both divergent-exploratory thinking and convergent-integrative thinking. These are *integration*, flexibility and *originality*.

- Integration refers to the number of different elements integrated together. Accordingly, integration is noted when a child integrates two or more elements together (Besançon, Lubart et al. 2013)
- Flexibility is related to the element's functionality and refers to the unexpected way in which items are used. Accordingly, it is noted when a child uses an object differently from its intended design (Besançon, Lubart et al. 2013).
- Originality is associated with the way the child acts compared to the other children. It is noted when the child engages in an activity differently to other children (Lubart, Besancon et al. 2012).

Going through the training for the EPoC test also helped to gain an understanding of the way the scoring system works, which then helped to design the Creative Play Taxonomy.

After studying creativity, the second field studied in order to design the Creative Play Taxonomy was children's play behaviours. This was not only achieved through studying the available literature, but also through the observation session held in the pilot study. Four different play contexts were chosen, based on the literature, and nursery children were taken to these contexts to play. Their play behaviours were observed and video-recorded. This gave an idea of the different play behaviours that may occur in different contexts.

Based on the understanding of creativity, children's play behaviours were analysed and described. The behaviours were linked to the three parameters of creativity found in the EPoC, which finally resulted in the development of the Creative Play Taxonomy, covering all the different play behaviours in which children were engaged.

According to the three parameters and children's play behaviours, the Creative Play Taxonomy was developed with eight possible stages for creative play across four different levels as follows:

LEVEL	STAGE	ABBREVIATIONS	DESCRIPTION	FLEXIBILITY	INTEGRATION	ORIGINALITY
D	1	**NO**	Playing with one or no element, as per its function and similarly to others			
C	2	**INT**	Playing by integrating **various types of elements** as per their function		■	
	3	**FLEX**	Playing with an element in an **unexpected way**	■		
	4	**ORI**	Playing with an element as per its function, but **differently to others**			■
	5	**FLEXINT**	Playing by integrating **various types of elements** in an **unexpected way**	■	■	

B	6	**INTORI**	Playing by integrating **various types of elements** as per their function, but **differently to others**			
	7	**FLEXORI**	Playing with an element in an **unexpected way** and **differently to others**			
A	8	**FLEXINTORI**	Playing by integrating **various types of elements** in an **unexpected way** and **differently to others**			

Level D is when the child is involved in a play behaviour which engages none of the three parameters of creativity. Level C includes three stages, INT, FLEX and ORI, where the child engages in only one of the factors of creativity during play. Level B, which is a higher level of creative play, also includes three stages, and these are noted when two of the three parameters of creativity happen together during play. The three stages are FLEXINT, FLEXORI, and INTORI. Finally, level A of the Creative Play Taxonomy is when the three parameters of creativity happen together in play, named FLEXINTORI. This is the highest level of creative play.

Children's play behaviours can be observed and coded based on the Creative Play Taxonomy. Accordingly, a child's play behaviours should be closely detected and coded based on the eight stages. For instance, when the child engages in play that none of the three parameters of a creative play take place, the child should be scored "NO". by the time he/she is engaged in the same activity, he/she is coded as "NO". As soon as the child engages in a play that includes one or more of flexibility, integration or originality, "NO" will end and a new stage is scored. For instance, if the child engages in a play that engages both flexibility and integration, he/she will be scored FLEXINT for as long as she/he is engaged in it.

Experts and researchers in the field of children's psychology, creativity and education can use this taxonomy to understand children's creative play behaviours. They can use this to research whether different aspects, such as the play context that is studied in this research, can encourage creativity amongst children's play.

Policymakers can use the Creative Play Taxonomy to evaluate the nature of children's settings based on the development of children's creativity.

8.2.2 Contribution Two: Outdoor Educational Environment Characteristics Fostering Creativity in Children's Play

The second contribution of this research is related to outdoor environmental characteristics. This takes two forms. First, it contributes the knowledge of the outdoor play contexts that are more supportive in nurturing children's creativity during play. Secondly, it presents design principles recommended for children's outdoor educational environments that should be taken into account in order to nurture their creativity. Landscape architects and playground designers can use these recommendations when designing children's play spaces and in particular educational outdoor environments.

8.2.2.1 *Supportive Outdoor Play Contexts for Children's Creativity*

Natural play spaces:

- Natural play spaces are amongst the most encouraging environments for children to engage in some level of creative play behaviours.
- For those children who are overall more creative in play, natural play settings are very supportive for some level of creative play amongst them.
- These spaces also provide the most encouraging context for the highest level of creativity in boys' play.
- Girls are most encouraged to engage in some level of creative play in natural play settings. However, boys are engaged in more level A creativity in natural play settings than girls.

Loose Parts play spaces:

- Play spaces facilitated with loose parts provide the most supportive environment for the highest level of creativity in overall children's play.
- In particular, loose parts are the best elements for encouraging both the most creative children and the least creative children to engage in the highest level of creativity in play.
- Also, these settings provide the best field for encouraging the least creative children to engage in some level of creative play.
- Boys engage in the highest level of creative play in these settings compared to other play settings.

Loose Manufactured play spaces:

- Manufactured play equipment is found not to be very supportive of children's creative play behaviours overall.
- Girls can be more creative than boys when playing with loose manufactured play equipment.

Fixed Manufactured play spaces:

- Play settings that only have fixed manufactured play structures hardly encourage any creative play amongst any group of children.

Natural play spaces are the most supportive environments for integration and flexibility in play amongst children, while play spaces with loose parts encourage originality more than any other play space. Overall, flexibility occurred more than integration and integration occurred more than originality in children's play.

8.2.2.2 *Educational Outdoor Design Principles Aiming to Foster Children's Creative Play Behaviours*

According to this research, some design principles are recommended for educational outdoor play spaces and the design of children's play equipment in order to foster their creativity:

- Outdoor play spaces should preferably have variety in contexts for play, as different contexts have been shown to enhance creativity in different ways and amongst different groups.
- As well as the play space, the elements provided within the play space should also have diversity. In other words, play elements should have different shapes, textures and sizes, as this results in more opportunities for integration and different ways in which a child can think of how to use them.
- Natural play settings and natural elements should be provided in all educational outdoor spaces as they are found to be highly encouraging of creative play behaviours amongst children. Natural environments include natural settings with fixed elements such as a wildlife garden with grass, soil, trees and bushes, as well as natural loose materials such as fallen leaves, water and clay.
- Children's play spaces should be facilitated with various types of loose parts. This can include synthetic materials and objects such as plastic boxes, ropes,

cloth and cardboard boxes, as well as natural loose materials such as sticks, sand and leaves.

- When providing manufactured play equipment in play spaces, it is suggested that equipment that allows integration is chosen.
- Multi-functional play equipment, which allows the child to choose from a variety of play activities, is suggested rather than single-function equipment, which only provides one certain way of use. Using play equipment with very restricted usage opportunities is not recommended.
- Some manufactured elements may not be supportive of creative play on their own; however, they may help to provide a creative play context when used along with other loose parts. For instance, a bowl may not seem to provide creative play opportunities; however, when it is taken to a natural setting, it can enhance creative play behaviours such as pouring water inside it and painting the trees. Using such manufactured elements to facilitate play in natural and loose part play contexts is recommended.
- Play elements that, apart from their main function, have the possibility to move or be moved, provide more chances for creative play behaviours. For instance, a riding-car, the main function of which is to ride and move in a certain way, may not result in much creativity; however, a ladder, the main function of which is not related to movement, but can be moved around the play space, can be used in different ways and result in more creative play.
- Elements that are changeable are suggested for use in children's play spaces. Changeability can be shape and form (moulding a piece of clay to make a creature), size (cutting leaves into small pieces to make soup) or any other aspect.
- It is recommended that open-ended and unfinished elements are provided. This gives the children the opportunity to think of different ways of using the element and design their own play features.
- Mouldable materials are another group of materials that result in creative play behaviours, so providing any material that is mouldable is highly recommended.

Flexible play equipment, materials and elements give the children the opportunity to integrate and play flexibly with them. Hence, having such elements is highly recommended.

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APPENDICES

APPENDIX A **Consent form for Study Site Two: Prestonfield Primary School**

APPENDIX B **Consent form for Study Site One: Bilston Nursery**

APPENDIX C **Headteachers explanation letter following the consent form in Bilston Nursery**

APPENDIX D **Study Site One Observation Data coded based on the Creative Play Taxonomy**

APPENDIX A Consent form for Study Site Two: Prestonfield Primary School

INFORMED CONSENT FORM
Project: Develop Design Principles for Primary Schools' Outdoor Play Areas to Enhance Pupils' Creativity

Reyhaneh Mozaffar,
PhD Student, Edinburgh School of Architecture and Landscape Architecture (ESALA)
The University of Edinburgh
5 Forrest Hill Edinburgh EH1 2QL

Dear Parent/Carer, 7th November 2013

My name is Reyhaneh Mozaffar and I am a PhD student from The University of Edinburgh. I am doing a research project on analysing which type of playgrounds can have a positive influence on children's creativity and have been discussing this with Mrs Murray, Headteacher. Mrs Murray has given me permission to ask parents/carers for their consent to talk to a small group of children from each class and I would like to include your child in this research project. I hope that the information obtained from this research will help your child's school know more about the value of their immediate outdoor environment/play in terms of creativity so that we can build a better environment for your children to play and learn in.

Process

The procedure will include several stages. Firstly, your child will be asked to take part in a focus group where they will be asked about their current playground and what they would like to have and do in their play time. Secondly, your child will be observed during normal outdoor playtime along with his or her classmates to assess his or her creative behaviours in playground. Some still photography and video will be taken during children's outdoor activities for further analysis. Based on the information gathered, we will design and develop a part of the current playground to make a more engaging and creative play setting. Your child will then be observed playing in this new play setting. After a few months, your child's creativity levels will be assessed once more to see whether the environment has had a positive impact on their creative abilities or not. All of these sessions will be accompanied by a member of the school's staff. The participation of your child in this study is voluntary.

Contact

If you have any questions at any time regarding the study or the process, please do not hesitate to contact me by email or telephone:
Email address: r.mozaffar@ed.ac.uk Mobile phone number: 07869608892

Please complete and return the consent slip to the School Office by Monday, 11th November 2013 if you agree that your child can take part in this research.

Consent Slip

I agree with my child taking part in the above study.
I agree to permit my child to be photographed as part of the study data collection and that the pictures can be shown in presentations in relation to the research results. Children's names will not be disclosed.
I agree to permit my child to be videotaped as part of the study activity and that her/his image can be shown in presentations in relation to the research results. Children's names will not be disclosed.

Name of Child Class

Parent's/Carer's Signature Date

Thank you very much for your help.

APPENDIX B Consent form for Study Site One: Bilston Nursery

The University of Edinburgh

INFORMED CONSENT FORM

Develop Design Principles for the Nursery's Outdoor Play Areas to Enhance Pupil's Creativity

Reyhaneh Mozaffar,
PhD Student, Edinburgh School of Architecture and Landscape Architecture (ESALA)
The University of Edinburgh
Dear ……

My name is Reyhaneh Mozaffar and I am a PhD student from The University of Edinburgh. I am doing a research project on analysing which type of playgrounds can have positive influence on children's creativity. This is to develop design principles for children's outdoor environment designs to enhance their creativity. Therefore, I would like to include your child, along with his or her classmates, in this research project. I hope that the information obtained from this research will not only benefit me, but help nursery teachers and parents know more about the value of different outdoor environments and outdoor play in relation to your child's creative abilities and we can build a better environment for your children to grow in.

Procedures

Your child will be observed during normal outdoor playtime along with his or her classmates to assess his or her creative behaviours in relation to different environments such as the current playground, or when the timber play equipment arrives, or when they are taken to the woods etc. Some still photography and video will be taken during the children's outdoor activities for further analysis. All of these processes will be accompanied by the nursery teachers. The participation of your child in this study is voluntary.

Contact

If you have any questions at any time regarding the study or the procedures, please do not hesitate to contact me by email or telephone:

Email address: r.mozaffar@ed.ac.uk Mobile phone number: 07869608892

Consent

I agree with my child taking part in the above study.	
I agree to still photographs and video being used as part of my research.	

Name of Participant's Parent Signature Date

Thank you so much for your cooperation. **Reyhaneh Mozaffar**

APPENDIX C Headteachers explanation letter following the consent form in Bilston Nursery

"Exciting Learning within our Friendly and Active Community of Roslin and Bilston"

INFORMED CONSENT FORM

Develop Design Principles for the Nursery's Outdoor Play Areas to Enhance Pupil's Creativity

Dear Parent/Carer

Attached is a consent form to allow a University of Edinburgh PhD student to observe our pupils whilst playing in the nursery environment.

The form is produced in line with university guidelines and may appear rather complicated. However, it is essentially asking your consent for your child to be included in the research and for photographs and video footage to be considered for future presentations. All of this voluntary and your child will not be included without your permission.

If you have any questions about the form, please ask a member of the nursery staff and we will do our best to answer them.

APPENDIX D Study Site One Observation Data coded based on the Creative Play Taxonomy

	Observations	Subjects					
Independe							
Behaviors			No				Ori
Statistics			Total num	Total dura	Mean	Rate per m	Total num
	Junk Playground 1	Aim	11	00:07:56	00:00:43	0.38	-
		Brd	20	00:16:20	00:00:49	0.69	1
		Dln	13	00:12:17	00:00:57	0.45	-
		JmS	19	00:20:19	00:01:04	0.65	-
		JoO	7	00:03:07	00:00:27	0.24	-
		Lws	16	00:16:04	00:01:00	0.55	-
		Mag	16	00:11:30	00:00:43	0.55	-
		Ryt	4	00:03:58	00:00:59	0.14	1
		Sdl	10	00:13:01	00:01:18	0.34	-
		Smr	23	00:18:36	00:00:49	0.79	2
		Str	30	00:21:01	00:00:42	1.03	-
	Junk Playground 2	Aim	11	00:06:06	00:00:33	0.59	-
		Brd	13	00:07:55	00:00:37	0.69	-
		Dln	6	00:06:14	00:01:02	0.32	-
		JmS	6	00:03:41	00:00:37	0.32	-
		JoO	11	00:09:00	00:00:49	0.59	-
		LwT	6	00:05:40	00:00:57	0.32	-
		Lws	11	00:08:03	00:00:44	0.59	-
		Mag	12	00:10:21	00:00:52	0.64	-
		Mrg	11	00:14:53	00:01:21	0.59	-
		Ryt	6	00:04:38	00:00:46	0.32	-
		Sdl	13	00:08:39	00:00:40	0.69	-
		Smr	10	00:08:20	00:00:50	0.53	-
		Stn	12	00:10:12	00:00:51	0.64	-
		Str	11	00:11:04	00:01:00	0.59	-
	Junk Playground 3-1	Aim	6	00:03:54	00:00:39	0.86	-
		Brd	6	00:04:37	00:00:46	0.86	-
		Dln	9	00:03:47	00:00:25	1.29	-
		JmS	6	00:04:43	00:00:47	0.86	-
		JoO	8	00:03:50	00:00:29	1.15	-
		LwT	6	00:05:52	00:00:59	0.86	-
		Lws	4	00:03:54	00:00:58	0.57	-
		Stn	6	00:03:33	00:00:36	0.86	-
		Str	4	00:04:18	00:01:05	0.57	-
	Junk Playground 3-2	Aim	6	00:04:21	00:00:43	0.45	-
		Brd	10	00:08:08	00:00:49	0.75	-
		Dln	7	00:03:49	00:00:33	0.53	-
		JmS	6	00:06:00	00:01:00	0.45	-
		JoO	6	00:11:17	00:01:53	0.45	-
		LwT	9	00:08:45	00:00:58	0.68	1
		Lws	6	00:02:11	00:00:22	0.45	-
		Stn	8	00:05:20	00:00:40	0.6	-
		Str	5	00:07:42	00:01:32	0.38	-
	Junk Playground 5	Aim	10	00:08:14	00:00:49	0.56	-
		JmS	16	00:10:12	00:00:38	0.89	-
		JoO	10	00:06:56	00:00:42	0.56	-
		LwT	14	00:14:35	00:01:03	0.78	-
		Lws	13	00:07:21	00:00:34	0.72	-
		Mag	6	00:11:48	00:01:58	0.33	-
		Ryt	8	00:08:44	00:01:06	0.44	-
		Sdl	3	00:03:57	00:01:19	0.17	-
		Stn	6	00:07:29	00:01:15	0.33	-

	Junk Playground 4	Aim	8	00:09:33	00:01:12	0.63	-
		Brd	7	00:07:00	00:01:00	0.55	-
		JmS	9	00:09:41	00:01:05	0.71	-
		JoO	8	00:05:54	00:00:44	0.63	-
		LwT	7	00:11:21	00:01:37	0.55	1
		Lws	7	00:04:07	00:00:35	0.55	-
		Mag	12	00:09:39	00:00:48	0.94	-
		Ryt	1	00:00:05	00:00:05	0.08	-
		Sdl	7	00:03:52	00:00:33	0.55	-
		Stn	10	00:10:39	00:01:04	0.79	-
		Str	7	00:07:54	00:01:08	0.55	1
	Play Equipment 1	Aim	7	00:07:45	00:01:06	0.73	-
		Brd	5	00:03:59	00:00:48	0.52	-
		Dln	3	00:06:44	00:02:15	0.31	-
		JmS	13	00:06:49	00:00:31	1.36	3
		JoO	5	00:02:52	00:00:34	0.52	-
		Kyl	9	00:06:14	00:00:42	0.94	-
		Lws	8	00:03:44	00:00:28	0.84	-
		Mag	2	00:03:58	00:01:59	0.21	-
		Ryt	3	00:02:57	00:00:59	0.31	-
		Sdl	10	00:05:21	00:00:32	1.05	1
		Smr	4	00:02:19	00:00:35	0.42	-
		Stn	9	00:07:11	00:00:48	0.94	-
		Str	5	00:09:34	00:01:55	0.52	-
	Play Equipment 2	Aim	7	00:04:10	00:00:36	0.29	-
		Brd	13	00:16:52	00:01:18	0.55	-
		JmS	10	00:20:47	00:02:05	0.42	-
		JoO	13	00:19:43	00:01:31	0.55	2
		LwT	20	00:22:30	00:01:07	0.84	-
		Lws	14	00:19:48	00:01:25	0.59	-
		Mag	11	00:13:08	00:01:12	0.46	4
		Mrg	7	00:08:51	00:01:16	0.29	-
		Ryt	12	00:10:20	00:00:52	0.5	1
		Sdl	15	00:21:13	00:01:25	0.63	-
		Smr	9	00:17:42	00:01:58	0.38	-
		Stn	22	00:11:33	00:00:32	0.93	12
	Play Equipment 3	Brd	17	00:28:41	00:01:41	0.59	-
		Dln	16	00:21:26	00:01:20	0.55	-
		JoO	10	00:28:50	00:02:53	0.34	-
		Kyl	19	00:17:13	00:00:54	0.65	2
		Ryt	9	00:18:36	00:02:04	0.31	1
		Sdl	14	00:26:06	00:01:52	0.48	2
		Smr	2	00:29:01	00:14:31	0.07	-
		Stn	19	00:25:17	00:01:20	0.65	-
		Str	11	00:29:01	00:02:38	0.38	-
	Play Equipment 4	Aim	10	00:10:58	00:01:06	0.59	-
		Brd	11	00:13:17	00:01:12	0.65	1
		Dln	8	00:13:00	00:01:38	0.47	-
		JmS	6	00:09:32	00:01:35	0.35	1
		JoO	13	00:11:10	00:00:52	0.77	-
		Kyl	13	00:14:28	00:01:07	0.77	-
		Lws	9	00:07:19	00:00:49	0.53	-
		Mag	3	00:16:59	00:05:40	0.18	-
		Mrg	9	00:11:16	00:01:15	0.53	-
		Ryt	3	00:01:49	00:00:36	0.18	-
		Sdl	16	00:15:08	00:00:57	0.94	-

		Smr	10	00:10:56	00:01:06	0.59	1
		Stn	9	00:09:15	00:01:02	0.53	-
		Str	8	00:16:59	00:02:07	0.47	-
	Play Equipment 5	Aim	6	00:13:21	00:02:13	0.45	-
		Brd	11	00:09:19	00:00:51	0.82	-
		Dln	12	00:13:21	00:01:07	0.9	-
		JoO	11	00:10:36	00:00:58	0.82	-
		Kyl	11	00:13:21	00:01:13	0.82	-
		Lws	18	00:10:16	00:00:34	1.35	-
		Mrg	7	00:11:59	00:01:43	0.52	1
		Str	6	00:13:08	00:02:11	0.45	-
	Play Equipment 6	Aim	10	00:12:07	00:01:13	0.81	-
		Brd	14	00:10:40	00:00:46	1.13	-
		Dln	10	00:12:02	00:01:12	0.81	-
		JoO	14	00:11:25	00:00:49	1.13	-
		Lws	9	00:08:45	00:00:58	0.72	-
		Mag	18	00:10:55	00:00:36	1.45	-
		Mrg	12	00:12:25	00:01:02	0.97	-
		Ryt	10	00:10:31	00:01:03	0.81	2
		Smr	17	00:11:07	00:00:39	1.37	-
		Stn	10	00:07:28	00:00:45	0.81	-
		Str	13	00:10:27	00:00:48	1.05	-
	Woodland 1	Aim	6	00:04:53	00:00:49	0.21	-
		Brd	6	00:08:20	00:01:23	0.21	-
		JmS	6	00:07:30	00:01:15	0.21	-
		JoO	10	00:18:02	00:01:48	0.36	-
		LwT	14	00:18:41	00:01:20	0.5	-
		Lws	6	00:04:31	00:00:45	0.21	-
		Mag	2	00:01:02	00:00:31	0.07	-
		Mrg	9	00:13:32	00:01:30	0.32	-
		Ryt	1	00:00:04	00:00:04	0.04	-
		Sdl	7	00:13:15	00:01:54	0.25	-
		Smr	7	00:14:20	00:02:03	0.25	-
		Str	9	00:20:09	00:02:14	0.32	-
	Woodland 2-1	Aim	5	00:07:52	00:01:34	0.17	-
		Brd	6	00:05:52	00:00:59	0.2	-
		Dln	2	00:05:13	00:02:36	0.07	-
		JmS	6	00:05:30	00:00:55	0.2	-
		LwT	3	00:02:09	00:00:43	0.1	-
		Lws	9	00:24:22	00:02:42	0.3	-
		Mrg	6	00:10:34	00:01:46	0.2	-
		Ryt	3	00:01:27	00:00:29	0.1	1
		Smr	8	00:21:04	00:02:38	0.27	-
		Str	5	00:04:46	00:00:57	0.17	-
	Woodland 2-2	Aim	1	00:00:02	00:00:02	0.16	-
		Brd	1	00:01:04	00:01:04	0.16	-
		Dln	3	00:01:54	00:00:38	0.49	-
		JmS	1	00:00:17	00:00:17	0.16	-
		LwT	3	00:06:10	00:02:03	0.49	-
		Lws	1	00:00:01	00:00:01	0.16	-
		Mrg	1	00:00:02	00:00:02	0.16	-
		Ryt	1	00:00:01	00:00:01	0.16	-
		Smr	2	00:01:25	00:00:42	0.32	-
		Str	2	00:06:10	00:03:05	0.32	-
	Woodland 3-1	Aim	1	00:00:03	00:00:03	0.05	-
		Brd	3	00:01:20	00:00:27	0.14	-

		Dln	4	00:04:27	00:01:07	0.19	-
		JmS	4	00:03:25	00:00:51	0.19	-
		JoO	2	00:03:07	00:01:33	0.1	-
		LwT	2	00:02:59	00:01:30	0.1	-
		Lws	1	00:00:21	00:00:21	0.05	-
		Mag	2	00:02:21	00:01:11	0.1	-
		Mrg	2	00:02:36	00:01:18	0.1	-
		Ryt	1	00:00:03	00:00:03	0.05	-
		Sdl	3	00:02:34	00:00:51	0.14	-
		Str	4	00:11:40	00:02:55	0.19	-
	Woodland 3-2	Aim	1	00:00:01	00:00:01	0.08	-
		Brd	3	00:04:40	00:01:33	0.24	-
		Dln	5	00:09:10	00:01:50	0.4	-
		JmS	4	00:06:12	00:01:33	0.32	-
		JoO	1	00:00:03	00:00:03	0.08	-
		Lws	2	00:02:00	00:01:00	0.16	-
		Mag	1	00:00:07	00:00:07	0.08	-
		Mrg	2	00:01:47	00:00:54	0.16	-
		Ryt	1	00:01:08	00:01:08	0.08	-
		Sdl	1	00:00:05	00:00:05	0.08	-
		Str	2	00:05:32	00:02:46	0.16	-
	climbing frame	Aim	8	00:12:30	00:01:34	0.63	-
		Brd	16	00:11:12	00:00:42	1.25	-
		Dln	12	00:12:30	00:01:03	0.94	-
		JoO	20	00:09:22	00:00:28	1.56	1
		Lws	12	00:11:05	00:00:55	0.94	-
		Mag	13	00:11:39	00:00:54	1.02	-
		Mrg	7	00:12:24	00:01:46	0.55	-
		Ryt	12	00:11:25	00:00:57	0.94	-
		Smr	9	00:11:52	00:01:19	0.7	-
		Stn	11	00:12:25	00:01:08	0.86	-
		Str	6	00:12:30	00:02:05	0.47	-

			Flex				Int	
Total dura	Mean	Rate per n	Total num	Total dura	Mean	Rate per n	Total num	Total dura
-	-	-	12	00:15:50	00:01:19	0.41	5	00:02:58
00:00:23	00:00:23	0.03	16	00:06:32	00:00:25	0.55	-	-
-	-	-	7	00:02:39	00:00:23	0.24	-	-
-	-	-	8	00:05:40	00:00:43	0.28	3	00:03:01
-	-	-	-	-	-	-	1	00:01:41
-	-	-	8	00:05:04	00:00:38	0.28	2	00:01:46
-	-	-	8	00:04:59	00:00:37	0.28	3	00:01:23
00:00:51	00:00:51	0.03	-	-	-	-	-	-
-	-	-	5	00:06:22	00:01:16	0.17	2	00:00:37
00:00:27	00:00:13	0.07	12	00:07:47	00:00:39	0.41	-	-
-	-	-	7	00:03:19	00:00:28	0.24	4	00:04:40
-	-	-	1	00:00:39	00:00:39	0.05	1	00:01:57
-	-	-	8	00:03:56	00:00:29	0.43	1	00:01:05
-	-	-	5	00:06:08	00:01:14	0.27	3	00:03:27
-	-	-	13	00:12:03	00:00:56	0.69	1	00:00:28
-	-	-	3	00:02:22	00:00:47	0.16	-	-
-	-	-	7	00:07:54	00:01:08	0.37	2	00:02:15
-	-	-	5	00:03:40	00:00:44	0.27	2	00:01:08
-	-	-	6	00:03:53	00:00:39	0.32	2	00:00:41
-	-	-	2	00:01:57	00:00:59	0.11	1	00:01:01
-	-	-	2	00:01:23	00:00:41	0.11	1	00:01:55
-	-	-	1	00:00:37	00:00:37	0.05	3	00:02:12
-	-	-	5	00:05:15	00:01:03	0.27	1	00:00:42
-	-	-	4	00:02:52	00:00:43	0.21	-	-
-	-	-	5	00:03:13	00:00:39	0.27	-	-
-	-	-	3	00:01:08	00:00:23	0.43	-	-
-	-	-	3	00:02:06	00:00:42	0.43	1	00:00:16
-	-	-	4	00:01:44	00:00:26	0.57	2	00:01:28
-	-	-	2	00:01:28	00:00:44	0.29	1	00:00:49
-	-	-	2	00:00:53	00:00:27	0.29	-	-
-	-	-	3	00:01:07	00:00:22	0.43	-	-
-	-	-	4	00:01:54	00:00:29	0.57	-	-
-	-	-	7	00:03:26	00:00:29	1	-	-
-	-	-	3	00:02:41	00:00:54	0.43	-	-
-	-	-	4	00:03:25	00:00:51	0.3	-	-
-	-	-	9	00:04:12	00:00:28	0.68	-	-
-	-	-	5	00:02:02	00:00:24	0.38	-	-
-	-	-	5	00:06:02	00:01:12	0.38	-	-
-	-	-	2	00:01:59	00:01:00	0.15	-	-
00:00:38	00:00:38	0.08	5	00:02:50	00:00:34	0.38	-	-
-	-	-	4	00:03:59	00:01:00	0.3	-	-
-	-	-	5	00:02:00	00:00:24	0.38	-	-
-	-	-	2	00:03:11	00:01:35	0.15	1	00:01:29
-	-	-	4	00:01:51	00:00:28	0.22	-	-
-	-	-	7	00:02:09	00:00:18	0.39	-	-
-	-	-	3	00:05:01	00:01:40	0.17	-	-
-	-	-	3	00:00:46	00:00:15	0.17	-	-
-	-	-	2	00:01:01	00:00:30	0.11	-	-
-	-	-	1	00:00:13	00:00:13	0.06	1	00:00:40
-	-	-	-	-	-	-	-	-
-	-	-	1	00:01:33	00:01:33	0.06	2	00:02:23
-	-	-	2	00:01:48	00:00:54	0.11	-	-

-	-	-	3	00:00:49	00:00:16	0.24	1	00:01:09
-	-	-	3	00:01:39	00:00:33	0.24	-	-
-	-	-	5	00:03:03	00:00:37	0.39	-	-
-	-	-	-	-	-	-	2	00:03:02
00:00:13	00:00:13	0.08	2	00:01:10	00:00:35	0.16	-	-
-	-	-	2	00:01:13	00:00:36	0.16	-	-
-	-	-	1	00:00:10	00:00:10	0.08	1	00:01:21
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	1	00:01:21
-	-	-	1	00:00:21	00:00:21	0.08	1	00:01:03
00:00:58	00:00:58	0.08	2	00:00:31	00:00:16	0.16	1	00:01:12
-	-	-	-	-	-	-	-	-
-	-	-	1	00:00:31	00:00:31	0.1	1	00:01:54
-	-	-	-	-	-	-	1	00:02:50
00:01:16	00:00:25	0.31	-	-	-	-	-	-
-	-	-	2	00:00:21	00:00:10	0.21	2	00:02:04
-	-	-	-	-	-	-	2	00:02:54
-	-	-	1	00:00:09	00:00:09	0.1	1	00:02:15
-	-	-	-	-	-	-	1	00:05:36
-	-	-	-	-	-	-	4	00:04:25
00:00:07	00:00:07	0.1	-	-	-	-	1	00:03:00
-	-	-	1	00:00:09	00:00:09	0.1	1	00:01:22
-	-	-	1	00:01:00	00:01:00	0.1	-	-
-	-	-	-	-	-	-	-	-
-	-	-	1	00:00:49	00:00:49	0.04	1	00:00:20
-	-	-	2	00:00:13	00:00:07	0.08	-	-
-	-	-	4	00:01:33	00:00:23	0.17	-	-
00:00:33	00:00:17	0.08	5	00:01:13	00:00:15	0.21	3	00:02:17
-	-	-	1	00:00:27	00:00:27	0.04	-	-
-	-	-	1	00:00:42	00:00:42	0.04	4	00:02:58
00:00:59	00:00:15	0.17	4	00:03:02	00:00:46	0.17	-	-
-	-	-	-	-	-	-	3	00:06:57
00:00:11	00:00:11	0.04	1	00:00:22	00:00:22	0.04	4	00:03:11
-	-	-	-	-	-	-	2	00:02:33
-	-	-	3	00:01:28	00:00:29	0.13	4	00:04:36
00:00:51	00:00:04	0.5	3	00:00:37	00:00:12	0.13	1	00:00:12
-	-	-	1	00:00:21	00:00:21	0.03	-	-
-	-	-	-	-	-	-	2	00:02:17
-	-	-	-	-	-	-	-	-
00:01:32	00:00:46	0.07	-	-	-	-	1	00:00:23
00:00:14	00:00:14	0.03	-	-	-	-	3	00:07:11
00:00:17	00:00:09	0.07	-	-	-	-	1	00:00:32
-	-	-	-	-	-	-	-	-
-	-	-	1	00:03:44	00:03:44	0.03	-	-
-	-	-	-	-	-	-	-	-
-	-	-	1	00:01:58	00:01:58	0.06	3	00:04:03
00:00:08	00:00:08	0.06	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
00:03:56	00:03:56	0.06	1	00:03:30	00:03:30	0.06	-	-
-	-	-	1	00:00:18	00:00:18	0.06	4	00:04:35
-	-	-	1	00:02:08	00:02:08	0.06	-	-
-	-	-	-	-	-	-	2	00:03:05
-	-	-	-	-	-	-	-	-
-	-	-	1	00:00:22	00:00:22	0.06	2	00:05:21
-	-	-	-	-	-	-	5	00:08:39
-	-	-	1	00:00:07	00:00:07	0.06	1	00:00:51

00:00:17	00:00:17	0.06	-	-	-	-	5	00:04:33
-	-	-	-	-	-	-	2	00:06:13
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	1	00:00:22	00:00:22	0.07	-	-
-	-	-	-	-	-	-	-	-
-	-	-	2	00:00:18	00:00:09	0.15	1	00:00:19
-	-	-	-	-	-	-	-	-
-	-	-	4	00:02:08	00:00:32	0.3	1	00:00:15
00:00:09	00:00:09	0.07	1	00:01:13	00:01:13	0.07	-	-
-	-	-	-	-	-	-	1	00:00:13
-	-	-	1	00:00:18	00:00:18	0.08	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	1	00:00:23
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	4	00:03:40
-	-	-	2	00:00:21	00:00:11	0.16	-	-
-	-	-	-	-	-	-	-	-
00:00:42	00:00:21	0.16	-	-	-	-	-	-
-	-	-	1	00:00:36	00:00:36	0.08	1	00:00:43
-	-	-	2	00:01:20	00:00:40	0.16	-	-
-	-	-	1	00:00:17	00:00:17	0.08	2	00:01:19
-	-	-	4	00:03:46	00:00:57	0.14	6	00:11:14
-	-	-	1	00:06:27	00:06:27	0.04	4	00:07:06
-	-	-	5	00:06:18	00:01:16	0.18	1	00:07:18
-	-	-	1	00:00:52	00:00:52	0.04	7	00:08:04
-	-	-	3	00:00:46	00:00:15	0.11	3	00:04:52
-	-	-	4	00:12:28	00:03:07	0.14	5	00:06:03
-	-	-	1	00:06:21	00:06:21	0.04	1	00:02:04
-	-	-	3	00:03:15	00:01:05	0.11	1	00:01:57
-	-	-	1	00:03:48	00:03:48	0.04	5	00:13:09
-	-	-	4	00:02:16	00:00:34	0.14	7	00:10:15
-	-	-	2	00:01:16	00:00:38	0.07	2	00:09:11
-	-	-	1	00:00:45	00:00:45	0.04	2	00:05:58
-	-	-	5	00:13:01	00:02:36	0.17	3	00:05:28
-	-	-	6	00:14:18	00:02:23	0.2	1	00:00:53
-	-	-	4	00:01:59	00:00:30	0.13	9	00:15:54
-	-	-	4	00:03:16	00:00:49	0.13	5	00:12:57
-	-	-	6	00:05:02	00:00:50	0.2	2	00:01:22
-	-	-	1	00:00:08	00:00:08	0.03	3	00:03:38
-	-	-	1	00:02:26	00:02:26	0.03	1	00:01:05
00:01:19	00:01:19	0.03	6	00:21:22	00:03:34	0.2	1	00:00:29
-	-	-	2	00:00:55	00:00:28	0.07	1	00:03:18
-	-	-	-	-	-	-	5	00:07:23
-	-	-	2	00:02:55	00:01:27	0.32	-	-
-	-	-	3	00:03:29	00:01:10	0.49	-	-
-	-	-	1	00:01:59	00:01:59	0.16	-	-
-	-	-	3	00:01:15	00:00:25	0.49	-	-
-	-	-	-	-	-	-	-	-
-	-	-	2	00:06:09	00:03:04	0.32	-	-
-	-	-	-	-	-	-	-	-
-	-	-	1	00:01:31	00:01:31	0.16	-	-
-	-	-	3	00:02:33	00:00:51	0.49	-	-
-	-	-	-	-	-	-	-	-
-	-	-	2	00:18:21	00:09:10	0.1	-	-
-	-	-	1	00:04:51	00:04:51	0.05	3	00:02:38

-	-	-	1	00:07:05	00:07:05	0.05	2	00:02:07
-	-	-	1	00:08:37	00:08:37	0.05	-	-
-	-	-	-	-	-	-	-	-
-	-	-	1	00:14:18	00:14:18	0.05	1	00:03:44
-	-	-	-	-	-	-	1	00:16:56
-	-	-	2	00:10:55	00:05:27	0.1	-	-
-	-	-	1	00:13:39	00:13:39	0.05	1	00:04:46
-	-	-	2	00:03:58	00:01:59	0.1	-	-
-	-	-	-	-	-	-	1	00:01:02
-	-	-	-	-	-	-	-	-
-	-	-	1	00:07:13	00:07:13	0.08	-	-
-	-	-	1	00:01:23	00:01:23	0.08	-	-
-	-	-	1	00:01:34	00:01:34	0.08	-	-
-	-	-	1	00:03:07	00:03:07	0.08	-	-
-	-	-	1	00:05:04	00:05:04	0.08	-	-
-	-	-	1	00:10:30	00:10:30	0.08	-	-
-	-	-	2	00:12:23	00:06:11	0.16	-	-
-	-	-	1	00:02:05	00:02:05	0.08	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	1	00:06:58	00:06:58	0.08	-	-
-	-	-	-	-	-	-	-	-
-	-	-	3	00:01:18	00:00:26	0.23	-	-
-	-	-	-	-	-	-	-	-
00:00:11	00:00:11	0.08	6	00:02:36	00:00:26	0.47	-	-
-	-	-	4	00:01:14	00:00:19	0.31	-	-
-	-	-	4	00:00:51	00:00:13	0.31	-	-
-	-	-	1	00:00:06	00:00:06	0.08	-	-
-	-	-	-	-	-	-	-	-
-	-	-	2	00:00:38	00:00:19	0.16	-	-
-	-	-	1	00:00:05	00:00:05	0.08	-	-
-	-	-	-	-	-	-	-	-

		Flexori				Flexint		
Mean	Rate per n	Total num	Total dura	Mean	Rate per n	Total num	Total dura	Mean
00:00:36	0.17	-	-	-	-	4	00:02:18	00:00:34
-	-	2	00:00:52	00:00:26	0.07	3	00:04:53	00:01:38
-	-	-	-	-	-	9	00:12:52	00:01:26
00:01:00	0.1	-	-	-	-	-	-	-
00:01:41	0.03	-	-	-	-	14	00:22:17	00:01:35
00:00:53	0.07	-	-	-	-	4	00:05:34	00:01:24
00:00:28	0.1	-	-	-	-	5	00:11:08	00:02:14
-	-	-	-	-	-	6	00:07:29	00:01:15
00:00:19	0.07	-	-	-	-	2	00:01:39	00:00:50
-	-	-	-	-	-	2	00:02:10	00:01:05
00:01:10	0.14	-	-	-	-	-	-	-
00:01:57	0.05	-	-	-	-	4	00:10:02	00:02:31
00:01:05	0.05	6	00:04:37	00:00:46	0.32	-	-	-
00:01:09	0.16	2	00:01:18	00:00:39	0.11	1	00:00:41	00:00:41
00:00:28	0.05	-	-	-	-	5	00:02:33	00:00:31
-	-	-	-	-	-	5	00:05:55	00:01:11
00:01:07	0.11	-	-	-	-	1	00:02:56	00:02:56
00:00:34	0.11	-	-	-	-	4	00:05:53	00:01:28
00:00:21	0.11	1	00:00:08	00:00:08	0.05	1	00:02:10	00:02:10
00:01:01	0.05	-	-	-	-	2	00:00:53	00:00:27
00:01:55	0.05	1	00:00:06	00:00:06	0.05	1	00:00:19	00:00:19
00:00:44	0.16	-	-	-	-	5	00:07:15	00:01:27
00:00:42	0.05	-	-	-	-	4	00:04:28	00:01:07
-	-	-	-	-	-	2	00:05:40	00:02:50
-	-	-	-	-	-	1	00:00:23	00:00:23
-	-	-	-	-	-	1	00:01:57	00:01:57
00:00:16	0.14	-	-	-	-	-	-	-
00:00:44	0.29	-	-	-	-	-	-	-
00:00:49	0.14	-	-	-	-	-	-	-
-	-	-	-	-	-	1	00:02:16	00:02:16
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	1	00:01:11	00:01:11
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	3	00:05:30	00:01:50
-	-	-	-	-	-	1	00:00:55	00:00:55
-	-	-	-	-	-	3	00:06:28	00:02:09
-	-	-	-	-	-	2	00:01:14	00:00:37
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	2	00:01:03	00:00:32
-	-	-	-	-	-	3	00:07:06	00:02:22
-	-	-	-	-	-	1	00:05:56	00:05:56
00:01:29	0.08	-	-	-	-	2	00:00:54	00:00:27
-	-	-	-	-	-	7	00:07:54	00:01:08
-	-	-	-	-	-	5	00:05:09	00:01:02
-	-	-	-	-	-	6	00:06:02	00:01:00
-	-	-	-	-	-	3	00:02:38	00:00:53
-	-	1	00:00:12	00:00:12	0.06	7	00:09:25	00:01:21
00:00:40	0.06	-	-	-	-	2	00:05:17	00:02:39
-	-	1	00:03:14	00:03:14	0.06	5	00:06:01	00:01:12
00:01:12	0.11	-	-	-	-	4	00:10:05	00:02:31
-	-	-	-	-	-	7	00:08:41	00:01:14

00:01:09	0.08	-	-	-	-	-	-	-
-	-	-	-	-	-	2	00:04:06	00:02:03
-	-	-	-	-	-	-	-	-
00:01:31	0.16	-	-	-	-	5	00:03:48	00:00:46
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	4	00:06:15	00:01:34
00:01:21	0.08	1	00:01:08	00:01:08	0.08	1	00:00:26	00:00:26
-	-	-	-	-	-	-	-	-
00:01:21	0.08	-	-	-	-	5	00:07:31	00:01:30
00:01:03	0.08	-	-	-	-	1	00:00:42	00:00:42
00:01:12	0.08	-	-	-	-	2	00:01:28	00:00:44
-	-	-	-	-	-	1	00:01:49	00:01:49
00:01:54	0.1	-	-	-	-	-	-	-
00:02:50	0.1	-	-	-	-	-	-	-
-	-	-	-	-	-	1	00:01:29	00:01:29
00:01:02	0.21	1	00:00:47	00:00:47	0.1	2	00:03:30	00:01:45
00:01:27	0.21	-	-	-	-	1	00:00:25	00:00:25
00:02:15	0.1	-	-	-	-	2	00:02:06	00:01:03
00:05:36	0.1	-	-	-	-	-	-	-
00:01:06	0.42	-	-	-	-	1	00:00:59	00:00:59
00:03:00	0.1	-	-	-	-	2	00:01:06	00:00:33
00:01:22	0.1	-	-	-	-	1	00:01:48	00:01:48
-	-	1	00:00:24	00:00:24	0.1	1	00:01:00	00:01:00
-	-	-	-	-	-	-	-	-
00:00:20	0.04	-	-	-	-	3	00:18:28	00:06:09
-	-	4	00:05:44	00:01:26	0.17	-	-	-
-	-	1	00:01:26	00:01:26	0.04	-	-	-
00:00:46	0.13	-	-	-	-	-	-	-
-	-	-	-	-	-	3	00:00:49	00:00:16
00:00:45	0.17	-	-	-	-	1	00:00:18	00:00:18
-	-	1	00:00:05	00:00:05	0.04	4	00:05:00	00:01:15
00:02:19	0.13	1	00:04:18	00:04:18	0.04	1	00:01:01	00:01:01
00:00:48	0.17	-	-	-	-	4	00:08:38	00:02:09
00:01:17	0.08	-	-	-	-	-	-	-
00:01:09	0.17	-	-	-	-	-	-	-
00:00:12	0.04	-	-	-	-	3	00:08:57	00:02:59
-	-	-	-	-	-	-	-	-
00:01:09	0.07	1	00:00:02	00:00:02	0.03	7	00:05:05	00:00:44
-	-	1	00:00:11	00:00:11	0.03	-	-	-
00:00:23	0.03	2	00:02:31	00:01:15	0.07	2	00:01:21	00:00:40
00:02:24	0.1	-	-	-	-	1	00:00:57	00:00:57
00:00:32	0.03	1	00:01:51	00:01:51	0.03	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
00:01:21	0.18	-	-	-	-	-	-	-
-	-	-	-	-	-	2	00:03:33	00:01:47
-	-	-	-	-	-	2	00:03:58	00:01:59
-	-	-	-	-	-	-	-	-
00:01:09	0.24	-	-	-	-	1	00:00:56	00:00:56
-	-	1	00:00:22	00:00:22	0.06	-	-	-
00:01:32	0.12	-	-	-	-	3	00:06:35	00:02:12
-	-	-	-	-	-	-	-	-
00:02:40	0.12	-	-	-	-	-	-	-
00:01:44	0.29	-	-	-	-	4	00:06:30	00:01:38
00:00:51	0.06	-	-	-	-	1	00:00:52	00:00:52

00:00:55	0.29	-	-	-	-	2	00:01:13	00:00:36
00:03:07	0.12	-	-	-	-	2	00:01:30	00:00:45
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	2	00:02:17	00:01:09
-	-	-	-	-	-	-	-	-
00:00:19	0.07	-	-	-	-	2	00:02:07	00:01:04
-	-	-	-	-	-	-	-	-
00:00:15	0.07	-	-	-	-	1	00:00:42	00:00:42
-	-	-	-	-	-	-	-	-
00:00:13	0.07	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	1	00:00:21	00:00:21	0.08	1	00:01:25	00:01:25
00:00:23	0.08	-	-	-	-	-	-	-
-	-	-	-	-	-	2	00:01:00	00:00:30
00:00:55	0.32	-	-	-	-	-	-	-
-	-	2	00:01:08	00:00:34	0.16	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
00:00:43	0.08	-	-	-	-	-	-	-
-	-	-	-	-	-	3	00:03:37	00:01:12
00:00:40	0.16	-	-	-	-	-	-	-
00:01:52	0.21	1	00:00:21	00:00:21	0.04	3	00:07:30	00:02:30
00:01:47	0.14	-	-	-	-	3	00:06:06	00:02:02
00:07:18	0.04	1	00:01:45	00:01:45	0.04	2	00:05:10	00:02:35
00:01:09	0.25	-	-	-	-	1	00:01:02	00:01:02
00:01:37	0.11	-	-	-	-	1	00:03:42	00:03:42
00:01:13	0.18	-	-	-	-	4	00:04:58	00:01:15
00:02:04	0.04	-	-	-	-	6	00:18:33	00:03:05
00:01:57	0.04	-	-	-	-	5	00:08:41	00:01:44
00:02:38	0.18	-	-	-	-	2	00:07:20	00:03:40
00:01:28	0.25	-	-	-	-	1	00:02:13	00:02:13
00:04:35	0.07	-	-	-	-	1	00:03:13	00:03:13
00:02:59	0.07	-	-	-	-	1	00:01:09	00:01:09
00:01:49	0.1	-	-	-	-	3	00:03:40	00:01:13
00:00:53	0.03	-	-	-	-	3	00:08:57	00:02:59
00:01:46	0.3	1	00:00:12	00:00:12	0.03	4	00:04:33	00:01:08
00:02:35	0.17	-	-	-	-	3	00:04:10	00:01:23
00:00:41	0.07	1	00:00:31	00:00:31	0.03	3	00:03:43	00:01:14
00:01:13	0.1	-	-	-	-	1	00:01:52	00:01:52
00:01:05	0.03	-	-	-	-	4	00:15:56	00:03:59
00:00:29	0.03	1	00:01:01	00:01:01	0.03	1	00:04:22	00:04:22
00:03:18	0.03	-	-	-	-	2	00:04:43	00:02:22
00:01:29	0.17	-	-	-	-	1	00:17:51	00:17:51
-	-	-	-	-	-	1	00:03:13	00:03:13
-	-	-	-	-	-	1	00:01:37	00:01:37
-	-	-	-	-	-	1	00:02:17	00:02:17
-	-	-	-	-	-	3	00:04:37	00:01:32
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	1	00:02:00	00:02:00
-	-	-	-	-	-	1	00:02:12	00:02:12
-	-	-	-	-	-	-	-	-
-	-	1	00:00:28	00:00:28	0.05	1	00:02:09	00:02:09
00:00:53	0.14	-	-	-	-	3	00:12:12	00:04:04

00:01:04	0.1	-	-	-	-	2	00:07:22	00:03:41
-	-	-	-	-	-	2	00:08:59	00:04:30
-	-	-	-	-	-	3	00:17:54	00:05:58
00:03:44	0.05	-	-	-	-	-	-	-
00:16:56	0.05	-	-	-	-	1	00:03:44	00:03:44
-	-	-	-	-	-	1	00:07:45	00:07:45
00:04:46	0.05	-	-	-	-	-	-	-
-	-	1	00:08:00	00:08:00	0.05	1	00:00:50	00:00:50
00:01:02	0.05	-	-	-	-	3	00:17:26	00:05:49
-	-	-	-	-	-	4	00:09:22	00:02:20
-	-	-	-	-	-	1	00:05:16	00:05:16
-	-	-	-	-	-	2	00:05:15	00:02:38
-	-	-	-	-	-	2	00:01:46	00:00:53
-	-	-	-	-	-	1	00:03:11	00:03:11
-	-	-	-	-	-	1	00:01:26	00:01:26
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	2	00:08:38	00:04:19
-	-	-	-	-	-	2	00:11:23	00:05:41
-	-	-	-	-	-	2	00:12:25	00:06:13
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	2	00:00:21	00:00:10	0.16	-	-	-
-	-	1	00:00:11	00:00:11	0.08	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	1	00:01:06	00:01:06	0.08	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

	Intori				Flexintori			
Rate per n	Total num	Total dura	Mean	Rate per n	Total num	Total dura	Mean	Rate per n
0.14	-	-	-	-	-	-	-	-
0.1	-	-	-	-	-	-	-	-
0.31	-	-	-	-	1	00:01:14	00:01:14	0.03
-	-	-	-	-	-	-	-	-
0.48	-	-	-	-	4	00:01:56	00:00:29	0.14
0.14	-	-	-	-	1	00:00:33	00:00:33	0.03
0.17	-	-	-	-	-	-	-	-
0.21	-	-	-	-	10	00:16:44	00:01:40	0.34
0.07	1	00:04:11	00:04:11	0.03	2	00:03:11	00:01:36	0.07
0.07	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.21	-	-	-	-	-	-	-	-
-	-	-	-	-	2	00:01:12	00:00:36	0.11
0.05	-	-	-	-	1	00:00:55	00:00:55	0.05
0.27	-	-	-	-	-	-	-	-
0.27	-	-	-	-	1	00:01:27	00:01:27	0.05
0.05	-	-	-	-	-	-	-	-
0.21	-	-	-	-	-	-	-	-
0.05	-	-	-	-	2	00:01:31	00:00:46	0.11
0.11	-	-	-	-	-	-	-	-
0.05	-	-	-	-	5	00:10:23	00:02:05	0.27
0.27	-	-	-	-	-	-	-	-
0.21	-	-	-	-	-	-	-	-
0.11	-	-	-	-	-	-	-	-
0.05	1	00:04:04	00:04:04	0.05	-	-	-	-
0.14	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.14	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.14	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.23	-	-	-	-	-	-	-	-
0.08	-	-	-	-	-	-	-	-
0.23	-	-	-	-	1	00:00:57	00:00:57	0.08
0.15	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.15	-	-	-	-	-	-	-	-
0.23	-	-	-	-	-	-	-	-
0.08	-	-	-	-	-	-	-	-
0.15	-	-	-	-	-	-	-	-
0.39	-	-	-	-	-	-	-	-
0.28	-	-	-	-	1	00:00:29	00:00:29	0.06
0.33	-	-	-	-	-	-	-	-
0.17	-	-	-	-	-	-	-	-
0.39	-	-	-	-	-	-	-	-
0.11	-	-	-	-	-	-	-	-
0.28	-	-	-	-	-	-	-	-
0.22	-	-	-	-	-	-	-	-
0.39	-	-	-	-	-	-	-	-

-	-	-	-	-	1	00:01:13	00:01:13	0.08
0.16	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.39	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.31	-	-	-	-	2	00:01:10	00:00:35	0.16
0.08	-	-	-	-	-	-	-	-
-	-	-	-	-	4	00:12:39	00:03:10	0.31
0.39	-	-	-	-	-	-	-	-
0.08	-	-	-	-	-	-	-	-
0.16	-	-	-	-	1	00:00:40	00:00:40	0.08
0.1	-	-	-	-	-	-	-	-
-	1	00:02:21	00:02:21	0.1	1	00:00:48	00:00:48	0.1
-	-	-	-	-	-	-	-	-
0.1	-	-	-	-	-	-	-	-
0.21	-	-	-	-	-	-	-	-
0.1	-	-	-	-	-	-	-	-
0.21	-	-	-	-	1	00:01:20	00:01:20	0.1
-	-	-	-	-	-	-	-	-
0.1	1	00:01:13	00:01:13	0.1	-	-	-	-
0.21	-	-	-	-	-	-	-	-
0.1	-	-	-	-	1	00:03:56	00:03:56	0.1
0.1	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.13	-	-	-	-	-	-	-	-
-	-	-	-	-	2	00:00:57	00:00:29	0.08
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.13	-	-	-	-	-	-	-	-
0.04	-	-	-	-	-	-	-	-
0.17	-	-	-	-	1	00:01:32	00:01:32	0.04
0.04	2	00:02:39	00:01:19	0.08	-	-	-	-
0.17	1	00:00:08	00:00:08	0.04	1	00:00:56	00:00:56	0.04
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.13	-	-	-	-	2	00:01:35	00:00:48	0.08
-	-	-	-	-	-	-	-	-
0.24	-	-	-	-	1	00:00:11	00:00:11	0.03
-	-	-	-	-	-	-	-	-
0.07	-	-	-	-	6	00:06:02	00:01:00	0.21
0.03	-	-	-	-	2	00:02:05	00:01:02	0.07
-	-	-	-	-	1	00:00:14	00:00:14	0.03
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.12	-	-	-	-	-	-	-	-
0.12	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.06	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.18	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.24	-	-	-	-	-	-	-	-
0.06	-	-	-	-	-	-	-	-

0.12	-	-	-	-	-	-	-	-
0.12	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.15	-	-	-	-	1	00:01:22	00:01:22	0.07
-	-	-	-	-	-	-	-	-
0.15	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.07	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.08	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.16	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	2	00:01:13	00:00:36	0.16
-	-	-	-	-	-	-	-	-
0.24	-	-	-	-	-	-	-	-
-	1	00:00:22	00:00:22	0.08	-	-	-	-
0.11	-	-	-	-	1	00:00:16	00:00:16	0.04
0.11	-	-	-	-	-	-	-	-
0.07	-	-	-	-	-	-	-	-
0.04	-	-	-	-	-	-	-	-
0.04	-	-	-	-	-	-	-	-
0.14	-	-	-	-	-	-	-	-
0.21	-	-	-	-	-	-	-	-
0.18	-	-	-	-	1	00:00:35	00:00:35	0.04
0.07	1	00:03:39	00:03:39	0.04	-	-	-	-
0.04	-	-	-	-	-	-	-	-
0.04	-	-	-	-	-	-	-	-
0.04	-	-	-	-	-	-	-	-
0.1	-	-	-	-	-	-	-	-
0.1	-	-	-	-	-	-	-	-
0.13	-	-	-	-	1	00:02:10	00:02:10	0.03
0.1	-	-	-	-	1	00:04:07	00:04:07	0.03
0.1	-	-	-	-	6	00:17:14	00:02:52	0.2
0.03	-	-	-	-	-	-	-	-
0.13	-	-	-	-	-	-	-	-
0.03	-	-	-	-	-	-	-	-
0.07	-	-	-	-	-	-	-	-
0.03	-	-	-	-	-	-	-	-
0.16	-	-	-	-	-	-	-	-
0.16	-	-	-	-	-	-	-	-
0.16	-	-	-	-	-	-	-	-
0.49	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	2	00:06:08	00:03:04	0.32
0.16	-	-	-	-	2	00:02:38	00:01:19	0.32
0.16	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.05	-	-	-	-	-	-	-	-
0.14	-	-	-	-	-	-	-	-

0.1	-	-	-	-	-	-	-	-
0.1	-	-	-	-	-	-	-	-
0.14	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.05	-	-	-	-	-	-	-	-
0.05	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.05	-	-	-	-	1	00:08:10	00:08:10	0.05
0.14	-	-	-	-	-	-	-	-
0.19	-	-	-	-	-	-	-	-
0.08	-	-	-	-	-	-	-	-
0.16	-	-	-	-	1	00:01:12	00:01:12	0.08
0.16	-	-	-	-	-	-	-	-
0.08	-	-	-	-	-	-	-	-
0.08	-	-	-	-	1	00:05:57	00:05:57	0.08
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.16	-	-	-	-	-	-	-	-
0.16	-	-	-	-	-	-	-	-
0.16	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
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-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

Rater	Duration
Reyhaneh	00:29:01
Reyhaneh	00:29:01
Reyhaneh	00:29:01
Reyhaneh	00:29:01
Reyhaneh	00:29:01
Reyhaneh	00:29:01
Reyhaneh	00:29:01
Reyhaneh	00:29:01
Reyhaneh	00:29:01
Reyhaneh	00:29:01
Reyhaneh	00:29:01
Reyhaneh	00:29:01
Reyhaneh	00:18:44
Reyhaneh	00:18:44
Reyhaneh	00:18:44
Reyhaneh	00:18:44
Reyhaneh	00:18:44
Reyhaneh	00:18:44
Reyhaneh	00:18:44
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Reyhaneh	00:18:44
Reyhaneh	00:18:44
Reyhaneh	00:18:44
Reyhaneh	00:18:44
Reyhaneh	00:06:59
Reyhaneh	00:06:59
Reyhaneh	00:06:59
Reyhaneh	00:06:59
Reyhaneh	00:06:59
Reyhaneh	00:06:59
Reyhaneh	00:06:59
Reyhaneh	00:06:59
Reyhaneh	00:06:59
Reyhaneh	00:06:59
Reyhaneh	00:13:16
Reyhaneh	00:13:16
Reyhaneh	00:13:16
Reyhaneh	00:13:16
Reyhaneh	00:13:16
Reyhaneh	00:13:16
Reyhaneh	00:13:16
Reyhaneh	00:13:16
Reyhaneh	00:13:16
Reyhaneh	00:17:59
Reyhaneh	00:17:59
Reyhaneh	00:17:59
Reyhaneh	00:17:59
Reyhaneh	00:17:59
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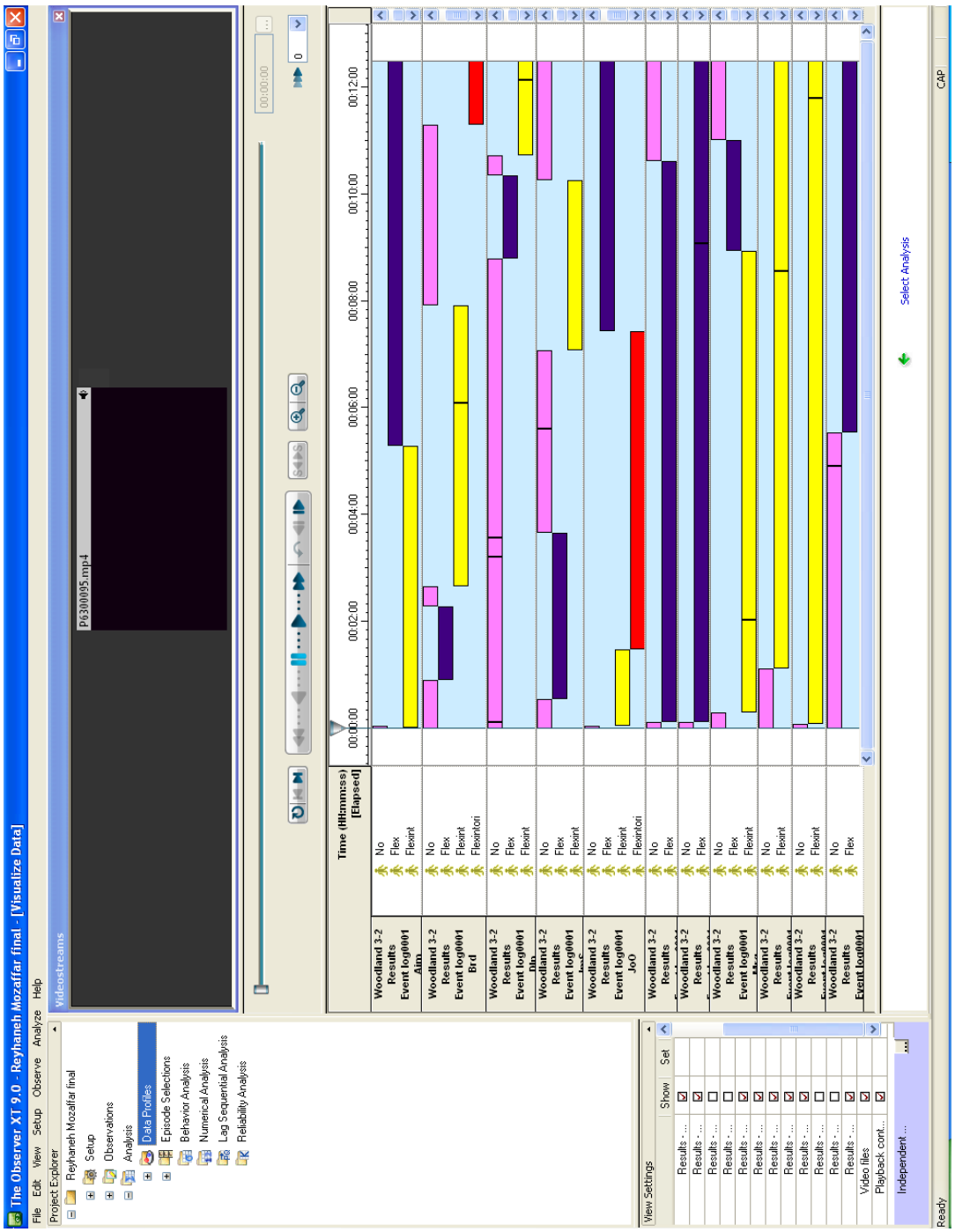
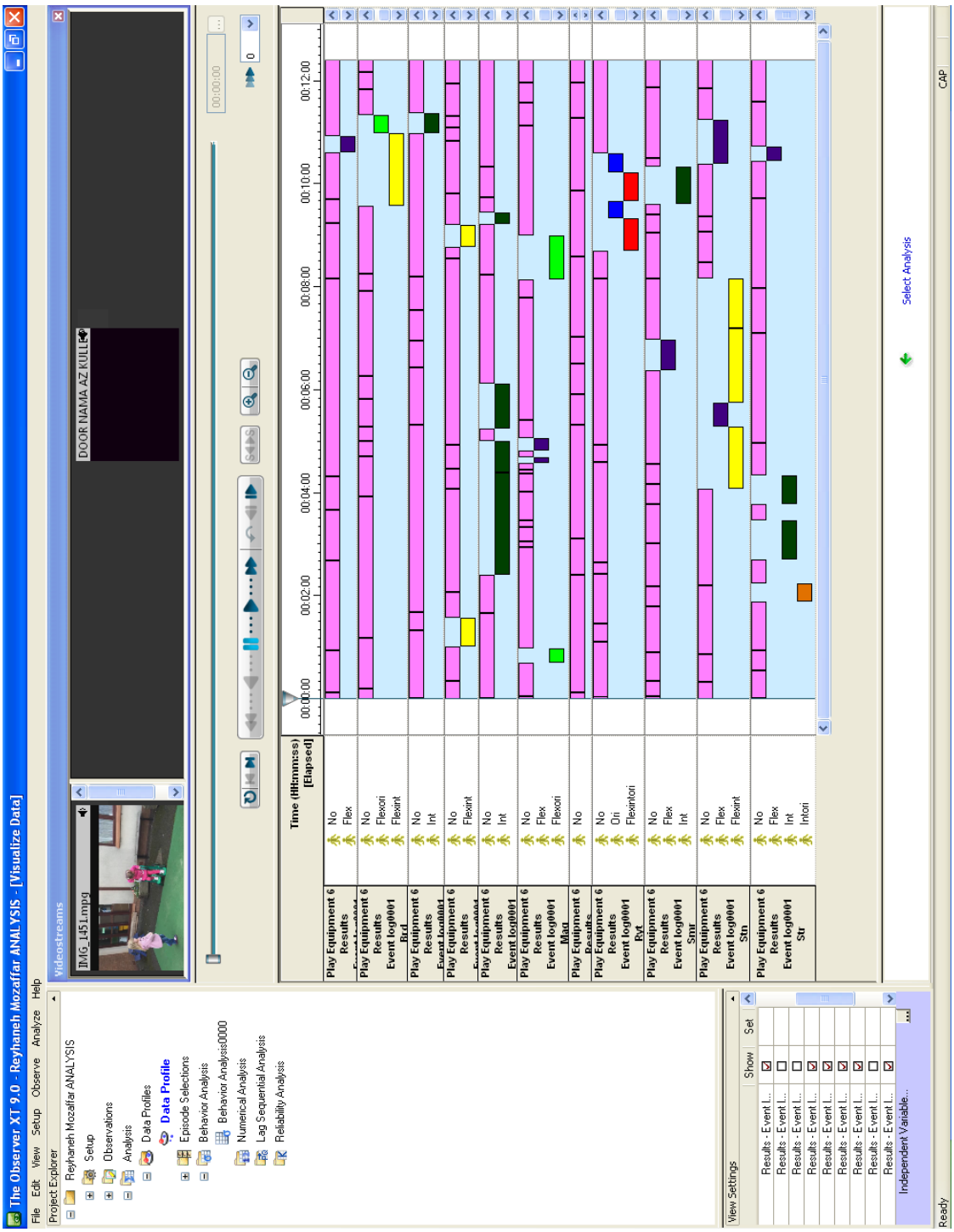
APPENDIX E Examples of Study Site One Data in Visual Format in the Observer Software

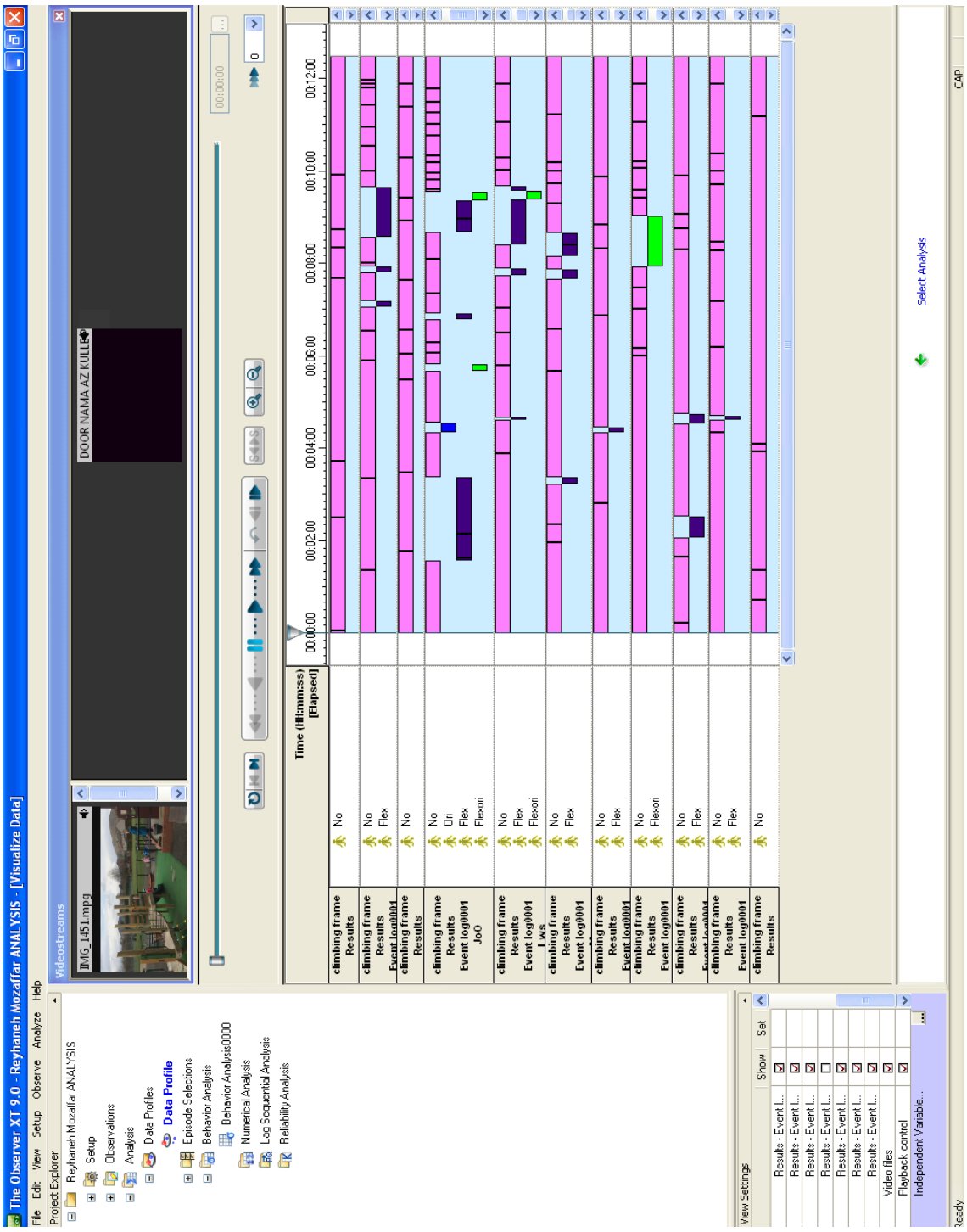
The Natural Play Context



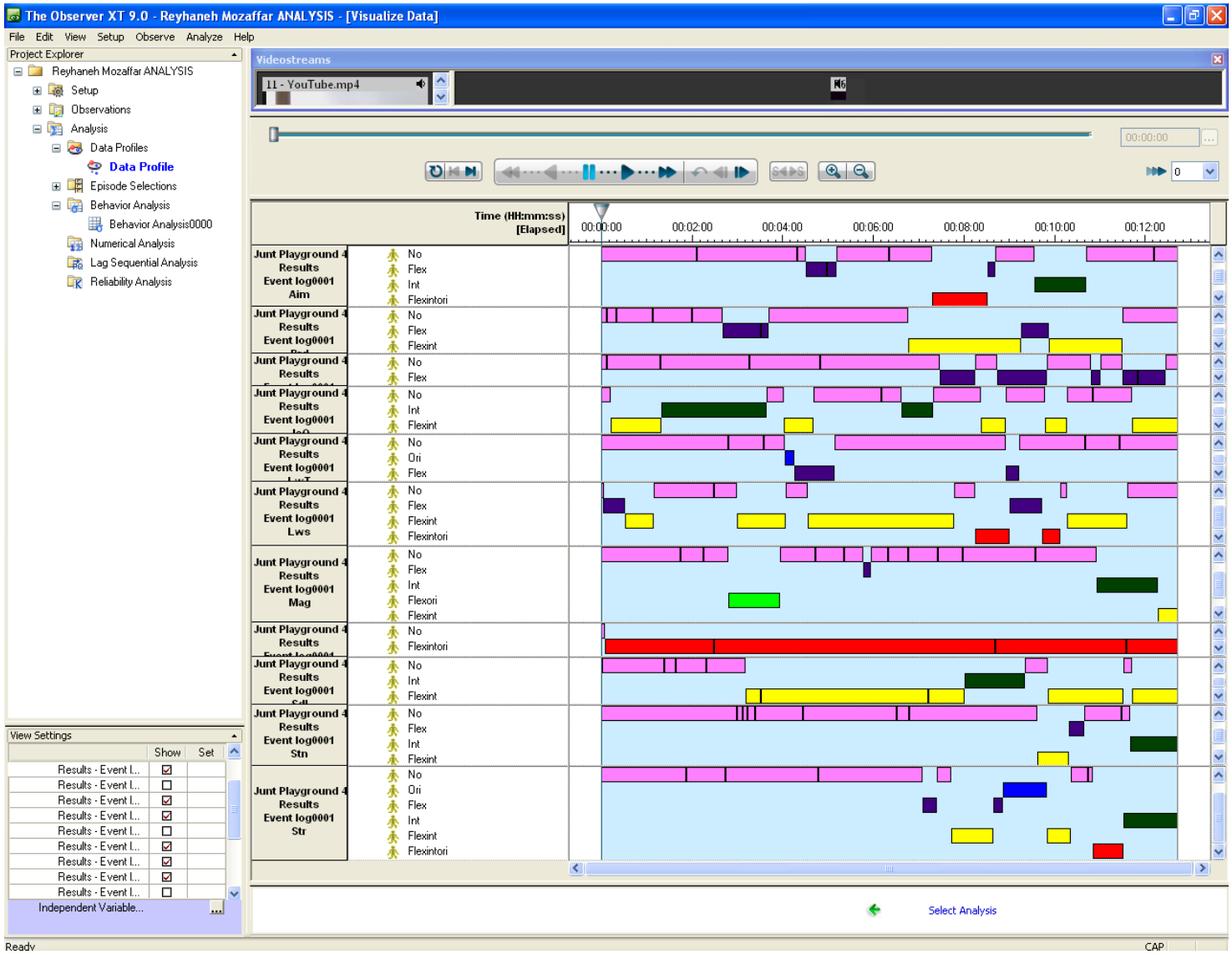
The Loose Manufactured Play Context



The Fixed Manufactured Play Context



The Loose Parts Play Context


The Observer XT 9.0 - Reyhaneh Mozaffar ANALYSIS - [Visualize Data]
File Edit View Setup Observe Analyze Help
Project Explorer
Reyhaneh Mozaffar ANALYSIS
Setup
Observations
Analysis
Data Profiles
Data Profile
Episode Selections
Behavior Analysis
Behavior Analysis0000
Numerical Analysis
Lag Sequential Analysis
Reliability Analysis
Videostreams
11 - YouTube.mp4
Time (HH:mm:ss) [Elapsed]
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