Inclusive Playground Design: Promoting Social Inclusion for Children with Disabilities

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June 16, 2023

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Colophon

Title: Inclusive Playground Design: Promoting Social Inclusion for Children with Disabilities

Location: Groningen

Date: June 16, 2023

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Version: Final

Number of pages: 21 (excl. references and appendices)

Word count: 7204 (excl. references and appendices)

Illustrations front page: Play equipment with ramp in Katschiplaan in the Hauge (Yalp, n.d.)

Abstract

The concepts of inclusivity and universal design are appearing in urban agendas and campaigns. This thesis studies inclusive playgrounds with regard to children with disabilities and the ways design encourages the potential for social inclusion. Playground designs were previously researched with regard to promoting active play, however, playgrounds that are inclusive for children with disabilities lack research. Specifically, there is a lack of academic literature on the design characteristics of playgrounds that influence the potential for social inclusion. This thesis delves into the physical and social characteristics of playgrounds that were not previously researched in much depth. Understanding the design of playgrounds for children with disabilities can improve future playgrounds or enable adapting existing ones to represent children's interests better. For this study nine semi-structured interviews with experts in various countries have been conducted; three with NGOs that promote inclusiveness for children with disabilities in play environments, and six with designers of companies that specialize in planning and designing play environments. These are the main findings on the design characteristics of playgrounds that encourage the potential for social inclusion; a need for quiet areas, strict routing, sensorimotor play, modified play equipment, and ground-level activities.

Keywords: Children with disabilities, playgrounds, accessibility, social inclusion, inclusive environments

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1. Introduction

1.1. Background

Inclusivity and universal design are concepts that are on the rise in urban agendas and campaigns, such as the 2030 Agenda for Sustainable Development, the New Urban Agenda, and the Cities for All campaign (Askew, 2019). The study by Stanton-Chapman and Schmidt (2017) stressed the current recognition and awareness of inclusiveness within international human rights standards while distinguishing the lack of inclusivity at the local level. With the rise of urbanization, urban land is scarce and reserved for housing and economic demand which limits land for recreational and play environments (Askew, 2019). UNICEF released a handbook on shaping urbanization for children where the emphasis is given to playgrounds, universal design, inclusiveness, accessibility, and the planning of child-friendly cities. The report signifies the importance of the 11th Sustainable Development Goal, sustainable cities and communities (Askew, 2019). Further, playgrounds are defined as outdoor and physical play environments (Stanton-Chapman and Schmidt, 2021). Universal design is an architectural movement that aims to design products and environments that are usable by all, including people with disabilities (Burke, 2013). The study by Barron *et al.*, (2017) states that social inclusion and the built environment are that of universal design. Further, inclusion is making an environment fit the child without the consideration of their abilities (Burke, 2013).

1.2. Social and theoretical relevance

This paper explores playgrounds' design characteristics and their surroundings that encourage usage by children with disabilities. It aims to provide suggestions for play environments that may enable opportunities for social inclusion for these children. Design for children with disabilities and social isolation in playgrounds were studied academically, however, separately. Burke (2013) defines disabilities under two categories, social disadvantage and physical impairment, suggesting that disabilities vary. Further, research was conducted on the influence of playground design on the play of children, not children with disabilities. El-Kholy, Moustafa and Abou El-Ela (2022) delve into the importance of the physical activity of children in playgrounds to enhance mental and physical development. Such as grassy areas which encourage running, courts indicating boundaries and hard surfaces enabling wheeled toy play. Whereas, Burke (2013) explores how universal design in playgrounds promotes play for children with physical impairments. Improved well-being, cognitive development, and learning outside of school environments are advantages of play for children with disabilities in playgrounds (Anderson, 2022). The study by Stanton-Chapman and Schmidt (2017) delves into the social inclusion in playgrounds for children with disabilities through caregivers' perceptions, however, has limited research on design. Raising concepts such as worrisome for a child's safety, comfortable social environments through an absence of teasing, accessibility, and the usability of play equipment. Further, van Engelen *et al.*, (2021) distinguished that social exclusion for children with disabilities in outdoor play occurs due to a lack of friends, not being able to adjust to outdoor play, the necessity of an adult, and the worries about the risks.

This thesis differentiates from previous studies as it delves into the physical and social characteristics of playgrounds that were not researched in much depth. Further, an innovative conceptual model was constructed from the theoretical framework which builds upon concepts from academic sources. Understanding the design of playgrounds for children with disabilities can improve upcoming playgrounds, provide solutions to modify existing ones, and represent children's interests better.

1.3. Research problem

This thesis explores inclusive play through research on the physical characteristics that prohibit access and participation in playgrounds and the ways that such environments discourage the social inclusion of children with disabilities. On top of playgrounds and their equipment, their surroundings are also studied. The surroundings in this paper refer to the reach and accessibility of the playground and the environment around it. Similarly, Fasting, (2019) defines the surroundings of play environments within a wider context, a combination of the physical place, its atmosphere, and the nature around the play equipment. The literature above delves into playgrounds and equipment while limiting focus on the ease for children with disabilities to participate in these play environments. The research's objective is to increase the social inclusion of children with disabilities in public recreational areas, specifically playgrounds.

Research question

How can the design of playgrounds and their surroundings promote the potential for social inclusion of children with disabilities?

Subquestions

1) What are the essential elements for social inclusion in playgrounds for children with disabilities?
2) What are the physical characteristics of playgrounds' surroundings that encourage participation for children with disabilities?
3) How do playground designers include children with disabilities when designing playgrounds?

1.4. Thesis structure

This thesis is followed by a theoretical framework that is based on academic literature and provides definitions for children with disabilities, child-friendly environments, inclusive playgrounds, and social inclusion. In addition, reports on previous research on physical and social characteristics of playgrounds for children with disabilities. Second, an innovative conceptual model depicts the factors that build up an inclusive playground. Third, there is a methodology section that explains how semi-structured interviews with NGOs and playground designers in various countries were used to research the inclusiveness of playgrounds. Fourth, the results from the interviews are conveyed in four main parts; perspective on children with disabilities, inclusive play environments for children with disabilities, social environment of play as a key factor for inclusivity, and strategies for the inclusive design of playgrounds and their surroundings. Lastly, a conclusion highlights that the social environment is influenced by a lack of awareness and skill of abled people to communicate with children with disabilities, the presence of parents, the presence of other children, and emotions. In addition, the physical characteristics of playgrounds and their surroundings put emphasis on layout, cost, nature, surfaces, and types of play equipment.

2. A theoretical framework for studying the inclusivity of playgrounds

2.1. Definitions of children with disabilities, child-friendly environments, inclusive playgrounds, and social inclusion

This paper will specifically research the inclusivity of playgrounds for children with disabilities both in regard to physical characteristics and social opportunities. Burke (2013) defines children with disabilities, under two categories, social disadvantage and physical impairment. Disability in relation to social disadvantage portrays the need to overcome barriers in societal phenomena that are not present for people without impairments. Second, physical impairments are defined as one's functional limitation of a part of the body. This thesis will focus on disabilities as a spectrum and not on a singular disability.

Child-friendly characteristics reflect independent access to places and the enabling of diverse affordances, the influence of play (Broberg, Kyttä and Fagerholm, 2013). Moreover, Askew (2019) delves into inclusive playgrounds as safe places for children's play, activity, and gathering. There are five constraints that determine a child's participation in such places: weak connectivity to peers, weak children's independent mobility, exclusion in public space, weak accountability structures, and physical inaccessibility. The definitions of child-friendly environments and inclusive playgrounds regard children, rather than specifically children with disabilities. Further, inclusion is an environment that provides access to all abilities (Burke, 2013).

Social inclusion is defined by Stanton-Chapman and Schmidt (2017) as the opportunity for a child to socially participate, be involved in life situations, or share an activity. In addition, a social environment is reliant on the presence of children, the greater the number of children, the greater the sense of community (Broberg, Kyttä and Fagerholm, 2013).

2.2. Perspective of the social environment within playgrounds for children with disabilities

Research on playgrounds' social environments suggests that play in public and outdoor environments should emphasize peer play along with prioritizing the community above technical requirements. Playgrounds should enhance children's imagination and creativity (Burke, 2013). Further, the study by van Engelen *et al.*, (2021) highlights the need for learning within such environments, such as learning to take risks, pushing one's limits, interacting with peers, and understanding social norms. The study by James *et al.*, (2022) conveys that areas where children can observe the playground encourage opportunities for social interactions.

As playgrounds consist of a social atmosphere it is common that parents and other children are in the surroundings. Parents either assist the child's play or act as protective and restrict independence. Parental supervision and perception of risk can be a barrier to play (Barron *et al.*, 2017). In play environments with diverse age groups and abilities, there is discrimination from individuals toward children with disabilities and negative social attitudes that enable false assumptions about the child's disability (Stanton-Chapman and Schmidt, 2017). Similarly, bullying by other children is present (Barron *et al.*, 2017). Inclusion in play may be promoted once play by other children is adapted (Woolley *et al.*, 2005). Such adaptations by others occur through a continuous process of listening, watching, interpreting, copying, and inventing play. In general, a social environment is an area where there are opportunities to enhance imagination, learn, take risks, and interact with peers.

2.3. Physical characteristics of playgrounds for children with disabilities

Children with disabilities face a constant social struggle in public environments along with exclusion from recreational facilities (Woolley *et al.*, 2005). An example is having limited number of parking for vehicles of people with disabilities and non-accessible bathrooms in playgrounds (Stanton-Chapman and Schmidt, 2017). This thesis will examine the effect that easing access to playgrounds and implementing modified play equipment has in promoting opportunities for social interactions of children with disabilities.

Askew, (2019) emphasizes the need for accessibility, such as playgrounds within walking distance or high connectivity to public transport. Accessibility through a technical lens is implementing a minimum number of steps, maximal leveled access, level curbs, wide stairs and routes for movement with wheelchairs or strollers, passages clear of obstructions, minimal distance, and minimum intersections. Figure 1 depicts a playground with wide routes. Further, space for play should highlight a spacious lobby entrance that enhances social interactions (Burke, 2013).

With regard to surfacing and routing, uneven ground surfaces and the use of grass and sand result in physical inaccessibility, specifically wheelchair mobility (van Engelen *et al.*, 2021). In contrast, there is effectiveness in sandpits, such as in Figure 2 which calls attention to sensorimotor play (Stanton-Chapman and Schmidt, 2017). Play should include challenges, a variety of playground equipment, and the ability to manipulate the existing space (Burke, 2013). Fear accumulates as a child feels they are misusing the equipment. If play environments are not inclusive children with disabilities become onlookers (Barron *et al.*, 2017).

Figure 1: Wide routes in a playground in Hillesluis, Rotterdam (Speelplan, 2022)
Figure 2: Sandpit play equipment (SamenSpeelNetwerk, n.d.b)

Moreover, an accessible space requires ground-level activities however, research concluded them as boring for children with disabilities (Stanton-Chapman and Schmidt, 2017). An inclusive playground should consist of high verbal content, high imaginative content, and high physical content, in addition to less structured play such as sitting, watching, talking, and walking (Woolley *et al.*, 2005). Observation points for the purpose of watching others play encourages a comforting environment. Further, a lack of visual markings is a barrier for visual disabilities. As a whole, the physical characteristics of inclusive playgrounds are having parking for vehicles of disabled people, high connectivity to public transport, wide routes, spacious entrance, hard surfaces, a variety of play equipment, ground-level activities, observation points, and visual markings.

2.4. Conceptual model

The conceptual model (Figure 3) depicts the influence on the inclusivity of playgrounds through the opportunities for play or the potential for social interactions in playgrounds or a combination of the two. Further, this study explores how providing opportunities for play through the design of playgrounds encourages the social inclusion of children with disabilities. Subcomponents compose playground designs such as accessibility, routing, surfaces, and modified play equipment. The potential for social interactions is further determined by exposure to other children and the availability of interactive play equipment. This model will be used to analyze how a playground's inclusivity positively affects the potential for social and play opportunities for children with disabilities.
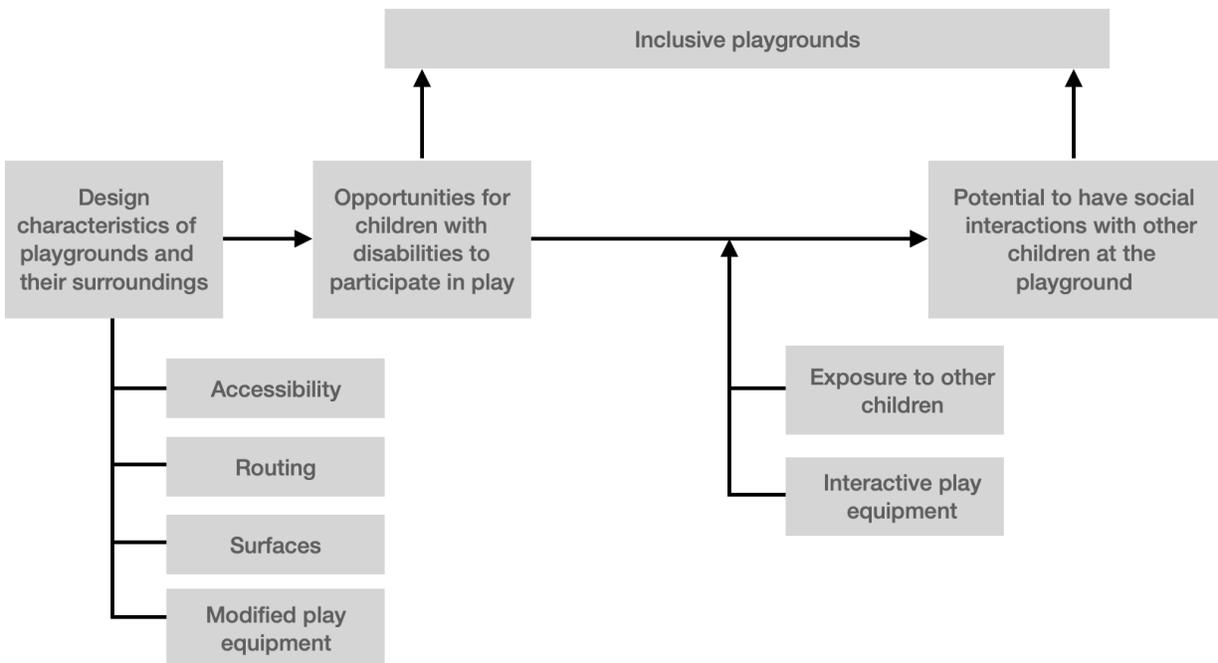
Figure 3: A conceptual model for inclusive playgrounds for children with disabilities

3. Methodology

3.1. Data collection instrument

Qualitative research methods were used for the following exploratory study, where semistructured interviews were conducted. Interviews enable experts to provide knowledge, insight, and case studies from their field. In addition, the authenticity of the interviewee allows for an in-depth analysis of the discussion and the availability of direct quotes. The interview guides (Appendix A) consisted of a set of questions based on the conceptual model, which enabled improvised follow-up questions and insight into the respondents' perspectives. Two different interview guides have been used. The first guide was formulated for interviews with NGOs that highlight inclusiveness for children with disabilities in play environments while the second guide is for playground designers. Such respondents were not seen to be studied collectively in similar studies.

The importance of interviewing members of NGOs is to exhibit a view on playgrounds from personal experiences as they are in daily contact with children with disabilities. In addition, these NGOs gather information and feedback from research, field experience, and insights from different viewpoints of local citizens. Moreover, playground designers plan and design the playgrounds according to the needs of clients which could be public or private stakeholders. The interviewees advocate diversity and contribute to the research as the NGO respondents are directly involved with children with disabilities while the playground designers are the ones implementing the designs. The interviewees were selected based on their profession or role within their recognized design company or NGO. Such interviewees were considered relevant experts and discovered by searching the internet and reading about their organization prior to contact. The location of the company was not a deciding factor for relevance which resulted in interviewees calling from the Netherlands, Belgium, Denmark, and Canada. Contact was established by emailing the individual directly through their company email address or calling the company to get directed to the individual.

Six playground designers from different companies were interviewed along with three interviewees from varying NGOs (Table 1). The interviews were one on one meetings in online video call environments. As the online interviews were prepared with an interview guide, consistency, and structure between the interviews were achieved. Answers were unique and ensured diverse perspectives on the topic, however, to improve quality, NGOs could further be represented by a greater number of interviewees. The online interviews were of quality as the interviewer and interviewee saw one another through video which allowed for dynamic discussions. Examples of playgrounds were presented by the interviewees by sharing their screens. These interviews were conducted to research the influence of the inclusiveness of playgrounds through design and the potential for social interactions of children with disabilities.

Interviewee	Based in	Date conducted
NGO 1 (O1)	Belgium	05/04/23
NGO 2 (O2)	The Netherlands	21/04/23
NGO 3 (O3)	The Netherlands	19/04/23
Playground designer 1 (D1)	Denmark	29/03/23
Playground designer 2 (D2)	The Netherlands	05/04/23
Playground designer 3 (D3)	Canada	31/03/23
Playground designer 4 (D4)	The Netherlands	05/04/23
Playground designer 5 (D5)	The Netherlands	07/04/23
Playground designer 6 (D6)	The Netherlands	07/04/23

Table 1: Table with interviewees, the location they are based in, and the dates the interviews were conducted

Figure 4, depicts the steps for the data analysis. First, deductive codes were identified from the theoretical framework. Second, interviewing and transcribing were carried out. Third, inductive codes were discovered in the interviews. Fourth, the coding tree was constructed from both inductive and deductive codes (Appendix B). Lastly, quotes were highlighted from the transcripts and linked to these codes.
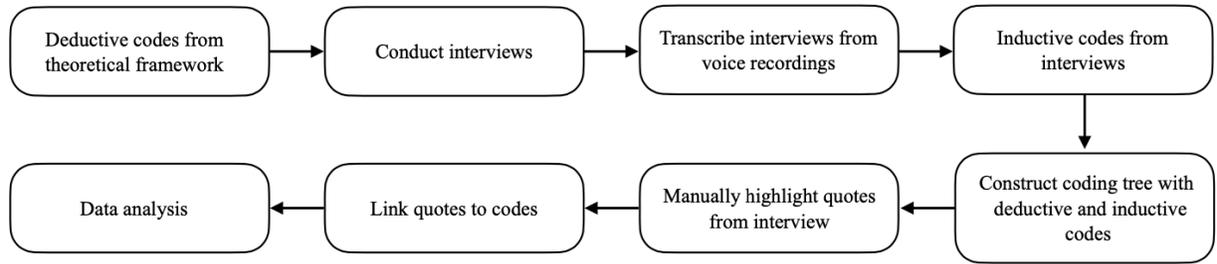
Figure 4: Data analysis scheme

3.2. Ethical considerations

Informed verbal consent and transparency to interview and record respondents were stressed before recording the interviewee in the introduction of the call (KNAW *et al.*, 2018). All interviews that were reported upon agreed to be recorded. The interviews remained anonymous as any identifiable information about the respondent was removed. The recordings of the interviews were honest and there was no manipulation of the responses. With regard to secure data management, the audio files and transcripts were stored in multiple locations, on the cloud and laptop. The interviewer was aware that it was probable that there was a language barrier between them and the respondent. The interviewees had the freedom to use terms in different languages that were later translated or collectively found an English word to communicate their thought.

4. Results on the inclusivity of play environments

This chapter presents the results from the interviews with the NGOs and playground designers on the social environment and design strategies for inclusive playgrounds. The results from the interviewees are cited in the text through a combination of letters and numbers (Table 1). Such outcomes are enriched by academic literature from the theoretical framework. However, this thesis delves further into the physical and social characteristics of playgrounds that were not researched in much depth in previous research.

4.1. Perspectives on children with disabilities

Collectively, all interviewees, NGO respondents and playground designers stated that there is no simple definition for children with disabilities. It is part of a spectrum and is not quantifiable. This is in line with Burke (2013) who states that disabilities may be visual such as being blind, auditive which relates to hearing problems, physical impairments with or without tools such as wheelchairs, and social impairments. The NGO interviewees' perspective on children with disabilities emphasized that these children are just like any other child, all have creativity, imagination, and the right to play. However, mentioned that they may require different needs and focus (O1, O2). While playground designers repeatedly mentioned specific physical or mental disadvantages, for example, when regarding play equipment there was a focus on wheelchair users or deaf or blind children. Further, social isolation in playgrounds was an identified struggle for children with disabilities (D5).

In addition, the interest of children with disabilities in playgrounds was not constrained to one specific play equipment. D5 stated that there are different preferences for each disability and individual. Stanton-Chapman and Schmidt, (2017) confirm it is challenging to accommodate the range of ages, skills,

and interests of all children. The following questions were suggested by O1 to identify a child's interest in play, "What are their needs, what can you do about it, and how can you play with them?".

4.2. Inclusive play environment for children with disabilities

Playground inclusivity was defined during the interviews since the definitions in the theoretical framework did not specifically include children with disabilities. Both the NGO interviewees and playground designers defined such similarly. The NGO respondents explained such environments as a place for everyone, where all are welcome and able to play without making the child's disability obvious (O1, O3). Inclusive playgrounds do not need to be one hundred percent inclusive, however, they require changes with regard to an activity's difficulty or adding different types of equipment to ensure everyone can participate (O1). Inclusivity highlights accessibility which is achieved through different types of play and combines social and physical activity (D2). Similarly, the playground designers reflected inclusivity as a place where children of all ages, with and without a disability can play together and learn from each other (D2, D3, D5, D6). An ideal playground allows a child to forget about their disability from the moment they step in (D3). Creating separation with equipment for children with disabilities discourages play and interactions between children (D3, D5). Further, play that is challenging allows for a child's personal development (D2, D4, D6). This is in line with the study of Fasting (2019) as challenges in play environments are essential for personal development. Inclusivity enables children to work with their own disabilities and provide challenges (D2).

Further, D3 defines outdoor play as an environment that focuses on physical development and a place where one learns about their surroundings. This resonates with the study by van Engelen *et al.*, (2021) which highlights the importance of learning within such environments, such as taking risks, pushing one's limits, interacting with peers, and understanding social norms. Inclusivity was a concept that was linked to social interactions (D3, O2). Moreover, playgrounds have visions and may depict storytelling, enabling children to use their imagination and creativity (O3, D3, D4). Correspondingly, Woolley *et al.*, (2005) portray an inclusive playground as one with highly imaginative content. Overall, inclusive play environments consist of such main findings, an area where learning and challenging opportunities are present, there is potential to interact socially and use one's imagination.

4.3. Social environment of playgrounds as a key factor for inclusivity

The interviewees perceived a social environment as an essential factor for inclusive play and shaped by the following, a lack of awareness and skill of abled people to communicate with children with disabilities, the presence of parents, the presence of other children, and emotions. O3 highlighted that a social environment should eliminate bullying and encourage children to grow up together instead of creating separation. Similarly, separation occurs when children with disabilities attend special education and study in different schools than children from their neighborhood.

A lack of awareness and skill of abled people to communicate with children with disabilities was emphasized to restrict the potential for social interactions and play for children with disabilities (SamenSpeelNetwerk, n.d.a). It is difficult to understand the struggles of children with disabilities making it important to educate oneself and increase awareness of ways to interact (D4). One needs to find their own limits which is another form of educating oneself (D2). Walking in the playground with a blindfold or entering with a wheelchair enables one to widen their understanding and step into the shoes of children with disabilities (O3). Children with disabilities often struggle to process the meaning of words resulting in miscommunication between themselves and others (O1).

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The influence of parents in playgrounds was raised by all interviewees. Having a parent or supervisor in close proximity is common. There is a need to form a trusting relationship between the child and the parent (O1). However, a parent can either be supportive, protective, or controlling. A parent may have the fear of their child being bullied as other children are not aware of the ways to interact with their child (O3). A protective parent can inhibit a child's learning process. It is important for a child to fall and stand up independently and experience play at varying heights (D4, D5). This aligns with Barron *et al.*, (2017) conveying that parents either facilitate the child's play or are protective and restrict independence. Parents can also provide help, participate in play with their child and bring children together to encourage inclusivity (D3). There is an importance for social control in playgrounds, a space between the child and the parent, however, the parent is close for when help when needed (D2). This space is created through a change of surface material (Figure 5). As the child walks over one surface and changes to another surface there is a feeling of distance (D2).

Figure 5: Playground in Hillegom, Lisse and Teylingen with different surface materials between the play equipment and bench area (Speelplan, 2023a)

Playgrounds are areas where children come to and create a community (Broberg, Kyttä and Fagerholm, 2013). O1 highlighted that children are resilient and learn fast, for example when a child with a disability cannot follow the same rules as the other children, they seem to quickly understand and adapt. In comparison, D3 mentioned that not every child can be apathetic. Children can be too nurturing which results in inconsiderate behaviors (D4). As children are not used to playing or interacting with children with disabilities bullying may occur or fear to communicate (O3). Discrimination and negative social attitudes lead to false assumptions about the child's disability (Stanton-Chapman and Schmidt, 2017). Moreover, children with disabilities commonly go to schools for special needs which are located in different parts of the city, resulting in social isolation and minimal to no friends from the child's neighborhood itself (O2, O3). Lastly, the playground designers suggested designing with levels, encouraging children to see each other in the eyes by standing or sitting together (D2, D3). These levels need to be accessible, if not the child feels left out.

A concept that rose within the interviews was emotions. This was more intensely commented on by the NGO interviewees in comparison to the playground designers. Some children experience fear when playing around children with disabilities. It is a fear of doing or saying something wrong (O1). Fear escalates when one believes they are using the play equipment in the wrong manner (Barron *et al.*, 2017). Children with disabilities feel lonely as they cannot always participate, they end up watching rather than playing together or using the same equipment. Having too many incentives or having difficulty communicating with other children are seen as mental barriers (O3). D2 suggested incorporating levels where children can climb, or stand higher which allows them to observe, providing comfort for the child. This resonates with the study of James *et al.*, (2022) as observation in playgrounds promotes

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opportunities for social interactions. Similarly, observation points where children are encouraged to watch others play enable a comforting environment (Burke, 2013).

4.4. Strategies for the inclusive design of playgrounds and their surroundings

This section identifies physical characteristics and design strategies for inclusive playgrounds and their surroundings. It is based on struggles that the interviewees perceive children with disabilities experience in play environments. These were categorized and coded into the surrounding, the municipality's role, the layout of the playground, costs, and the design characteristics of playground equipment (Appendix B).

4.4.1. Criteria for the surrounding environment

The concept of the surroundings was directly linked to the accessibility of the playground, which is the reachability to the child and their family. With regard to entrances to the play environment, it needs to be easy, if not the child experiences difficulty without using any of the equipment (D2). Central or main entrances provide a distinctive path and a common route (D6, D4). Such spacious entrances to playgrounds enhance social interactions (Burke, 2013). Additionally, there is an importance for consistency in the surface material for the paths (D2). The implementation of ramps to and from equipment such as in Figure 6 eases use for wheelchair users. Similarly, wider paths above 1.8 meters ease usage (D3). This aligns with the study of Askew, (2019) which portrayed accessibility in playgrounds as a minimum number of steps, maximal leveled access, level curbs, and wide stairs and routes for maneuvering with wheelchairs. O3 stated that eliminating curbs, implementing hard surfaces, and coordinating the placement of playground equipment increases accessibility.

Figure 6: Play equipment with ramp in Katschiplaan in the Hauge (Yalp, n.d.)

The surrounding is additionally identified through the availability of parking. A limited number of parking for handicapped vehicles raise concerns (Stanton-Chapman and Schmidt, 2017). Often there is limited space to park a car or bike along with minimal space to get in and out of the vehicle (D2). Lastly, playgrounds near busy roads or highways limit accessibility (O2). Overall, accessibility in the surrounding environment of playgrounds is achieved through central entrances, consistent material for surfaces, widening paths and implementing ramps, and availability of parking.

Some interviews put forward the role of the municipality. As playgrounds are located within neighborhoods, the municipality should include the neighborhood's residents and children in the decision-making process to design for the children's interests (O3). There is a lack of knowledge on the

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impact certain decisions of municipalities have on families when not including inclusive play equipment (O1). Similarly, D4 emphasized that the decision-makers are not the end users of the playground. This resonates with the study of van Melik and Althuizen, (2022) which emphasized the need for open communication between municipalities and potential stakeholders such as families, schools, and NGOs.

4.4.2. Modified play equipment

The following section reports on the physical characteristics of playgrounds and universal design by discussing the layout of the play equipment, cost, nature, surfaces, and types of play equipment. Such findings stand out; the layout of play equipment needs quiet areas, strict routing, and opportunities for observation. In addition, nature promotes sensorimotor play and social interactions. Bird's nest swings and spider nets are inclusive types of play equipment. Lastly, ground-level activities, closed spaces to hide, and poles scattered around for rest promote usage by children with disabilities.

With regards to the layout of play equipment, D1 states that the isolation of children with disabilities is caused when equipment is placed away from the main attraction or guarded by a fence (Figure 7). Both the NGOs and the playground designers emphasized the importance of quiet and active areas. A quiet place consists of picnic benches or open spaces, seen as resting points (O1, O3). This distinction between resting and play areas is typically separated by different surfaces or paths which create buffers (D2). Less structured play such as sitting, watching, talking, and walking strengthens inclusive playgrounds (Woolley *et al.*, 2005). Clear routes indicate where children can play together but also on their own (D4). Similarly, D3 comments on strict routing as providing a safe haven for children, highlighting resting and entrance points. A safe haven area makes the playground observable, where children can oversee the different play opportunities, and identify the highly programmed, the social, and the wandering around areas. Such results are provided in greater depth than in the literature. Although, the study of James *et al.*, (2022) suggests that placing swings on the outskirts allows children to observe the main and social play equipment in the center.

Figure 7: Swing for wheelchair users surrounded by a fence (Rhinoplay, n.d.)

The interviews differentiated between the playground designers and NGO interviewees with regard to the discussions on cost. The designers considered the interests of children with disabilities when the client or budget made it possible. The NGO interviewees did not discuss costs for designing or constructing playgrounds while the designers had a cost-technical point of view. Play equipment for children with disabilities is more expensive, limiting inclusive play to the availability of budget or clients' requests (D1, D2, D3, D6).

The following topics were highlighted for modified play equipment, nature, and surfaces. Nature brings everybody together, connecting children through simplicity (D1). Elements such as water and sand were seen as interactive and inclusive. For example, sandboxes or water taps where water flows in designated routes such as in Figure 8, encourage playing together (D3, D5, O1, O3). Similarly, Stanton-Chapman and Schmidt, (2017) described sand as limiting mobility for wheelchair users or children with cognitive impairments, however, indicated the effectiveness of sandboxes as they call attention to sensorimotor play. Lastly, solid surfaces were greatly discussed in the interviews. Loose-fill surface materials such as wood chips and sand are not accessible for wheelchairs. The designers recommended using unitary materials such as rubber, engineered wood fibers, artificial grass, and flat surfaces (D1, D3). In contrast, van Engelen *et al.*, (2021) stated that the use of grass may result in physical inaccessibility.

Figure 8: Water play equipment in the Kitskensberg playground in Limburg (SamenSpeelNetwerk, n.d.c)

As disabilities vary, it is challenging to create playground equipment that suits all abilities. However, it is important to stimulate a child's imagination and provide a challenge (O3, D3). Figure 6 depicts that equipment can be modified and made accessible for wheelchair users by adding a ramp (O1, D3, D4, D6). In addition, in Figure 9, a piece of play equipment that was repeatedly recommended by the interviewees was a bird's nest swing (O1, D2, D5, D6). This aligns with the study of Anderson, (2022) which states that as the child sits on top of the net another child or person could swing them, resulting in swinging motions that do not require the child to operate the equipment independently. Another play equipment is a spider net, it similarly allows the child to move freely due to the movement of others on the net (Figure 10). Further promoting non-verbal interactions between the users (D3). In addition, a swing specifically for a child with disabilities was suggested (Figure 7). These adaptive swings allow children with wheelchairs to transfer into the swing with ease through the addition of ramps. It was emphasized that such swings should be placed next to a row of ordinary swings in order to limit social exclusion (D1). Carousels and spinners can also be modified for wheelchair users.

Figure 9: Bird's nest swing (Earthscape, n.d.)
Figure 10: A net play equipment in Kiwanis Park in London, Ontario (Earthscape, 2021b)

Moreover, playground equipment may have height differences or levels. Wheelchair users struggle to use hills or floating surfaces which suggests not creating steep hills. Ground-level activities, maximum heights of 1.5 meters, or table height activities are recommended (D1, D2, D3, D5, D6). However, this contradicts the study by Stanton-Chapman and Schmidt, (2017) which concluded that ground-level activities are boring for children with disabilities. Moreover, a transfer bench eases the movement from a wheelchair onto a piece of equipment (D3). Handles may be placed for better support (Figure 11). A transfer bench was not reported upon in previous literature.

Figure 11: Transfer bench on a hill in Kiwanis Park in London, Ontario (Earthscape, 2021a)

Play for children with disabilities does not only refer to wheelchair users. Blind children or ones with autism were discussed further by playground designers. Children with autism may need to hide, D5 recommended small rooms or closed spaces within the playground that do not require them to be in the open. Furthermore, poles scattered such as in Figure 12 allow blind children and others to grab them and have a moment of rest, by catching their breath, listening, or observing their surroundings (D2). D4 introduced play equipment that incorporates braille and simultaneously teaches other children the language through the play. Moreover, a contrast between the colors used, such as dark wood with yellow accents makes it easier for people with visual disabilities. To keep a play environment calm D2 emphasizes the usage of organic forms and limiting colors and materials. Comparably, a barrier for visual disabilities is when playgrounds lack visual markings (Barron *et al.*, 2017).

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Figure 12: Playground with scattered poles in Zaandam (Speelplan, 2023b)

The following are the main findings on the strategies for the inclusive design of playgrounds and their surroundings. There is a need for quiet areas, strict routing, and opportunities for observation. In addition, water and sand highlight sensorimotor play and encourage interactions. The interviewees suggested solid surfaces such as rubber and engineered wood fiber. The playground designers reported that inclusive play is incorporated when the budget is available or upon clients' requests. Inclusive types of play equipment are bird's nest swings, spider nets, and swings and carousels that are modified for wheelchair users. Further, ground or table-level activities and transfer benches promote usage by children with disabilities. Lastly, closed spaces to hide, poles scattered around for rest, and the use of contrasting colors encourage a comforting environment.

5. Conclusion

5.1. Main findings

This study investigates how the inclusive design of playgrounds and their surroundings can promote the potential for social inclusion of children with disabilities. Alongside the innovative conceptual model and theoretical framework, semi-structured interviews were conducted with NGO interviewees and playground designers to analyze the inclusivity in play environments. The subcomponent in the conceptual model, interactive play equipment could further be enriched by exploring specific examples of such play equipment and their influence on social interactions. The role of the parent could be added to the subcomponents of the potential to have social interactions with other children as it was greatly commented on by the interviewees.

The findings show that this inclusivity is directly linked to social interactions of playing and learning together (Barron *et al.*, 2017). With regard to a playground's social environment, it can be concluded that a child with disabilities is restricted from social interactions when others lack the awareness and skill to communicate with children with disabilities. Other hampering factors are parents who are overprotective and other children fearing to wrongly interact with these children. A suggested solution for interacting with others was to design with levels as it encourages children to see each other in the eyes. Similarly, James *et al.*, (2022) suggest incorporating levels as they allow children to observe and feel comfort.

Through the technical lens of designing playgrounds, a piece of equipment is commonly modified for wheelchairs. The playground designers take into account the interests of children with disabilities in the

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design process when the budget is made available. In addition, promoting accessibility for children with disabilities was highlighted by implementing one central and wide entrance, adding and widening parking spots for bikes and motorized vehicles, and widening paths (Askew, 2019). On top of that, there is a need to modify play equipment with ramps and incorporate bird's nest swings, spider nets, transfer benches, and ground-level activities to promote social inclusion. There is importance for quiet and active areas which enables children to observe others, rest or participate in play. Poles positioned around the playground encourage such observation points (Burke, 2013). Play equipment that emphasizes nature was seen to bring children together and connect through simplicity. Similar findings by Stanton-Chapman and Schmidt, (2017) convey nature as sensorimotor play. The recommended surfaces for children with disabilities were rubber, engineered wood fibers, artificial grass, and solid and flat surfaces. Further, organic forms and limited use of colors provide a comforting environment. Lastly, the social inclusion of children with disabilities is achieved by not separating specific play equipment for children with disabilities from ordinary equipment.

5.2. Reflection on the methodology

The expert interviews provided in-depth insight into the inclusiveness of playgrounds and identified each interviewee's perspective. The level of responses from the interviewees was detailed, as experts were asked to discuss aspects within their field of expertise, enabling thoughtful and dynamic interviews. A weakness is that the results may not be robust as children with disabilities were seen as a complex subject of study. Disabilities were generalized and the thesis did not solely study one specific disability. However, this thesis provides a wider perspective and awareness of the struggles of children with disabilities in playgrounds, in addition to studying this with interviews from different fields and countries. The parents' and children's perspectives on the perceived inclusiveness of playgrounds are underrepresented in this study. Further, observational studies would allow to directly study the physical environment and focus on specific playground examples. With regard to the geographical representativeness of the study, interviewees were selected from various countries and primarily represented Northern and Western Europe with an expectation of Canada. Solely selecting interviewees from the same region would enable to conclude on the perceptions of interviewees from that region rather than generalize.

5.3. Suggestions for future research

As children with disabilities have different disabilities their needs are not necessarily represented. Their interests should further be delved into and understood. This could be completed by directly interviewing children or their parents on their interests in playgrounds. However, to continue the current research of this paper a dialogue between the NGO interviewee and the playground designers could portray their difference in perceptions of children's interests. First, the NGO respondents would be interviewed where definitions and insight into children with disabilities in play environments will be reported on. Second, these responses would be conveyed in the interviews with the designers. They would provide technical solutions for the children's interests based on the insight provided by the initial interviews with the NGOs. Moreover, the interviewees reported that children with disabilities study in special needs schools that are not in their neighborhood. It is important to explore the effect of studying in special need school in different cities on the strength of the friendships within the neighborhood of residence of the child with disabilities.

Lastly, this thesis has importance for influencing the planning practice. There is a need to prioritize inclusiveness for children with disabilities by introducing stringent requirements for universal design and accessibility. Further, stimulate discussions on the awareness of the struggles and needs of children with

disabilities with regard to play and social opportunities. There is a need to allocate greater budgets for inclusive play environments. In addition to encouraging active participation by incorporating children with disabilities and their parents in public decision-making along with collaborating with various stakeholders such as NGOs and playground designers.

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8. Appendices

Appendix A: Interview guides for NGO interviewees and playground designers

Questions	Link to theoretical framework	References
Introduction Questions:		
Could you please explain your role in this organization?	Provides insight on the role and position of the interviewee.	
What does this organization stand for?	Further explores the aim of the NGO and the aim and beliefs of the interviewee within the NGO.	
Definition Questions:		
How would you define children with disabilities?	As disabilities vary along a spectrum, this questions aims to direct to the interviewee's view and understanding of disabilities.	Burke (2013)
What struggles come to mind when thinking about children with disabilities in play environments?	Here the interviewee conveys their understanding of the struggles of children with disabilities in play environments which may differ for the type of disability that is mentioned.	Stanton-Chapman and Schmidt (2017), Broberg, Kyttä and Fagerholm, (2013), Woolley et al., (2005), Barron *et al.*, (2017), van Engelen *et al.*, (2021), Burke, (2013)
How would you define inclusive play environments?	This question provides a definition for the interviewee's perspective on inclusive play which could differ between the specialisation of the NGO.	van Engelen *et al.*, (2021), Woolley *et al.*, (2005)
Are there any specific playground examples or projects that come to mind with regard to inclusivity and children with disabilities?	Through photos and examples there is a greater understanding and support to what inclusivity means to the interviewee, this further provides examples that could be used throughout the thesis.	Askew (2019), James et al., (2022), Barron *et al.*, (2017)
What are the interests of the children you are in contact with, with regard to playgrounds?	As these NGOs directly aim to improve the lives of children with disabilities and are in contact with them through initiatives, the interviewee's perspective on the personal needs of these children is portrayed.	Stanton-Chapman, T.L. and Schmidt, E.L. (2017), Woolley et al., (2005)
Playground and Surrounding Questions:		
What playground characteristics limit children with disabilities to participate in social interactions in playgrounds?	This questions delves into the view of the interviewee with regard to questioning if they see a relationship or effect between social interactions and play design for children with disabilities.	Stanton-Chapman and Schmidt (2017), Broberg, Kyttä and Fagerholm, (2013), Woolley et al., (2005), Barron *et al.*, (2017), van Engelen *et al.*, (2021), Burke, (2013), James et al., (2022)
From your awareness of playgrounds, do you have any solutions for improving the surroundings (such as routing and accessibility), environment, or play equipment?	As this thesis is written within a Spatial Planning and Design undergraduate, emphasis is given to the surroundings of playgrounds as there is a need to understand the larger environment and its direct effect on the play and interactions of children.	Askew (2019), Burke (2013), Stanton-Chapman and Schmidt, (2017), Van Melik and Althuizen, (2022)
What are ways to create a comfortable social environment for children with disabilities?	The aim of this question is to understand the ways to improve the social environment for children with disabilities and if this overlaps with the design solutions for play environments and their surroundings.	Stanton-Chapman and Schmidt (2017), Broberg, Kyttä and Fagerholm, (2013), Woolley et al., (2005), Barron *et al.*, (2017), van Engelen *et al.*, (2021), Burke, (2013), James et al., (2022)
Closing Questions:		
Any additional thoughts that you feel were not raised?	Allows for additional comments or questions to close the interview respectfully.	

Table 2: Interview guide for NGOs and links to the theoretical framework

Questions	Link to theoretical framework	References
Introduction Questions:		
Could you please explain your role in this company?	Provides insight on the role and position of the interviewee.	
What does this company stand for?	Further explores the aim of the company and the aims and beliefs of the interviewee within the company.	
Definition Questions:		
How would you define children with disabilities?	As disabilities vary along a spectrum, this questions aims to direct to the interviewee's view and understanding of disabilities.	Burke (2013)
How would you define inclusive play environments?	This question provides a definition for the interviewee's perspective on inclusive play which could differ between designers.	van Engelen *et al.*, (2021), Woolley *et al.*, (2005)
Are there any specific playground examples or projects that come to mind with regard to inclusivity and children with disabilities?	Through photos and examples there is a greater understanding and support to what inclusivity means to the interviewee, this further provides examples that could be used throughout the thesis.	Askew (2019), James et al., (2022), Barron *et al.*, (2017)
What struggles come to mind when thinking about children with disabilities in play environments?	Here the interviewee conveys their understanding of the struggles of children with disabilities in play environments which may differ for the type of disability that is mentioned.	Stanton-Chapman and Schmidt (2017), Broberg, Kyttä and Fagerholm, (2013), Woolley et al., (2005), Barron *et al.*, (2017), van Engelen *et al.*, (2021), Burke, (2013)
How would you reduce these struggles for children with disabilities in playgrounds?	This is a follow up question for the one prior and through a designer's perspective immediate solutions are provided for the struggles mentioned beforehand.	Askew (2019), Stanton-Chapman, T.L. and Schmidt, E.L. (2017), Barron *et al.*, (2017)
Playground and Surrounding Questions:		
When designing playgrounds how do you consider children's interests, is there a focus on ones with disabilities? How so?	Each designer has their own process for designing and this question explores this and enables to understand if or when children's interests come into the design decisions.	Stanton-Chapman, T.L. and Schmidt, E.L. (2017), Woolley et al., (2005)
What playground characteristics do you believe limit children with disabilities from participating in social interactions in playgrounds?	This questions delves into the view of the interviewee with regard to questioning if they see a relationship or effect between social interactions and play design for children with disabilities.	Stanton-Chapman and Schmidt (2017), Broberg, Kyttä and Fagerholm, (2013), Woolley et al., (2005), Barron *et al.*, (2017), van Engelen *et al.*, (2021), Burke, (2013), James et al., (2022)
What are design features within playgrounds that you see as increasing the usage by children with disabilities?	This directly emphasises the physical design elements of playgrounds and the specialism of the designer. Their answers may vary in regard to their experience in the field.	Askew (2019), Burke (2013), Stanton-Chapman and Schmidt, (2017), Van Melik and Althuizen, (2022)
What are design features within the surroundings (such as routing or accessibility) of playgrounds that you see as increasing the usage by children with disabilities?	As this thesis is written within a Spatial Planning and Design undergraduate, emphasis is given to the surroundings of playgrounds as there is a need to understand the larger environment and its direct effect on the play and interactions of children.	Askew (2019), Burke (2013), Stanton-Chapman and Schmidt, (2017), Van Melik and Althuizen, (2022)

What are ways to create a comfortable social environment for children with disabilities?	The aim of this question is to understand the ways to improve the social environment for children with disabilities and if this overlaps with the design solutions for play environments and their surroundings.	Stanton-Chapman and Schmidt (2017), Broberg, Kyttä and Fagerholm, (2013), Woolley et al., (2005), Barron *et al.*, (2017), van Engelen *et al.*, (2021), Burke, (2013), James et al., (2022)
Closing Questions:		
Any additional thoughts that you feel were not raised?	Allows for additional comments or questions to close the interview respectfully.	

Table 3: Interview guide for playground designers and links to the theoretical framework

Appendix B: Coding tree for the data analysis
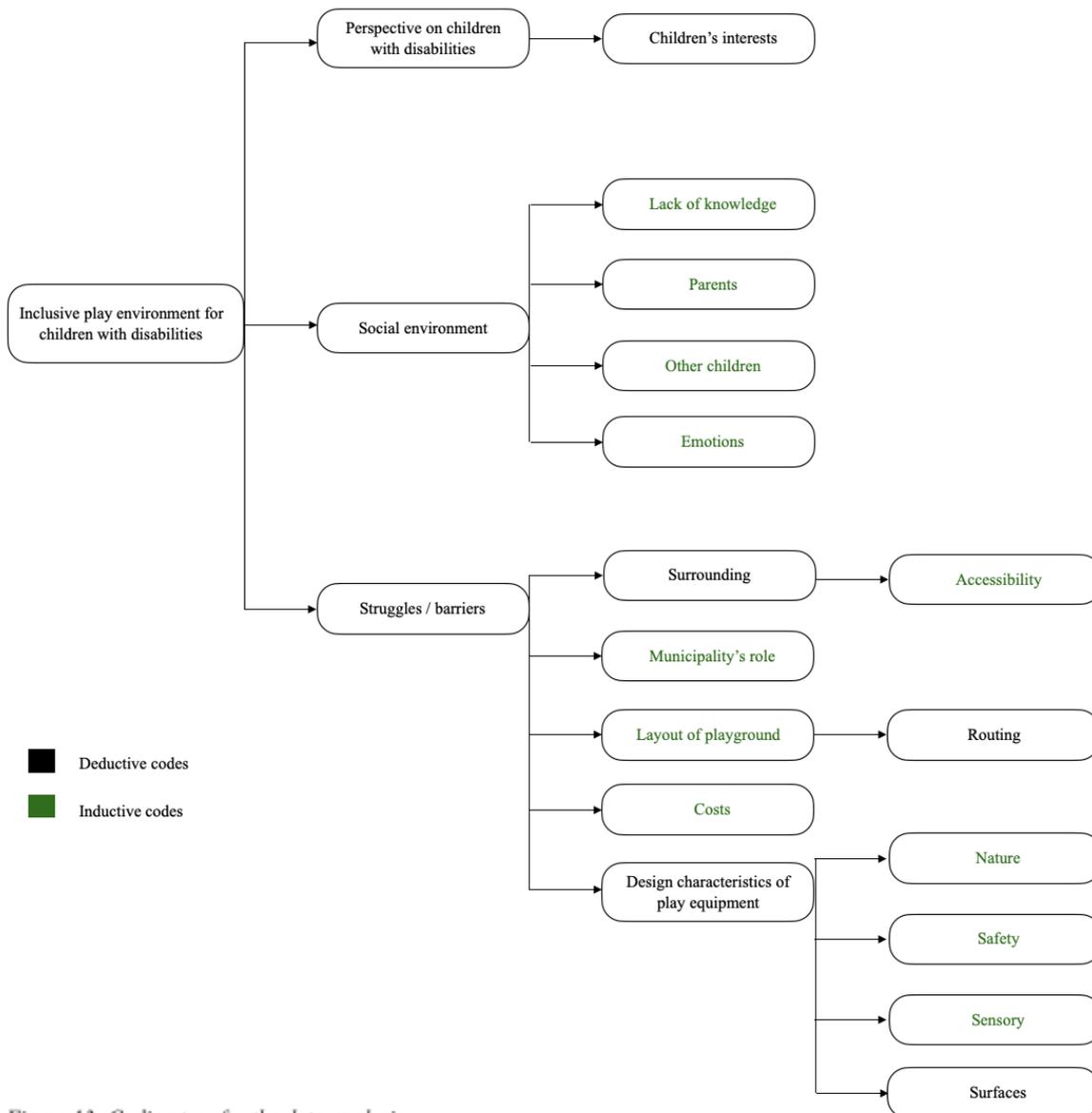
Figure 13: Coding tree for the data analysis