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EVIDENCE-BASED PRACTICES FOR THE DESIGN OF INCLUSIVE
PLAYGROUNDS THAT SUPPORT PEER INTERACTIONS
AMONG CHILDREN WITH ALL ABILITIES

by

Courtney L. Fernelius

A thesis submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF LANDSCAPE ARCHITECTURE

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2017

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ABSTRACT

Evidence-Based Practices for the Design of Inclusive Playgrounds that Support
Peer Interactions Among Children with All Abilities

by

Courtney L. Fernelius, Master of Landscape Architecture

Utah State University, 2017

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Department: Landscape Architecture and Environmental Planning

Play is necessary for the social, emotional, intellectual, and physical development of all children. Although playgrounds are designed to support the play of children, children with disabilities are often unable to fully participate in play on playgrounds. As a result, children with disabilities experience fewer opportunities to participate in play, and hence have fewer developmental opportunities. Because of the lack of awareness of evidence-based practices supporting the play of children with disabilities, playground designers continue to perpetuate this disparity. Therefore, the purpose of this study was to determine the evidence-based practices for inclusive playground design that support peer interaction between children of all abilities, and to demonstrate how they can be implemented into a playground design.

Through a systematic literature review and design implementation, 10 evidence-based practices of inclusive playground design were determined and then implemented

into a playground design located on the Utah State University campus. The design for this inclusive playground was evaluated, analyzing the ease and difficulty of including each of the 10 practices of inclusive playground design.

The results of this study provide designers with a concise list of 10 practices that, if implemented, should create an inclusive playground setting. These practices also have research-based evidence to support their effectiveness in facilitating peer interactions between children of all abilities. As our society strives to make various environments and built structures more inclusive, the results of this study provide a helpful resource to guide designers, administrators, businesses, city councils, and many more organizations in their work to create inclusive playgrounds.

(79 pages)

PUBLIC ABSTRACT

Evidence-Based Practices for the Design of Inclusive Playgrounds that Support Peer Interactions Among Children with All Abilities

Courtney L. Fernelius

Play is necessary for the social, emotional, intellectual, and physical development of all children. Although playgrounds are designed to support the play of children, children with disabilities are often unable to fully participate in play on playgrounds. In part due to the lack of awareness of evidence-based practices supporting the play of children with disabilities, playground designers continue to perpetuate this disparity. Therefore, the purpose of this study was to determine the evidence-based practices for inclusive playground design that support peer interaction between children of all abilities, and to demonstrate how they can be implemented into a playground design.

A systematic review was completed in order to find evidence-based practices for playground designs that support play for children with disabilities. The systematic review evaluated and synthesized all current literature and provided a summary to answer the research question, ‘what evidence-based practices for playground design support play for children with disabilities?’ The design process was also used in this study to describe how the findings from the systematic review were implemented into the design of an inclusive playground.

This research found 22 identified studies from which 10 evidence-based practices of playground design that support play for children with disabilities were determined.

These 10 practices are; circular playground design that links activities to complementary activities; playground equipment designed as common and recognizable objects; loose parts on the playground such as various props for imaginative play, play houses and tables, sporting equipment, sand toys, musical instruments, and water play opportunities; accessible surfacing and sufficient space for maneuvering between and on pieces of equipment; equal amounts of elevated and ground level components for gathering in groups, and more ramps or transfer systems to access elevated components; multi-niche settings (equipment/activities that require more than one child to operate or play); equipment that provides appropriate levels of challenge and risk for children of all abilities; observation points or “jump in points;” comfortable or “cozy” places, often created by enclosed areas or pieces of equipment; and sensory stimulus activities and visual or tactile cues throughout playground.

The evaluation of the inclusive playground design found, that while certain of the 10 practices were easier to implement than others, all of them could be implemented given adequate consideration and use of creative design solutions. As our society strives to make various environments and built structures more inclusive, the results of this study provide a helpful resource to guide designers, administrators, businesses, city councils, and many more organizations in their work to create inclusive playgrounds.

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Courtney L. Fernelius

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CHAPTER I

INTRODUCTION

Background

Peer relationships are important for the development of all children, with or without disabilities. Further, opportunities to develop relationships through peer interactions are particularly important for children with disabilities (Ginsburg, 2007). Playgrounds are designed to support peer interactions between children (Yuill, Strieth, Roake, Aspden, & Todd, 2007). However, typical playgrounds may not support the peer interactions of children with disabilities (Prellwitz, 2007). While inclusive playground design practices are intended to increase the peer interactions of children with disabilities, there is little evidence to support this claim. Likewise, there are very few evidence-based guidelines that clearly articulate what design elements make a playground inclusive (Moore & Lynch, 2015). Therefore, the purpose of this study was to determine the evidence-based practices for inclusive playground design that support peer interaction between children of all abilities, and to demonstrate how they can be implemented into a playground design.

Importance of Peer Relationships

Peer relationships play an essential role in the social, emotional, and intellectual development of all children (Ginsburg, 2007). Children develop healthy peer relationships as they interact with one another in various activities. Through their

interactions, they learn how to respect, care about, and support each other as well as develop various other skills needed to successfully function in a community (Loy & Dattilo, 2000). Peer interactions have been proven to be the most effective way to achieve these benefits. Research shows that poor peer relationships in childhood are among the most powerful predictors of social and emotional problems in adolescence and adulthood (Parker, Rubin, Erath, Wojslawowicz, & Buskirk, 2006). In much of his work, Vygotsky indicated that peer interactions were key to the cognitive development of children (McLoed, 2007). Thus, the need for facilitating peer interactions between all children is strongly supported.

Peer Relationships of Children with Disabilities

Meaningful peer relationships are just as necessary for children with disabilities, who often lack the opportunity or encouragement of peer interactions within everyday settings (Cheung, 1989; Locke, Ishijima, Kasari, & London, 2010). Theoretical, empirical, and ethical rationales emphasize the benefits that children with disabilities receive from interacting with their typically developing peers (Hestenes & Carroll, 2000). It is difficult to say in what way deprivation of peer interactions during play can harm the development of a child with disabilities, but the development acquired through healthy peer relationships is equally important for children with disabilities (Prellwitz & Skär, 2007). Sadly, instances of quality peer interactions are often lacking since children with developmental disabilities typically struggle interacting with their peers due to physical and social barriers (Loy & Dattilo, 2000). These barriers are compounded, as many

environments are not built to include children with disabilities or to accommodate their needs, forcing them to interact primarily with adult caregivers rather than with their peers. Despite the physical and social barriers which children with disabilities face, providing opportunities for effective interactions with their peers is essential in fostering healthy development (Woolley, Armitage, Bishop, Curtis, & Ginsborg, 2006).

Playgrounds Support Peer Interactions

Playgrounds represent an important space where children are able to congregate in groups, often with limited adult supervision, and play with their peers (Yantzi, Young, & Mckeever, 2010). These opportunities for playful peer interactions support the development of various aspects of a child's character and personality that will help him/her to successfully function in society as s/he grows and matures. Consequently, participating fully in playground activities has wide-reaching effects that extend beyond the play environment and beyond childhood (Yantzi et al., 2010). Research has recognized that the design of playgrounds may influence the amount and quality of interactive play between children (Kodjebacheva, 2008).

Playgrounds can facilitate peer interactions, not only through communication, but also through the physical and cognitive activities available. For example, certain toys and play equipment can result in more independent and isolated play, whereas others can result in the likelihood of more interactions with peers, such as slides, sandboxes, and large toys that are designed for several children to use together. These elements facilitate interactions between peers because they allow children to engage in associative and

cooperative play (Buckley, 2012). Consequently, playground time is valued in education as a means of fostering crucial peer interactions (Yuill et al., 2007). Supporting studies have suggested that outdoor playground settings promote almost twice as much peer interactions than do indoor play settings. Furthermore, similar research found that children interacted more with their peers than with adults on the outdoor playground setting than in the indoor play setting (Buckley, 2012; Cheung, 1989). This could be due to the fact that on the playground children have more freedom and spontaneity to select and structure their own activities as well as to choose the peers with whom they interact (Barbour, 1999; Clements, 2004; Malone & Tranter, 2003). Thus, the playground, as a built environment, is an integral element in promoting interactions between children (Yantzi et al., 2010).

Shortcomings of the Traditional Playground

Despite the increasing evidence supporting the benefits of peer interactions for children with disabilities, and the positive effect that playgrounds have on the instances of peer interactions (Guralnick, 1978), children with disabilities continue to describe playgrounds as environments where they experience tremendous exclusion (Yantzi et al., 2010). In studies interviewing children with disabilities about their perception of playgrounds, many remarked that they have felt excluded at playgrounds, often feeling like spectators, watching other children play and interact, but not being able to participate themselves (Prellwitz, 2007). Children with disabilities feel this lack of inclusion on playgrounds due to their decreased ability to use the available equipment and materials

and to engage in playground activities (Barbour, 1999; Woolley et al., 2006). If a child cannot successfully access or use a piece of equipment, or if they have a perceived lack of ability due to the structure of the environment, then s/he will not engage in activities on the playground, nor will the child interact with his/her peers playing on the playground (Barbour, 1999; Missiuna, Rivard, & Pollock, 2004).

Regulatory design guidelines establish a minimum standard of accessibility for playground design. However, most designers tend to only follow the base minimum, which is often not even adequate enough to provide necessary accessibility. A playground that provides opportunities for children of all abilities to physically approach the play activities is deemed “accessible.” In an *accessible* environment as many physical barriers are removed as possible, creating a space where a person with a disability can enter and physically access the components within. However, playgrounds not only provide physical opportunities for play, but also social opportunities (Meneer, Smith, & Lanier, 2006; Tamm & Prellwitz, 1999). Removing the physical barriers to play does not necessarily mean the social barriers are removed as well (Christensen, 2001). Thus, making an environment accessible does not always address the wide spectrum of disabilities that are prevalent today, including mental, visual, auditory, and physical. An *inclusive* environment means that more than a person’s capacity to enter and access a certain environment is taken into account. An inclusive environment is not only designed so that all people can access it despite their limitations, but that they can also participate in the social aspects of the play activities. Hence, inclusion means removing social barriers as well. While it may not be possible to make every part of the play environment

accessible to all of its users, the social experience, or opportunities for meaningful peer interactions, must be accessible to everyone (Christensen, 2001, p. 8). Playground design should downplay differing abilities, and highlight the similarities between children, encouraging them to interact with one another (Christensen, 2001, p. 27).

Behavior Settings and Affordances

When considering the affect that a designed environment has on its users, it is important to understand the concept of affordances and behavior settings. When an environment is designed to illicit a specific behavior from its users, it affords that opportunity or in other words, is designed to support a particular set of behaviors (Lang, 1987). Affordances are the perceived properties of the physical environment that allow a person to perform certain actions (Maier, Fadel, & Battisto, 2009). However, providing affordances and opportunities for certain behaviors in an environment does not guarantee that they will be taken advantage of. Yet, without designing the physical environment to support the desired behaviors, it will be unlikely for them to occur (Lang, 1987, p. 103). The framework of affordances allows for closer examination of inclusive playground design practices by identifying the environmental features that support behavioral possibilities for increased peer interactions during play.

Similar to this concept of affordances is the concept of behavior settings, first described by Barker (1968). A behavior setting is a discrete spatial and temporal unit that affords a certain behavior or certain behaviors. Barker recognized, through direct observation and detailed recording of a child's activities that certain activities require

specific environmental features, or that distinct environmental features afford certain behavioral possibilities. For example, on a playground a behavior setting might be a pathway used for riding tricycles or a shaded area with a bench used for sitting and talking (Drown & Christensen, 2014). The behavior setting includes both the environment and the integrated activity, or the features and the behavioral possibilities. Landscape architect Kevin Lynch proposed that knowledge of behavior settings could be used as a basis for designing places that would better suit people's behavior (Lynch & Hack, 1984, pp. 34, 113). Following this logic, linking setting type and peer interactions is essential for understanding the impact of design on children's social inclusion on a playground and for guiding design interventions (Lang, 1987). Furthermore, understanding a playground according to its behavior settings/affordances and how they support distinct behavioral possibilities for children's play would help professionals design playgrounds that effectively include all children (Drown & Christensen, 2014). It is also important to realize that while multiple studies may show that a certain play environment promotes inclusive play, due to the concept of affordances, it is not guaranteed that inclusive play will always occur in that specific play environment.

Purpose of the Study

As stated previously, playgrounds rarely facilitate peer interactions of children with disabilities. This lack of inclusion not only denies children with disabilities their right to play, but it also excludes them from crucial interactions with their peers necessary for healthy development. Over the past 25 years, three significant findings have

been reported from the review of play research: (1) children with disabilities demonstrate delays in play compared to typically developing children; (2) play continues to be a functional goal for children with disabilities; and (3) interventions to increase play skills of children with disabilities are effective and should be implemented more often (Lifter, Mason, & Barton, 2011).

The use of inclusive play environments to enhance peer relations between children of all abilities is one of these recent interventions that have led to many positive findings. As opportunities for inclusive play continue to develop, it has become increasingly important to design inclusive play settings that promote peer interactions between children of all abilities (Loy & Dattilo, 2000). The specific influences of different play materials, equipment, or environments in facilitating peer interactions are still unclear. Also, the effectiveness of current inclusive playground design practices and principles in promoting the inclusion of children of all abilities on a playground lacks empirical evidence. Therefore, the purpose of this study was to determine the evidence-based practices for inclusive playground design that support peer interaction between children with all abilities, and to demonstrate how they can be implemented into a playground design.

CHAPTER II

**SYSTEMATIC REVIEW OF EVIDENCE-BASED PRACTICES FOR
INCLUSIVE PLAYGROUND DESIGN¹**

Abstract

The importance of play in the development of children, and the necessity of playgrounds that are designed to facilitate play has been well documented. However, much less is understood about how playgrounds can be designed to include children with disabilities. This systematic review was conducted to examine the evidence-based practices of playground design that have been effective in providing children with disabilities the opportunity to participate on playgrounds. The systematic search of the literature, identified 22 articles, a limited evidence-base supporting design principles for playgrounds meant to be inclusive for children of all abilities.

Introduction

Play is necessary for the social, emotional, intellectual, and physical development of all children (Ginsburg, 2007). Although playgrounds are designed to support the play of children, children with disabilities are often unable to fully participate in play on playgrounds (Yantzi et al., 2010). As a result, children with disabilities experience fewer opportunities to participate in play, and hence have fewer developmental opportunities. Due to the lack of awareness of evidence-based practices supporting the play of children

¹ Chapter II was coauthored by Courtney Fernelius and Keith Christensen for submission to the *Journal of Children, Youth and Environments*.

with disabilities, playground designers continue to perpetuate this disparity (Moore & Lynch, 2015; Sailer et al., 2009). Therefore, the purpose of this study was to describe evidence-based practices for playground designs that support play for children with disabilities.

Background

Play allows children to use their creativity while developing social, emotional, intellectual, sensory, and physical skills. Social skills are developed as children interact through play and learn how to share, negotiate, resolve conflicts, and develop self-advocacy. Play allows children to create and explore a world they can master, practicing adult roles in a safe environment. As they master their world through play, children's emotional skills are increased by developing new competencies that lead to enhanced confidence and the resiliency they will need to face future challenges (Ginsburg, 2007). Play is also important for healthy brain development. Studies have shown that children's cognitive capacity is enhanced when they experience significant changes in activity such as play provides. Vigorous outdoor play activities increase the growth and development of the fundamental nervous centers in the brain for clearer thought and increased learning abilities (Clements, 2004). Children between the ages of 3 and 12 demonstrate great interest in running, climbing, and jumping. Research shows that it is during this period of life that a child's body experiences its greatest physical growth. In contrast to passive entertainment, play builds active, healthy bodies. Such vigorous movements not only enhance muscle growth, but also support the growth of the heart and lungs as well as all other vital organs essential for normal physical development (Clements, 2004).

Encouraging unstructured play, such as what occurs on playgrounds, may be an exceptional way to increase physical activity levels in children (Ginsburg, 2007).

Significance of Problem

Because of the research supporting the value of play in the social, emotional, intellectual, sensory, and physical development of all children, designs of playgrounds have been expanded and improved throughout the years to include a wider range of opportunities, places, and materials (Bruya & Langerdorfer, 1988). In playgrounds, children have opportunities to run, swing, climb, jump, and interact with other children (Tamm & Prellwitz, 1999). Essentially, playgrounds are designed to encourage children's play (Maxwell, Mitchell, & Evans, 2008)

However, there are many developmental needs of children with disabilities that have on occasion not been taken into consideration when designing playgrounds. In research interviews, children with disabilities have described playgrounds as spaces where they do not feel included in the play opportunities (Yantzi et al., 2010). All children, including children with disabilities, have continuously expressed the desire to play in outdoor environments. Yet, the lack of suitable playgrounds, and the use of non-inclusive equipment that can be difficult for all children to utilize, become obstacles for participating in play activities and inhibits children with disabilities from fulfilling this desire (Fjørtoft, 2004; Prellwitz & Skär, 2007). Children with disabilities are often not treated in a positive manner by their peers without disabilities. Likewise, their efforts to engage socially with their peers during play are not always met with receptive responses. This usually leads children with disabilities to develop play behaviors that isolate them

from their peers (Celeste, 2006). Various studies have suggested that children with disabilities, especially those who have visual impairments, demonstrate play behaviors that are predominantly exploratory in nature (Celeste, 2006). Children with intellectual disabilities and language impairments struggle to participate in social play, and participate in less conversation with their peers on the playground (Stanton-Chapman & Schmidt, 2016). Children with disabilities also tend to engage in less variety of play (Barton & Wolery, 2008) and spend less time in spontaneous functional play than do children without disabilities (Stahmer & Schreibman, 1992).

It is difficult to establish good practice in playground development due to the fact that there are few formal guidelines or definitions that clearly articulate what an accessible playground is, or should be. Furthermore, the guidelines that do exist have not been proven through research, nor are they evidence-based (Moore & Lynch, 2015; Sailer et al., 2009). The current guidelines available for playground design focus on accessibility, making the environment accessible to those who use a wheelchair, but do not consider the needs of children who have other impairments. Various architects have attempted to develop more inclusive designs, but the concept and implementation of “inclusivity” is still open to interpretation depending on how it is understood by the designer (Burke, 2013). Thus, due to the lack of availability and awareness of evidence-based practices supporting the play of children with disabilities, playground designers continue to perpetuate this disparity. Therefore, the purpose of this study was to identify evidence-based practices for playground designs that support the inclusion of children with disabilities in play.

Key Terms

Disability: “Disability arises in the confrontation between an individual with an impairment, or a disease, and an imperfection in the environment or in an organized activity, that makes accessibility difficult or impossible for him/her” (Prellwitz, Tamm, & Lindqvist, 2009, p. 57). An impairment differs from a disability in that an impairment is individual and private, while a disability is structural and public. So, for the purpose of this study, a disability will be defined as a condition that is caused by an obstacle to participate in a typical activity in a community due to barriers that have been created by society (Shakespeare, 2006).

Evidence-based practice: Evidence-based practices first began in the field of medicine. It involved the use of existing best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine (EBM) involves integrating individual clinical expertise with the best available external clinical evidence from systematic research (Sailer et al., 2009). Evidence-based design (EBD) is based off the principles of EBM. However, EBD focuses on slightly different issues that relate to the specific principles of design as a discipline. Decisions are based on the best available information from credible research and evaluations of projects. Critical thinking is also required to draw rational inferences about design from information that seldom fits a unique situation precisely. Depending on the specific discipline and profession that it is applied to, it is important to realize that evidence-based practices may vary (Sailer et al., 2009).

Because design disciplines are based so much on intuition, artistic inspiration,

learning-by-doing, and practical experience, EBD is not an easy, straightforward practice (Sailer et al., 2009). Likewise, evidence-based practices have not been common in the profession of Landscape Architecture (Brown & Corry, 2011). Because evidence-based landscape architecture (EBLA) is still fairly new to the profession, the following definition is proposed for this paper:

Evidence-based landscape architecture is the deliberate and explicit use of scholarly evidence in making decisions about the use and shaping of land. EBLA supports decisions but does not dictate them and it uses knowledge—generally from methodically studied experiment or experience—as the principal information source for design. (Brown & Corry, 2011, p. 328)

Inclusion: As found in *Merriam Webster's Dictionary*, the word “inclusion” means “the act of including” (Merriam-Webster’s collegiate dictionary, 2004). Inclusion of children with disabilities means that all children, regardless of ability level should be given equal opportunities to participate in activities. Inclusion on the playground refers to creating an environment where all children have equal access and opportunity to engage in play and social interactions (Mejeur, Schmitt, & Wolcott, 2013).

Play: The term “play” will be defined as having the following four attributes, it is typically voluntary; it is intrinsically motivating, that is, it is pleasurable for its own sake and is not dependent on external rewards; it involves some level of active, often physical, engagement; and it is distinct from other behavior by having a make-believe quality (Rieber, 1996).

Playground: Playgrounds are important environments where many children play during their childhood. The term “playground” in this article refers to children’s public play settings. Playground settings typically include equipment, specifically designed and

built for children. These environments are generally available to the public, and found in public parks, schools, and preschools (Moore & Lynch, 2015).

Methods

A systematic review was completed in order to find evidence-based practices for playground designs that support play for children with disabilities. The systematic review evaluated and synthesized all current literature and provided a summary to answer the research question: What evidence-based practices for playground design support play for children with disabilities?

To complete the systematic review, PRISMA guidelines were followed (Moher, Liberati, Tetzlaff, & Altman, 2009) to identify, screen, evaluate eligibility, and decide on inclusion. Databases searched included Academic Search Premier, AVERY, Scopus, Web of Science, Google Scholar, and JSTOR. Academic Search Premier and AVERY were chosen because of their inclusion of studies regarding landscape architecture. Scopus and Web of Science were chosen due to their focus on studies featuring information pertaining to recreation, health, and people with disabilities. Finally, Google Scholar and JSTOR were chosen for their wide selection of multidisciplinary articles. These six databases captured such journals as *The Journal of Physical Education, Recreation & Dance, Scandinavian Journal of Occupational Therapy, Therapeutic Recreation Journal, Children, Youth and Environments, Children's Geographies, Children & Society, Journal of Physical Education, Recreation & Dance, Early Childhood Research Quarterly, and Occupational Therapy International.*

The inclusion criteria were as follows: The articles had to include terms related to “disability,” “evidence-based practices,” “inclusion,” “play,” and “playground.” Studies were excluded if they did not address the design of playgrounds as they relate to children with disabilities. Next, the articles had to have been included in a peer-reviewed journal. Thus, any books, grey literature, and/or guideline manuals were excluded. Finally, only articles that had data to back up their research, such as a case studies, observational studies, survey results, or literature reviews were kept for further evaluation.

The existing literature was searched using the following Boolean operator combinations: “universal design OR structure OR practice” AND “handicap* OR disability* OR inclusive* OR accessible OR barrier” AND “playground”; “design OR planning” AND “handicap* OR accessible*” AND “playground OR environment”; “playgrounds + barrier + free design”; and “children with disabilities + recreation”.

Results

The literature review was conducted during March of 2016. From Academic Search Premier 181 articles resulted from the Boolean search. Avery held 46 articles, Scopus 49 articles, and from Web of Science 9 articles were located. Finally, from Google Scholar, 17,600 articles were produced, of which only the first ten pages (100 items) were reviewed, and JSTOR produced 2,025 articles with the first five pages (50 items) being reviewed. After reviewing the titles and abstracts, 66 articles were selected for further review. An ancestry search was performed on these 66 articles, resulting in 84 more articles whose titles appeared to meet the inclusion criteria. In total, the extensive

search process identified 150 articles. From these 150 articles, 72 did not pertain to the inclusion criteria upon further review of the abstracts. The remaining 78 articles were then further screened to identify only the ones that were peer-reviewed, which resulted in a total of 36 articles. The full text of all of these 36 articles were read to identify the purpose, research questions, methods, participants, setting, independent and dependent variable, results, implications, and future research. This further examination resulted in 22 manuscripts containing empirical research regarding playground design for children with disabilities. These 22 articles were chosen for inclusion in this literature review. Figure 1 is a flow diagram adapted from the PRISMA statement (Moher et al., 2009) describing how many articles were found from the different sources and how many were removed in each stage of selection.

Study Characteristics

Various research methods were used throughout the 22 articles chosen for review. As depicted in Table 1, seven articles used case studies; nine used surveys, five used observational studies, and four included literature reviews.

Among the case studies there were three types. First, there were case studies that evaluated how the design of an inclusive outdoor play environment affected play among children with disabilities. Second, there were case studies that evaluated how the design of equipment and the use of loose parts influenced the effectiveness of inclusive play on playgrounds built for that purpose. Third, various case studies evaluated how social factors might play a role in the effectiveness of an inclusive play environment.

The literature reviews included in this study provided some evidence of best

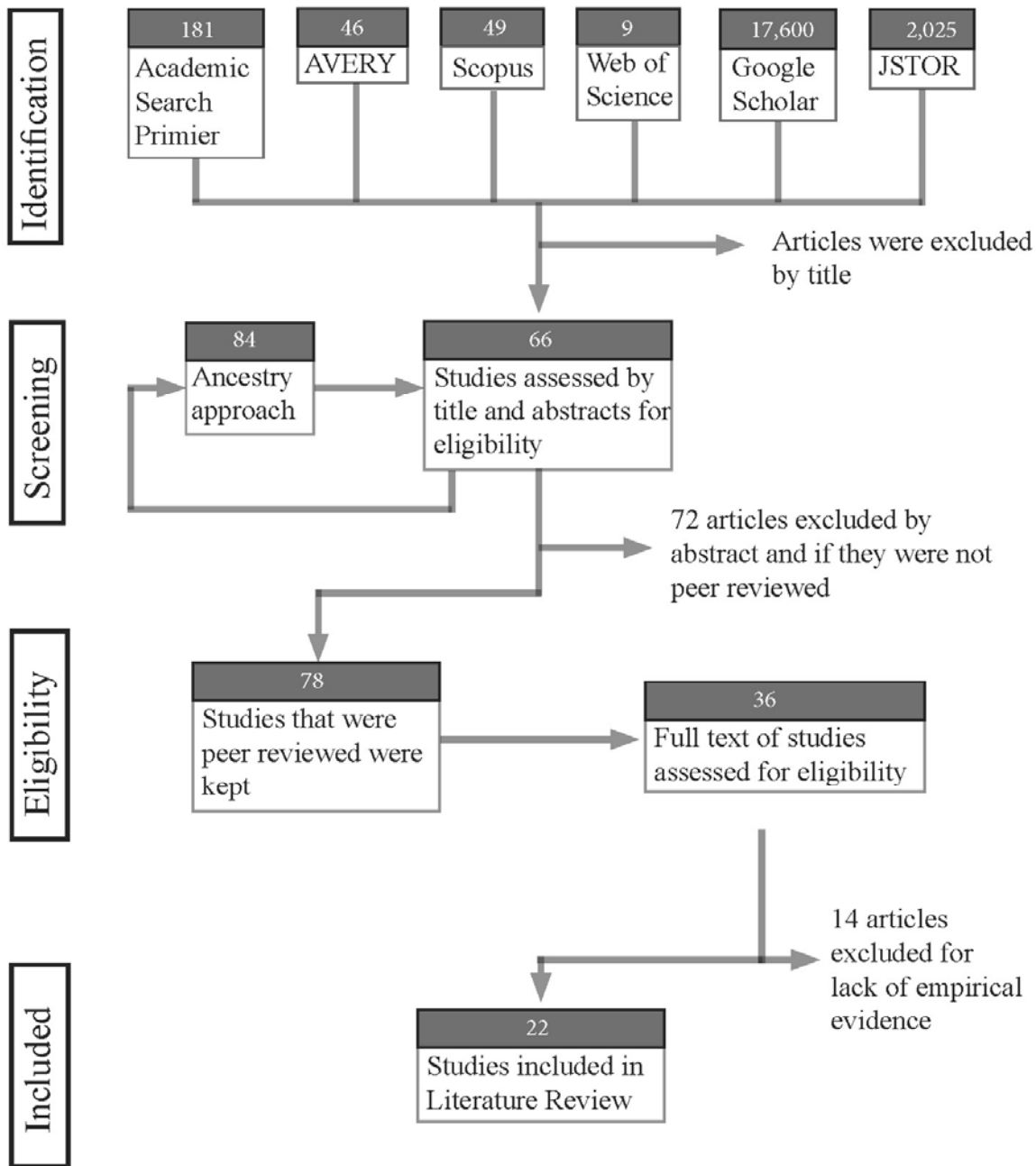


Figure 1. PRISMA-format process diagram.

Table 1

Comparison of Studies

Disability	Case studies	Surveys	Observational study	Literature review
Autism	Menear et al., 2006 (US)		Yuill et al., 2007 (UK)	
Visual disabilities			Kern & Wolery, 2001 (US)	
			Schneekloth, 1989 (US)	
Physical disabilities	Yantzi et al., 2010 (Canada)	Prellwitz et al., 2009 (Sweden)	Barbour, 1999 (US)	
		Tamm & Prellwitz, 1999 (Sweden)		
		Dunn & Moore, 2005 (UK)		
		Ripat & Becker, 2012 (Canada)		
Intellectual disabilities	Cheung, 1989 (US)	Cheung, 1989 (US)		
Various disabilities	Shapiro, 2006 (Israel)	Talay et al., 2010 (Turkey)	Woolley et al., 2006 (England)	Mejeur et al., 2013 (US)
	Christensen, 2001 (US)	Christensen, 2001 (US)		Moore & Lynch, 2015 (Ireland)
	Kodjebacheva, 2008 (US)	Prellwitz, 2007 (Sweden)		Woolley, 2013 (UK) Christensen, 2001 (US)
	Dien, 1991 (US)	Prellwitz & Skar, 2007 (Sweden)		

practices for playground inclusion, and identified barriers to inclusion that children with disabilities face in play environments. There were few studies with guidelines that clearly articulated what an inclusive playground was, or should be (Moore & Lynch, 2015).

The surveys included interviews focused on obtaining information from users and creators of playgrounds. Each survey inquired about which aspects made a playground successful and which aspects made it difficult to provide inclusive play environments.

There were two observational studies, one evaluated the play of children with Autistic Spectrum Disorder (ASD) on their original playground versus a new inclusive playground that was built for them (Yuill et al., 2007), and the other looked at how musical adaptations to a playground affected the play of a three-year-old boy with congenital blindness (Kern & Wolery, 2001).

Various disabilities were addressed in the 22 articles. Two articles evaluated the design of playgrounds for children with Autistic Spectrum Disorder, 1 article addressed children with intellectual disabilities, 2 articles pertained to children with visual impairments, 4 addressed physical impairments, and 13 covered a spectrum of disabilities (see Table 1). Nine of the studies were conducted in the U.S., five were conducted in the United Kingdom, four in Canada, four in Northern Sweden, one in Israel, and one in Turkey.

Discussion of Results

Evidence-based practices. This study found that the 22 identified studies supported 10 evidence-based practices of playground design that support play for children with disabilities. Table 2 outlines each study, the purpose of the study, the methods used, the participants, and the result and implications. The 10 evidence-based practices of inclusive playground design were compiled from an analysis of the 22 results and implications. The 10 evidence-based practices of inclusive playground design are as follows.

1. Circular playground design that links activities to complementary activities;
2. Playground equipment designed as common and recognizable objects;

Table 2

Study Results

Citation	Year of publication	Purpose of study	Methods	Participants	Results and implications
Schneekloth, L.H.	1989	To determine appropriate design guidelines for a playground for children with visual impairments	Observational Study	Twelve blind, partially sighted, and sighted children, ages 7-13	Playgrounds should include real world things; miniaturization; and soft areas
Cheung, Maria Marisa	1989	To assess the impact of play equipment and the social environment on the behavior of all children	Case Study, Survey	87 children with a disability & 72 children without a disability; & their caretakers	Multi-niche areas, complex equipment, and enclosed equipment encouraged positive interaction between peers
Laurie R. Dien	1991	To study the effect toys have on the social interaction between children of all abilities	Case Study	Children ages 3-12; no disabilities, mental, physical, emotional, & learning disabilities.	Effective toys: tricycles, wagons, musical instruments, sand areas, costumes, props, jump ropes, & building blocks
Maare Tamm & Maria Prellwitz	1999	To find out what "creators and users of playgrounds" think about accessibility	Survey	Head of the Parks and Roads Dept, Landscape Architect, & 3 children with disabilities	Children with restricted mobility have been excluded from environments that are important to them
Ann C. Barbour	1999	To understand how the playground setting & physical competence affect peer relationships	Observational Study	Eight elementary school children from two schools with differing levels of ability	Playgrounds with more choices of activities with varied levels of physical competence promote greater peer interaction
Keith M. Christensen	2001	To determine what settings on a playground offer the greatest play value for children with disabilities	Literature Review, Case Study, Survey	Various playgrounds in the United States	Successful playgrounds support a diversity of activity types

(table continues)

Citation	Year of publication	Purpose of study	Methods	Participants	Results and implications
Petra Kern & Mark Wolery	2001	To evaluate playground adaptations on the participation of a boy with visual impairment	Observational Study	3-year-old boy with congenital blindness	Staff training along with playground adaptations may be needed to improve children's play
Karen Dunn & Michele Moore	2005	Review current accessible play space practices	Survey	40 local authority workers, 58 families of children with disabilities	Include more safety surfacing, wider gates, sufficient space between equipment; variety of equipment
Kristi Menear, Shannon C. Smith, Shane Lanier	2006	Design a multipurpose fitness playground that serves purposes during free play and physical education	Case Study	Children with autism at a private school	A fitness course, basketball court, track, funnel ball, were found to be effective in the play of children with autism
Michele Shapiro	2006	Develop a playground that meets the developmental needs of children of all abilities	Case Study	Children with and without disabilities at the Beit Issi Shapiro in Ra'anana adaptive playground	A playground should be safe, accessible, durable, easy to maintain; promote independence, social communication, and sensory stimulation
Helen Woolley, Marc Armitage, Julia Bishop, Mavis Curtis, & Jane Ginsborg	2006	Identify factors affecting the inclusion of children with disabilities on primary school playgrounds	Observational Study	The teachers and students of six schools in England	There were social, organizational, and physical factors that affect the inclusion of children with disabilities
Nicola Yuill, Sara Strieth, Caroline Roake, Ruth Aspden & Brenda Todd	2007	Assess the impact of the physical environment on the playful interaction of children with ASD with their peers	Observational Study	8 boys with ASD attending a special school in West Sussex, UK (mean age of 6)	An appropriate level of challenge, props to foster group and imaginative play, a track, were all factors that attributed to increased peer interaction

(table continues)

Citation	Year of publication	Purpose of study	Methods	Participants	Results and implications
Maria Prellwitz	2007	To identify aspects of playground accessibility and usability for children with disabilities	Survey	Children with and without disabilities, parents, administrators of provinces, etc.	Create playgrounds that encourage a range of play behaviors; include playground equipment with recognizable designs
Maria Prellwitz & Lisa Skar	2007	To better understand how children with different abilities experience usability in playgrounds	Survey	15 children with disabilities, and 5 children without disabilities	Equipment that is easy to understand and to maneuver around, accessible surfacing, & visual identifiers for stairs, barriers, and ground surfacing
Gergana Kodjebacheva	2008	To assess the effectiveness of a 'Boundless' Playground and its benefits to the development of children	Case Study	Children with various abilities who used 'Shane's Inspiration' Boundless Playground	Playgrounds should provide not only opportunities for access but also for activity and variability
Maria Prellwitz, Maare Tamm, Rafael Lindqvist	2009	How accessible playgrounds are to children with restricted mobility in Sweden	Survey	41 Municipalities in Northern Sweden	Few playgrounds are accessible to children with disabilities Greater collaboration with users, providers, and designers is needed
Likden Talay, Nevin Akpınar, Nur Belkayali	2010	Evaluate playgrounds in terms of the barriers causing restricted use by children with disabilities	Survey	667 parents of children with disabilities & 355 playgrounds	Major barriers for children with disabilities in playgrounds are ground surfacing, inaccessible equipment, lack of interactive play components
N.M. Yantzi, N.L. Young, & P. McKeever	2010	To study how the design of playgrounds affect the play of children with disabilities	Case Study	Children on 5 different playgrounds	More ramps to access elevated components; accessible surfacing; greater balance between the amount of elevated and ground level components

(*table continues*)

Citation	Year of publication	Purpose of study	Methods	Participants	Results and implications
Jacquie Ripat & Pam Becker	2012	To understand the experience of playground use by children with disabilities	Survey	20 caregivers and children of various ages, gender, and disabilities	Barriers - ground surfaces (sand, gravel, grass, boards/railway ties) Accessibility – ramps and pathways to each area of function
Helen Woolley	2013	To explore how to overcome barriers of inclusion and accessibility in playgrounds	Literature Review	N/A	Barriers can be overcome by: direct involvement of people with disabilities in the planning and design of outdoor play spaces
Megan Mejeur, Graceann Schmitt, Hannah Wolcot	2013	Provide evidence of best practices for playground inclusion	Literature Review	N/A	Effective playground designs were the circuit-style structure for fixed equipment, a circular design with a central open area, playground equipment designed as common and recognizable objects, loose parts, and accessible entrances and surfaces
Alice Moore & Helen Lynch	2015	To identify factors that enable or constrain social inclusion in community playgrounds	Literature Review	N/A	Play components with recognizable designs, and swings were the most usable by all children. Playgrounds are an important place for peer interaction

3. Loose parts on the playground such as various props for imaginative play, play houses and tables, sporting equipment, sand toys, musical instruments, and water play opportunities;
4. Accessible surfacing and sufficient space for maneuvering between and on pieces of equipment;
5. Equal amounts of elevated and ground level components for gathering in groups, and more ramps or transfer systems to access elevated components;
6. Multi-niche settings (equipment/activities that require more than one child to operate or play);
7. Equipment that provides appropriate levels of challenge and risk for children of all abilities;
8. Observation points or “jump in points;”
9. Comfortable or “cozy” places, often created by enclosed areas or pieces of equipment; and
10. Sensory stimulus activities and visual or tactile cues throughout playground.

Circular playground design. In a study that evaluated how the playground design affected the play of children with autism, it was found that a circular shaped playground encouraged increased play experiences. An effective way for creating this circuit structure was to place the fixed play equipment in a circle and leave the middle open for cooperative play (Mejeur et al., 2013).

Another study compared how children with autism played on two different playgrounds, an older playground versus a recently built playground. The older playground had a central climbing/sliding structure, portable play equipment that changed daily, and a very linear structure. Group play and social initiations in the children with ASD were higher on the new playground versus the old playground. One of the aspects of the new playground, which seemed to be most effective, was that there was clear structured movement. The new playground layout included a circuit structure; each

piece of equipment led the user to the next piece of equipment. A circular track with road crossing points was also incorporated. The track was effective in that it encouraged repetitive and ritualistic behavior, both necessary elements in the play of children with and without autism (Yuill et al., 2007).

Common and recognizable objects. Designing an inclusive playground for children with visual impairments is an interesting challenge that was addressed by two studies within the literature review. From case studies and various experiments, it was determined that equipment designed as common, and recognizable objects were more usable on playgrounds for children with visual impairments (Mejeur et al., 2013; Moore & Lynch, 2015). For children of all abilities, playground equipment that was too complicated to understand were less likely to be used for fear of using it improperly, which ultimately led to seclusion and isolation from play (Mejeur et al., 2013).

This is due to the fact, that among children with visual impairments, there are significant differences in motor proficiency levels, gross motor skills, self-stimulation, and social/play behaviors. Data suggest that some of the developmental delays seen in the visually impaired children can be attributed to lack of experience, particularly in gross motor interactions with the environment. Thus, play environments designed for children with visual impairments need real-world objects that children can recognize through touch. Also, miniaturization of objects or scale adjustments can be effective to reinforce in a tactile way how smaller parts in the environment make wholes (Schneekloth, 1989).

Loose parts. When comparing a playground that only occasionally had a ball available for children to use with another playground that had multiple items such as

tricycles, wagons, building blocks, large plastic spoons, wood planks, pails, gardening tools, hard hats, assorted containers and plastic chairs, play houses, water tables, garden area, and a sandbox, it was found that the availability of loose parts on the second playground created more opportunities for cooperative and complex play. It was also interesting to note that on the playground with more loose parts, it was more common for two or more children to engage in the various activities together than for a child to be found playing alone. Likewise, the duration of time children spent playing with stationary elements such as the sandbox, water table, and playhouses was longer with the addition of loose parts (Barbour, 1999). However, as one study found, if props and other loose parts were used on the playground, children were more apt to use them in their play if they were not changed out frequently (Yuill et al., 2007).

When evaluating the use and management of toys and 'loose parts' on a playground for integrating children with and without disabilities, it was found that sand toys, miniature vehicles, and musical instruments on the playground were the most used by children with and without disabilities (Dien, 1991, p. 256). Toys that could be used by more than one child at the same time, such as one that has multiple moving parts, encouraged more peer interaction (Dien, 1991, p. 258). It was determined that small adjustments to the playground such as widening the riding track and providing more variety in the landscape, making the sand areas more accessible; creating some sort of a stage for children to use for imaginative play, and adding equipment with musical instruments possibly connecting them to a moving bridge so children could make sounds and jump at the same time, would increase the play value and peer interactions of

children on a playground (Dien, 1991).

Research evaluating gross-motor play equipment discovered that children prefer movable and complex equipment to static ones (Cheung, 1989, p. 30). As found in various other studies, friendly and cooperative behaviors occur most frequently on equipment supporting role-play and water play (Cheung, 1989, p. 31).

Accessible surfacing and sufficient space. Physical disabilities are probably thought of the most in reference to creating inclusive playgrounds. Naturally, these studies addressed the physical aspects of the environment that need to be accessible to include children with physical disabilities, but they also addressed the social aspects that affect the inclusion of such children in play environments. Physical barriers in playgrounds are not hard to identify. Playgrounds and play equipment are major barriers in and of themselves. Play equipment is generally not designed for children with restricted mobility. Ground cover is a major barrier as well. Sand or gravel makes it difficult for children with disabilities to enter the playground (Talay, Akpinar, & Belkayali, 2010). There should be accessible paths that lead to the playground. Accessible surfacing such as rubber tiles should be used in the playground area so that children with wheelchairs can maneuver around easily (Mejeur et al., 2013; Talay et al., 2010). Playgrounds that meet the physical needs of all children, will not only enable play, but will also enhance social interaction (Talay et al., 2010).

One study found that the most effective elements promoting inclusion were safety surfacing, wider entrances, and sufficient space between pieces of equipment for children with assistive devices to easily maneuver around (Dunn & Moore, 2005; Prellwitz &

Skär, 2007).

Equal amounts of elevated and ground-level components. Research shows that elements within play environments should be unified to ensure the flow of play and to support the interaction of all children. After evaluating four different playgrounds in Canada, it was found that all of them lacked the correct ratio of elevated play components to ground-level components (approximately 1 lower element for every 2-4 elevated elements). The purpose for creating this ratio is to help playground designers view the playground as a whole space rather than single, isolated pieces of equipment (Yantzi et al., 2010). In inclusive playgrounds, all children do not need to access every play element the same way. However, the components should be connected enough that children are still able to socially interact despite the different ways they are able to access and use the equipment. Generally, all playgrounds can benefit from more ramps or transfer systems to access elevated components, creating less of an imbalance between the amount of elevated and ground level components, and using more accessible surfacing material (Yantzi et al., 2010).

Multi-niche settings. Another type of activity setting found to promote a high amount of peer interactions was a multi-niche, large muscle setting. In other words, equipment that required at least two children to operate. The study illustrated that play equipment that brings children into close physical proximity or equipment that requires more than one child to operate or play is most effective in facilitating peer interactions in play (Dien, 1991). Specific playground elements that were found to elicit more simultaneous play by two or more children were tire swings, water tables, and wheeled

vehicles such as tricycles and wagons (Barbour, 1999).

Equipment that provides appropriate levels of challenge and risk. Children tend to seek a level of challenge that best suits their individual needs. Not only is it important to include equipment and materials that promote the motor skill development of children with various disabilities and provide opportunities for them to interact socially with peers, it is also important to physically challenge children without disabilities (Barbour, 1999). Playground designs should strive to provide a spectrum of challenges for children. For example, children with ASD struggle with a variety of social issues, thus often making playgrounds a difficult environment in which to feel included and safe. Multiple studies have specifically addressed which playground elements were most effective in promoting the play of children with ASD. One study found that areas offering a range of individual and cooperative activities met the developmental needs of students and provided opportunities for students to self-select activities that matched their abilities and interests were the most effective on the playground (Menear et al., 2006).

Since playgrounds are rarely used by children with only one type of disability the majority of studies evaluated inclusive design practices that would be effective for a variety of children with diverse abilities. One such study began by evaluating different aspects of play. For example, play activities usually provide some kind of physical stimulus, meditative stimulus, cognitive stimulus, imaginative stimulus, social/emotional stimulus, developmental stimulus, and sensory stimulus. Thus, play settings that simultaneously support multiple activities, are linked to complementary activities, and offer graduated challenges are more valuable than those which do not, and provide

greater developmentally appropriate play opportunities for children of all abilities (Christensen, 2001, p. 96). “As for inclusion, quality interactive activities involve the whole child: gross motor, fine motor, senses, intellect, and individual growth. A diversity of play opportunities that meet these criteria is the key to both the quality of an interactive activity and the integration of all children” (Christensen, 2001, p. 27).

Observation points. Oftentimes children find it difficult to approach peers or join the group activity. This is especially true for children with autism. Observation points provide a safe area where children can be alone and observe the play activities before joining. Such places may be a tower that is designed for only one child to stand and observe the whole play area. Also, crawl tubes or other enclosed areas with openings out of which children can look were successful observation areas. Likewise, secluded seating areas provided the same affect (Yuill et al., 2007).

Comfortable places. Children with visual impairments often feel restricted in what they can do with their bodies, always having to be careful and alert of their surroundings so as to not injure themselves. Creating large, soft areas in playgrounds where children can move freely and feel comfortable and safe is essential to their sense of inclusion (Schneekloth, 1989).

Another interesting research finding was that children prefer equipment with more enclosure. The playground with the most encapsulated areas (equipment enclosed on 2-6 sides), promoted the highest levels of social, motor, and language behaviors (Cheung, 1989, p. 32).

Sensory stimulus. One study found that the most effective element promoting

inclusion was safety surfacing, such as bright colors used for identification on pathways and equipment. The coloring is used to help children see more clearly what certain play areas are used for and where they should probably take caution (Dunn & Moore, 2005). However, some children can be over stimulated by too much color. So, it is important to use bold colors for crucial areas, but more neutral colors for less relevant objects or areas. Textured surfaces help to stimulate perceptual development among all children, especially those with visual impairments. Purposefully protruding objects invite children to explore and discover what it might be using their sense of touch instead of sight. Auditory stimulation is also important to include within a playground setting. Not all children respond well to loud noises, so musical equipment should be dispersed throughout the playground to reduce the amount of sounds in one location. Also, high-pitched sounds can be uncomfortable for those with auditory oversensitivity, so musical instruments that produce low tones should be chosen for the playground (Shapiro, 2006)

Perceptions of Current Playground Design Practices

A few of the studies reviewed did not provide evidence-based practices regarding inclusive playground design. However, they did provide interesting information regarding perceptions of playgrounds, the usability of the playgrounds, and possible reasons as to why more playgrounds are not designed to accommodate children of all abilities. These studies were helpful in that they evaluated the usability of current playgrounds, some of which claimed to be inclusive and some of which did not. They provided a clear picture of what elements within the structure of the playground and the

process of how it was designed what elements were effective for promoting inclusion, and which elements were not, and then suggested possible solutions to the problems.

The majority of these studies found that very few playgrounds were accessible to children, much less inclusive (Prellwitz et al., 2009). Problems that ‘creators’ of playgrounds had with developing inclusive playgrounds were a lack of organizational unity, insufficient knowledge of disabilities and how to accommodate for them, and a lack of financing (Tamm & Prellwitz, 1999).

Another study, which interviewed local authority workers such as playground amenity officers; parks, landscape and leisure managers; senior parks and services officers; and planners identified further perceptions that made the incorporation of inclusive playground design difficult. These were issues such as a lack of clarity in the policy regarding inclusive playground design; a lack of understanding for what good practice on accessible play space is; a need for greater understanding of disabilities, the benefits of improved accessibility for everyone, safety issues, design and the environment; and the need for more planning, consultation, and use of natural resources (Dunn & Moore, 2005).

Perceptions that ‘users’ of playgrounds with disabilities had regarding the types of playgrounds available to them were that the playgrounds were generally not designed for to accommodate their needs. If they wanted to use the playground, assistance was a prerequisite for accessibility (Tamm & Prellwitz, 1999). Children with disabilities who were interviewed in these studies described playgrounds as a place where they saw other children playing and interacting with friends, but that they could not participate with their

peers on the playground because the design hindered their ability to be included (Prellwitz & Skär, 2007). Parents of children with disabilities tended to have similar perceptions of playgrounds as their children. They described playgrounds as being environments that hindered independence, play, and participation with peers in play activities (Prellwitz, 2007).

Interviews of children and caregivers from Canada stated the importance of using the playground as a venue for promoting child development in physical, emotional, and social realms; and offering opportunities for children to engage in age-appropriate activities that promoted the child's development, autonomy, and social and motor skills (Ripat & Becker, 2012).

As seen from these studies, playgrounds are not currently meeting the needs of children with disabilities. There are inclusive design practices that have been proven to be effective, but for various reasons they were currently not being implemented as well as they could. Much of the change that needs to occur must begin with planners and designers of playgrounds.

Additional Findings

While playground design has a major impact on the inclusion of children with and without disabilities, there are a variety of other factors that have been shown to affect the play and interaction of children on playgrounds. Such factors include the type of relationships children with disabilities have with both their peers and staff. However, the existence of playtimes, the individual routines of the children with disabilities, how a child with a disability is managed when moving to a new school, staff experience and

training, the use of PE lessons to help teach important skills for playing, and children with disabilities having extra time outside are all factors that affect how children with disabilities are included in a playground setting. Possible solutions as determined from the research conducted, were that children with disabilities could be taught how to use playground equipment to reduce the amount of needed staff assistance. Children with disabilities could also be given extra time on the playground and brought out at the very beginning of the recess period so that they have a better chance of being included. Finally, an appropriate level of risk in the playground setting could be provided, thus increasing the child's confidence as they explore and master different challenges (Woolley et al., 2006).

Another study found that children's play and social behaviors on the playground were influenced by factors such as (a) children's characteristics—age group, gender, and whether they had a disability or not; (b) the play environment; and (c) the social environment, which included factors such as group composition, adult supervision, social density, and social partners. It also determined that training should be provided to caretakers, playground staff, and teachers on how to effectively integrate children with and without disabilities (Dien, 1991). Just because the opportunity for children of all abilities to interact was presented did not mean that it would happen without some teaching interventions. Integration does not always occur simply because the opportunity is there (Kodjebacheva, 2008).

Limitations

Although this research successfully discovered evidence-based practices for

inclusive playgrounds, there were still unavoidable limitations within the study. First, the quality of the studies were assessed based on whether they were peer-reviewed and whether they included empirical evidence to support their research. Despite having this basic guideline to establish the quality of the studies used, a stricter assessment could have been used to acquire greater reliability among the studies. Also, since only peer-reviewed articles were included there could have been other sources in the literature that were not identified or used, such as various articles and guidelines about inclusive playground design that were not peer reviewed. While various theses and dissertations were used in this research, the exclusion of gray matter could have unknowingly eliminated unpublished theses and dissertations that covered this topic. Second, even though only peer-reviewed articles were used, study quality was never assessed for each source. Thus, future research could identify more articles pertaining to this subject by broadening the search criteria. In addition, more reliable sources could be determined through evaluating the study quality of the sources used.

Implications

There are very few guidelines that clearly articulate what evidence-based inclusive playground design practices are, or should be. What is known is that inclusive playgrounds should incorporate circular playground design that links activities to complementary activities; playground equipment designed as common and recognizable objects; loose parts on the playground such as various props for imaginative play, play houses and tables, sporting equipment, sand toys, musical instruments, and water play opportunities; accessible surfacing and sufficient space for maneuvering between and on

pieces of equipment; equal amounts of elevated and ground level components for gathering in groups, and more ramps or transfer systems to access elevated components; multi-niche settings; equipment that provides appropriate levels of challenge and risk for children of all abilities; observation points or ‘jump in points’; comfortable or ‘cozy’ places; and sensory stimulus activities and visual or tactile cues throughout the playground

Legislation, policies, and standards need to be established according to these practices to support children’s access to the social environment on equal terms with peers. Usability, design, and equity of playground environments can determine the inclusiveness of such environments. Further, although children are rarely consulted in the design process for their own play spaces, they could provide essential information for designing more inclusive environments (Moore & Lynch, 2015). By including children with disabilities and their caregivers in the design process, and following evidence-based design practices, playground designers will be able to increase their knowledge about the activities that take place on a playground and about the users’ subjective experience. This would help them to create playgrounds that encourage and accommodate a range of play behaviors with a focus on various abilities (Prellwitz, 2007). An inclusive playground is not about providing alternative play opportunities, but it is about making all opportunities inclusive to everyone (Ripat & Becker, 2012). The evidence-based practices for playground design identified through this study support the inclusion of children with disabilities in play.

CHAPTER III

METHODS

This paper essentially has two method sections. The first methods were incorporated into Chapter II as part of the paper, which the chapter represents, and illustrates how the systematic review was conducted. This methods section describes how the findings from the systematic review were implemented in the design of an inclusive playground.

The primary method used to implement the findings from the systematic review was the design process. The design process has been defined as “the organization of the external physical environment to accommodate human behavior” (Lynch & Hack, 1984, p. 57). Thus, the design process with regard to a playground design would be focused on supporting play behaviors and positive interactions between children and parents. It would also need to take into account the need for children or parents to sit and rest. The design process deals with the qualities and locations of structures, land, activities, and living things. For a playground design, this would require an analysis of where the best locations would be to place the playground equipment, benches, plantings, sport courts, parking, etc. The output of such a design process would be documents such as grading plans, utility layouts, survey locations, planting plans, sketches, diagrams, and specifications. These items are simply a conventional way of illustrating the process of going from an initial idea to a more finalized design plan (Lynch & Hack, 1984, p. 57). Thus, the design process comprises various steps in a cyclical pattern involving analysis, design, and evaluation.

The site chosen for this project was the outdoor play space for the Emma Eccles Jones Early Childhood Education and Research Center (EEJ ECERC). This building houses the Sound Beginnings program, which is an early education program that provides home and center-based services to children ages 2-6 with hearing impairments whose families want their children to learn to listen and talk. The EEJ ECERC also includes the Dolores Dore Eccles Center for Early Care and Education. This is a child care program that provides services mostly to typically developing children, as well as children with disabilities ages birth-5. The design of the playground took these user groups into consideration, including equipment that would be suitable for preschool age children, as well as children with disabilities, especially hearing impairments. However, as the design process in this research was intended to determine how well the inclusive design practices could be implemented in a playground for children of all abilities, there were certain pieces of equipment that were included in the design that would be potentially unsuitable on a playground specifically meant for children with hearing impairments (i.e. musical instruments, slide).

The design process for the inclusive playground began with conducting a site inventory and analysis dedicated to the study of the climatic, geographical, historical, legal, and infrastructural context of the specific site. The purpose of the site inventory and analysis was to help further understand the existing conditions of the site and its surrounding context, which would then lead to the identification of problems and potential uses of the site that would maximize the desired outcome. For the current project, this step consisted of going to the site of the existing playground, taking pictures,

and evaluating the landform, location of the playground on campus, and its exposure to the sun during the various times of day and seasons.

The playground that is currently in use at the EEJ ECERC is focused on implementing different aspects of nature play, sensory play, and imaginative play. However, while some of the existing elements are inclusive to all children, it was determined that the playground as a whole does not meet the evidence-based inclusive design principles that have been identified in the current research (Christensen & Fernelius, 2017; see also Figure 2). Items on the existing playground that were not inclusive were the sandbox and garden boxes, which were isolated away from the path and located on the ground where a child using a wheelchair could not participate in the play. The musical instruments in the center of the playground and the gate in the far southwest corner were also not inclusive as they were both located away from the path and surrounded by wood chips. The surfacing of the pathway did not meet the inclusive standards since it did not provide enough tactile or visual cues. Material choice was also poor, as it did not take into consideration better options for safety such as rubberized surfacing. Features on the existing playground that were not effective were the cluster of logs and posts. While they created possible opportunities for imaginative play, their overall purpose was very ambiguous. The brick structures were also ineffective, as they had no other openings besides the large one facing the path, and the material choice made the structures seem cold, hard, and uninviting. Other aspects of the playground that were lacking were sufficient shade structures over predominant play areas, and vegetation along the fence line.



GATE IN CORNER (INACCESSIBLE)



CLUSTER OF POSTS (AMBIGUOUS)



FENCE LINE (LACK OF VEGETATION)



PERGOLA #1 (INSUFFICIENT SHADE STRUCTURE)



BRICK STRUCTURES (AMBIGUOUS)



SURFACING (UNSAFE)



MUSICAL INSTRUMENTS #1 (INACCESSIBLE)



MUSICAL INSTRUMENTS #2 (INACCESSIBLE)



PERGOLA #2 (INSUFFICIENT SHADE STRUCTURE)



GARDEN BOX (INACCESSIBLE)



CLUSTER OF LOGS (AMBIGUOUS)



SANDBOX (INACCESSIBLE)

Figure 2. Emma Eccles Jones Early Childhood Education and Research Center: Existing playground site conditions.

Once there was a thorough understanding of the site, its users, and the program, this information was implemented along with the results of the study regarding evidence-based practices of inclusive playground design. At that point various conceptual designs and diagrams that explored possible design solutions for the playground were drawn. After receiving more feedback from design professionals, best aspects from the conceptual designs were selected based on how well they implemented each of the 10 practices of inclusive. Then, two schematic designs that represented the best implementation were produced. Next, further analysis with these schematic designs was completed, evaluating how the elements in each met the inclusive design practices. Using the most effective aspects from these two designs a final design was created addressing the issues found in the site inventory and analysis as well as current research. How the 10 practices of inclusive playground design have been implemented into this playground design are listed below.

Circular Playground Design That Links Activities to Complementary Activities

A circular playground design can be acquired through the actual placement of equipment in a circuit formation, somewhat close to one another; or it can be acquired through a pathway that is not necessarily a circle, but that somehow links back to the beginning. The area of land allotted for the playground is long and narrow, so condensing all the equipment into a circular formation was not practical. The existing pathway already linked everything back to a starting point, so it was decided to keep the existing

pathway, but to make necessary additions to allow for greater accessibility.

Playground Equipment Designed as Common and Recognizable Objects

The purpose of integrating recognizable objects into the playground design was to provide areas of play that were easy for children of all abilities to use. These objects give children a source of familiarity, and a way to relate to each other. Thus, choosing equipment that children growing up in the western United States would most likely recognize and to which they would have some connection was important. Recognizable equipment such as play cabins, play teepees, and a play train was selected.

Loose Parts On the Playground Such as Various Props for Imaginative Play

Loose parts can be anything from play houses and tables, sporting equipment, sand toys, musical instruments, water play opportunities, etc. Loose parts that complement other objects on the playground, as well as provide a variety of dramatic and sensory play opportunities are the most effective. For these reasons, water tables, a sandbox, picnic tables, items to be used with the play cabins and teepees, musical instruments, and tricycles to be used on the pathway were selected for the playground.

Accessible Surfacing and Sufficient Space for Maneuvering Between and On Pieces of Equipment

The surfacing needed to be firm enough to support a wheelchair, but not too hard

that it would present a hazard for children if they were to trip and fall. Thus, a rubberized surfacing material that would have a certain amount of give to it if a child were to fall on it was selected for implementation. Also, additions to the pathway that surrounded various playground features were designed to be large enough to hold the equipment as well as provide appropriate clearance from the pathway or other pieces of equipment, making it safer and easier for children and caregivers to maneuver around.

**Equal Amounts of Elevated and Ground-Level Components for
Gathering in Groups, and More Ramps or Transfer
Systems to Access Elevated Components**

This practice is especially important to consider when designing a playground with one main piece of equipment. Special consideration should be given for building ramps and transfer systems to all the different levels on the piece of equipment. However, in this playground design, a variety of equipment were implemented, placing the majority of the equipment on ground level, with a few climbing items to provide varying levels of challenge for children. Following this practice, though, a ramped walkway that led up to the slide was included in the playground design.

Multi-Niche Settings

Multi-Niche settings are equipment/activities that require more than one child to operate or play. One of the main purposes of an inclusive playground is to promote interactive play between children. Equipment selection can facilitate this interaction if it

requires more than one participant to successfully operate. A variety of multi-niche settings, those that absolutely required more than one participant, and those that could be done alone, but would be much more enjoyable with more children involved, were included in this playground design. The elements that absolutely needed more than one participant were the saucer swing, the rock 'n' raft, and the merry-go-round. The equipment that would be more enjoyable with more participants were the water tables, the garden box, the play cabins and teepees, the sandbox, the musical instruments, and the play train.

Equipment That Provides Appropriate Levels of Challenge and Risk for Children of All Abilities

In this playground design, certain elements have been included that provide challenges to children of varying abilities. They are the log bridge, the tree climber, and the climbing wall. However, special consideration was made in selecting this equipment since pre-school children are at a crucial age for developing gross motor skills, and there are numerous developmental benefits that come from climbing. These more difficult items were balanced out by including equipment of moderate and varied difficulty such as the saucer swing, stepping logs, musical instruments, rock 'n' raft, merry-go-round, roller table, and slide.

Observation Points or “Jump in Points”

Observation points were used in this playground design to create places where

children who were feeling shy or unsure of a particular activity could watch from a safe location until they felt comfortable enough to join. In order to create a variety of uses for these places, little picnic tables and boulders along the dry streambed were selected to serve as these observation points or jump in points.

Comfortable or “Cozy” Places, Often Created by Enclosed Areas or Pieces of Equipment

In the hopes of facilitating increased interaction with nature, this design uses the placement of plants to create comfortable, or cozy places where children can escape from the commotion of their peers at play, and enjoy being surrounded by nature. Also, since the playground is located in the middle of campus, more plants were added along the fence so that children would feel safe and secluded somewhat from the outside activities of campus. The play cabins and teepees also provide an enclosed area for children to congregate or isolate themselves from certain peers.

Sensory Stimulus Activities and Visual or Tactile Cues Throughout Playground

The use of this practice in the playground design was twofold; first, to help children with visual disabilities to navigate their way through the playground; and second, to provide opportunities for children to develop various aspects of their five senses by interacting with multiple sensory stimulus activities. The color of the pathway, and the variation between the rubber surfacing and the grass provided a tactile cue for

navigating around the playground. Also, the bridges along the pathway provided a cue for when the dry streambed was being crossed. Pieces of equipment were specifically chosen that would facilitate activities meant to increase sensory skills such as the water tables, the garden box, the sand box, the musical instruments, the roller table, and the plants.

CHAPTER IV

RESULTS

Each play setting and piece of equipment selected for this playground was based on whether or not it met one or more of the 10 practices of evidence-based inclusive playground design. The existing circular path links complimentary activities to each other, and provides a place for children of all abilities to engage in physical play such as walking, running, or riding wheeled toys. The garden boxes, play cabins, play teepees, tables, and play train were included in the design because they were all common and recognizable objects, and, therefore, easy for all children to understand how to use and interact with other children using the same equipment. Loose parts were included in the playground through the incorporation of the garden boxes, sandbox, play cabins, and music play. The use of loose parts helps children with disabilities to engage in more imaginative and cooperative play. The pathway, with resilient surfacing, allows for wheelchair access around the playground and to play settings and equipment such as the saucer swing, water play, garden boxes, play cabins, play teepees, rock 'n' raft, merry 'go' round, music play, play train, and roller table. The slide, which was designed into a hill, had a ramped pathway constructed to the top of the slide so that children who use a wheelchair can access the slide. The saucer swing, rock 'n' raft, and merry-go-round were included due to their multi-niche attributes, providing activities that require multiple children to participate and engage socially with one another. All of the equipment provides varying levels of challenge and risk for each child depending on their current abilities. The stepping logs, climbing wall, tree climber, and log bridge provide a range of

challenging gross motor activities that are ideal for developing pre-school age children to explore. The plantings around the playground and the tables provide places of observation or 'jump in points' where children can watch the play that is occurring until they feel comfortable enough to participate. The plantings as well as the shade canopies create inviting places for children to play or gather in groups. Finally, the water play, garden boxes, sandbox, dry riverbed, and music play were incorporated into the playground design as sensory stimulus activities. The textured and colored surfacing of the pathway also provides visual and tactile cues for children with disabilities to easily navigate around the playground (see Figures 3-5)

Additional plants added to the new playground were chosen from the existing plant pallet as it already contained plants that were suitable for children. For example, plants that would not be harmful if they were consumed or touched were not included in the original or current planting plan. Some plants were removed from the existing plan to create more areas of exploration among the vegetation and to create open areas for children to participate in active recreation (see Figure 6).

The implementation of the 10 practices of inclusive playground design were assessed by comparing the old playground to the new playground (see Figure 7).

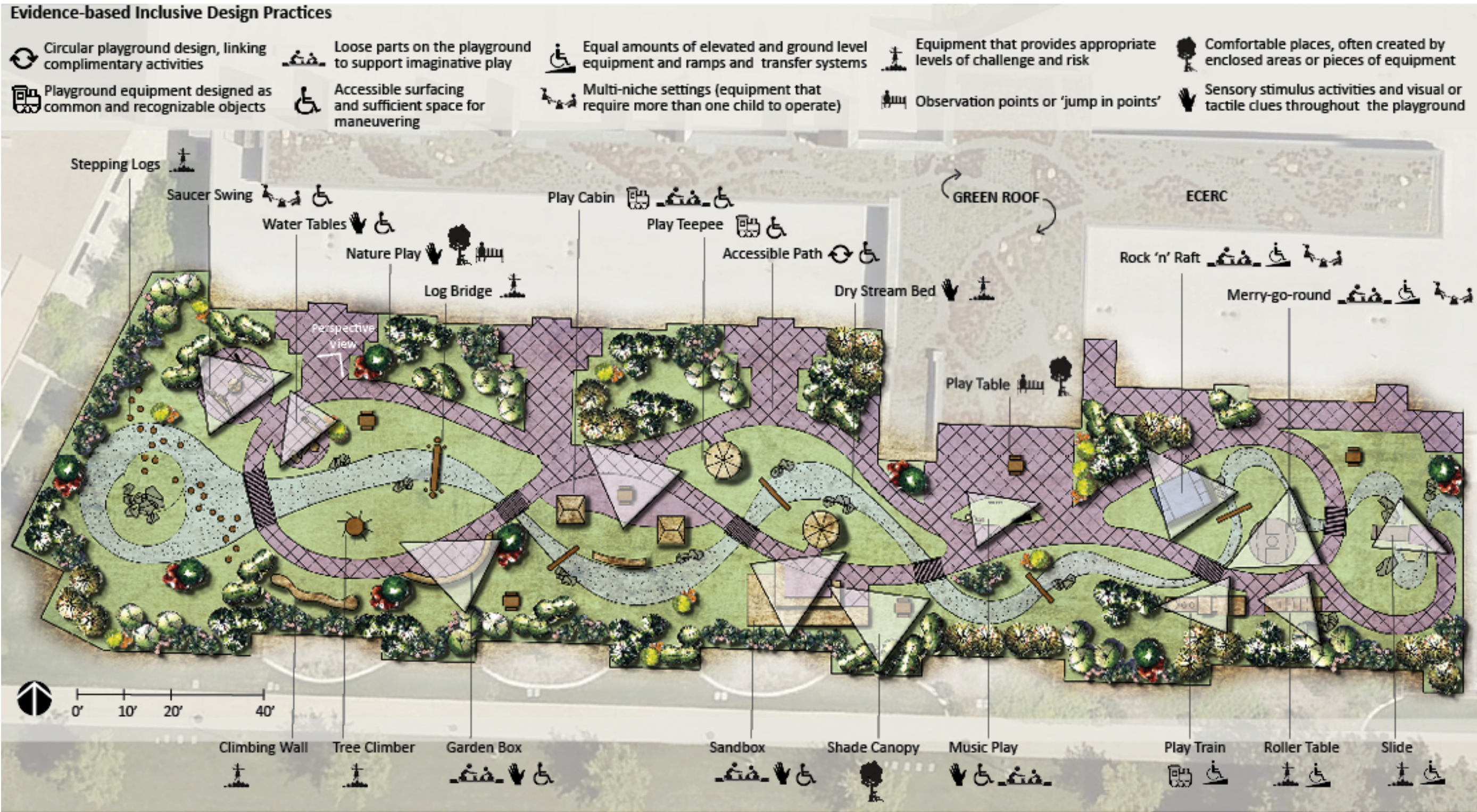
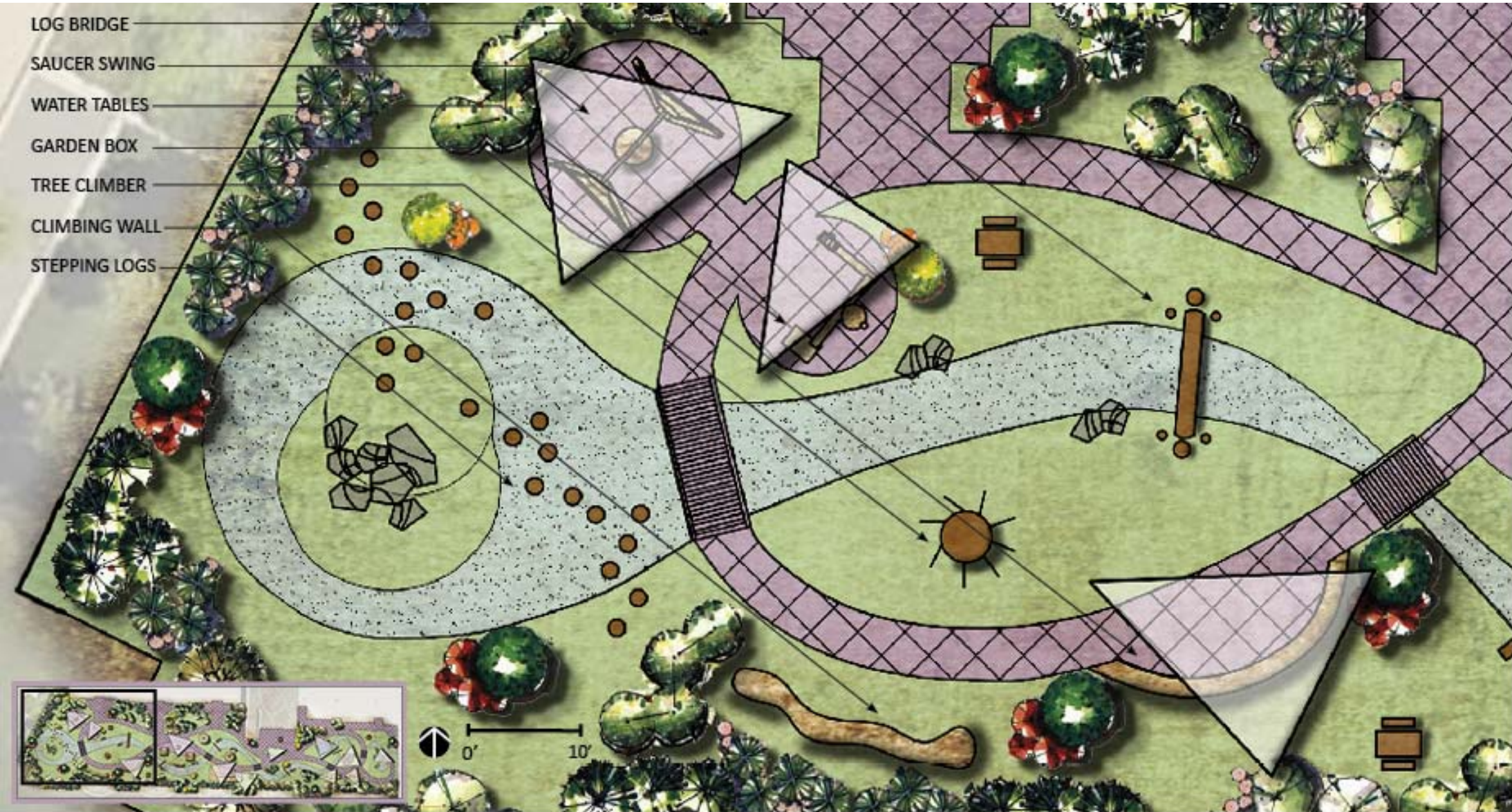


Figure 3. Emma Eccles Jones Early Childhood Education and Research Center: Schematic master plan.



Figure 4. Emma Eccles Jones Early Childhood Education and Research Center: Perspective.



SAUCER SWING



WATER TABLES



LOG BRIDGE



STEPPING LOGS



CLIMBING WALL

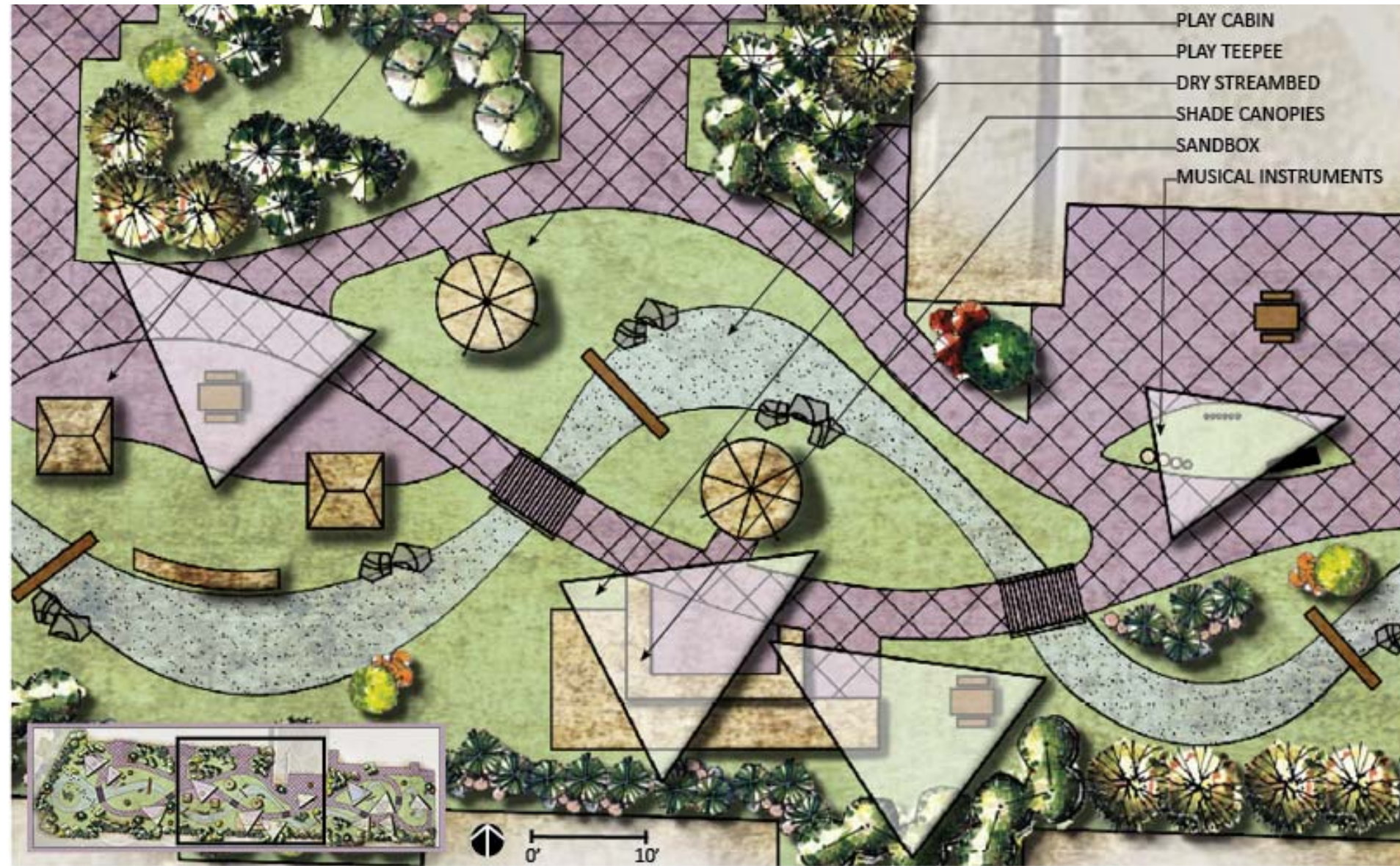


TREE CLIMBER



GARDEN BOX

Figure 5. Emma Eccles Jones Early Childhood Education and Research Center: Design details.



MUSICAL INSTRUMENTS



SHADE CANOPIES



PLAY CABIN



PLAY TEEPEE



SANDBOX



DRY STREAMBED

Figure 5 (continued).



ROCK 'N' RAFT



MERRY-GO-ROUND



SLIDE

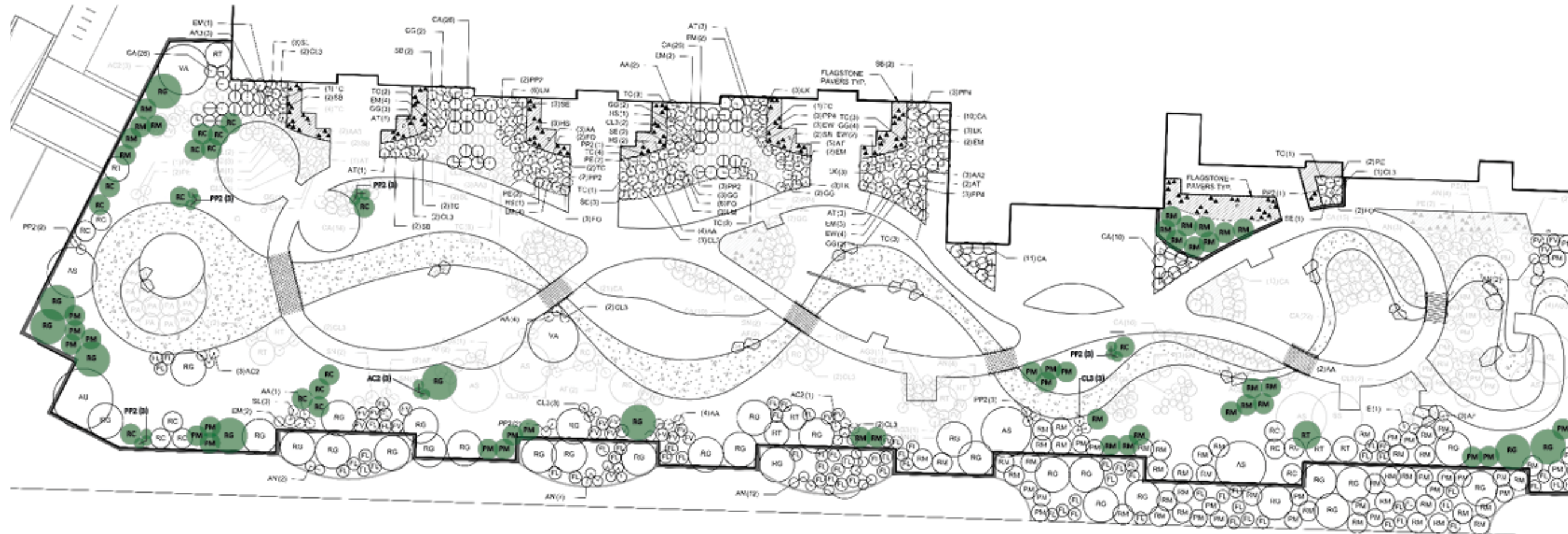


PLAY TRAIN



ROLLER TABLE

Figure 5 (continued).



PLANT SCHEDULE

SHRUBS	QTY	BOTANICAL	COMMON	CONT	GRASSES/PERENNIALS	QTY	BOTANICAL	COMMON	CONT
AS	7	Amelanchier alnifolia	Serviceberry	5 gal	FO	13	Festuca ovina glauca 'Elijah Blue'	Blue Fescue	1 gal
AU	1	Amelanchier ulmifolia	Utah Serviceberry	5 gal	FV	40	Fragaria vesca	Woodland Strawberry	1 gal
AN	40	Artemisia nova	Black Sagebrush	5 gal	FL	94	Fragaria x 'Lipsick'	False Strawberry	1 gal
CL	1	Cercocarpus ledifolius	Curly-Leaf Mountain Mahogany	5 gal	CC	24	Carex lincheimii 'Whirling Butterflies'	Whirling Butterflies Carex	1 gal
PM	37	Pinus mugo mugo 'Slowmound'	Slowmound Mugo Pine	5 gal	HS	7	Helictotrochon sempervirens	Blue Oak Grass	1 gal
PA	11	Polygonum cuspidatum	Mexican Bamboo	5 gal	LM	15	Lavandula angustifolia 'Munstead'	Munstead English Lavender	1 gal
RG	57	Rhus aromatica 'Gro-Low'	Gro-Low Fragrant Sumac	5 gal	LK	12	Liatris spicata 'Kobold'	Spike Gayfeather	1 gal
RT	10	Rhus trilobata	Three leaf Sumac	5 gal	PP4	11	Panicum virgatum 'Prairie Sky'	Prairie Sky Switch Grass	1 gal
RC	11	Ribes cereum	Wax Currant	5 gal	PP2	19	Pentstemon cyananthus	Wasatch Pentstemon	1 gal
RM	136	Rubus ciliolobus	Rocky Mountain Thimbleberry	5 gal	PE	17	Pentstemon cottoni	Firecracker Pentstemon	1 gal
SS	2	Sorbus scopulina	Western Mountain Ash	5 gal	SL	10	Schizachyrium scoparium	Lille Bluestem Grass	1 gal
VM	22	Viburnum dentatum 'Blue Muffin'	Blue Muffin Viburnum	5 gal	SN	10	Sorghastrum nutans	Indian Grass	1 gal
VA	2	Viburnum trilobum	American Cranberrybush	5 gal	SB	12	Stachys byzantina 'Silver Carpet'	Lamb's Ears	1 gal
					SE	9	Stachys lanata	Flowerless Lamb's Ear	1 gal
					TC	42	Thymus x citriodorus 'Aureus'	Lemon Thyme	1 gal
CRASSES/PERENNIALS	QTY	BOTANICAL	COMMON	CONT	FLAT SIZE PLANTS	QTY	BOTANICAL	COMMON	CONT
AA3	8	Allium x 'Ambassador'	Ambassador Allium	1 gal	▲	148	Thymus x citriodorus 'Aureus'	Lemon Thyme	Flat
AA2	8	Allium x 'Mount Everest'	Mount Everest Allium	1 gal					
AT	22	Anemone coccinea roses	Pussy Toes	1 gal	VINES	QTY	BOTANICAL	COMMON	CONT
AC2	27	Aquilegia canadensis	Rocky Mountain Columbine	1 gal	**▲	8	Humulus lupulus 'Aureus'	Golden Hops	5 gal
AG3	10	Aquilegia chrysantha	Golden Columbine	1 gal					
AF	24	Aquilegia formosa	Western Columbine	1 gal					
AA	24	Aster alpinus	Alpine Aster	1 gal					
CA	279	Calamagrostis acutifolia 'Karl Foerster'	Foerster's Reed Grass	1 gal					
CL3	39	Chamaeranthium latifolium	Northern Sea Oats	1 gal					
EM	17	Echinacea purpurea 'Magnus'	Magnus Purple Coneflower	1 gal					
EW	9	Echinacea purpurea 'White Swan'	Purple Coneflower	1 gal					

Notes:

*Each symbol represents one plant. Quantities shown for flat size plants are for individual plants. *Flat denotes size only for the plants. Plant Thyme in gaps between paving stones as detailed (see detail 4 on LS-501).

**Golden Hops vines are planted at each arbor post.

See LP-501 for Landscape Notes.

- Removed Existing Plants
- Maintained Existing Plants
- Proposed Plants

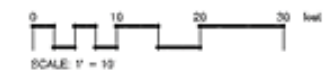


Figure 6. Emma Eccles Jones Early Childhood Education and Research Center: Planting design.

Inclusive Design Practices Met by the Playground Design	Old Playground	New Playground
Circular playground design, linking complimentary activities	●	●
Playground equipment designed as common and recognizable objects	●	● ● ● ●
Loose parts on the playground to support imaginative play	● ● ● ●	● ● ● ● ● ●
Accessible surfacing and sufficient space for maneuvering	●	● ● ● ● ● ●
Equal amounts of elevated and ground level equipment and ramps and transfer systems		● ●
Multi-niche settings (equipment that require more than one child to operate)		● ● ●
Equipment that provides appropriate levels of challenge and risk	● ● ● ● ● ●	● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●
Observation points or 'jump in points'	● ● ●	● ● ● ● ● ●
Comfortable places, often created by enclosed areas or pieces of equipment		
Shade Structures	● ● ● ●	● ● ● ● ● ● ● ● ● ● ● ●
Tables	● ● ●	● ● ● ● ● ●
Sensory stimulus activities and visual or tactile clues throughout the playground	● ●	● ● ● ● ● ●

Figure 7. Emma Eccles Jones Early Childhood Education and Research Center: Results.

CHAPTER V

DISCUSSION

There are very few guidelines that clearly articulate what evidence-based inclusive playground design practices are, or should be. This research has gathered what is known about inclusive playground design and organized it into 10 clear practices that, if implemented into a playground, would facilitate inclusive play between children of all abilities. Furthermore, this research attempted to connect the gap between the understanding that playgrounds can facilitate important peer interactions, and how that can be achieved for children of varying abilities. This is accomplished through the discovery of 10 practices of inclusive playground design, and the design example of how one might implement these practices into an actual playground.

Designing a playground using the 10 practices of inclusive playground design helped to illustrate certain challenges or issues that should be considered. First, loose parts such as sand toys, water table toys, garden toys, and props for imaginative play are extremely important. However, it would be difficult to incorporate them into a public playground, since it would be challenging to find a way to keep the loose parts at the playground, and to maintain them in good condition. The practice that was most difficult to incorporate effectively into the playground design was providing appropriate levels of challenge and risk for children of all abilities. Understanding the importance of developing gross motor skills, especially during pre-school age, the design included elements such as the stepping logs, climbing wall, tree climber, and log bridge. However, these elements are not inclusive to children of all abilities. This dilemma posed the

question of whether the elements on the playground should be inclusive to children with or without disabilities, or if the playground would be considered just as inclusive if it had equal amounts of inclusive elements for children of all abilities. The easiest practices to implement were observation points and comfortable places. These practices already seemed to come naturally in the environment or design since it was already somewhat intuitive to create places to sit or rest, or provide protection from the rain or sun. It took various renditions of the playground before the design adequately addressed the balance of elevated and ground level components, as well as the accessible surfacing and sufficient space for maneuvering around equipment. While at first it seemed challenging to think of alternative ways to make equipment such as a sandbox, slide, or a merry-go-round inclusive, it greatly enhanced the overall functionality of the playground once those accommodations were made within the design. The overall incorporation of the 10 practices of inclusive playground design was not that difficult. It did require more planning and thinking through all the various disabilities children may have and how they might be addressed through playground design, but the end result was a playground that was much more functional and enjoyable for all users.

Through the combined results from the design process and systematic review, it was determined that although a certain piece of equipment may be considered *inclusive*, it may not be inclusive to certain age groups or to specific disabilities. Tables 3 and 4 illustrate which inclusive design practices may be more suitable for certain ages or disabilities.

Table 3

Inclusive Design Practices and Specific Disabilities

Inclusive design practices	Autism	Visual disabilities	Physical disabilities	Intellectual disabilities	Various disabilities ^a
Circular design	Meneer et al., 2006; Yuill et al., 2007				Mejeur et al., 2013;
Common objects		Schneekloth, 1989			Mejeur et al., 2013; Moore & Lynch, 2015; Prellwitz, 2007; Prellwitz & Skar, 2007
Loose parts	Yuill et al., 2007				Mejeur et al., 2013; Woolley, 2013; Dien, 1991
Accessible surfacing			Ripat & Becker, 2012; Dunn & Moore, 2005; Yantzi et al., 2010		Mejeur et al., 2013; Shapiro, 2006; Talay et al., 2010; Moore & Lynch, 2015; Kodjebacheva, 2008; Prellwitz & Skar, 2007
Elevated & ground level components			Yantzi et al., 2010		Moore & Lynch, 2015; Woolley, 2013; Kodjebacheva, 2008
Multi-niche settings			Dunn & Moore, 2005	Cheung, 1989	Talay et al., 2010;
Appropriate levels of challenge	Yuill et al., 2007;	Schneekloth, 1989	Barbour, 1999	Cheung, 1989	Moore & Lynch, 2015; Christensen, 2001; Woolley, 2013; Prellwitz, 2007; Kodjebacheva, 2008
Observation points	Yuill et al., 2007		Dunn & Moore, 2005	Cheung, 1989	Woolley, 2013
Comfortable places		Schneekloth, 1989	Dunn & Moore, 2005	Cheung, 1989	
Sensory stimulus		Kern & Wolery, 2001	Dunn & Moore, 2005		Shapiro, 2006; Prellwitz & Skar, 2007; Dien, 1991

^aVarious disabilities.

Table 4

Inclusive Design Practices and Age Groups

Inclusive design practices	Preschool	Elementary	Adolescent
Circular design		Menear et al., 2006; Yuill et al., 2007	
Common objects		Moore & Lynch, 2015; Schneekloth, 1989	Schneekloth, 1989
Loose parts		Yuill et al., 2007; Dien, 1991	
Accessible surfacing		Moore & Lynch, 2015	
Elevated & ground level components		Yantzi et al., 2010; Moore & Lynch, 2015	
Multi-niche settings	Cheung, 1989	Cheung, 1989	
Appropriate levels of challenge	Cheung, 1989	Yuill et al., 2007; Schneekloth, 1989; Barbour, 1999; Cheung, 1989	Schneekloth, 1989
Observation points	Cheung, 1989	Cheung, 1989	
Comfortable places	Cheung, 1989	Schneekloth, 1989; Cheung, 1989	Schneekloth, 1989
Sensory stimulus	Kern & Wolery, 2001	Dien, 1991	

Note. If a study did not explicitly state the age group that was used in the research, it was not included.

Incorporating the inclusive design principles that have been indicated to apply to various disabilities can be effective in a public playground setting where children of all abilities will be playing. However, if a playground is built for a specific group of children, such as children with ASD, visual disabilities, hearing disabilities, etc it is essential to do specific research for the certain disability to ascertain that the most suitable and proper equipment and design are being used.

As seen from the tables above, it is important to note that each of these inclusive design practices should be carefully considered before implementing into a playground.

For example, common and recognizable objects are easier for all children to understand and use, making them a favorable selection for an inclusive playground. However, a designer should avoid including equipment that is too specifically designed. For example, a piece of equipment designed as a castle would limit children to engage in play that involved only those things that pertain to a castle. Yet, a simple enclosed structure with windows and doors would allow children to pretend that they were in a castle, a cabin, a store, a normal house, and so forth (Mejeur et al., 2013). Just as certain inclusive design practices are better suited for specific age groups and disabilities, there could be a situation where a themed playground was appropriate and effective. Before implementation, it is critical to make sure that the user needs have been analyzed and that the playground design will fulfill the purpose it is intended for.

Another design practice that requires special consideration is the inclusion of appropriate challenges and risks. Children of all ages and abilities encounter various physical, psychological, and social challenges as they play outdoors. The process through which children react and behave in these different situations help them to learn necessary skills in their developmental process (Moore & Lynch, 2015). The challenge is to understand the range of skills that children will bring to a playground, and be able to create an environment where every child can find something that will give them an opportunity to push him/herself in a new and exciting way.

Limitations

While not the intent of this paper, the lack of not being able to implement this

playground design and then observe the play of children, creates a limitation to the results of this research. Through the systematic review, inclusive design practices were identified. However, due to the concept of affordances, it is still uncertain how successful this playground would be in providing an inclusive environment if all of the 10 practices were implemented. Being able to test the results of the systematic review more accurately and thoroughly would increase the credibility of this research.

Conclusion

The results of this study provide designers with a concise list of 10 practices that if implemented should create an inclusive playground setting. These practices also have research-based evidence to support their effectiveness in facilitating peer interactions between children of all abilities. The additional findings from the systematic review regarding other influences that effect successful peer interactions in a playground environment, also provide a helpful resource for designers to consider. As our society strives to make various environments and built structures more inclusive, the results of this study provide a helpful resource to guide designers, administrators, businesses, city councils, and many more organizations in their work to create inclusive playgrounds.

Future Research

To further evaluate the concepts presented in this paper, future research should assess the effectiveness of each of these 10 practices of inclusive playground design in an actual playground. One would need to find a playground that incorporated all of these

practices, or they would need to construct such a playground. They would also have to determine what interactions between children would denote increased peer interaction between children with disabilities and children without. Finally, to ensure greater accuracy and reliability, they would need to address the other influencing factors other than the design that affect how children interact with one another.

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