DESIGNING PLAYGROUNDS FOR ALL CHILDREN: ALL-INCLUSIVE ADVENTURE
PLAYGROUND FOR THE CITY OF ARLINGTON, TEXAS

By

MOHAMED MAHMOUD ALY AMER

THESIS

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Supervising Committee:
Taner R. Ozdil, Supervising Professor
Diane J. Allen
Amy A. Archambeau
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Abstract

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MOHAMED MAHMOUD ALY AMER, MLA

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Supervising Professor: Taner R. Ozdil,

A child’s play is an essential part of his/her connection to a community, social relations, and physical activity and mentality. Through play, a child gains an understanding of himself and his /her world. “Limiting children’s outdoor play harms their cognitive, social and language development, it limits their physical fitness, hurts their health, and reduce learning and the ability to cope with trauma” (Forest, 2008 p.140). Creating a friendly, safe and accessible environment for all is just as significant as the play equipment.

Adventure playgrounds, which are in most cases natural environments for children, provide many opportunities for children to develop physical, cognitive, and social skills, while at the same time increasing personal creativity, curiosity, imagination, and the ability to communicate (Staempfli, 2009). Although there has been increasing awareness of adventure playgrounds in the USA in recent years (Teague, 2015) the number of built projects is currently small, thereby depriving many children of experiences with accessibility exploration of all-
inclusive options which provide an opportunity for all children to play, learn, and heal together. Literature also suggests that making a playground accessible may not always address the full range of disabilities that are affecting children, including mental, visual, auditory, and physical, and playground spaces should be accessible by children with a broader range of disabilities, including physical disabilities (Burke, 2013).

The purpose of this thesis is to study and assess all-inclusive and adventure playgrounds to inform the design of all-inclusive adventure playground for the City of Arlington. The goal is to design an all-inclusive adventure playground for the city of Arlington, Texas that allows all children to develop critical, cognitive, and social skills through play with other children of various ages and abilities.

The research underlying this thesis utilizes both qualitative and quantitative research methods (Sommer & Sommer, 2002) to design an all-inclusive adventure playground for the City of Arlington, Texas. This research follows three steps. First, a comprehensive literature review was conducted to understand the importance of play, play environments, adventure playgrounds, and all-inclusive playgrounds. Second, five case studies were conducted to analyze playground characteristics (Francis, 2001; Marcus & Francis, 1998). The purpose of the case studies was to collect data, gain knowledge from other critical playgrounds projects, and focus on design elements such as accessibility and circulation in the playground, play equipment, vegetation, natural materials, different texture, colors, and so on (Forest, 2008). Through case studies of different types of playground areas, researchers critiqued the richness of play environments and analyzed their suitability for children. Third, based on the lessons learned from the previous steps, a site was selected and an all-inclusive adventure playground was designed for the City of Arlington.
In conclusion, the review of literature and case studies, as well as the site observations, reveals that multiple physical, cognitive, and social skills are potentially beneficial to all-inclusive adventure playgrounds. This research reveals set of design considerations such as; equipment is secondary to design and decrease the amount of equipment to consider to design an all-inclusive playground. All-inclusive adventure playgrounds are critical for outdoor play, and they have the possibility to offer a richness of developmental opportunities for children to grow emotionally, socially, and physically. The exploration and the design of such a design illustrate the critical role that landscape professionals can play be influential in providing such visions for families with all children in the same setting. Possible design recommendations for the City of Arlington and the scope of future research is also discoursed.
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CHAPTER 1
INTRODUCTION

1.1 Introduction

This chapter describes the motivation for this research and introduces the problem statement for this thesis. This chapter also discusses the purpose, the research questions, the research methods, and definitions of key terms in this research. The end goal of this research is to design all-inclusive adventure playgrounds to provide play, and to improve the healing and the learning environment in Arlington Texas. The latest research shows the value of play and play-based learning and healing (Goldstein, 2012). Research has shown that play is an essential part of a child’s development (Gleave, 2012). Play-based learning is especially important for children with and without disabilities. Adventure playgrounds are a type of playground that can develop the chances for children to grow emotionally, socially, and physically (Staempfli, 2009). All-inclusive playground needs to be carefully designed to make sure that children can appreciate the full benefits of play (Lareau & McNamara, 1999).

1.2 Problem Statement

A child’s play is an essential part of his/her connection to a community, social relations, and physical and mental activity. Through play, a child gains an understanding of himself and his/her world. “Limiting children’s outdoor play harms their cognitive, social and language development, it limits their physical fitness, hurts their health, and reduce learning and the ability to cope with trauma” (Forest, 2008, p.140). Creating a friendly, safe and accessible environment for all is just as significant as the play equipment.
Literature suggests that research has been limited to the quality of playgrounds, mostly about how playgrounds affect physical activity in children (Qazi, 2013). Most of the designers of landscape do not seem to design playgrounds (Stewart, 1999). Some scholars also argue that playgrounds are not exciting, and have become dull for children because the design of playgrounds area do not have “special” elements such as water features, change in materials and loose parts to increase the novelty of play (Forest, 2006). Playgrounds have fallen out of favor in neighborhoods and schools (Forest, 2008, p.139). There has been increasing awareness of adventure playgrounds in the USA in recent years (Teague, 2015), though the number of such projects, is currently small. Children are thereby deprived of experiences with accessibility exploration of all-inclusive options which provide an opportunity for all children to play, learn, and heal. Research shows that when children participate in free play outdoors, they learn and adapt more freely to their culture, society, and the world. Today’s playgrounds do not seem to address the full range of disabilities (Burke, 2013). Over the last thirty years natural outdoor play of all kinds has declined, both in liveliness and quality (Forest, 2008). Although there are examples of all-Inclusive, or adventure playgrounds there are no known all-Inclusive adventure playgrounds examples in scholarly literature. All-inclusive adventure playgrounds have the potential to give opportunity to all children to play together while giving them the opportunity to practice physical and social skills.

1.3 Research Purpose

The purpose of this thesis is to study and assess all-inclusive and adventure playgrounds to inform the design of an all-inclusive adventure playground for the City of Arlington. The goal is to design a playground for the City that allows all children to develop critical, cognitive, and social skills while at play, while encouraging risk-taking and outdoor free play options for
children of all ages and abilities (Wilson 2016). The research specifically focuses on lessons learned from literature to inform future design of an all-inclusive adventure playground.

1.4 Research Questions

The research questions are the result of the collection of information from the literature. Analysis of this data is intended to guide the future design and implementation of playground that brings the natural outdoor world. The research addresses the following questions:

1. What are some of the critical features and considerations for all-inclusive playgrounds?

2. What are some of the critical features and considerations for adventure playgrounds?

3. How are these considerations can be brought together to design all-inclusive adventure playground for all children for the city of Arlington?

1.5 Definitions of Terms

These definitions are included for terms, which may be unfamiliar.

_Playground:_ Playgrounds can be defined as specialized open spaces especially designed for children in towns and cities (Metin, 2003).

_Inclusive Play:_ The design of public play environments for children of all abilities that help the sensory, physical, cognitive, and social needs (Lareau & Horvat, 1999).
**All-Inclusive Playground:** The goal is to include everyone. They are thoughtfully designed to provide a safe area where children of all abilities can play together and are developmentally suitable for children with and without disabilities (May, 2006).

**Adventure Playground:** A space dedicated solely to children’s play, where skilled play workers enable and facilitate the ownership, development and design of that space physically, socially and culturally by the children playing there. It usually offers both indoor and outdoor play experiences (playengland.org.uk 2014).

**Accessibility:** Accessibility can be defined as the meeting between the functional ability of a group and the demands of the physical environment (Iwarsson & Ståhl, 2003). This does not mean that each feature or event must be usable by every child (Accessible, 2018). The fact that a Play area is accessible does not mean that it is inclusive (Prellwitz, 2007).

**Loose Parts:** Give young children manipulate able materials to use in play their imagination stimulate and to create, explore, experiment, and build (Daly & Beloglovsky, 2015).

**ASTM F1951:** The American Society for Testing Materials (ASTM) related to resiliency for falls and accessibility (ASTM F1951) around accessible equipment. Some jurisdictions and municipalities require surface systems to have certificates of compliance with ASTM standards (ADA 2010).

**Children with Disabilities:** The most widely accepted definition of children with disabilities is that “children under the age of eighteen who have or are at increased risk for a chronic physical, development, behavioral, intellectual, or emotional condition and who also require health and related services of a type or amount beyond that required by children generally (Department of
Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau, 2007).

1.6 Research Methods

This research uses both qualitative and quantitative methods (Sommer & Sommer, 2002) to design an all-inclusive adventure playground for the city of Arlington, Texas. This research follows three step procedures to study, assess, and design all-inclusive adventure playground.

First, a literature review was conducted to understand the importance of play, play environments, adventure playgrounds as well as all-inclusive playgrounds. Second, five case studies are conducted following procedures informed by case studies (Francis, 2001). Two of these case studies also included on-site documentation to promote understanding of the design characteristic of children’s outdoor spaces and how these design characteristic effect the users of the playground. (Marcus & Francis, 1998). The second method used case studies as an organized way of documenting site projects (Francis, 2001). The purpose of the case studies was to collect the data, gain knowledge from professional projects and focus on design elements such as playground accessibility, circulation, play equipment, vegetation, natural materials, different textures, colors, and so on (Forest 2008). Through case studies of various types of playground, researcher assessed the richness of play environments and analyzed their suitability for children. Third, employs secondary descriptive research strategies to gather information about specific all-inclusive and adventure playground. Finally, based on the lessons learned from the previous steps the researcher proposed design all-inclusive adventure playground for the city of Arlington.
1.7 Significance and Limitation

This research helps to better understand the design characteristics of play environments for all abilities while exploring the design of a new type of playground that highlights the importance of adventure. This research signifies the importance of the design of play environments to cover not just a child’s physical needs but also cognitive, social, and emotional aspects. Research and design attempt to bring all-inclusive playground and adventure playground typologies together to propose a new type of playground that is inclusive of both qualities and features. There is a limited number of known all-inclusive adventure playgrounds “especially” in the DFW metroplex for case studies. Majority of the lessons learned is documented through secondary sources and from remote adventure and all-inclusive playground case studies. Due to scope, time and resources research was limited to data collection procedures that were attainable by a single researcher from remote case studies.

1.8 Chapter Summary

The purpose of this thesis is to study and assess all-inclusive and adventure playgrounds to inform the design of an all-inclusive adventure playground for the City of Arlington. Chapter one focuses on the introduction of the research problem, purpose, research questions and overall research procedures. The significance of this research to landscape architecture and the limitations of this research are briefly addressed. Chapter two focuses on literature review and the value of play, play environments, adventure playgrounds as well as all-inclusive playgrounds. Chapter three focuses on research methods introduces the research design methodology used for this study; it provides an overview of the study population and study locations, describes the data collection, and data analysis methods. Chapter four focuses on analysis and findings from case studies for the inclusive and adventure playground, the data
from literature and secondary data. The data from on-site documentation help to understand playground characteristics in the Dallas-Fort Worth (DFW) area. Finally, the design matrices have been further analyzed and classified to understand the design elements. Chapter five focuses on design of an all-inclusive adventure playground for the City of Arlington and Chapter six focuses on conclusions from this thesis as well as potential for future research.
CHAPTER 2
LITERATURE REVIEW

2.1 Play

In general sense, play, identified as engagement in activity for recreation and enjoyment, is essential for a child’s optimal development. A child’s play is an essential part of his/her connection to a community, social relations, and physical/mental activity. Through play, the child gains an understanding of himself and the world. The chance to play improves one’s ability to develop independence and self-sufficiency. According to the United Nations (1989) Convention on the Rights of a Child, play is a central feature of children’s everyday life. An essential part of play is the child’s communication with peers and the environment. Play is more than merely a recreational activity that children involved in; it is an occupation with a range of potential benefits (Sandberg et al., 2004).

Researchers have identified four categories of play that offer children with the experiences they need to grow and develop (Moore, 1986):

1. Cognitive Play or Creative Play
   - This type of play is critical to the development of imagination and logical thinking.
   - Activities can include: digging, molding, shaping, constructing, demolishing, discovering, and changing.

2. Active Play or Physical Play
   - This type of play is critical to the growth of a child’s body and movement.
• Activities can include balancing, coordination, endurance, strength, depth, speed, accuracy, stillness, patience.

3. Group Play or Social Play

• This type of play is critical to the development of personal skills and identity.

• Activities can include: group play, talking, laughing, pretending, acting, learning from others, leading, following.

4. Individual Play or Quiet Play

• This type of play is critical to developing private and personal views, and to developing one’s identity.

• Activities can include: sitting, thinking, observing and imagining. It has been documented that children need to involve in all four types of play in order to enjoy the time of childhood (Bloch & Pellegrini, 1989).

Play is a key element of learning for children; play is an essential element of healthy growth for children of all ages and abilities. It provides children the chance to learn about the self, others, and the physical environment. Mainly, social media have reduced the freedom to use accessible opportunities. Fearful about crime, parents are careful about permitting their kids to go out by themselves, and dense pedestrian traffic can make it impossible for children to use the sidewalks for their games. Vehicular traffic prevents them from playing in the street.

Additionally, as plans for civic improvement projects progress, one may ask, where and when can the kids play? How can they find out about themselves and their skills, about their world and
their relationship to it? What potentials exist for children in the city to find places to meet others, to discover their environment, to build an image of themselves and the world.

Playgrounds were chosen to provide a range of opportunity for activity and interaction. Children may have the chance to run, make noise, get dirty, get wet, play with other children, have tools, play on specialized equipment, and so on. Also, most playgrounds intentionally incorporate physical features which make likely a variety of activity choices for their users. There is usually some amount of open space for play, some equipment for the use of children, and often an opportunity to use or at least to see natural materials such as sand, dirt, water, leaves, tree bark, stones, and more (Forest, 2008).

In principle, the planning of play spaces has been seen as based on instinct about what a child wants and needs, and how to plan for it. The notion that many different interests and needs are helped by play (e.g., physical release, peer group association, exploration, conversational and organizational skills, and so on) causes an organized consideration of children's play and its interrelationships with play spaces (Casey, 2007).

Play can be complex, and the complication lies in the many different ways in which children play. Play is also a natural part of a child’s life, with many chances to engage in play and interact with peers (Zinger, 2002). According to US population ages, the percentage of people with special needs increases (Disability Statistics Annual Report, 2017). A child with disabilities may not have as many chances to engage in play activities, especially outdoors. Research has found that a child with disabilities may have a hard time finding peers to play with, and that relationships to friends of the same age are often narrow or non-existent (Segal et al.2002; Skar, 2002). In playgrounds, children with disabilities are observed playing alone or with an adult more often than children without disabilities (Nabors & Baldawi, 1997). This
demonstrates a need for more information about what the possibilities are for children with disabilities to be involved in play on the playground, and how they perceive play in this setting.

The benefits of play for children with and without disabilities are critical to a child’s health and emotional improvement. Play enhances problem solving, creativity, imagination, social bonding, identity, and self-expression (Casey, 2007).

2.1.1 Play and Healing

There seem to be general agreement in research that play is important to the healthy growth of a child. Need for childhood play is innate; it is not only enjoyable but also crucial to the processes of learning and development (Gleave & Cole-Hamilton, 2012). Children with mental, physical and emotional problems are often excluded from play opportunities (Gleave & Cole-Hamilton, 2012). Play designed to be inclusive can build a helpful environment for all children, as it combines social interaction with physical accessibility. During such play, children develop qualities that will eventually help them to become more productive members of society (Clifford & Bundy, 1989). According to Tai et al. (2006, p. 11) “The benefits of play for all children, counting those with disabilities” are:

1. Brain development, physical development, and health.

2. Building social, emotional and life skills.

3. Helping to develop an awareness of risk.

4. Encouraging children to experiment, generate ideas, practice skills, role play, invent.

5. Allowing an opportunity for children with disabilities to interact with their peers.

6. Offering opportunities for choice and decision making.
7. Establishing a critical bond with nature during childhood. (Tai el at., 2006)

Professional therapists use play to assist children with disabilities reach healing goals. Play activities are used to accomplish conduct objectives such as “fine motor skill development, postural control, and concept development” (Missiuna, Cheryl & Pollock, 1991 p.882). According to Rast “in a therapeutic setting, play frequently comes to be a tool used to work towards a goal” (Rast, 1986 p.30). Therefore, play and healing can work together for children with all abilities.

2.1.2 Play and Learning

Learning to look, touch, hear, and feel are the primary objectives of these early lessons in the playground, these skills one associated with future learning that can last a lifetime (Tekle, 2004). Playgrounds can also provide a suitable experimental environment in which children are given chances to make selections, chase their questions and concerns, link what is known to the unknown, and be successful as they learn and discover through play, informal learning activities, and projects (Tekle, 2004). Children during play develop qualities that will eventually help them to become more productive members of society (Clifford & Bundy, 1989). They learn about interactions through friendships and experience emotions like curiosity, anxiety, excitement, and courage. The play also begins learning through speaking and non-speaking connections and its flexible practice. It encourages perceptual, conceptual, intellectual, and language development, and the eventual addition of cognitive abilities (Levitt 1975; Weininger & Fitzgerald, 1988). Play also offers chances for behavior and characters to be either appreciated or disapproved. Through it, children learn how to conform to the norms of their community. A play area is a place where young minds can discover nature’s adventures. Shrubs, trees and native flowers can entice butterflies and songbirds, making a beautiful teaching moment. According to Moore and Wong
dynamic learning in outdoor settings stimulates all aspects of child increase more strongly than internal environments. The developmental effects of outdoor space fall into three main categories cognitive, physical, and social (Herrington et al., 1998). Natural play spaces frequently deliver a variety of physical structures allowing for a variety of movements. Adventure playground thinking recommended children themselves should have a higher hand in guiding their play. They should be suitable to join their creativity by having access to ‘loose parts erection materials they could build with, manipulate or destroy without limitation. Children learn how to interrelate with peers when involved in play activities. According Piaget’s and Vygotsky’s to our understanding of the play are in the dimensions connected to abstract thinking and the creation of rules (Van Hoorn et al, 2007). Piaget and Jean (1978) see play as the building of knowledge within the specific child by interacting with the parts. Children also need be allowed to explore each of the materials that will engage all of their senses, touch, hearing, vision, smell and taste. Teachers or other adults can play with children to help their learning. Providing activities that recognize the use of all senses is significant for developing children. The senses are used to accept and process information about the world around us and to find out how we are connected to our environment. By doing sensory stimulating activity, children are learning the information they receive and interpret knowledge (Piaget & Jean 1978).

2.1.3 The Role of Nature Play

Today’s children often have limited chances to connect with the natural environment. Children spend more time watching television and playing video games on computers than they do being physically active outside. (Lovu, 2006). According to North Carolina State University College of Design: the benefits of connecting to nature have been documented in many research studies such as support multiple development domains, supports creativity and problem solving,
improves social relations Increases physical activity and Enhances cognitive abilities (Natural Learning Initiative, 2012). It is also essential for children with different abilities play, touch, smell and explore the natural elements, to improve use of all five senses and increase respect for nature. A natural playground is a play area where children play with natural features such as plants, water, rocks and sand (British Columbia Recreation and Parks Association, 2015; Kuh, Ponte, & Chau, 2013). Natural playground affects the development of the whole child. Children also interact with each other. They have chances to develop a sense of, inclusiveness, risk-taking, and being passionate (Daly & Beloglovsky, 2015). Children can play together in a sandbox, act on a dramatic play stage, or build with loose parts allows children chances to communicate, and share (Curtis & Carter, 2003). Children interact in a natural playground more than a traditional playground (Fjortoft, 2001). As children physically play together with the natural elements in a playground, they are also investigating and discovering. Children are asking questions, and problem-solving. They are, through their self-constructed play, engaging in science, social studies, and learning from each other (Ritchie & Clifford, 2013).

2.2 Understanding Disabilities

According to a 2012 U.S. Survey, (the United States Census Bureau, 2012), almost one of every five Americans has a disability. Accessibility only is not enough to design an inclusive playground as social circumstances and play interest. It may not be possible for every child to access every feature of the space in the same playground. In the last ten years, great moves have been made to design more inclusive playground opportunities for children with disabilities. According to Wagenaar, Different types of degrees of disabilities can occur (Wagenaar et al., 2012). Each child may have his or her own characteristics, with some limitations but also with
benefits or strength. Four levels of disabilities have been recognized (Althuizen, 2016), as follow as:

1. Physical disabilities

   Children with a movement impairment are often confined to wheelchairs, and though this seems unambiguous, there are significant differences among them. Most of these children can sit up straight and some have much strength in their arms because they do everything with them (Wagenaar et al., 2012). Children with a hand- or walking impairment who are not in wheelchairs are children who have restrictions of others sorts. This group is the largest group of children with physical impairment. They are challenged in managing themselves in the world around them and keeping balance is often pretty difficult. (Wagenaarat et al., 2012). For these Children, accessibility is the essential feature, because they are not able to go everywhere. A significant aspect is the design of paths and gates, to enable a child in a wheelchair to ride around.

2. Behavior disabilities

   Children with a mental disability are children who more quickly scary because fearful is an unusual situation. The most important features for them are feeling safe and having someone (parents, occupational therapist assistant, or adult friend) around who make them secure, these children may also have difficulties in identifying hazards. Such children have a strong need for simplicity and consistency in both time and spatial management, and changes can make them panic. They need to have a place to observe and discover new places with no many pressures; they prefer to have back cover, and playing alone often keeps them away from unwanted impulses. (Wagenaar el at., 2012). They can quickly forget themselves in playing in a sandbox
Disabled Children may prefer open play areas where they can play without disrupting the games of others, where they can discover new activities. The maybe intercalated in challenges play areas are crucial to them, even though they sometimes use them in a way they are not supposed to (Prellwitz & Skar, 2007).

3. Intellectual and developmental disabilities

Children with intellectual and developmental disabilities can be beneficial from access to an inclusive playground. In the worst case, their disabilities may include those of play special nature such as a motor skill, or visual impairment (Wagenaar et al., 2012). The challenges for these children are obtaining and understanding of their environment, expressing themselves, and when getting older, dealing with the fact that others do not understand them. The way these children play is not that different from children without disabilities, though they take more time to approach the same level of play. This can mean a young adult with a developmental delay can easily entertain him- or herself at the same play areas where usually younger children play. Other children often have problems in playing with someone with a mental disability; because they do not understand why an older child still wants to play the same games (Richardson, 2002). They usually enjoy themselves by touching, smelling, and watching.

4. Sensory disabilities

Children with a visual impairment are children who have less than 30% visibility or who have a visual angle of fewer than 30 degrees (Wagenaar et al., 2012). For these children it is vital that they can move around freely without barriers, and it must be easy to orientate to and recognize the playground equipment (Haug, 2007). Children with auditory impairment are children who are less able to hearing or interpreting sounds. Luckily because of new medical
possibilities, now almost nobody is completely unhearing, but there still are children who cannot hear enough to follow a conversation. For them, the visibility of others is significant to play and make contact. These features make the appearance of plenty of orientation points on the playground important (Haug, 2007) other significant aspects are the elimination of background for sounds while playing or practicing their balance (Wagenaar et al., 2012)

2.3 All-inclusive Play and Playground

Playgrounds are essential environments where children spend time during their childhood. Playgrounds are designed for children, to be a place where they can do different activities. Playgrounds are not only for physical activities. They are also a principal place for children to interact with other children. Playgrounds are essential for children with disabilities. A recent study noted that only about 1% of playgrounds are designed to be reachable for children with disabilities (Arsrapport, 2006). By not having an access to playground feature a child with a disability can miss out both the chance to be in both the physical and the social environments that happen there (Bundy, 1997). The inclusion is a fundamental principle within any accessible environment and should support the reality of shared play and access to environments (Nind & Seale, 2009). In basic terms, inclusion in any environment is about creating an environment good enough for the child, regardless of their abilities, rather than regressing the child to fit into the existing environment. In the beginning to understand how inclusion can be designed into a playground, we consider the terms ‘exclusion’, ‘segregation,’ ‘integration’ and ‘inclusion.’ These terms are shown in (Figure 2.1). Exclusion, is not being a part of a system where most people can join in, for example families, friends, communities or employment networks (Veres et al., 2013). Exclusion from a play area can be a network to keep children out. For disabled children, this can be done by physical exclusion, as when they are not capable of entering the play area, or
mental exclusion as when other children tell them they do not want to play with them. Segregation is a form of seclusion that can be seen as being left out of a group (Eisenberger et al., 2003). Specific schools for disabled children are a form of socially inclusion splitting them from other children. At school, they able only play with other disabled children because they do not have another option. Integration in play strives to create environments that allow with a disability to join in to play if they are capable of adjusting to the location.

Figure 2.1 Understanding Inclusion, Source: (Valdemar, 2016)
Social integration needs ability in a recognized common language of the society (Kay, 2015). Inclusion has a wider understanding. The main thing in play areas is to be open and designed to welcome children with different abilities. Inclusion can be defined as “the coming together of several forces to give an advantage to the child in his or her life” (Lareau & Horvat, 1999, p.48). According to inspiring play magazine (2012), inclusive play is the design of play environments for children of all abilities in public that help their sensory, physical, cognitive, and social needs (Figure 2.2). Designing an inclusive playground is challenging because children with disabilities have a broad diversity of needs, and fulfilling one group of children may make a playground unreachable for others (Wheway & John, 2003). For example, the use of colored, physical equipment and auditory systems may be encouraged to provide for the needs of site users, and steady color may be used to classify specific activities and amenities. For example, for children with autism, bright colors can affect them and cause difficulties. The designers have to focus on requirements that balance each other and do not conflict with each other (Wheway & John, 2003).

![Figure 2.2 Inclusive Play, Source: (Christensen & Morgan, 2019)](image-url)
Public officials, healthcare professionals, and members of the community at large to build a successful and wide-ranging inclusive play space and social experience for all children. “The message from inclusive play makes it better for everyone” (Casey, 2010, p.7).

The three critical elements to inclusive play (Inspiring Play Magazine, 2012):

1. The improvement of completely accessible and rich play environments to meet the broadest range of needs and the broadest range of all abilities and users.

2. The improvement of educational programs to build community understanding for inclusive play, build a socially-inclusive environment for all children, and sustainability of that inclusive play environment.

3. The involvement of architects, landscape designers, manufacturers, inclusive play advocates, educators.

2.3.1 Accessible vs Inclusive Playgrounds

Accessibility can be defined as the meeting between the functional ability of a group and the demands of the physical environment (Iwarsson & Stahl, 2003). An accessible playground is one that provides a range of play experiences to children of varying abilities. This does not mean that each feature or event must be usable by every child. A that area is accessible, is not necessarily inclusive (Prellwitz, 2007). However, in the setting of playgrounds, accessibility has been mainly designed by the addition of access ramps and transitions. According to the accessibility rules of the Americans with Disabilities Act (ADA, 2000), at least one of each type of play equipment must be on an accessible path, and at least 50% of the equipment on the playground should be accessible. Research shows that less than 10% of children with disabilities can use the ramps and transfer stations that were added to make playgrounds more accessible.
(Christensen & Morgan, 2003). In designing an accessible playground, the first phase is to design an accessible path to the play area. This should contain an accessible protective surfacing to each planned structure to be used by children with disabilities. Also, parking space and turnaround is suggested to be at least 5 in diameter should be provided next to any play structure that requires transferring from a wheelchair onto the structure. The maximum slope for a ground-level accessible route is 1:16. The access path should be at least 5 feet wide to let two wheelchairs to pass. Merging moveable and artificial surfaces is a standard solution. Choosing this method, must be attentive of possible trip hazards where the wood fiber, sand or other moveable material meets the accessible surface. Physical therapists consider that 40 to 60 percent of wheelchair users can shift out of their chairs onto play equipment. Children in wheelchairs need a change point between 11 and 18 inches in height to make this transfer by themselves. Once these children are on the play structure, steps no higher than 8 inches will let them play with their peers. Stairs should be at least 14 inches deep, and 24 inches wide to accommodate children of different ages. Playgrounds designed to serve children of all ages, the design of the landscaping of the playground should show the separate areas for the different ages. The areas should be divided at least by a buffer zone, which could be an area with vegetation or benches. The buffer zone will decrease the possibility of injury from more active children running through areas filled with younger children with generally slower movement. Also, Ramps give another way for children to access a raised platform. Ramps should be no more than a 1:12 slope and at least 36 inches wide and they must have handrails and curbs. To decrease circulation conflicts, ramp Landings should be at least 5 feet in diameter and ramps should be no more than 12 feet long between level landings. Though, a recent study showed that only about 1% of the countries playgrounds are built with the intent to be accessible for children with disabilities (Arsrapport,
According to ADA Standards for Accessible Design, recommended on a variety of requirements such as transfer systems (which are design features that enable a wheelchair user to move from the chair to the play component), surfacing, and the ratio of elevated to ground-level components that are required to be on an accessible route (See Table 2.1) (ADA, 2010). Recent studies recorded 57 playgrounds that only 5% had accessible paths and surfaces, while 45% had enough ramps and transfer systems (Olsen & Dieser, 2012). These studies recognize further limits in an overall requirement, as children could not access the transfer systems provided due to the poor accessibility of the routes and surfacing (Olsen &Dieser, 2012). The primary need to have a clear design of inclusive playgrounds in place. Playgrounds are not only for accessibility and physical activities. Playgrounds should be just as crucial for all children with and without disabilities.

<table>
<thead>
<tr>
<th>Number of elevated play components provided</th>
<th>Minimum # of ground-level play components required to be on accessible route</th>
<th>Minimum # of different types of ground-level play components required to be on accessible route</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
<tr>
<td>2 to 4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5 to 7</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8 to 10</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>11 to 13</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>14 to 16</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>17 to 19</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>20 to 22</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>23 to 25</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>More than 25</td>
<td>8 plus 1 for each additional 3 over 25, or fraction thereof</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 2.1 Accessibility Ratio (ADA, 2010)
There are advantages for children with disabilities in an inclusive environment. The study shows an improvement in their social skills, and promotes more challenges to play with materials (Bailey, 1998). Designing an inclusive playground is challenging because children with disabilities have a broad diversity of requirements, and satisfying one group of children may make a playground inaccessible for others (Rob, 2003).

### 2.3.2 Design Criteria for Inclusive Playground

In 2017 Fernelius reviewed the literature and suggested a subset of design criteria. According to Fernelius, the methods of inclusive playground design are as follows (Fernelius, 2017). (Table 2.2).

<table>
<thead>
<tr>
<th>Criteria for Inclusive Playground, (Fernelius, 2017)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circular playground design (Mejeur et al., 2013).</td>
</tr>
<tr>
<td>Loose parts (Barbour, 1999).</td>
</tr>
<tr>
<td>Observation area (Yuill et al., 2007).</td>
</tr>
<tr>
<td>Sensory Stimulation (Wagenfeld, 2009).</td>
</tr>
<tr>
<td>Equal quantities of elevated and ground-level components. (Yantzi et al., 2010)</td>
</tr>
<tr>
<td>Equipment that gives proper levels of challenge and risk (Barbour, 1999).</td>
</tr>
<tr>
<td>Accessible surfacing and sufficient space (Talay et al, 2010).</td>
</tr>
<tr>
<td>Comfortable area (Schneekloth, 1989).</td>
</tr>
<tr>
<td>Common and recognizable objects (Schneekloth, 1989).</td>
</tr>
</tbody>
</table>

Table 2.2 Inclusive Playground Criteria (Fernelius, 2017)
1. Circular playground design

   It was found that a circular form playground increased the play experience. An effective way for creating this loop structure was to place the fixed play equipment in a circle and leave the middle open for combining play (Mejeur et al., 2013).

2. Loose parts

   Designed inclusion of loose parts has been an element of children’s playground for many years. Loose parts include multiple items such as, wagons, building blocks, wood planks, pails, gardening tools, mixed containers and plastic chairs, playhouses, tricycles water tables, garden area, and a sandbox. Using loose parts is one way to provide an environment where children can learn and improve critical thinking skills, language skill, and problem-solving skills (Daly & Beloglovsky, 2015). Loose parts can aid in the holistic development of children. Loose parts were essential for social development and learning because two or more children to join in different activities together. Likewise, the duration of time children spent playing with stationary was longer with the addition of loose parts (Barbour, 1999).

3. Observation areas

   Frequently children find it challenging to approach peers or join the group activity. This is particularly true for children with autism. Observation points give a safe area where children can be alone and observe the play activities before joining. Such places may be a berm or tower that is designed for only one child to observe the whole playground. Also, crawl pipes or other enclosed areas with openings out of which children can look were proper observation areas. Likewise, secluded seating areas provided the same effect (Yuill et al., 2007).
4. Sensory Stimulation

A sensory garden focuses on overwhelming, different natural senses which include, smelling, seeing, touching, hearing and tasting, as well as body awareness and balance (Wagenfeld, 2009). Pathways that allow children to have access from one area to another are essential in playgrounds that include uneven surfaces areas which would be difficult to play in. Including pathways that are clear of restrictions is essential primarily for children with physical impairments in order to have equitable participation of all children. Materials such as soft leaves, bright flowers, and aromatic herbs allow children to explore and learn about plants while stimulating senses in a controlled and relaxing environment. The coloring is used to support children see more clearly what specific playground are used for and where they should probably take caution (Dunn & Moore, 2005). However, some children can be overstimulated by too many colors. So, it is essential to use bold colors for crucial areas, but more neutral colors for less critical areas. Textured surfaces help to stimulate perceptual improvement among all children, particularly those with visual impairments. Different texture over surfaces and objects encourage children to explore and discover what it might be using their imagination of touch instead of sight. Hearing stimulation is also important to include within a playground setting. Not all children react well to loud noises, so musical equipment should be scattered throughout the playground to reduce the amount of sounds in one location. (Shapiro, 2006) An edible garden can be developed to a new dimension if herbs, fruit plants, and vegetables are grown together with the natural planted vegetation in an easily accessible space. This “edible garden” should be balanced and straightforward, but designed in a repeating pattern with wandering paths establishing public and private spaces (Parcel, 2012).
5. Multi-niche environments.

Another type of activity environment found to develop 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 and wheeled vehicles such as tricycles and wagons (Barbour, 1999).

6. Equal quantities of elevated and ground-level components.

Usually, all playgrounds can benefit from more ramps or transfer systems to access elevated components, creating less of inequality between the quantity of elevated and ground level components, and using more accessible surfacing material (Yantzi et al., 2010) approximately one ground element for every 2-4 elevated elements. The purpose of creating this ratio is to help playground designers view the playground as a whole space rather than separate pieces of equipment (Yantzi et al., 2010). However, the components should be connected enough that children are still able to socially interact despite the different ways they can access and use the equipment. In inclusive playgrounds, all children do not need to access every play element (Yantzi et al., 2010).

7. Equipment that gives proper levels of challenge and risk.

Children attend to try a level of difficulty that best satisfies their individual needs. Not only is it essential to include equipment and materials that support motor skill increase of
children with different disabilities and give chances for them to communicate with peers, but it is also essential to physically challenge children without disabilities (Barbour, 1999).

8. Accessible surfacing and sufficient space.

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 move around easily (Mejeur et al., 2013). Sand or gravel makes it difficult for children with disabilities to enter the playground (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). Physical disabilities are probably thought of the most about creating inclusive playgrounds. Physical barriers in playgrounds are not hard to identify. Ground cover is a significant barrier as well. Play equipment is generally not designed for children with limited mobility.

9. Comfortable area.

Children with visual impairments often feel limited in what they can do with their bodies, always having to be careful and alert of their surroundings not to injure themselves. Designing large areas in playgrounds where children can be free and feel comfortable and secure is crucial to their sense of inclusion (Schneekloth, 1989).

10. Common and recognizable objects.

Designing an inclusive playground for children with visual impairments is an exciting challenge. For children of all abilities, playground equipment that was too complicated to understand were less likely to be used for fear of misusing it, which ultimately led to seclusion and isolation from play (Mejeur et al., 2013). This is because 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 (Schneekloth, 1989).

### 2.3.3 Design Principals for Inclusive Playground

These principles are more practical and aesthetic designs for individuals with different anthropometric dimensions and different abilities are developed (Hansen, 2019). The goal of design principles is to design environments useful and usable to as many people as possible (Center for Universal Design, 2008) (Table 2.3).

<table>
<thead>
<tr>
<th>Design Principles (Center for Universal Design, 2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equitable use</td>
</tr>
<tr>
<td>Flexibility in use</td>
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<tr>
<td>Simple and intuitive use</td>
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<tr>
<td>Perceptible Information</td>
</tr>
<tr>
<td>Tolerance for Error</td>
</tr>
<tr>
<td>Low Physical Effort</td>
</tr>
<tr>
<td>Size and Space for Approach and Use</td>
</tr>
</tbody>
</table>

Table 2.3 Design Principles for Inclusive (Center for Universal Design, 2008)

- **Equitable use**: Playground need to be designed so that all users can access and use.
- **Flexibility in use**: Community playground is accessed and used by diverse user group’s people of different ages, abilities, sizes, and gender.
- **Simple and intuitive use**: the design needs to be clear to understand, regardless of the users, experience, language skills, and knowledge.
- **Perceptible information**: the playground should be a place for learning and creativity.
• Tolerance for error: The design decreases hazards, and the playground is needed to be specific safety standards. This does not mean that challenges need to be reduced from a playground.
• Low physical effort: The design can be used efficiently and comfortably with a minimum of fatigue Poor design can appear in user’s effort accessing and using.
• Size and space for approach and use: Playground need to be designed to offer suitable space for access, reach, and use regardless of the user’s body size, posture or mobility. (Center for Universal Design, 2008).

2.4 Adventure Play and Playground

Adventure playgrounds were found in Europe after World War II with the objective of providing children from urban, inner-city neighborhoods with suitable and much needed outdoor play chances (Staempfli, 2009). The first planned adventure playground was founded at Emdrup near Copenhagen, Denmark, in 1943. The work of Danish C. T. Sorensen inspired adventure playground. C. T. Sorensen, an architect who had designed several playgrounds, observed that children enjoyed playing with scrap materials left on construction sites rather than on traditional playgrounds (Frost & Klein, 1979). He founded the idea of adventure playgrounds, which has since been additional developed and abstracted in various forms and applications (Chilton, 2003). The purpose specified was that children recognized adult-made playgrounds as dull and uninspiring places (Staempfli, 2009). This declaration gave increase to the idea of adventure playgrounds and the idea that a place where children have a feel of possession of the play space as well as the rate of the play itself, would lead to a much higher quality of play experience for children of all ages. Adventure playground is described as a place where children are free to do many things that they cannot easily do elsewhere in our crowded urban society (Bengtsson,
In an adventure playground which can be any size from one third of an acre to two and a half acres, they can build houses, dens and climbing structures with waste materials, have bonfires, cook in the open, dig holes, and loose parts garden or just play with earth sand, water and clay (Bengtsson, 1972). It is essential to have a member of staff qualified to work with children. According to LAPA, Adventure playground prefers to have two full-time leaders to help children what they are trying to do. The play leader teaches children how to use the tools and checks the forms as they are being built for safety. Teaching children to put away tools and help care for the area is also a function of the play leader (Rudolph, 1974). They are essential to a successful, safe play experience for children (Frost & Klein, 1979). There is a big shed on the playground, and this will prepare with materials for painting, dressing up and acting, modeling and other forms of outdoors and indoors play. Also, the adventure playground shed becomes a social center for many children have nowhere to play except the street in bad weather and winter (Bengtsson, 1972). Adventure playgrounds were presented into the United States in 1950 by McCall's magazine. Adventure playgrounds are now found in seven of the United States, most of them in Illinois, Wisconsin, and California. Because of the mild year-round climate, California cities contain the best examples (Vance, 1982).

The American Adventure Playground Association was established in 1976 by a group of park and recreation officials, educators and commissioners in Southern California. The purpose of the association is to give information about adventure playgrounds and to promote their concept. The ability to change playgrounds for children such as building dens, cooking on an open fire, growing crops and plants, and touching water is an excellent way for children to interact and reshape with their environment. Also, the adventure playground environment is suggested to be a critical way for children to socialize with other children and adults. Because
the children are building structures, it requires others to participate and collaborate. These types of playgrounds are spaces that can bring children, teenagers and adults together (Teague, 2015). The first adventure playground for disabilities was open in 1970, at 56 old church street, London (Bengtsson, 1972). The adventure playground was designed for enjoyment and for children with physical and mental disabilities. According to Bengtsson, suggestions some characteristic and equipment for adventure playground: It was entirely safely enclosed with a simplistic and flexible environment, a small stream has been made to flow from water fountain, an eleven foot sizeable wooden structure with wooden platform for climbing and free jumping into foam rubber and garden for herbs and cooking area (Bengtsson, 1972), material of all kinds role as any adventure playground such as painting and crafts for imaginative play, piano and musical instrument, old clothes for dressing up and dramatic play, area for construction toys, sandpit and medium storage to collect all the loose parts. One of the most significant problems in the playground was the surface for accessibility. In our complex society, many ways of caring for children are necessary, but as life becomes more controlled by unnatural environments, the adventure playground will have a more important responsibility to the play area with connection to nature challenges and visions into the heart of the city (Bengtsson, 1972).

2.4.1 Adventure vs Traditional Playground

Traditional playground, in general, is part of neighborhood parks and schools-usually contain some form of slid, swings, climbing and as seesaws. According to some studies, traditional playgrounds are used in a highly limited fashion and are empty at least 88% most of the time (Wade, 1968) traditional playgrounds appear to support the community.

According to Aaron and Winawer (1965), traditional playgrounds today have the same design as playgrounds of the 1870s describe traditional playgrounds as being flat, open spaces
paved with concrete surrounded by a tall fence (Aaron & Winawer 1965). Equipment usually includes swings, see-saws a slide, balance beams and climbing frames. Most of the material are metal and are cemented in place. There is usually no pergola to protect from sun, no drinking fountains or bathrooms (Aaron & Winawer, 1965). Most of the traditional playgrounds provide for only one kind of play exercise, and each equipment creates a one-dimensional play experience (Frost, 1979). Each type of equipment is designed to support one or more specific forms of activity, such as climbing, balancing, and sliding (Woolley & Lowe, 2013).

It may be that traditional and adventure playground each support different features of children’s movement development. For example, a traditional playground with hard surfaces support more vigorous activity such as bike riding and running. Adventure playground more likely to support the development of children (Woolley & Lowe, 2013). Adventure playground showed natural environments that offer loose parts to improve opportunities for manipulative play and engagement in creativity, social communication, and imagination (Zamani & Moore, 2013). In comparison with more traditional playground characterized by standard equipment (Woolley, 2008), natural adventure environments have been defined as giving children with more exciting and complex spaces that promote motor activity (Fjortoft, 2001). Where traditional playgrounds only offered play in supervised environments focused on social development, adventure playgrounds offer children the ability to experience construction play. Construction play also offers a quality of physical and social development which traditional playgrounds did not (Fjortoft, 2001). Children using adventure playgrounds could work together to solve problems cooperatively as well as explore the physical demands of building their playground (Woolley & Lowe, 2013). In terms of nature experiences, adventure playgrounds also offer children exposure to natural elements which traditional playgrounds did not incorporate.
Adventure playgrounds fill in some of the gaps in an opportunity where traditional and are lacking; however, the adventure playground concept has not had strong support in the United States; the city official does not accept certain features of the adventure playground.

### 2.4.2 Design Recommendation for Adventure Playground in Literature

The design must be sensitive to the desire for clearness expressed. Playgrounds may need complete visual barriers, such as dense plantings or fences. Additionally, secured storage and office structures must be designed as part of the playground. The playground can be aesthetically pleasing while allowing for creativity by its users. The design recommendation provides places for exploration and discovery, challenging physical ability and allowing the imagination such as: (EPT, 2012) (Table 2.4).

<table>
<thead>
<tr>
<th>Criteria for Adventure Playground (EPT Design, 2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discovery New Entry</td>
</tr>
<tr>
<td>Physical challenge</td>
</tr>
<tr>
<td>Imaginative play</td>
</tr>
<tr>
<td>Sensory Garden</td>
</tr>
<tr>
<td>Water play</td>
</tr>
<tr>
<td>Build Your Adventure</td>
</tr>
</tbody>
</table>

Table 2.4 Criteria for Adventure Playground (EPT Design, 2012)

1. Discovery New Entry

Goal: to create a sense of entry and a gathering area with information about the playground.

Elements: a sense of exploration, a plants with shade structure, and an accessible pathway.

2. Physical Challenge
Goal: to challenge children to climb, jump, balance, and push and pull to build physical ability.

Elements: boulders or rock wall to climb up, ropes to balance on, hang from and pull on and Zipline to “fly.

3. Imaginative Play

Goal: To encourage imagination and promote social skills and creative vision.

Elements: pirate ship or similar themed play structure stage and informal seating area treehouses and loose parts.

4. Sensory Garden

Goal: to provide a place to learn how natural materials appeal to the five senses.

Elements: a tunnel and maze for a sense of enclosure and plants with scent, texture, color, sound, taste

5. Water Play

Goal: to manage storm water and provide chances for water play, digging and moving materials.

Elements: Streambed, waterfall and pond Plants and boulders around edge water pump for children to power

6. Build Your Adventure

Goal: to allow children to use materials and build small objects or forts.

Elements: Willow tunnels or forts, Natural plant material to be used for building and confined space for using tools (EPT Design, 2012).
Adventure playgrounds which let children to learn through, creative play are needed. The adventure playground is one which bring up the natural learning style of children. Diversity in the natural environment is an important compound for children’s play.

2.5 Chapter Summary

All-inclusive and adventure playground offer children a diversity of environmental stimuli that contributes to increased use of senses, improved health benefits, interactive physical activity, and experimentation with social situations. Also, there are common elements and design characteristic between both playgrounds. There is limited consideration for inclusive adventure playground, designing accessible and usability playground is not possible. In sequence to make inclusive adventure playground, we need to ensure that the varieties of play experiences available broadly include different characters of disabilities than just physical disability. Playground needs to provide a beneficial environment that supports play interactions than just being only accessible. Creative design solutions are sought to ensure opportunities for all children to actively engage in play in their own way and to provide plenty of variety for high play value.
CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter focuses on the methods used for this study. This research uses both qualitative and quantitative methods to study the design characteristics of children outdoor spaces. It specifically concentrates on inclusive and adventure playgrounds to inform the design of all-inclusive adventure playground. Chapter three discusses the research design, study population and study location, data collection, data analysis, potential point for bias and error in methods, and site design process.

3.2 Research Design

The research followed qualitative and quantitative research methods (Sommer & Sommer, 2002) by following three step procedures identified by the researcher. First of all, this thesis reviews literature on the benefit of the role of nature paly and the design principles for inclusive and adventure playground. Secondly, five case studies two in depth case studies are documented following procedures outline by Francis, (2001) and Marcus and Francis, (1998). Lastly, researcher examines secondary and archival resources to gather background data and knowledge to inform design processes characteristics and elements for an all-inclusive adventure playground for the City of Arlington. Following graphics illustrates the research design process adopted in this study (See Figure 3.1).
Figure 3.1 Research Design
3.3 Study Population and Location

The study population for this research was all-children as well as people supervising them as the users of all-inclusive and/or adventure playgrounds. The study focused on both ages 2-5 years old and 5-12 years old age groups independent of their abilities. Although case studies in this research focused on various all-inclusive and/or adventure playground examples across USA the particular focus was to design an all-inclusive adventure playground for the City of Arlington as an the outcome of this exploration. Due to limited number of playground examples at this nature the research explored case studies not only from DFW region but also various part of USA. The researcher choose the City of Arlington as the study location to program and design the all-inclusive adventure playground. Three potential playground sites are reviewed with city officials to determine the need. This process also informed by lessons learned from the case studies regarding playground sites. Finally, an existing playground site in Arlington was selected to re-program and re-design a new all-inclusive adventure playground. Site selection process is further explained in chapter four.

3.4 Data Collection Method

3.4.1 Case studies

The researcher studied five case studies of playgrounds. The purpose of those studies was to collect the data, gain knowledge from professional projects, and identify design elements that would inform future design. Researcher has practiced case study analysis procedures described in Francis (2001). This process usually depends on documenting sources, which include archival documents, master plans, journals, and previous studies. See Figure 3.2 to visualize the steps taken in this type of analysis. The purpose of the case studies is to describe the design and collect the data, gain knowledge from professional projects and focus in design elements such as
accessibility and circulation in the playground, play equipment, vegetation, natural materials, different texture, colors, and so on (Forest, 2008).

3.4.2 On-Site Documentation

Given that two of the case studies are in the DFW area, the researcher had the opportunity to do more in-depth data collection. The method of on-site documentation is used to understand the design characteristics of children’s playgrounds and how these design characteristics effect on the user of the playground. The first on site documentation, Randol Mill all-inclusive playground is located in North Arlington, Texas. The second study, Flag pole Hill Park adventure playground is located in Dallas, Texas.

3.4.3 Archival and Secondary Data

Researcher benefited heavily from literature, secondary and/or archival data to document to inform design processes with knowledge gathered from past lessons. The five case studies were primarily conducted using secondary data gathered from literature, park websites, or sources provided by their respective cities. Researcher also utilized city information, maps, and graphics from publicly available sites to inform the research and the design process.

3.5 Data Analysis Methods

This section discusses the data analysis method in this research. The design consideration matrices developed in the literature review have been further analyzed to understand the design elements that affected the construction of the all-inclusive and adventure playground for the City of Arlington. The design elements matrix from literature that has been used for site documentation (Fernelius, 2017) is used for site documentation process in the following case studies. The researcher examined and evaluated the data extrapolated from the literature and within the case studies to analyze the methods used in the construction of the playground. The
researcher studied the criteria from the literature review, and then evaluated the criteria in the case studies to analyze the overall design consideration for the new playground in (Table 3.1).

<table>
<thead>
<tr>
<th>Literature Secondary Analysis</th>
<th>Case Studies Analysis</th>
<th>Case Study in-depth Analysis</th>
</tr>
</thead>
</table>

<table>
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<tr>
<th>Synthesis</th>
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<tbody>
<tr>
<td>Criteria for Inclusive Playground</td>
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</tbody>
</table>

| Overall Design Considerations for New Playground |

Table 3.1 Overall Design Consideration for New Playground

The major data collection method used in this research was the case study documentation. Case studies are organized way of documenting projects. Case studies are a beneficial way for professionals to describe the success and unsuccessful projects and learn lessons from the case studies (Francis, 2001) (Figure 3.2). In this research, researcher reviewed all five case study based on their strengths and weaknesses. After that researcher evaluated case studies based on the design criteria retrieved from literature. Finally, researcher synthesized the lessons learned from all case studies and combined overall design consideration for a new all-inclusive adventure playground.
3.5.1 Case Study Analysis

Figure 3.2 Case Study Analysis (Francis, 2001)
3.5.2 Case Study Evaluation Criteria

The case studies design evaluation matrices are used to understand the design elements that found the importance in all-inclusive and adventure playground in literature (See Table 3.2).

<table>
<thead>
<tr>
<th>Evaluation Criteria for inclusive playground - Literature Secondary Analysis</th>
<th>CS.1</th>
<th>CS.2 In-depth</th>
<th>…</th>
<th>CS. n In-depth</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Inclusive</td>
<td>Inclusive</td>
<td>Adventure</td>
<td>Adventure</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Evaluation Criteria for Adventure playground - Literature Secondary Analysis</th>
<th>CS.1</th>
<th>CS.2</th>
<th>…</th>
<th>CS. n</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

| Four Level of evaluation | | | | |
|---|---|---|---|
| | | | |

Table 3.2 Evaluation Criteria for playground

Evaluation Scale

High ■ Low □
3.6 Site Selection

Upon choosing the site, the researcher studies of the design considerations to determine the best site for the new playground (Table 3.3).

<table>
<thead>
<tr>
<th>Criteria of Design Consideration</th>
<th>Inclusive Playground</th>
<th>Adventure Playground</th>
</tr>
</thead>
</table>

Table 3.3 Site Consideration

Initial case studies were conducted by the researcher to document and analyze existing site conditions, existing site amenities and space available for potential inclusive adventure playground (Table 3.4).

<table>
<thead>
<tr>
<th>Evaluation Criteria for site selection</th>
<th>Site 1</th>
<th>Site 2</th>
<th>Site 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>five Level of evaluation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.4 Evaluating Criteria for Site Consideration

Evaluation Scale “5” is Highly Suitable “1” Least Suitable

3.7 Design Process

The collective findings from the literature review, case studies, and park inventory and site analysis were then utilized to develop a design proposal for a playground suitable for the study area. (Figure 3.3). The design for the new playground was shaped from the data collected.
from case studies, design considerations, and site selection. The programmatic elements are necessarily the most significant features for design after the finalized design considerations. Once design considerations list is created from various data collection methods these criteria inform the program for the all-inclusive adventure playground.

![Design Process Diagram]

**Figure 3.3 Design Process**

### 3.8 Bias and Errors

This research is limited to data that is primarily collected from secondary sources and such data typically prone to bias and errors that researcher has no control. Beyond availability of time, access to resources, and geographic limitations, the researcher acknowledges possible bias and errors associated with secondary sources such as case study websites, news articles, architectural
reviews, and critics and etc. The researcher is also aware of the human bias and errors associated with site documentation. Researcher has been impartial throughout the process and has taken preventive measures throughout the research and design processes to avoid potential human bias and error. The researcher suggests that the scope and the amount of data from multiple sources helps to reduce bias and errors in this research.

3.9 Chapter Summary

This research uses the qualitative and quantitative methods to study and assess the all-inclusive Adventure playground to inform the design of all-inclusive adventure playground for the City of Arlington. Chapter three specifically discussed the research design, study population, study location, data collection, data analysis, bias and error in methods, and site design process. Specifically research focused children of all ages and all abilities as well as people supervising them. Research benefited from secondary data, case studies, and literature review to document, assess and synthesis design criteria to inform the design of an all-inclusive adventure playground for the City of Arlington. Chapter four discusses the analysis and findings informed by the processes outlined in this chapter.
CHAPTER 4
ANALYSIS AND FINDINGS

4.1 Introduction

This chapter provides analytical findings from case studies for the inclusive-and-adventure playground. It also provides data from literature and other sources. The data provided comes from on-site documentation for two case studies as well as an additional under construction project specifically designed to help understand playground characteristics in the DFW area. Finally, the design matrices are used to evaluate cases based on the criteria collected from literature. This information is further synthesized to distill design criteria and program elements to design an all-inclusive adventure playground for the City of Arlington.

4.2 Case Studies

The following section reviews five case studies that were conducted to analyze key characteristics of the two playground types (Francis, 2001; Marcus & Francis, 1998). The purpose of these studies is to describe the design collect the data, gain knowledge from professional projects and focus on design elements such as accessibility, circulation in the playground, play equipment, vegetation, natural materials, different texture, colors, etc. (Forest, 2008). The researcher has done five case studies (three inside DFW and two outside) to compare their design characteristics and design elements to inform the reader of a future design that combines design features of an all-inclusive and adventurous playground.

4.2.1 All-Inclusive Playground Case Studies

The researcher investigated the following all-inclusive playgrounds, Clemyjontri Playground, and the Randol Mill Playground. The case studies on these playgrounds were conducted to document and understand the playground’s design.
4.2.1.1 Case Study 1: Clemyjontri Park, All-inclusive Playground

Location and Context:

The first case study is Clemyjontri Playground is located in Mclean, Virginia, Washington DC area (Figure 4.1). According to community resources, Mrs. Adele Leibowitz donated 18 acres to the Virginia County for a design park and playground, she had four children: Carolyn (CL), Emily (EMY), John (JON) and Petrina (TRI), the playground was named in their honor. Clemyjontri Playground is an all-inclusive playground for all ages and all levels of ability. The park opened in October 2006. According to Park Authority officials the park hosts about 200,000 kids and adults annually suggesting a very strong use for the playground (Community Guide, 2018).

![Figure 4.1 Site Location Case Study 1](image)

The playground size is two acres. G.E. Fielder & Associates designed five-axis in the playground, two axes for entrance and three axes to connect the playground with a focal point to the carousel. The playground had parking, main entrance, and amenities including waste receptacles, seating shelter, drinking fountains, restrooms, and picnic benches that can be rented.
for events. Play areas are divided into four different themes: The Rainbow theme, Schoolhouse and Maze theme, Transportation theme and Fitness theme. (Figure 4.2) Clemyjontri playground provides a wheelchair accessible swing that lets children in wheelchairs to swing without having to transfer out of their chairs. (Figure 4.3)

Figure 4.2 Plan and Circulation
Source: (Ksenia Kruglyanskaya, 2011)
Updated by the researcher
Figure 4.3 Photo of wheelchair accessible Source: (Gofundme, 2015)

Design Analysis:

Clemyjontri was designed to promote connection between physically able and physically challenged children (G. E. Fielder, 2015). Clemyjontri is one of the unique all-inclusive playgrounds in the United States (Adams, 2010). The four different themes offer variety of play, learning, and creativity. The Rainbow theme has rainbow arches with a diversity of swings to serve all physical levels. It has signs in Braille, and sign language teaches color of the rainbow. The pictures teach kids communication skills with mental and physical challenges. It is for children of all ages and abilities (Taylor & Staff, 2016). The rainbow theme gives a chance to see and touch. (G. E. Fielder, 2015). It is displayed as a precise series of colors such as red, orange, yellow, violet and so on. The Schoolhouse & Maze has learning panels forming a maze that may be reconfigured. It focuses on educational learning games, and teaches “where am I”; reading maps, and a globe teaches “what time it is” using time zones and clocks. The Schoolhouse picks up the color theme of the Rainbow Room and presents the primary and secondary colors in a
color wheel (G. E. Fielder, 2015). The upright of the schoolhouse includes six colors and adds black and white, the presence and lack of color. Signs are also in metric and English measurements (Taylor & Staff, 2016). The colors in the Rainbow Room are repeated in the Schoolhouse to prompt color recognition, memory development, and associations; which are all principles inherent in constant learning. The learning turns to fun with the alphabet, counting to 100 and a multi-solution maze with moving panels (G. E. Fielder, 2015). The maze and Schoolhouse are original to the playground. The “Movin' and Groovin’” transportation area was designed with transportation themed equipment such as a race track, motorcycles, planes, and trains. It stimulates imagination, teaches balance and special skills mimics exact roadway situations (G. E. Fielder, 2015). Fitness and Fun theme are devoted to physical development, with areas for upper body strengthening and balance (Taylor and Staff, 2016). Fitness and Fun include jungle-gym elements to build confidence, burn energy, and increase physical-strength challenges (G. E. Fielder, 2015).

Successful features: Good provision for cognitive, social, physical aspects. Access to amenities is found to be one of the successful features of the site. The use of outdoor musical instruments provides a conducive play environment for children with sensory disabilities. The different themes are for learning while physical activities are present since they are critical elements of the park. According to literature there are no fences that make children interact with nature. Literature also suggests that there is balance between quantities of elevated and ground-level components of the park, and there are beautiful plantings (G. E. Fielder, 2015).

Unsuccessful features: Use of bright colors for each of the four play sections is helpful for the visually impaired, but might pose challenges for children with autistic sensory disabilities. The equipment in the fitness themed section may not be suitable for children with autistic
disabilities because it is quite complex for them to comprehend, process and navigate. Review of the secondary sources also suggests that there are no provisions for a comfortable zone for children to observe, and there is no water play (Taylor and Staff, 2016).

4.2.1.2 Case Study 2: Randol Mill All-Inclusive Playground, in-Depth Case Study

Location and Context:

The Randol Mill is a community park located in 1901 West Randol Mill Street, Arlington Texas, (Figure 4.4). It is few blocks south Highway I-30, and this playground is approximately 0.50 acres. The immediate neighborhood surrounding this park is mostly residential. Randol Mill Park is planned to provide recreational activities for the Arlington community. The park has a mix of passive and active recreational activities such as fishing, natural trails, basketball courts, family aquatic center, tennis courts and a picnic area. People typically spend up to 1.5 hours at the park when they visit.

Figure 4.4 Site Location Case Study 2
Design Analysis:

The form of the playground is a circular design, and it is barrier free. The entire play area is accessible for kids with physical disabilities. The accessible walkways are continuing within the play area and there are ramps that connect ground level play components. There is also an elevated play structure with learning panels forming a maze and a braille playground to help the visually impaired, and support social interaction and learning (Figure 4.5). The playground serves different age groups from 2 to 12 years but the playground can be limited for the older ages because there are limited number of pieces of play equipment that kids can move or manipulate. The two colors that are clearly visible are blue and yellow which helps children with autism spectrum disorders (Simmons et al., 2009). The playground itself does not incorporate natural elements.

Successful features: The Playground features a significant relationship between play settings, clear path, visual connection, and balancing between the elevated/ground levels. There are raised zones for observation area. The boardwalk is designed, so the slope does not pass the 5% maximum grade for an accessible route.
Figure 4.5 Learning Panel

Unsuccessful features: Playgrounds seem to be in small space, and there are no plantings, cognitive play options like sand box and water feature and natural sources. There are big shade structures, but the site seems to lack natural shade such as trees to give sense of nature. The playground needs to install a welcome sign at the entrance to the playground which states general safety considerations and describes the age range for intended users. Although the site seems accessible it looks too sterile and disconnected from other programmed elements within the park.

Next section the evaluation matrix is designed to evaluate and understand case studies about the types of play activities, play elements, and existing play conditions. It is composed of essential criteria from the literature review that need to be considered and understood before design.
Evaluating All-Inclusive Case Studies:

The following section briefly reviews the all-inclusive playground. Specifically, this section reviews design elements, design analysis, and features. The researcher then assessed this case study based on the evaluation criteria attained from literature in (Table 4.1). The following criteria summarized as critical by Fernalius is used to study and evaluate all inclusive case studies. Level of evaluation (Low [ ] High [ ]).

<table>
<thead>
<tr>
<th>Evaluation Criteria for All-Inclusive Playground:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circular playground design</td>
</tr>
<tr>
<td>Observation area</td>
</tr>
<tr>
<td>Sensory stimulation</td>
</tr>
<tr>
<td>Multi-niche environments.</td>
</tr>
<tr>
<td>Equal quantities of elevated and ground-level components.</td>
</tr>
<tr>
<td>Equipment that gives proper levels of challenge and risk.</td>
</tr>
<tr>
<td>Comfortable area</td>
</tr>
<tr>
<td>Common and recognizable objects</td>
</tr>
<tr>
<td>Loose Parts</td>
</tr>
<tr>
<td>Accessible surfacing and sufficient space</td>
</tr>
</tbody>
</table>

Table 4.1 Inclusive Playground Criteria (Fernalius, 2017)

<table>
<thead>
<tr>
<th>Evaluation Criteria for inclusive playground</th>
<th>Clemyjontri playground All-inclusive playground CS 1</th>
<th>Randol mill All-inclusive playground CS 2</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circular Playground Design</td>
<td>[ ]</td>
<td>[ ]</td>
<td>The form of the playground is circular form and the existing pathway already linked everything back to a starting point</td>
</tr>
<tr>
<td>Common and Recognizable Objects</td>
<td>[ ]</td>
<td>[ ]</td>
<td>Recognizable equipment such as play cabins for visual impairment</td>
</tr>
<tr>
<td>Loose Parts</td>
<td>[ ]</td>
<td>[ ]</td>
<td>Loose parts such as sand toys, musical instruments, water play and social development and learning</td>
</tr>
</tbody>
</table>

54
<table>
<thead>
<tr>
<th>Accessible Surfacing and Sufficient</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal amounts of elevated and ground level components</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-niche settings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment that provides appropriate levels of challenge and risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observation area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comfortable or “cozy” places, often created by enclosed areas or pieces of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensory stimulus activities and visual or tactile cues throughout playground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The pathways that surrounded various playground features were designed to be large enough to hold the equipment as well as provide appropriate clearance from the pathway. Access path should be at least 5 feet wide providing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special consideration should be given for ramps and transfer systems to all the different levels on the piece of equipment. Ramps should be no more than a 1:12 slope and at least 36 inches wide.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The elements that absolutely needed more than one participant, more enjoyable with more participants were the water tables,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide at least two activities that allow a child to attempt different challenge levels such as A tunnel that changes elevations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>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. Recommended to be in high point</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create area where children can escape from the commotion of their peers at play, and enjoy being surrounded by nature.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide opportunities for children to develop various aspects of their five senses by interacting with multiple sensory stimulus activities such as Create pathways that undulate and/or have texture built into them for fun wheeled play.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.2 Evaluating All-Inclusive Case Studies
Lessons Learned from All-Inclusive Playground:

A summary of evaluation matrix findings for design considerations are shown in the table below (4.2). This table combines the criteria of design characteristics and plays elements. The two playgrounds have similar criteria such as design form, similar amounts of elevated and ground level components and the multi-niche settings.

<table>
<thead>
<tr>
<th>Criteria for Inclusive Playground (case study 1 Analysis)</th>
<th>Criteria for Inclusive Playground (case study 2 In Depth)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Different themes for different ages</td>
<td>Choosing Calm Colors</td>
</tr>
<tr>
<td>No Barriers and Fences</td>
<td>Ramps that lead to play component</td>
</tr>
<tr>
<td>Information Signs</td>
<td>Transfer platform</td>
</tr>
<tr>
<td>Special Entry</td>
<td>Close seating is for young children (ages 2-5 Years)</td>
</tr>
<tr>
<td>Parking preferably close by</td>
<td>Choose play panels that provide the ability to build tolerance</td>
</tr>
</tbody>
</table>

Table 4.3 Lesson Learned from All-Inclusive Playground (Case Studies)

4.2.1.3 Design Considerations and Site Criteria for All-Inclusive Playground

Design Considerations for All-Inclusive Playground:

- Consider activities at all heights of the play area; build-in access to all heights/activities if at all possible.
- Consider adding activities that provide challenges and potential for learning, interaction and growth at each age level.
- Connects elevated play components to many kinds of play activities like slides, climbing equipment, social and imaginative play activities
• Sensory elements are an important play component for all children and particularly so for children who are not able to enjoy the more physically challenging such as Sound and musical elements, such as talk tubes or falling water, smell (Some plantings, such as pine, lavender, and roses, are a great sensory element but can cause allergic reactions in some children), Textured paths, textured designs, and shapes

• Designed with neutral and calming colors, which are recommended in creating a soothing environment, with a different-colored surface material in the area to better define it for Children with autism spectrum disorder or ‘Asperger’ syndrome, and some children with attention-deficit/hyperactivity disorder.

• Safety and Security Boundaries need to be merged into the design to ensure children with hyposensitive issues do not get hurt

• Nature-inspired play spaces that are well designed can offer several benefits.

   Site Consideration of All-Inclusive Playground

Site Selection criteria for all-inclusive playground:

The researcher makes a study of the design considerations to determine the best site for the all-inclusive playground. The researcher also studied the location and context of case studies including existing site conditions, and existing site amenities. The criteria used to identify the site is: (Table 4.4)
### Guidelines | Site Selection Criteria
--- | ---
Accessibility | The site should connect to the communitywide trail network if available, or be connectable to the network via Sidewalks or a trail. Walkable (accessible by sidewalk on foot)
Topography | Extremely Low Slope (requiring minimal re-grading)
Parking | Existing Accessible parking, Avoid On-street parking
Existing Amenities, Recreation amenities | Bathroom facilities, Basketball courts, Open turf area for unstructured play, basketball, community center
Ponds and water feature | Doesn’t need to have ponds but water feature is important
Existing Vegetation | The site should front on a public street
Close to hospital, residential, | be close to hospital and pediatric therapy and residential

Table 4.4 Site Selection criteria for all-inclusive playground

### 4.2.2 Adventure Playground Case Studies

The researcher investigated the adventure playgrounds, the third case study is Adventure playground, and the forth case study is the Flag Pole Hill playground.

#### 4.2.2.1 Case Study 3: Adventure Playground, All-inclusive Playground

**Location and Context**

The first idea for the park was in 1848, William Cullen Bryant wrote articles about designing large Public Park in New York City and proposed the creation of a park at the center of Manhattan. The New York State Government approved the idea, dedicating more than 750 acres of land central to Manhattan to design first significant landscaped Public Park. (Central Park Conservancy, 2018) (Figure 4.6). Central Park has twenty-one playgrounds. These 21 playgrounds can be classified into three types: traditional, contemporary, and adventure
playground. Most of the playgrounds in Central Park are Traditional playground. (Central Park Conservancy, 2018) (Figure 4.7).

The Third case study for this study is the adventure playground, located near the West 67th Street entrance of Central Park, Manhattan, New York (See Figure 4.8). The playground was the first adventure style playground in Central Park. The playground is designed by Richard Dattner in 1966. On the east side of the site, there is a traditional playground for toddlers. Many tree spices surround the area of the project such as Ulmus Americana, American Elm Aesculus Pavia, Red Buckeye, Acer Campestre, Hedge Maple and so on. Various migratory birds visit the playground, one of these species is the red-tailed hawk, and also there are few mammals around the playground such as raccoon and eastern gray squirrel (Kinkead, 1974). Dattner’s mixed between three materials from concrete, granite blocks, and wood. Dattner’s design featured a conical climber with tunnels and a slide, several fortress and maze like structures, amphitheater steps, water spray feature and intimate gathering area located around existing trees (Dattner, 1979).
Figure 4.6 History of Adventure Playground Source: (Design Principles of Frederick Law Olmsted, 2014)

Updated by the researcher
Figure 4.7 Playgrounds on Central Park Source: (Mappery, 2015)
Updated by the researcher
Figure 4.8 Site Location Case Study 3
Design Analysis:

The designer Richard Dattner was considered with childhood development, and he was meeting with parents to help reshape the design of adventure playground as an environment for both creative and physical play (the culture landscape foundation, 2018). The design shows a relationship between play elements and the enclosed central space for safety. The design also has a form that is based on the radial and curved structure. (Dattner, 1979). Concrete and stacked cobblestones are external pavement and walls. Most benches are outside play areas to let kids play free and also for watching kids for safety (Lange, 2018). The inside surface is sand and great sculptural water. There are round mazes and shortened cones, slides, and a water feature surrounded by steps. A jungle gym made of wood has horizontal steel bars for climbing, a treehouse, and uses existing trees (Dattner 1979). According to resources the south side of the playground is designed for physical activity such as jumping, climbing, building, and tunneling, while the north side of the playground is designed for digging, painting, building and playing with water (Dattner 1979). The stepped pyramid is designed for climbing, sliding, and it houses a storeroom for all the supplies the leader or supervisor might need, besides changing rooms (Lange, 2018).

The following is a site analysis utilizing secondary descriptive data including site plans and site photos. Refer to the main two elements are sand and water (Dattner, 1979). According to Jacquettes (2017) the most dynamic feature was the water that linked two different areas, an amphitheater in the north ran down in the channel into the pool (Jacquettes, 2017) (Figure 4.9). Water is the essential elements on the adventure playground, involving a group of children to play together and play with adults (Dattner, 1979). The elements of the playground inspired by ancient architecture and nature such as Roman Amphitheater, Saqqara Pyramids and
Popocatepetl volcano Mexico (Jacquettes, 2017). Jacquette’s said these elements structure created stories and lets kids imagine and think more between the spaces. All of these elements connect as a part of the design and create connectivity and movement through space (Jacquettes, 2017). The different levels provide challenges for kids and create a kind of protection, and open view in the top (Lange, 2018). Dattner designed a kit-of-parts such as Play Panels, and they came in two sizes, 24 x 32 inches and 12 x 32 inches, (Dattner, 1979). These wood panels create walls, houses, vehicles, and platforms. Dattner said Play Panels are like loose parts theory” and it inspired by junk playground. That kind of play has many benefits for all abilities such as creativity, imagination, discovery, and let kids interact and play together. That is an essential connection between the indoor classroom and outdoor playgrounds (Kinkead, 1974). The existing Tree canopy is playing a critical role in the playground because they provide the right amount of shade (Dattner, 1979). And also connect kids with nature. The adventure playground designed to be accessible for physical disabilities. There are no bright colors or special signs for the visual or hearing impaired which could pose challenges to kids with such disabilities but creates a calming environment (Lange, 2018).

Figure 4.9 Master Plan for Adventure Playground Source: (Design for Play, 1974)
Successful Features: The playground features plenty of shade and individual/group play. The design of the playground includes various areas where children can have fun by playing with loose parts. Visitors of the park can also have their children able to take play tools from storage and play with them in the willow tunnels. Another innovative part of the park is a play leader area where young leaders can practice their leadership skills by having other children follow them. There is also an area for the crafty children to use their imagination and play with wood panels for construction play. An important aspect of the playground is its design to have changing levels to encourage physical activity. The literature also suggests accessibility for the disabled children. Each element was considered for its play possibilities for both older and younger children (Lange, 2018).

Unsuccessful Features: The playground can be too small and busy for everyone. Visitors also can experience no sense of exploration upon entry due to the lack of sensory gardens. Having no basic amenities is also an unsuccessful feature. Although the playground is inaccessible for disabled children, changes in the surface of the playground will make the center of the playground accessible.

4.2.2.2 Case Study 4: Flag Pole Hill Adventure Playground In-Depth Case study

Location and Context:

The Flag Pole Hill Park is Public recreation and picnic area high on a hill overlooking a lake, it has a large pavilion provided for gatherings and a favorite spot for kite-flying, park located in 8015 Doran Circle Dallas, Texas (Figure 4.10). This playground is approximately 0.55 acres, and the immediate neighborhood surrounding the park is mostly residential. Playground surrounded by wooded forest area. The area provided natural image for children and let them interact with nature.
Design Analysis:

The playground, which was designed to be Adventure for a wide range of mobility levels as possible, the elements are designated to be interesting for all ages. Playground helps sensory processing by offering chances to climb, jump touch, spin, swing, and slide. La Terra Studio designers, who designed the playground at Texas Scottish Rite Children’s Hospital, included many of the same components into their Flag Pole Hill design. The main element is a spatial sculpture consisting of two green steel pipes winding and floating in between discover,
continuous, sequence of gaming activities for children and teens (Figure 4.11). There are a
variety of trees providing a right amount of shade, but overall there is a lacking of vegetation.

Figure 4.11 Main Sculpture

Successful features: The playground features interesting sculpture so children can watch
and appreciate them. Plenty of trees provides shade for adults and children alike. Multiple
playgrounds and natural materials provides play time for children of different ages of groups.
Another important successful feature is that the playground is accessible from three sides. Good
provision for motor play and good settings for social play is also a plus. A close picnic shade
structure also provides shade along with the trees. A lack of bright colors invites children with
autism to play as well. The open design lets kids interact easily because there are no barriers between the play elements, also separation between toddler’s zone and active area.

Unsuccessful features: The playground has plenty of trees and shade, but it does not have any vegetation or a sensory garden. Due to a limited space in the playground there is no loose parts games, or storage. Young leaders will also not be able to practice their leadership skills since there is no leader play area. The playground has not a barrier in the south side of the playground to enclose the place from high slope. Children can get bored easily since there is no imaginative play area or a water play area.

Evaluating Adventure Playground Case Studies:

This section of the evaluation matrix is designed to evaluate and understand case studies about the types of play activities, play elements, and existing play conditions. It is composed of essential criteria from the literature review that need to be considered and understood before design. Following criteria summarized as critical by EPT, 2012 is used to study and evaluate all inclusive case studies (Table 4.5) Level of evaluation (Low - High).

<table>
<thead>
<tr>
<th>Criteria for Adventure Playground</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discovery New Entry</td>
</tr>
<tr>
<td>Physical challenge</td>
</tr>
<tr>
<td>Imaginative play</td>
</tr>
<tr>
<td>Sensory Garden</td>
</tr>
<tr>
<td>Water play</td>
</tr>
<tr>
<td>Build Your Adventure</td>
</tr>
</tbody>
</table>

Table 4.5 Criteria for Adventure Playground (EPT, 2012)
Table 4.6 Evaluating Adventure Case Studies

Lessons Learned from Adventure Playground

A summary of evaluation matrix findings for design considerations are shown in a table below (4.7). This table combines the criteria of design characteristics and plays elements.

<table>
<thead>
<tr>
<th>Criteria for Adventure playground (case study 3 Analysis)</th>
<th>Criteria for Adventure playground (case study 4 In Depth)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual and Group play</td>
<td>View to Open space</td>
</tr>
<tr>
<td>Connectivity in Design</td>
<td>No Barriers and Fences</td>
</tr>
<tr>
<td>Loose parts</td>
<td>Sculpture</td>
</tr>
<tr>
<td>Storage</td>
<td>Build a shelter close to the playground</td>
</tr>
<tr>
<td>Soothing Areas to re-center</td>
<td>designing seating wall to have different levels</td>
</tr>
<tr>
<td>Sense of Nature</td>
<td>No fences or barriers</td>
</tr>
<tr>
<td>Safety</td>
<td></td>
</tr>
<tr>
<td>Natural material</td>
<td></td>
</tr>
<tr>
<td>Fences and barriers</td>
<td></td>
</tr>
<tr>
<td>play leader</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.7 Lesson Learned From Adventure Playground (Case Studies)
4.2.2.3 Design Considerations and Site Criteria for Adventure Playground

Design Considerations for Adventure Playground:

- Safety and security environment are the most essential part for adventure playground
- Natural view and open green landscaping provide opportunities to let children interact with each other in a nature-based environment.
- Playgrounds which include houses, tunnels, water feature and interactive equipment produce much balance between physical play and dramatic play.
- Have smaller spaces that allow for more private play and larger spaces that allow for group interaction
- Provide for a variety of sensory experiences by using different natural material and textures.
- Plenty of Shade provide trees and shade structures variety of elements such as topographical changes.
- Combination of elements which stimulate sight, sound, touch, taste, and smell.
- Combination of physical elements which provide a variety of Physical Challenges physical challenge such as climbing, crawling, running, sliding, swinging, etc.…
- The merger of unique movable objects which children can seek like sand, constriction bricks, so on.

Site selection criteria for Adventure Playground:

The researcher makes a study of the design considerations to determine the best site for the all-inclusive playground. The researcher also studied the location and context of case studies including existing site conditions, and existing site amenities. The criteria used to identify the site is (Table 4.8):
<table>
<thead>
<tr>
<th>Guidelines</th>
<th>Site Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessibility</td>
<td>The site should connect to the communitywide trail network if available, or be connectable to the network via Sidewalks or a trail. Walkable (accessible by sidewalk on foot), and Bike route</td>
</tr>
<tr>
<td>Topography</td>
<td>Low Slope</td>
</tr>
<tr>
<td>Parking</td>
<td>Existing accessible parking</td>
</tr>
<tr>
<td>Existing Amenities, Recreation amenities</td>
<td>Bathroom facilities, open turf area for unstructured play, bouldering features, Natural area, storage, drinking fountain</td>
</tr>
<tr>
<td>Ponds and water feature</td>
<td>need to have ponds for sense of nature</td>
</tr>
<tr>
<td>major street</td>
<td>The site should front on a public street</td>
</tr>
<tr>
<td>Existing Vegetation</td>
<td>No existing poisonous plants</td>
</tr>
<tr>
<td>Close to hospital, residential,</td>
<td>proximity to hospital and school</td>
</tr>
</tbody>
</table>

Table 4.8 Site Selection Criteria for Adventure Playground

4.2.3 Case Study 5 PlayGrand Adventures (all-inclusive adventure playground)

PlayGrand Adventures is a ten-acre playground located on 2100 Epic Place, Grand Prairie, Texas (see Figure 4.12). Although this playground is not yet built, it is reviewed in planning stages to showcase as an example that attempts to combine all-inclusive and adventure playground features. According to Holt, It is a unique playground with adventure play themes designed to challenge and engorge the development of many skills. The playground will provide discovery, physical activity, and social interaction for all abilities (Holt, 2018).
The playground provided equipment with certain parts of the playground to include adventure areas and toddler area. These areas will classify from energy to peaceful and quiet activity. Themes will also be as varied, from modern and colorful to rustic and nature-themed. The playground concept will enhance sensory, physical, cognitive and social abilities. There are different themes on the playground such as Adventure Zone, Adventure Challenge, Exploration Zone, Adventure Sports, Tranquil Adventures Adventure Village, Adventure Stars, and Adventure Hill (Figure 4.13).
Figure 4.13 Plan for Playgrand Adventure Source Grand Prairie Destination Playground Park (2010)

PlayGrand Adventure playground gives the ability to every child to discover and explore. According to Holt, the designers focused on connecting children to nature by emphasizing natural material such as rocks, wood, etc. also there is a zone that will promote learning. Unfortunately, the playground still under constructions and phase one will open in the fall of 2019 (Holt, 2018)

4.3 Synthesis of Findings to Build Design Consideration for All-Inclusive Adventure Playground

This section synthesis the findings from case study evaluations and literature review for both all-inclusive and adventure playground to provide a set of design considerations to design
an all-inclusive adventure playground for the City of Arlington. In this section researcher also focusing the needs of children with all abilities. This includes typically, physical disabilities behavior disabilities intellectual and developmental disabilities and sensory disabilities. The design consideration of all-inclusive and adventure playgrounds:

<table>
<thead>
<tr>
<th>Design Considerations for All-Inclusive Playground</th>
<th>Design Considerations for Adventure Playground</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessible surfaces in a play area that meet the ASTM Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment, ASTM F1951. Safety and Security Boundaries need to be merged into the design to ensure children with hyposensitive issues do not get hurt.</td>
<td>Safety and Security environment are the most essential part for adventure playground.</td>
</tr>
<tr>
<td>Provide <strong>Comfortable</strong> and Quite area for Children with autism. .</td>
<td>Have smaller spaces that allow for more <strong>private play</strong>.</td>
</tr>
<tr>
<td><strong>Sensory</strong> elements are an important play component for all children and particularly so for children who are not able to enjoy the more physically challenging such as <strong>sound</strong> and musical elements, such as talk tubes or falling water, smell (Some plantings, such as pine, lavender, and roses, are a great sensory element but can cause allergic reactions in some children), Textured paths, textured designs, and shapes</td>
<td>Provide for a variety of <strong>sensory</strong> experiences by using different natural material and textures. Combination of elements which stimulate sight, <strong>sound</strong>, touch, taste, and smell.</td>
</tr>
<tr>
<td>Consider <strong>physical activities</strong> at all heights of the play area; build-in access to all heights/activities if at all possible.</td>
<td>Combination of <strong>physical elements</strong> to provide different levels</td>
</tr>
<tr>
<td>Connects elevated play components to many kinds of play activities like slides, climbing equipment, social play and imaginative play activities.</td>
<td>Provide a variety of <strong>Physical Challenges</strong> physical challenge such as climbing, crawling, running, sliding, swinging, etc.…</td>
</tr>
<tr>
<td><strong>Nature</strong>-inspired play spaces that are well designed can offer several benefits.</td>
<td><strong>Natural</strong> view and open green landscaping provide opportunities to let children interact with each other in a nature-based environment.</td>
</tr>
<tr>
<td>Provide area for <strong>Loose Parts under supervising</strong></td>
<td>Provide area for <strong>Loose Parts and free play with play leader</strong></td>
</tr>
</tbody>
</table>

Table 4.9 Guide to Design Consideration

After the researcher has studied the design consideration for the all-inclusive playground and the design consideration for the adventure playground the following points were obtained.
The Design consideration of all-inclusive adventure playgrounds:

- Natural elements such as vegetation, water, rocks, and sand are important elements and features for both type of playgrounds. These natural elements may not be part of the play equipment but they make a significant contribution to the playground environment and especially play an important role in children’s physical and mental health.
- Vegetation is especially a critical feature to enhance the playground experience and plenty of shade provides shade for structures.
- Diversity of sensory stimulation: Changes in textures, colors, smell, and sounds but careful consideration should be given to brighter colors for disabilities such as autism.
- A variety of physical movements: Play equipment and the design of enclosed and open spaces can encourage different levels of physical exercise for all children.
- Variety of places for many ages: smaller semi enclosed spaces for younger children to play in small groups or separately while being able to observe other children as well as larger spaces for older children to play in larger groups.
- Plenty of shade provided by trees and shade structures are especially critical for hot climates.
- Clear boundaries in a playground provide a balance between spaces, ensuring the transition between spaces are not abrupt.
- Calming areas to escape and re-center when overwhelmed, and to allow kids to watch activities from a distance so that they can learn from other children and become comfortable to participate.
- Provide transition between spaces to allow children to place themselves before feeling something new as they are uncomfortable with change.
• Safety and security boundaries need to be combined into the design to make sure children do not get hurt.

• Increase interest of play and play opportunities by providing water pool and water channels. Slopes over five percent should be avoided as they are difficult for handicapped and small children on play vehicles.

• Encourage activities that provide chance to connect with nature and improve social skills such as gardening and bed planters.

• Numerous interactive panels fostering cognitive development designed to spark children’s imagination and have a location for a maze.

• Handicap accessible parking and extra wide sidewalks are critical to access to playground.

• Play elements that promote parallel play; creating opportunities for children to play together

4.4 Chapter Summary

In summary, this chapter discussed the data collected through two methods. The first is the secondary descriptive method collecting data from five case studies, the second is a site documentation for all-inclusive and adventure playground in DFW area. This data is analyzed through methods of Francis (2001) and Cooper and Marcus (1998). Findings from the literature review, secondary descriptive data, and the on-site documentation are then synthesized to inform and create a set of criteria to use in determining a site and then applying the recommended design strategies to that determined site. Following chapter focuses on applying this knowledge to design of a specific site in the City of Arlington.
CHAPTER 5

DESIGN

5.1 Introduction

This chapter presents the site selection criteria and suggested design strategies for Arlington derived from the synthesis of data from the literature review, secondary descriptive findings, and on-site documentation findings in Chapter 4. This chapter also presents a site inventory and analysis of Vandergriff in Park Arlington, documenting the existing conditions such as existing structures, amenities, and critical design features and pedestrian and vehicular circulation. Additionally, programmatic elements and a suggested concept and design scheme are illustrated to demonstrate the recommended design strategies for the all-inclusive adventure playground.

5.2 Site selection

Researcher reviewed and assessed the three sites pre-selected by the Department of Parks and Recreation of Arlington for assessment and feasibility of all-inclusive adventure playground are: (Figure 5.1)

Site 1: Vandergriff Park Figure
Site 2: Martin Luther King Jr. Sports Complex
Site 3: Webb Community Park

Figure 5.1 Arlington City (Data Source: GIS ArcMap)

Initial sites reviews were conducted by the researcher to observe and analyze existing site conditions, existing site amenities and space available for potential all-inclusive adventure
playground. Based on the lessons learned from site selection criteria developed in the findings chapter following set of criteria is assessed for each site following Evaluation scale “5” is Highly Suitable “1” Least Suitable. (Table 5.1)

<table>
<thead>
<tr>
<th>Criteria for site selection</th>
<th>Site 1</th>
<th>Site 2</th>
<th>Site 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessibility Bike route, sidewalks,</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Topography High, medium, low slope</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Existing Vegetation</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Parking</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Existing Amenities</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Close to residential/School area/ pediatric therapy</td>
<td>5</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Nature play, open space, native plants</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Ponds and water feature</td>
<td>0</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Active recreation amenities (tennis, baseball…)</td>
<td>5</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Sun/Shade imbalance (this is a very exposed site with no trees or wind protection)</td>
<td>5</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Close to major street</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Clean Site (No landfill or dumping activity recorded)</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Total score</td>
<td>53</td>
<td>49</td>
<td>35</td>
</tr>
</tbody>
</table>

Table 5.1 Site Selection

After evaluation of the three sites, the most suitable site for the all-inclusive adventure playground is determined to be Vandergriff Park site 1. Vandergriff Park is an existing 84-acre
Community Park located on 2800 S Center St, Arlington just a few miles south of downtown Arlington. The existing park amenities include restroom building with picnic shelter, existing soccer fields, baseball fields, tennis courts, and skate park. The criteria for the site selection of the playground mainly included such concerns such as proximity to accessible parking lots, existing amenities, and gently slope less than 5%. Additionally, the playground should be closed active recreation amenities and open nature space. Another major concern is for the playground to be located in residential area, pediatric therapy and close to a major street. This particular site responded to some of the concerns previously assessed during case studied.

5.3 Site Inventory and Analysis

Once the site selected researcher focused on understanding the strengths and weakness of the park through site inventory and analysis. GIS maps that represent the existing condition of Arlington Vandergriff Park is reviewed. Site analysis and park information helps to understand the existing site condition beside potentials and limitations, which directly impacts the proposed design. In order to have a more holistic view inventory and analysis included region, city, neighborhood and site scales.

5.3.1 Regional Context and City Inventory

The site located 4 miles south of downtown Arlington (Figure 5.2). The researcher focused in city analysis for hydrology, access and parks and green space map (Figure 5.3) The major interstates within its proximity are I-20 (approximately 2-mile south), I-30 (approximately 5-miles north), and highway 303-Pioneer Freeway (approximately 1.5-miles north) (Figure 5.2). Hydrology map indicates the location of our site and its relation to the existing Johnson creek, and the water running out from our site (Figure 5.3).
Figure 5.2 Regional Context
5.3.1.1 Hydrology

Figure 5.3 City Inventory (Hydrology) 1
5.3.1.2 Access

Figure 5.4 City Inventory (Access)
5.3.1.3 Parks and Green Spaces

Figure 5.5 City Inventory (Parks and Green Spaces)
5.3.2 Park Inventory

The surrounding context of the site is predominately zoned residential area with a few commercial zones, Vandergriff Park is surrounded on all sides by roadways the major street is South Center Street. It has numerous recreation facilities including baseball fields, practice fields and tennis courts. There is also a pavilion that seats approximately 120 people. The water running out from our site to west and south-west to Johnson Creek (Figure 5.6).

![Figure 5.6 Park Inventory](image)

5.3.3 Site Inventory and Analysis

The site analysis diagram helped shape the initial concept plan by locating areas best suited to the various elements, while indicating potential issues and problem areas. Analysis of the existing site conditions and issues revealed opportunities for locating features and elements such
as the accessible path, areas for climbing, and a storm water treatment pond. A site analysis was conducted to determine the ideal location for the placement of the playground, as well as identifying issues that may need to be addressed as part of the design process, the analysis includes a site and slopes study, sun/shade study, connectivity to recreational amenities and vehicles and pedestrian entry (Figure 5.7). The researcher proposed to demolished the existing playground since the playground serve different age groups 2-5 years and 5-12 years but the playground can be limited for the older ages because there are limited number pieces of play equipment that kids can move or manipulate. Also, the playground is not fully accessible for physical disability also the features of the park are intended to attract a larger range of use, the researcher opinion the park need larger playground to serve the community, different ages, and for all abilities.

![Figure 5.7 Site Inventory and Analysis](image)
5.4 Programmatic Elements

The programmatic elements are the most essential features of the playground. This includes Discovery new entry sensory garden to provide aesthetic and learning, water table and sand table accessible wheelchair, natural and sound elements, physical challenges (climbing, crawling), loose parts for free play and construction area, Benches with below store for loose parts, fences next to the road for safety, elevated bed planters for accessible wheelchair, dry creek to act like as green swale during the rainy months, willow huts tunnel to provide sense of nature, and comfortable and observation area.

The programmatic elements that were included in the design of the all-inclusive adventure playground derived from the data gathered from the literature review, case studies, and on-site documentations.

5.5 Concept

The concept for the playground design materialized from the site analysis, design criteria synthesized in chapter four and the programmatic elements developed as a result of these criteria. The concept design of the playground goals to reach these objectives: (Figure 5.8)

- Provide gathering point with water feature and sand table (accessible wheelchair). Water located at the center of the playground which offer opportunities to play and connect with other kids and also offers opportunities for localized views into adjacent spaces in the playground.
- Provide accessible, safe and natural structures and materials for children to build, explore, dig, manipulate and make their own environments.
- Provide an accessible path of travel throughout the playground.
• Provide a planted buffer between the physical activity and comfortable zone.

• Proposed connectivity with the community pool and new entry to the playground.

  Provide tunnels made from willows, a sensory garden, an accessible path, and large open areas.

• Provide a balance between spaces, ensuring the transition between spaces are not abrupt for kids.

• There is a wide range of native plants on both sides of the discovery new entry.

• Center kiosk for play leader to serve between to nature play and loose parts area.

• Provide a vegetation and fence line next the road for safety.

Figure 5.8 Concept Design

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5.6 Design

The report at this point has many conceptual diagrams to explore possible design solutions for the playground. The final design was created addressing the concerns found in the site inventory and analysis as well as current research (Figure 5.7). The researcher focused on combining physical play, cognitive play, nature play, creativity, communication, and social play. The playground design can be developed through the actual placement of equipment in a circular form, which links back to the beginning of the play area. The observation area that is placed at the high point is used for children who are shy. They are given a chance to watch from a secure location until they feel comfortable enough to join. The playground also provides chances for children to improve various features of their five senses by interacting with multiple sensory stimulus activities such as create pathways that have texture built into them for fun wheeled play. Dry creek and sensory garden in the north of the playground provides opportunities for children to discover and learn about nature. The surfacing needed to be flexible enough to support a wheelchair, but not too firm that it would present a hazard for children. Also, additions to the pathway that surrounded various playground features were designed to be wide enough to hold the equipment as well as provide appropriate clearance from the pathway or other pieces of equipment, making it safer and more comfortable for children to move around. Loose parts and nature play area can be anything from rocks, sticks, wood panels, sand toys, and water play opportunities. Loose parts that complement other objects on the playground, as well as implement a variety of dramatic and sensory play opportunities are the most effective. Elevated bed planters provide parallel play and learning about the plants. Design details show the loose parts area, the willow huts tunnel and the kiosk for play leader. Also, the loose parts area close to
the play leader to has a small connection with the outside in case they need advising. (Figure 5. 10).
Figure 5.9 All-Inclusive Adventure Master Plan
Figure 5.10 Design Detail Kiosk for Play Leader

Figure 5.11 Design Detail Willow Huts Tunnel
5.7 Chapter Summary

In summary, this chapter discusses the synthesis of data collected in Chapter 4, which are the site selection criteria and suggested design strategies for the City of Arlington. This chapter also discusses the site analysis conducted for Vandergriff Park, which illustrates the existing conditions such as vehicular and pedestrian circulation, existing and reaction amenities, and study of the site conditions. Providing this information is intended to inform how the suggested design criteria are incorporated and applied to the site. Additionally, a suggested concept and design are discussed in detail.
Play is a focal part of a child’s life. It raises social connections, learned behaviors and creativity. The specific environment used for play can have different cognitive, social and motor development impacts on children. There are common elements and design characteristic between the two playgrounds typologies studied here (all-inclusive and adventure playground). Research revealed that there seem to be limited consideration for all-inclusive adventure playground in the literature as well as in the profession. Therefore research benefited from various case studies each of which provided varying sets of criteria to consider to design an all-inclusive adventure playground for the City of Arlington. At the end all-inclusive adventure playground most often suggested to include elements of vegetation and the concepts of inspiration and variety. One of the most useful elements of the playground is that require the use of all senses: sight, sound, smell, touch, and taste. It is the variety of sensory experiences that initiate a more creative learning environment for children Also, a difference of physical elements and social interaction.

Following section briefly reviews the research question raised in this research as well, the relevance of the research for the landscape architecture profession. This chapter concludes with suggestion for directions for future research.

6.2 Research Questions Revisited

The purpose of this thesis is to study and assess an all-inclusive and adventure playground and to inform the design of an all-inclusive adventure playground for the City of Arlington. The goal is to design an all-inclusive adventure playground that allows all children to
develop critical, cognitive, and social skills through play with other children of various ages and abilities.

1. What are some of the critical considerations for All Inclusive Playgrounds?

When considering an all-inclusive playground, recognize that all disabilities are not physical. It is necessary to think about all types of impairments like sensory, physical, and communication. The playground should have a mixture of activities to attract children of all ages. It should implement a balance of more natural and more accessible playground elements with those that are more challenging. Playground considerations for children with various disabilities, textured routes and shapes, varieties of colors or patterns to mark and identify spaces, and elements that can be moved responding to touch.

2. What are some of the critical considerations for Adventure Playgrounds?

Adventure playgrounds which support children to learn through creative and imaginative play are needed. Unlike traditional play areas which provide only for the physical aspects of play, these adventure playgrounds, under the direction of a play leader, provide children free control to search, build, and share with others. Adventure playgrounds addresses the play needs of children. The flexibility of these playgrounds as well as the opportunities these playgrounds provide for independent exploration is critical. Existing traditional equipment such as slides that are too high or swings made of metal and are placed in concrete should be removed from the playground. These structures might be utilized as scrap materials to be used by the children in building their own physically challenging structures. Concrete surfaces could be used as a ground for a play or storage room for materials such as tools, sand and water play. Gardening activities are also essential elements in the adventure playground.
3. How can these considerations be brought together to design an all-inclusive adventure playground for all children for the City of Arlington?

Playground design must be one which allows for creativity and exploration. There are common elements and design characteristic between both playgrounds, such as sensory garden, loose parts and physically challenging activities. A mixture of materials and activities will challenge children of all ages and abilities to use their bodies to balance, climb, jump, pull, hang, dig, and run. Moreover, natural features such as great wooden posts supports a rope course could be an attractive feature for such playground. Also, a loose parts play area that support imaginative play for all children of any ability is found to be a critical factor to incorporate in all-inclusive playgrounds. Boulders, stumps and open fields add opportunities to climb, jump, balance, sit, hop, run or watch active play. A sensory garden, inserted into the quiet corner of the all-inclusive adventure playground, may not only provide additional programmatic elements for such playgrounds but also provide a multi-sensorial adventure for all children. Water and sand are essential elements on both typologies of playgrounds. These features (such as a water table and a sand area) can be brought together involving a group of children to play together and play with adults, increase interest of play opportunities. Natural elements such as vegetation, rocks, and sticks are important features for both types of playgrounds. Such natural elements may not be part of the play equipment but they make a significant contribution to the playground environment and especially play an important role in children’s physical and mental health.

6.3 Implications for Landscape Architecture

The creative aspects of play suggest that children must be involved in their environment to be able to change it to be able to communicate and learn from each other. Playgrounds are critical in meeting children’s need to play; therefore, any ideas proposed for children’s
playgrounds should pay attention to the inclusive design criteria and consider all children regardless of whether they are disabled or not. All-inclusive adventure playgrounds allow all children to engage and play so everyone can be included in the play. This typically involves children with social/emotional disabilities or perceptual/intellectual difficulties like hearing, visual impairments, learning disabilities, and/or well a wide range of physical disabilities. It takes into consideration much needed social interaction in the play space. Playgrounds have to be suitable environments for all children, regardless of their abilities. Landscape architects should come to recognize that not every playground needs to be fully designed by equipment and that playgrounds would benefit from the minimal design, natural elements and the accessibility to a shaped playground. Landscape architects need to be well equipped with the programming such environments and fully involved with designing a playground that teaches all children to be creative, adaptable and flexible while playing learning and healing together.

6.3 Future Research

This research focused on study and assess an all-inclusive and adventure playground to inform the design of all-inclusive adventure playground. The goal was to design a playground for the City of Arlington that allows all children to develop critical, cognitive, and social skills through play with other children of various ages and abilities. This research reveals few other opportunities for feature research. Investigating the social, environmental, and economic benefits affecting user’s perceptions of playgrounds besides the design characteristics can influence the design of new playgrounds therefore it is a critical area for further exploration. Moreover, research about improving the connection between design characteristics and social interaction on the playground can also be studied to enhance the user experience from start to finish. Finally, evaluating important case studies such as “Playgrands’ adventure” after project is completed by
conducting an in-depth behavioral observation and performance study can be beneficial for future playgrounds.
References


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