An Approach to Designing Playgrounds that Promote Game Play

by

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Abstract

The time American children spend on average engaged in valuable play has been in decline over the past several decades. This trend is upsetting when considering the important role of play in the development of children. Valuable play is active, creative, and social and play led by children is commonly regarded as the most beneficial type of play. This study reviews Literature related to play, games, child development and playgrounds.

The playground is place that can help change this trend. Unfortunately the standard American playground fails to meet the broad developmental needs of children. This study offers a new approach to designing playgrounds that promote game play. Games associated with this approach are invented, modified, shared, and/or taught by children or adults. This creative, imaginative and social play aims to meet important developmental needs of children.

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Chapter 1: **Introduction**

1.1 Problem Statement

A growing body of research supports the valuable role of play in the development of children. Informal and invented games have long been a part of play. Unfortunately, recent research suggests that play in the U.S in decline. The amount of time children spend engaged in valuable physically active play is on the decline. This is reflected in the fact that recess time in schools across the country is decreasing. It should come as no surprise then, that childhood obesity is on the rise.

Playgrounds have always been a place where children can experience the joy and benefits of play but common American playgrounds do little to improve the state of play. Increased safety standards and litigation have led to a standardized playgrounds with set use that fail to meet the broad developmental needs of children. Playgrounds should be as creative as play and encourage creativity and imagination in children. A new approach to designing playgrounds is needed so that children can engage in play of the highest value.

1.2 Need for Study

Throughout history Great thinkers such as Greek philosophers Plato and Aristotle and early educators such as John Amos Comenius, Jean-Jacques Rousseau, Johan Pestalozzi and Friedrich Frobel, the father of the kindergarten, have recognized the importance of play (Frost & Klein, 1978, p. 1). In 1959 the United Nations lent its support to this as well in the *Declaration*

of the Rights of the Child. This document states: "The child shall have full opportunity for play and recreation, which should be directed to the same purposes as education; society and the public authorities shall endeavour to promote the enjoyment of this right." The importance of play speaks its great benefits. Isenberg and Quisenberry (2002) state "Play is a dynamic process that develops and changes as it becomes increasingly more varied and complex. It is considered a key facilitator for learning and development across domains, and reflects the social and cultural contexts in which children live" (p. 2).

While the amount of research supporting the value of play continues to grow, the amount of time children spend engaged in valuable play is on the decline. Though acknowledged by play scholars and historians, this decline in play is difficult to quantify. Gray (2011) points to a study conducted by Rhonda Clements in 2004. She surveyed 830 mothers throughout the United States, 85 percent of whom said they had played outside more than their kids were at the time of the study. When asked about their childhood 70 percent of mothers said they played outside daily and 56 percent said when they did it was for periods of three hours or more. When asked about their children, the percentages, respectively, were 31 percent and 22 percent. A large majority of mothers cited television, computers, and their own fears as reasons for this discrepancy (pp. 445-446).

The nature of play has changed; many children now play on computers, mobile devices and video games. These types of play limit the imagination and creativity of the user and rarely involve physical activity. A 2007 government report revealed that only 26 percent of adolescents met the current physical activity recommendations (Federal Interagency Forum on Child and Family Statistics, 2007). This is no doubt a contributing factor to the alarming childhood obesity statistics. "Childhood obesity has more than doubled in children and tripled in adolescents in the

past 30 years" (Centers for Disease Control and Prevention, 2013b). Representing the American Academy of Pediatrics, Ginsburg (2007) addresses this issue,

> In contrast to passive entertainment, play builds active, healthy bodies. In fact, it has been suggested that encouraging unstructured play may be an exceptional way to increase physical activity levels in children, which is one important strategy in the resolution of the obesity epidemic. (p. 183).

Ginsburg (2007) also present data that suggests the schools' role in the decline of play. A 1989 survey found that 96% of elementary schools had at least one recess period, yet a decade later a survey found that only 70% of kindergarten classrooms had a recess period (p. 183). A study by the Robert Wood Johnson Foundation (2007) presents factors that contribute to decreased play time in schools.

> As Schools experience increased pressure to perform on standardized tests and face discipline challenges on the playground, many are cutting back on programs that encourage kids in physical activity of any kind, let alone activities that are fun and meaningful (p. 1).

Playgrounds are as are an ideal place to encourage healthy valuable play amongst children. The playground is a place designated for one thing, play! Some feel that playgrounds are contributing little to help this situation. Solomon (2005) criticizes the common playground in her book *American Playgrounds: Revitalizing Community Space*.

> Existing American playgrounds are a disaster. The landscape is filled with variations of a model that has few local or regional distinctions. Today's playground normally is defined by a sizable, colorful piece of commercial equipment that links steps, deck, and slides. It is topped by pyramidal roofs, rests on a resilient surface, and is cordoned off from its surroundings by fences and gates. These assemblages have become so commonplace that most citizens will be shocked to learn that these play areas are cultural artifacts that emit a mixed message. Playgrounds no longer function as a hub of community activity and rarely attract a variety of participants over the course of a single day. Use is set and predetermined, leaving scant prospect for improvisation. Often divorced from the site, the playground does not aid in preserving remembrances of the past. Playgrounds used to reflect theories about how children learn; today they are largely unconnected to seasoned beliefs on the subject. The problem is

> exacerbated by the American public's increasing difficulty with assessing risk on a daily basis (p. 1).

Solomon describes a playground that most Americans are familiar with. She, like Frost (2008), identifies the negative effects of increased safety regulations in playground design as well as the fear of litigation involving safety. Solomon (2005) makes an important point when referring to the common American playground saying, "Use is set and predetermined, leaving scant prospect for improvisation" (p. 1). Like many video games, computer activities and toys, some playgrounds greatly limit creativity, improvisation and imagination. These characteristics are important elements of play that should be promoted on the playground. Frost (2006) points to the lack of consideration given games in approaches to designing playgrounds:

> All too commonly, adults responsible for designing, selecting and purchasing playground equipment make choices that are wasteful and expensive, that provide redundant challenges, that ignore many important forms of children's play and games, and that fail to take into account the range of interests and abilities of children across developmental levels (p. 12).

Grover states, "Children today need the opportunity to invent their own games, to fail and to succeed with their friends, and to experience the natural world as previous generations did with such unbounded enthusiasm on the playgrounds of America's country schools" (as cited in Frost, 2010, p. 130)

A new design approach to playgrounds could help improve the current state of play. Parents and teachers can also help by developing play opportunities and allowing time for children to play on their own. The solution proposed is a playground that encourages creative game play while also serving as grounds for adults to creatively organize valuable play activities and games.

1.3 Objectives of Study

The following are the objectives to be accomplished by this study.

Objectives:

- To research the nature of play and games
- To research the importance and value of play and games
- To research traditional playground games
- To identify instances of playgrounds and other structures that promote game play
- To develop a new approach for designing playgrounds
- To implement the design approach into the design of a structure for the playground

1.4 Literature Review

1.4.1 Overview

The literature reviewed for this study aims to lay the foundation of the design approach. The nature of play is examined as well as that of free play and structured play. The developmental benefits of play are explored. It is important to note that the benefits of play apply to both free play and structured play. Benefits specific to free play and structured play will also be presented.

1.4.2 The Nature of Play and Games

When reviewing literature on the subject of play, it is clear that defining play is a difficult task. Sutton-Smith (1997) states, “Any earnest definition of play has to be haunted by the possibility that playful enjoinders will render it invalid” (p. 213). Defining games is also challenging as explained by David Parlett: “The word [game] is used for so many different activities that it is not worth insisting on any proposed definition. All in all, it is a slippery

lexicological customer with many friends and relations in a wide variety of fields" (as cited in Salen & Zimmerman, 2003, p. 71). A difficulty in distinguishing between play and games also exists. Garvey (1990) explains,

> This semantic problem pervades the literature on play. In French, German, and Russian, one word (*jeu*, *Spiel*, and *irga*) refers at once to both play and game. Translators of the Influential works of Jean Piaget and Roger Caillois, for example, must deal with the problem and are sometimes inconsistent in the English words they select. And we ourselves do not, of course, always use "play" and "game" consistently in everyday language to distinguish the different concepts (p. 103).

Although inconsistencies in translation exist, it is clear that Jean Piaget (1962) recognizes games as a subset of play. Piaget identifies the stages of play in development; the third being "games with rules." He explains that "Rules are a regulation imposed by the group, and their violation carries a sanction. Although games with rules are common among children and adults, many are specifically children's, handed down from one generation to the next without adult influence" (p.112-113). The games described by Piaget are of similar nature to those that will be presented in this study. Frost's (2010) attempt to define play also recognizes games as a subset of play.

> Play is voluntary activity of ludic and imaginary quality that emerges from biological foundations through the child's initial solitary and social interactions with objects and people. Play is manifested and elaborated through games and amusements, and results in cognitive, social, motor, linguistic, and emotional growth and development. Play has therapeutic powers, yielding positions of cognitive clarity, power, and primacy to the player. (Frost, 2010, p. xvii)

This definition addresses not only the question, *what is play?,* it address the bigger question, *why do we play?* This is question is one that has motivated great thinkers throughout time to study play. Other definitions reflect the attempt to answer both of these questions. Frost and Klein (1978) present a collection of definitions from influential works on the subject of play.

Schiller (1875): The aimless expenditure of exuberant energy.

> Frobel (1887): The natural unfolding of the germinal leaves of childhood.
>
> Spencer (1873): Superfluous actions taking place instinctively in the absence of real actions… Activity performed for the immediate gratification derived, without regarding for ulterior benefits.
>
> Groos (1898): Instinctive practice, without serious intent of activities that will later be essential to life.
>
> Dewey (1922): Activities not consciously performed for the sake of any result beyond themselves.
>
> Gulick (1920): What we do because we want to do it. (p. 2)

These definitions represent various play theories that have been presented throughout the years in an attempt to explain the universal phenomenon of play.

Play Scholar Stuart Brown (2008), in an attempt to further describe play, presents a framework of play devised by Scott Eberle, intellectual historian of play. Eberle has defined a six step-process he believes most people go through during play. He says that play involves:

> **Anticipation**, waiting with expectation, wondering what will happen, curiosity, a little anxiety, perhaps because there is a slight uncertainty or risk involved (can we hit the baseball and get safely on base?), although the risk cannot be so great that it overwhelms the fun. This leads to . . .
> **Surprise**, the unexpected, a discovery, a new sensation or idea, or shifting perspective. This produces . . .
> **Pleasure**, a good feeling, like the pleasure we feel at the unexpected twist in the punch line of a good joke. Next we have . . .
> **Understanding**, the acquisition of new knowledge, a synthesizing of distinct and separate concepts, an incorporation of ideas that were previously foreign, leading to . . .
> **Strength**, the mastery that comes from constructive experience the understanding, the empowerment of coming through a scary experience unscathed, of knowing more about how the world works. Ultimately, this results in . . .
> **Poise**, grace, contentment, composure, and a sense of balance in life (p. 34).

Eberle's model provides an interesting perspective on play as he gives insight into the mind of the player. I believe this six-step process could prove to be very useful to a designer aiming to enhance the play experience.

The various attempts to define, understand and classify play speak to the complexity and depth of the subject. While differences in definitions do exist, the importance of play is widely recognized. Frost (2006) states "On no other educational or child development issue is the body of evidence clearer – play is essential to the healthy development of children and to their adaptation to their culture, society and world" (p. 6).

1.4.3 Stages of Play and Games

The developmental needs of children change as they grow. Influential scholars in the field of child development, Piaget, Buhler, and Smilansky identified theses stages and their relationship to play. While differences exist in their models, there are many commonalities (Frost & Klein, 1978). Table 1 presents different types of play and when they are most common in children.

Table 1 – Different kinds of play during child development

Kind of Play	Description	Age Range of Greatest Incidence
Exploratory play/object play/ sensory play	Very young children explore objects and environments – touching, mouthing, tossing, banging, squeezing. Sensory play appears in children's early attempts to feed themselves. As they get older, materials like playdough, clay, and paint add to sensory-play experiences.	0–2.5 years
Dramatic play (solitary pretense)	Many young children spend a lot of time engaged in imaginative play by themselves throughout the early- childhood years. They invent scripts and play many roles simultaneously. Toys or props, (e.g., dolls, cars, action figures) usually support this kind of play. As children get older, they create entire worlds in solitary pretense, often with large collections of small objects or miniature figures.	3-8 years
Construction play	Children begin to build and construct with commercial toys (Lego, Tinkertoys, blocks), with found and recycled materials (cardboard boxes, plastic tubing) and with a variety of modelling media, (clay, playdough, plasticine). Older children play for extended periods with complex commercial model sets. Children across the age range engage in this kind of play by themselves and in groups, often combining it with episodes of solitary pretense or socio-dramatic play.	3-8 years

Physical play	Sensorimotor play begins as young infants discover they can make objects move; e.g., kicking the figures on a crib mobile or crawling after a rolling ball. Physical play in the preschool years often involves rough-and-tumble play, a unique form of social play most popular with little boys. Rough and tumble play describes a series of behaviours used by children in play fighting. Adults often mistake it as aggression. Older preschoolers engage in vigorous physical activity, testing the boundaries of their strength by running, climbing, sliding, and jumping, individually and in groups. This kind of play often develops spontaneously into games with invented rules.	3-8 years
Socio-dramatic play	Pretend play with peers – children take on social roles and invent increasingly complex narrative scripts, which they enact with friends in small groups.	3-6 years
Games with rules	Children begin to play formal games in social groups. These games have fixed, predetermined rules; e.g., card games, board games, soccer, and hockey.	5 years and up
Games with invented rules	Children begin to invent their own games and/or modify the rules of traditional playground games in their self-organized playgroups; e.g., tag, hide-and- seek, red rover, hopscotch.	5-8 years

(Hewes, 2006, p. 3)

According to Piaget (1962) "games with rules" begin to emerge around the age of five. Hewes (2006) adds "games with invented rules" beginning at the same time but ending around eight years old. Distinguishing between games with rules and games with invented rules can be difficult. Rather than distinguishing between the two, it is better to consider the progression of complexity in game play. Children begin to playing games with simple rules such as tag and red rover and by age eight or nine they lose interest in these games. Children beyond these years tend to prefer games with more complex rules. Another progression in games during development involves the number of players in the game. Studies indicate that size increases during middle childhood (Baines & Blatchford, 2011).

1.4.4 The Value of Play and Games

The importance of play to children's development has been "well documented in child psychology, anthropology, sociology, and in the theoretical framework of education, recreation,

and communications" (Hewes, 2006, p. 1). Joseph Chilton Pearce, author of several books on child development states "Play is the only way the highest intelligence of humankind can unfold" (as cited in The Strong, n.d.b). It is clear that play is beneficial to children and some types of play are more valuable than others. Frost (2006) presents his view as to what constitutes valuable play.

> Play that is beneficial to children is play that is active, creative, and social, engaging the body in fine and gross motor development and the mind in negotiation, problem solving, imagination and flexibility. An extensive review of UK play research identifies a range of play values. Play encourages autonomous thinking and environment building, provides opportunities to practice new skills and functions, promotes flexibility in problem-solving, develops creative and aesthetic appreciation – all in a context of minimum risks and penalties for mistakes. In very general terms, play promotes cognitive development, social development, language development, physical fitness and health, learning and coping with trauma (p. 6).

Frost (2006) suggests the multitude of benefits available to children through play. The Different games and play activities present different benefits. These valuable experiences can be best explored in different categories.

1.4.4.1 Physical Benefits of Play and Games

In regards to the outdoor playground setting, the physical benefits of play and games are perhaps the most obvious because this play is most often physically active. Children grow stronger, increase stamina, and can stay fit through physically active play. These fitness benefits are relevant now more than ever as childhood obesity in our culture has become a major concern. The joy of exercise can be learned through play but benefits go far beyond fitness. Gallahue (1993) touches on the many benefits of physically active play.

> Movement is that the very center of young children's lives. It is an important facet of all aspects of their development… To deny children the opportunity to reap the many benefits of regular, vigorous, physical activity is to deny them the opportunity to experience the joy of efficient movement, the health effects of

movement, and a lifetime as confident, competent movers. (as cited in Frost, Brown, Sutterby, & Thornton, 2004, p. 19)

Through movement a child learns and practices skills like running, jumping and climbing. This practice can help children gain spatial awareness and a better understanding of their bodies and the way they move. This can help children in future recreational activities, sports, exercise, and life (Miller, 1972). Physical activity also contributes to mental functions as explained by Sattelmair and Ratey (2009): "Physical activity presents a physiological stress to the brain that, when balanced with recovery, promotes adaptation and growth, preserves brain function, and enables the brain to respond to future challenges" (p. 366).

Fine and large motor skills are developed through play. Miller (1972) references the work of Jean Piaget when present the significances of these skills as a building block for development. "The child moves through certain developmental levels or stages on his way to becoming an adult. Motor development is a prerequisite for mental development" (p. 6).

1.4.4.2 The Role of Play in Emotional Development

Gray (2012) offers insight by exploring the role of play in emotional development. Children love to play in ways that stimulate emotions. Kids like to climb to high heights, move at fast speeds and play in other ways that involve risk and danger. They know the limits and will gradually push those limits. Joy and fear are experienced in these types of play and the combination of these emotions results in thrill. There are thresholds to the fear children experience; if a child climbs too high or goes to fast, the fear will be overwhelming and the result is no longer anything but terror. Through experiences like these a child can learn to overcome the fear (Gray, 2012).

Aggressive play offers similar learning experiences to children. Like thrill-seeking play ,there are limits to aggressive play, like mock fighting and taunting. This kind of play can evoke

some degree of fear and anger. When becomes too angry they may "lose it," thus ending the play. Seeing as play generates what Brown and Vaughn (2009) call "continuation desire" (p.17), an outburst that causes play or a game to stop is seen as unfavorable to the child. Through experiences like this a child will learn to regulate emotions, a skill that will prove useful throughout the child's life (Gray, 2012).

1.4.4.3 The Role of Play and Games in Social Development

Games can provide scaffolding for children to from friendships and peer networks. This opportunity created through games is especially important to those children that are new to a social environment or those that struggle forming friendships in other settings (Baines & Blatchford, 2011). As children play together they develop valuable social skills such as cooperation, sharing, turn-taking and conflict resolution (Singer, Golinkoff, & Hirsh-Pasek, 2005). These skills help children to learn how to constructively interact with other children.

Games offer opportunities for children to assume leadership roles and with leaders come followers. Social roles like these can be learned through play and then carried over into the classroom and later into a work environment. Children grow to accept the views and values of other children as well as elders through play (Miller, 1972).

During play children develop an understanding of socially acceptable behavior. Bekoff (2011) explains that "there are codes of social conduct that regulate what is permissible and what is not permissible." He then asks, "What could be a better atmosphere in which to learn social skills than during social play, where there are few penalties for transgressions?" (p. 85). This point holds true for much of the learning that takes place during play: the location where children play should be a safe place to learn.

Berkoff (2011) makes a valid point in recognizing play as a safe place for learning and development. While playing, children can test their limits of themselves and others through play. When they push too far or act inappropriately, they may cause the play to break down. Other children may show their disapproval in various ways. The child who is out of line stands to gain from observing and understanding these social cues.

A study on play deprivation offers insight into the lasting effects social play. Frost, Brown, Sutterby, & Thornton, (2004) present a recent study by Stuart Brown. He studied 26 convicted murders and found that 90 percent of them either did not play as children or they played in abnormal ways (e.g., violent, aggressive). Brown's data found a correlation between the quantity and quality of social play during youth and adult interaction skills later in life (p. 20). This study shows the importance of proper development during youth. The social benefits of play reinforce the overall developmental value of play.

1.4.4.4 The Role of Play and Games in Cognitive Development

The playing of games lead by children often involves a period of preparation before the game begins. The process before a game begins offer great opportunity for learning as children must discuss and negotiate rules. These rules are often abstract concepts and numerous mental processes are developed during this process, including language skills and problem-solving skills. In the creation of a new game, children stand to develop mental processes associated with creativity and imagination (Baines & Blatchford, 2011). Adult-led games diminish the opportunity for development of this kind but adult leadership creates an opportunity for specific learning, like math, science and vocabulary, to be incorporated into the game.

Isenberg and Quisenberry (2002) present numerous studies that suggest a "strong relationship between play and cognitive development. Studies indicate a positive relationship

between play and student learning. They identify improvements to attention, planning skills, and attitudes; creativity and divergent thinking; perspective-taking; memory; and language development" (para. 2).

Sattelmair and Ratey (2009) examine physically active play and cognitive development. "Physical activity presents a physiological stress to the brain that, when balanced with recovery, promotes adaptation and growth, preserves brain function, and enables the brain to respond to future challenges" (p. 366). This and other research supporting the cognitive benefits of physical activity are combined with the benefits of play when play is physically active. They offer the following:

> Play facilitates healthy cognitive development by stimulating frontal lobe maturation, by alleviating Attention Deficit Hyperactive Disorder (ADHD) symptoms (such as impulsiveness), and by promoting prosocial minds through the maturation of behavioral inhibition. Thus, physically strenuous play synthesizes the neural benefits of both exercise and play by simultaneously providing physical, social, and intellectual stimulation. This synergy of stimuli creates a positive challenge or stress to the brain, which in turn causes the brain to adapt, resulting in healthy cognitive development (p. 366).

This relationship between play and ADHD is a relevant finding when considering the rise in diagnoses. **"**The percentage of children with a parent-reported ADHD diagnosis increased by 22% between 2003 and 2007" (CDC, 2013a). This information suggests that benefits experienced on the playground could improve a child's performance in the classroom.

1.4.5 The Role of Adults in Play and Games

Much of the research on play suggests that the most valuable play occurs when children play on their own. Play with limited or no adult involvement is often called free play.

> Free play is defined by play scholars as an activity that contains five key dispositional factors: free play is voluntary, allowing players to enter or leave play at will; free play is spontaneous in that the play can be changed by the players; free play involves a pretend element and is different from everyday experience; free play is engaging as players are involved in the activity, separated from all

> surrounding activities; and free play is fun, pleasurable, and enjoyed by the players. (Frost, Brown, Sutterby, & Thornton, 2004, p. 18)

It is clear that these characteristics of free play are similar to those of play in section 1.4.2. When asked about free play, Gray (2013) said "…Sometimes I call that free play, but I would rather call it just play…"(p. 272). Elkind (2008) calls free play the purest form of play while also identifying it as the most valuable type of play.

> Decades of research has shown that play is crucial to physical, intellectual, and social- emotional development at all ages. This is especially true of the purest form of play: the unstructured, self-motivated, imaginative, independent kind, where children initiate their own games and even invent their own rules. (Elkind, 2008)

It is important to note that Elkind (2008) includes games in his description of free play. However, incorporating games into the playground setting will call for moments of adult leadership. While it is important for kids to play and figure things out on their own, play led by adults can be very beneficial to the play experience.

Adult-led play activities can be designed to provide specific benefits to children. In *A Position Paper of the Association for Childhood Education International,* Isenberg and Quisenberry (2002) state that the "ACEI supports all adults who respect, understand, and advocate legitimizing play as an essential pathway to learning for all populations of children. When working with children, adults should use their knowledge about play to guide their practice" (p. 2). This statement acknowledges those who work to raise the perceived value of play. This in itself is a positive attribute of adult-led play.

The Robert Wood Johnson Foundation (2007) study, *Recess Rules* examines the effectiveness of structured play programs implanted into schools with discipline problems and low participations rates during recess. The program, Sport4Kids is a non-profit structured play

program led by trained professionals guiding playground games like Four Square and helping kids resolve conflicts by teaching tools such as rock-paper-scissors (p. 16).

Principals of schools that implemented Sports4Kids reported improvements in key areas of childhood development, improved relationships among students, and a more supportive culture on the playground. Kids reported feeling safer during recess and feeling better by engaging in physical activity. Both teachers and students reported increased productivity in the classroom (pp. 11-12). The study

> identified two key reasons for the transformation. The first was the level of student participation: by playing games that got everyone involved, kids were more likely to stay focused and involved. The second factor was having an adult present and actively participating in games: kids tended to be more motivated to play when adults were directly involved in recess, and games were more likely to go smoothly. (p.12)

The transformation of recess and playground culture speaks to the effectiveness of a well-run play program. These results are possible on a smaller scale as well. A single classroom teacher or play leader can impact playground culture by teaching games. Adult leadership of this kind can also lead to free play. In many cases, children will only need to be taught a game once; after that they can initiate and play the game on their own.

1.4.6 Playground Games

Playground games have long been a part of American culture. In a recent American publication, Stokes (2012) lists the "Top 10 Classic Playground Games" as follows:

- Tag
- Hide-and-Seek
- King of the Hill
- Four Square
- Horse
- Dodgeball

- Hot Potato
- Hopscotch
- Red-light, Green-light
- Mama, May I?
- Marbles

Some of these games date back to Colonial America and their roots can be traced back to England and other countries. Many books, most of them English, explore the rich history of traditional playground games and rhymes. Frost (2010) writes about early American play and games.

> Early colonial children had the finest of "play-grounds" (their hyphenated designation) with acres of fields, meadows, streams, and woodlands, and they invented games learned from experiences in this new land—building and defending forts, making bows and arrows, Native American surprises, and playing soldiers. In common with children through history, they played games of tag, ball games, hiding games, leap frog, and various others learned by their elders while in England and Holland and taught to their children (p. 37).

1.4.6.1 Evolution of American Playgrounds

Play and games can occur anywhere and will often incorporate elements of the particular environment. A forest presents opportunity for a great game of Hide-and-Seek and a sand dune is a great setting for King of the Hill. While games like these are often played on the playground, very few instances of built structures for such games can be found.

Frost (2010) describes the often-referenced Hull House playground , built shortly after Jane Adams founded the Chicago settlement house in 1892. "This playground of almost an acre was equipped with sand garden type apparatus, sand pile, building blocks, swings, giant stride, indoor gymnasium, and outdoor games areas to accommodate children, youth, and adults. A student and a policeman supervised the playgrounds" (p. 70). This playground was built at the

dawn of the American playground movement and is seen as a major advance in playground design. The so-called model playground "sought to determine what specific apparatus, activities, and supervision would best attract and guide children" (Eriksen, 1985, p. 11). As evident in the description, games were a part of this equation but the environment for games was that of open space.

Figure 1 The Jane Addams Hull House and playground with a "giant stride" in the foreground (Frost, 2010, p. 71)

By 1900 major American Cities had playgrounds for children and in 1906 the Playground Association of America (PAA) was founded. In 1910 the PAA published recommendations for supervised playgrounds. The recommendations included, "1 sliding board; 2 giant strides; a sand court; 4 rope swings, 10 feet high; 2 teeter boards or teeter ladders; 4 sets of ring toss or quoits; and balls, bats, nets, bean bags, and similar materials" (Frost, 2010, p. 272). These materials are indicative of the games played on playgrounds of the time. During this early period of playgrounds, in American play leadership was considered essential. According to Cavallo, the

"Team Games" of this period "symbolized the key goals of modern liberalism: harmony between classes, orderly competition between interest groups, and individual achievements within frameworks will regroup and social process" (as cited in Brett, Moore, & Provenzo Jr., 1993, p. 24).

The early American playground movement defined the traditional American playground. During the first half of the twentieth century "Manufacturers continued the pattern of producing traditional swings, slides, merry-go-rounds, jungle gyms, seesaws, and giant strides, with only minor design changes—ostensibly to attract customers" (Forst, 2010, p. 179). These playgrounds were indeed the grounds of many great games, organized and invented, but it is hard to find examples of structures associated with games.

Roud (2010) offers an example of structures incorporated into playground games. He outlines a game from Nottingham, England in the 1950's.

> 'Four corners': a playground game useful in the wet. In the playground was a rectangular covered area called the 'shed'. You have five players (mostly but not necessarily boys). One child stood with the hand on the pillar of each corner, And the fifth child stood in the middle. Pairs of corners would swap place by running, during the child in the middle to get there first and still the corner. The person left over after a swap became the person in the middle. This game could last the whole playtime, especially in the rain (pp. 3-4)

The use of the shed in this game shows how the physical environment can become an integral part of the game.

1.4.6.2 Surface Markings and Structures for Games

Among the games listed in section 1.4.6, hopscotch, marbles and four square require only simple surface markings that are sometimes drawn with chalk (see fig. 2-4). These markings are commonly painted in schoolyards and playgrounds. These markings are simple and inexpensive, yet they provide the grounds for classic playground games of which the rules can be modified

while also allowing for the creation of new games. It has also become common to see a map of the United States painted onto the surface of a play yard (Figure 5). Such a design allows for invented games as well as games or activities for learning geography.

Figure 2 - Four Square

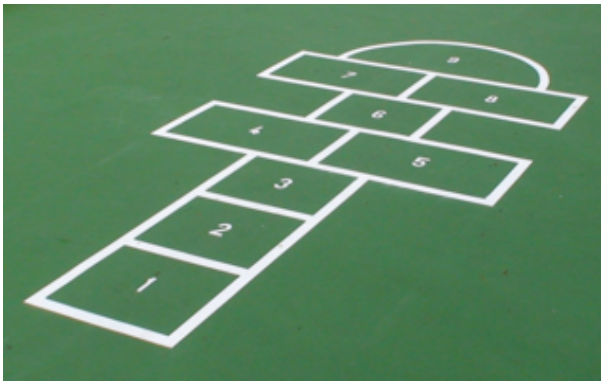

Figure 3 –Hopscotch Court

Figure 4 – Boys playing marbles

Figure 5 – School yard map

A newer addition to American playground games came from a Wisconsin playground manufacturer (Figure 6). According to the company website, “In 1972, Burke invented Funnel Ball® which was an industry standout for its ingenuity. Other playground manufacturers quickly

replicated the concept and the Funnel Ball became a playground staple across America" (Burke Playgrounds). According to Wikipedia,

> Funnel ball is a common playground game. A giant fiberglass or plastic funnel, roughly 5ft in diameter with a 45 degree pitch, is placed atop a post. The exits of the funnel are multiple 1ft diameter holes or tubes, projected parallel to the ground, and spaced equally around the bottom. Play consists of tossing a basketball or small medicine ball into the mouth of the funnel and waiting for it to exit through one of the holes. Each hole is marked with a point value, 2, 4, 6 and 8 points. The ball usually precesses around inside the funnel for a short time, making the outcome of the shot nearly random. Shots which exit through a desired hole are rare because they require incredible accuracy, and because the target is somewhat hidden. There is no formal score to which games are played, and games can be played with high score winner or low score winner. Both team and "every-player-for-her/himself" games are commonplace (Wikipedia, 2013).

Figure 6 - Funnel Ball

Funnel Ball seems to draw inspiration from the game of basketball. A vast number of playground games are ball games. Wall ball is a classic game with many variations that can be played nearly anywhere as it only requires a wall, ball, and players. Of course many organized sports are ball games that involve structures and surface markings that make play possible.

The game of basketball, before becoming a global phenomenon, was an invented game for a physical education class. The game of basketball was invented in 1891 by James Naismith and was originally played with peach baskets and a soccer ball (Grasso, 2011). Figure 7 shows female students playing basketball around 1899. The hoop in the photograph is one that has

evolved from the peach basket. The basketball hoop is one of many examples of structures that make games possible.

Figure 7 - Female students playing basketball in a gymnasium, Western High School, Washington D.C. ca.1899

1.5 Definition of Terms

Cross-Generational Play- Play involving two or more players of different ages (across a generation gap) i.e. parent and child playing together.

Giant Stride- A gymnastic apparatus consisting of an upright pole surmounted by a revolving disk to which are hooked grips that when grasped enable one to take great strides around the pole (Giant Stride, 2013).

Player- An individual engaged in play.

Play Leader / Play Worker- A professional trained in the leadership of play activates and games.

Playground Games- Games that are typically played on the playground or schoolyard such as, tag, hopscotch, marbles and dodge ball. Many traditional playground games are passed down through generations. The rules of playground games are usually flexible and most games have numerous variations.

1.6 Assumptions of Study

It is assumed that the games referenced in this study and associated with this approach are activities that exist as a subset of play, a larger phenomenon. In other case play can by categorized as a subset of games. For example organized sports are games that would not be called play; however, play is an element that exists with organized sports. Playground games are often led by children, have flexible rules and are sometime cooperative rather than competitive. These characteristics of playground games are in line with the characteristics of play. Therefore it is assumed that playground games are a type of play.

1.7 Scope and Limits

Testing of the implemented design will be limited. Due to financial constraints the full-scale model will not be constructed of production-grade materials. Test subject will not be involved due to time constraints and difficulty in attaining university permission. Rather than formal testing the design is to be evaluated by professionals in the playground industry.

The vast amount of research pertaining to play and games does not allow for all types of play and games to be studied. Therefore, the study of play and games will only pertain to the types of play and games associated with the design approach.

1.8 Procedures and Methods

The goal of this study is to develop a unique approach to designing playground that promote game play. In order to achieve this goal the following procedures and methods will be used:

Procedure: Research the nature of play and games

Method: Identify attempts to define play and games. Identify literature that examines the relationship of play and games.

Procedure: Research the importance and value of play and games

Method: Identify literature containing theories and scientific studies that present the many benefits of play experienced by children. Identify the characteristics of play and games that affect the value of the activity.

Procedure: Research traditional playground games

Method: Identify literature that examines the nature of playground games.

Procedure: Identify instances of playground structures and other structures that promote game play

Method: Seek out historical literature on play, games and playgrounds. Explore current products from playground manufactures.

Procedure: Develop a new approach for designing playgrounds

Method: Establish design criteria based on the findings of the literature reviewed and other playground design consideration. Develop a design process focused on meeting the design criteria.

Procedure: Implement the design approach into the design of a playground

Method: Apply the design approach to a playground design project in an industrial design studio course sponsored by PlayCore, a leading playground manufacturer. The industry professionals of PlayCore will play a key role in the evaluation of the design.

1.9 Anticipated Outcome

Considerable research exists supporting the importance of play in children's development. Children grow and progress through many stages of play. However, the majority of American playgrounds fail to meet the broad range of developmental needs of children. Children in middle childhood tend engage in games during play. Children also tend to initiate and play these games with adult leadership. The importance of free play has been a hot topic in the past few decades. Games are often and unfairly left out of this debate. Child-led game play is free play with added structure and intellectual social interaction, not to mention the fact that children often invent new games.

An approach to designing structure for the playground that encourages creative game stands to deliver a disruptive product in world of playgrounds. The result will be a play structure with no set use but unlimited potential. This approach has the opportunity to influence children and attitudes towards playground design.

Chapter 2: **A Novel Design Approach to Playgrounds**

2.1 Introduction

The following chapter outlines a new and unique design approach to designing playgrounds that promote game play. This chapter will outline design considerations, criteria, and process. This approach is universal and can be applied to a wide variety of projects.

2.2 Exploration

In order to prepare for the design process the designer must research and explore. As part of the exploration process, the designer should take time to play. Swiss playground designer Alfred Ledermann (1968) includes this step of playground design in a list, “ten points for the educationist” (p.15). Taking time to play allows the designer to experience the movements, emotions and wonders of play. The designer can also benefit from playing games, as they are an important part of this design approach. Engaging in play can help the designer in gaining a better understanding of play as well as providing inspiration for design.

Observation of play is another useful step in the design process. Visits to local playgrounds offer the designer opportunity to observe the user. Observation of children at play can provide valuable insight into the type of structures children are attracted to, the games children play, the movements of play and much more. Once again the designer stands to gain understanding and inspiration from this step.

Playground visits can also serve as market research by examining existing playgrounds. The designer also stands to gain knowledge of materials and construction methods used on current playgrounds.

2.3 Project Specific Research

Research must be conducted before designing begins. Through research, limits and constraints of the specific project will be identified. The target user should be identified. Age, gender, ability should be researched as well as cultural context of the user. Specific needs of different users can be researched in literature. Interviewing and surveying children, teachers, and parents can be useful in gaining better understanding of the target demographic.

The material and process available for manufacturing the design should be identified. If a manufacturer has already been established, the company should be able to provide this information. If the designer will be seeking a manufacturer, then common industry materials and processes should be identified and considered in order to later identify the best manufacturer for the design.

The materials and process will greatly affect the cost of production. If a budget is already established, it needs to be included in the design criteria. If a budget needs to be established, research of materials and process as well as their costs will help in the development of a budget.

Applicable safety standards need to be identified as these differ from state to state. Manufacturers may also voluntarily follow a set of safety guidelines. These must be identified, learned, and incorporated into the design criteria. Some playground manufacturers have compliance specialists that can help designers navigate through safety standards.

Designing for a chosen site requires research based on the location. Local laws and ordinances regarding playgrounds and public space should be identified. If the design is to

complement an existing playground, the aesthetics, colors, materials, and themes of the playground should be identified. If the playground is to be built on the grounds of an organization such as a school or daycare, policies, rules and other information related to the organization should be reviewed.

2.4 Design Considerations

The following design consideration will help formulate the design criteria and provide guidelines for the design process. The considerations will also be used to evaluate designs.

2.4.1 Developmental Needs of Children

This approach is focused on designing for boys and girls in middle childhood (school-age), ages 6-11. This is the age in which games commonly occur during play. Children tend to play games with simple rules in early middle childhood and tend to prefer more complex games as the progress towards late middle childhood. Around the age of eight or nine children tend to transition from simple games to more complex games. Another change in games during development is group size, which tends to increase as children grow.

Children need to engage in valuable play as outlined in section 1.4.4. Play is essential to the healthy development of children. The developmental needs of children in middle childhood have been divided in four categories: physical, emotional, social, and cognitive.

2.4.1.1 Physical

Playing of games on a playground designed with this approach should allow children to:

- Move quickly, run, break a sweat
- Strengthen their bodies by use of large and small muscle groups
- Develop fine and large motor skills

- Develop coordination, body awareness, spatial awareness
- Develop specific physical skills to prepare for future physical activity

2.4.1.2 Emotional

Playing of games on a playground designed with this approach should allow children to:

- Experience joy and happiness
- Experience the emotions of winning and loosing
- Deal with conflicts and unhappy moments and learn to regulate emotions
- Develop compassion and empathy for others

2.4.1.3 Social

Playing of games on a playground designed with this approach should allow children to:

- Make new friends or strengthen bonds with existing friends
- Develop conflict resolution skills
- Cooperate with other players and learn function within a group
- Develop understand of socially acceptable behavior
- Learn to operate within rules and learn to create them
- Learn from adults and share knowledge with peers

2.4.1.4 Cognitive

Playing of games on a playground designed with this approach should allow children to:

- Develop problem-solving skills
- Develop language skills
- Develop creative thinking skills
- Master new concepts

- Use their imagination

2.4.2 Needs of Adults

The adults responsible for supervising and teaching play have needs, as do the children. The adults in focus are teachers and play leaders who will be teaching games. Consideration should also be given to adults supervising free play. Providing a safe free play opportunity for children allows adults to rest, relax, and enjoy observing children at play.

When designing the goals of teachers and play leaders should be considered. These goals include furthering the development of children. Therefore the developmental needs of children also apply to the adults that lead play. The opportunity for academic teaching should also be considered. Inclusion of numbers, letters, and symbols may allow for a teacher to incorporate math, literacy or other academic content into play.

When leading play, communication during activities plays a major role. In order to facilitate communication, the environment should have identifiable points and elements. This can be achieved through colors shapes and symbols on both the surface and in three-dimensional space. For example, if the surface of a playground has simple shapes of different colors, a teacher can tell one student to stand on the red square and another to stand on the blue circle.

2.4.3 Site Considerations

The natural features of the site need to be considered. The topography of the land may present opportunity for integration into the playground and make for an interesting play environment. Trees, bushes and other vegetation can also be integrated into the design. This presents a valuable opportunity for children to interact with the natural world, but the designer must consider both benefits and possible issues. Trees create shade but also shed leaves. Hedges can serve as boundaries but they can injure the children or be damaged themselves. In any case,

incorporating elements of nature into the design is efficient if considering these are elements that are already in place.

2.4.4 Material Considerations

Material choices on playgrounds are dependent upon many factors. These factors include durability, safety, hygiene, maintenance, cost, and anesthetics. Table 2 identifies advantages and disadvantages of common playground materials.

Table 2 - Advantages and Disadvantages of Various Playground Materials

MATERIALS	ADVANTAGES	DISADVANTAGES
Wood (CCA* Pine/Redwood) *CCA is a pressurized treated process.	· Easy to use. Well suited to volunteers constructing playground. · Looks natural. · Easy to repair. · Easy to attach elements to it (e.g., slides, handles, climbers). · Inexpensive. · Can be creative and design what you need.	· Splinters, cracks, and splits. · Can burn. · Soon looks weathered. · Lots of maintenance. · Does not last as long as other materials. · Does not look as upscale or classy. · Some feel the CCA process is hazardous for children.
Laminated Plywood (painted commercially)	· Very colorful. · Allows for designs with lots of flat surfaces. · Easier to use for infant/toddler pieces. · Can be repaired. · A natural material that lasts.	· Can chip and deteriorate more quickly than plastic and metal. · Restricted to flat designs. · Expensive. · Not appropriate if you don't want bright colors.
Polyethylene	· Does not get hot. · Has no splinters. · Initially bright and attractive. · Shapes that are safe (e.g., a curved slide). · Not structurally strong but usually used with metal. · Smooth and friendly to hold. · Lasts a long time.	· Colors fade over time. · Overuse makes the playground look like a new car salesroom. · Expensive. · Limited number of uses and possibilities
Steel or Aluminum (coated, painted, or untreated)	· Strong. · Lasts a long time. · A large choice of paint colors. · Unitized to provide a variety of options. · Resists vandalism. · Good for structural strength.	· Slides can be very hot and should not be used; posts/railings also get hot. · Hurts to fall against · Almost impossible to repair. · Cannot add to as you wish. · Expensive.
Fabrics	· Lightweight for roofs and canopies. · Easy to replace. · Shade is becoming a more critical issue on playgrounds.	· Soon fades and gets dirty. · Tears easily. · Flies in the wind. · Tends to look shabby. · No structural strength.
"Recycled" Plastics	· Looks like wood. · Has some similar properties to wood. · Can be cut and drilled. No splinters. · Doesn't rot, rust, or split. · Is made from recycled materials. · Can be cut and drilled. No splinters.	· Has no structural integrity. · Cannot be recycled into other plastics. · Doesn't hold nails, screws, and lug bolts as well as wood does.

(Wardle, 2008)

2.4.5 Safety Considerations

The overall goal of this design processes to support the well-being of children. Naturally, safety of children is an important consideration. In regards to safety, Beckwith (1988) presents an important point.

> It is best to make a distinction between "challenge" and "hazard." The goal of playground safety programs is NOT to remove excitement and challenge but rather to control hazard. Clearly children set out and enjoy the stimulation of challenge. The literature on play behavior supports the notion that access to such challenges is fundamental to human development. The fundamental difference between a challenge and a hazard is that a hazard is something, which is hidden, or at least not perceived by the child. (p. 50)

If a design includes a challenging element, it should present a challenge free of hazards. The playground safety programs mentioned below include private and public organizations that present guidelines, standards, and regulations to improve playground safety. Government regulations and standards differ from state to state, and playground manufacturers often choose to follow certain standards or guidelines.

The playground must comply with applicable safety regulations. Many states and playground manufactures have adopted all or some of the safety guidelines presented by the American Society for Testing and Materials (ASTM) and the U.S. Consumer Product Safety Commission (CPSC). The CPSC Public Playground Safety Handbook (2008) provides guidelines for safe playgrounds. It is also useful in gaining a general understanding of playground safety standards. The following safety guidelines are included in the handbook.

2.4.5.1 Surfacing

Soft safety surfacing should be used under and around playground equipment and anywhere there is a risk of falling. The CPSC (2008) lists appropriate and inappropriate surfacing for theses so called fall zones.

Appropriate Surfacing
• Any material tested to ASTM F1292, including unitary surfaces, engineered wood fiber, etc.
• Pea gravel
• Sand
• Shredded/recycled rubber mulch
• Wood mulch (not CCA [Chromated Copper Arsenate]-treated)
• Wood chips

Inappropriate Surfacing
• Asphalt
• Carpet not tested to ASTM F1292
• Concrete
• Dirt
• Grass
• CCA treated wood mulch (p. 9)

The handbook (2008) explains that "Unitary materials are generally rubber mats and tiles or a combination of energy absorbing material held in place by binder that may be poured in place at the playground site and then cured to form a unitary shock absorbing surface" (p. 9). This type of surfacing can be colored and include patterns or designs. Engineered wood fiber (EWS) is a wood product looks similar to landscaping mulch but it is designed for use under playground equipment. There is also rubber mulch made for playgrounds. (p. 9)

2.4.5.2 Playground Hazards

The CPSC (2008) handbook includes a chapter on potential playground hazards to be avoided. Understanding these hazards can lead to safer design. Here are some of hazards presented:

3.1 Crush and Shearing Points

Anything that could crush or shear limbs should not be accessible to children on a playground. Crush and shear points can be caused by parts moving relative to each other or to a fixed part during a normal use cycle, such as a seesaw…

3.2 Entanglement and Impalement

Projections on playground equipment should not be able to entangle children's clothing nor should they be large enough to impale...

3.3 Entrapment

3.3.1 Head entrapment

Head entrapment is a serious concern on playgrounds, since it could lead to strangulation and death. A child's head may become entrapped if the child enters an opening either feet first or head first [See Figure 8] …

3.3.2 Partially bound openings and angles

Children can become entrapped by partially bound openings, such as those formed by two or more playground parts [See Figure 9]…

3.4 Sharp Points, Corners, and Edges

Sharp points, corners, or edges on any part of the playground or playground equipment may cut or puncture a child's skin. Sharp edges can cause serious lacerations if protective measures are not taken…
(pp. 14-16)

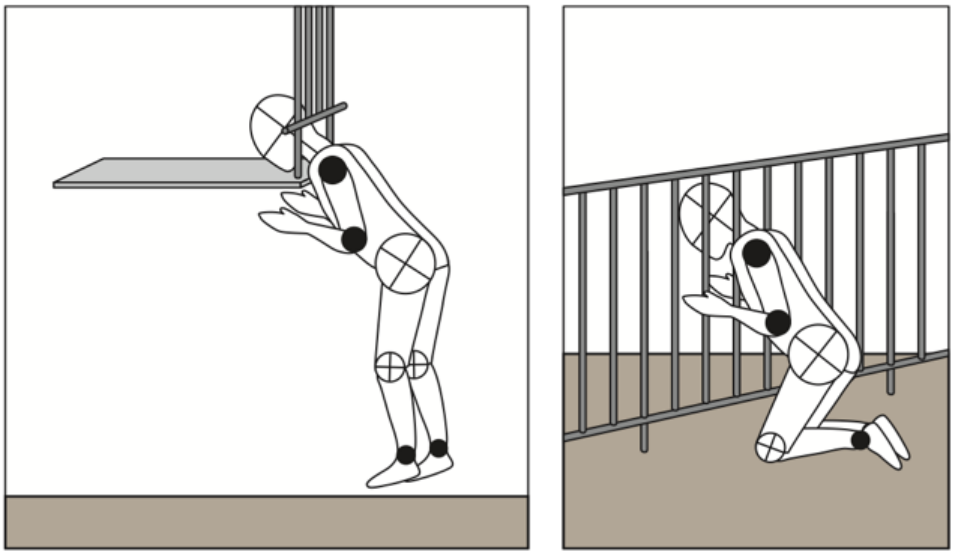

Figure 8 - Examples of entrapment below a barrier and between the vertical bars of a barrier

(CPSC, 2008, p. 15)

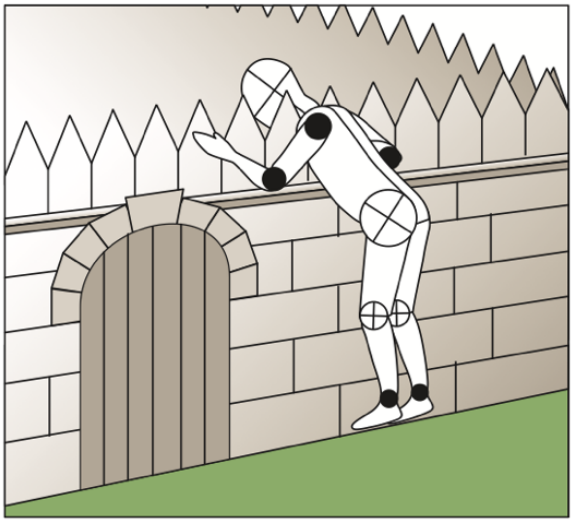

Figure 9 - Example of entrapment in an angle less than 55 degrees on a fort

(CPSC, 2008, p. 16)

2.5 Design Criteria

The design considerations and research are used to establish criteria that the design aims to meet. These criteria are both guidelines and a tool for evaluation of designs. Project specific research may require for additional criteria or modification of the criteria presented here.

A playground designed with this approach should fulfill the following criteria.

The playground should…

- be free of predetermined use
- promote valuable game play led by children
- encourage children to invent new games
- encourage adults to invent games to be taught to children
- include identified points to facilitate communication during the invention, teaching, and playing of games
- provide a safe environment for play and comply with any and all applicable safety standards
- be durable, able to withstand harsh weather and the forces of play

- allow for maintenance and cleaning
- include literature to educate the user and provide sample games

2.6 Concept Generation

Design begins in the concept generation phase. The goal of the concept generation phase is to establish a concept for further development. The concept generation phase should be creative, imaginative, and fun. This can be said for many design projects but it is perhaps even more relevant here as the goal of the design is the promotion of play.

The first step of this phase is to develop and document ideas. It is recommended that ideas be recorded in a sketchbook or another product with paper pages. Sketching allows the designer to quickly transfer ideas from the mind to paper. Written words can also be useful in this process. Ideas can also be explored in 3D space using inexpensive materials that are easy to manipulate. No matter what medium is selected, it is important that the designer be able to document ideas quickly.

Concepts are generated from the documented ideas. The generation of concepts and ideas can occur simultaneously. Concepts can be documented with the same tools used for ideation. Concepts should aim to meet the criteria but the generation of numerous general concepts is more favorable than the generation of a few detailed concepts. As concept generation progresses, so should the quality of the documentation. Concepts should be identified are represented by sketches, renderings, and/or models for presentation.

2.6.1 Concept Selection

One or more of the concepts generated needs to be selected for further development. Concepts should be evaluated based on the design criteria. This process is best executed with the cooperation of peers or industry representatives. Concepts should be presented in way that

clearly demonstrates the functions and features of the design. The feedback received during presentation will help identify a concept to develop. Feedback may also lead to modification of a concept or combination of multiple concepts. Once a selection has been made, the concept need to be further developed.

2.6.2 Concept Development

The concept development phase consists of design, refinement, evaluation/testing, and refinement. This process is documented through sketching, rendering, scale model making, and full-scale model making.

The selected concept lays the foundation of the concept development phase. The fundamental properties and intentions of the concept should be identified. It may be that this concept can be better achieved through a different form, and development in this phase will aid in identifying adjustments that may need to be made to the selected concept. Designs should be evaluated throughout the process based on the design criteria.

Through evaluation, problems and details in need of attention are identified. The design needs to be refined to address these issues. The process of evaluation and refinement may progress through several cycles before the concept is ready for testing.

2.6.2.1 Game Book

Possible games to play on the playground should be explored throughout the design process. During the development phase some of these games should be developed into written rules to be included as sample games in a game book. The game book should also include an introduction to the structure and its function. In addition, the game book should be designed for children and adults. The game book should promote the creation of new games.

2.6.2.2 Testing and Evaluation

The creation of a full-scale model allows for testing of the playground. Ideally a high-quality prototype will be built and tested by play leaders. However, in situations where this is not feasible, a full-scale model can be constructed at low-cost with simple materials and tested with the family and friends of the designer and his or her colleagues. Predetermined games should be played and new ones should be created. Once again, the design criteria should be used during evaluation. The results of the evaluation will determine the refinements that need to be made, or the testing may confirm that a final design has been reached. If major refinements need to be made, more testing should be implemented. This cycle should continue until a final design is reached.

Throughout the design process concepts need to be evaluated. Evaluation of concepts is based on how well the design meets the design criteria outlined in section 2.5. When working with industry, evaluation of concepts and designs is a cooperative effort. For the most effective evaluation, representatives from design, marketing, engineering, management and other related areas should be involved.

2.7 Design Communication

Design communication is the final phase of the design process after a final design has been established. The final design needs to be prepared for presentation and production; at this stage, documentation of the process should be compiled.

High quality scale models and rendering should be created for presentation purposes. A slide show may also be in order. The medium in which the design is presented depends upon the context of the presentation. For example, if such a project were to be launched on Kickstarter, the design should be presented in a video. Regardless of the method of communication, certain

goals need to be accomplished through presentation. The functions and features of the design should be presented as they relate to the design criteria. The playground needs to be presented in a visual manner that conveys the aesthetic value.

The documentation of the design process should be organized and composed into a comprehensive document or report. This information may prove valuable during presentation. It may also provide valuable reference material for future projects.

The final design must also be prepared for production. CAD files and working drawings should be generated so the design can be transferred to those responsible for the production phase. These elements, if made properly, will ensure that the design is produced to the specifications of the designer.

Table 3 illustrates the steps of the design process.

Table 3 - Design Process

Step	Methods and Considerations	Duration
Exploration	• Designer should play, play games and invent games • Visit playgrounds and observe play	

Research	• Identify and research:
	  • target users
	  • constraints and limitations of site
	  • available materials and processes
	  • budget
	  • applicable safety standards/guidelines	

Concept Generation	• Document ideas through sketching, words, graphics, and/or models • Organize ideas into concepts • Prepare for presentation • Select concept for further development	
Evaluation	• Evaluate concepts and designs based on design criteria • Present work to those involved in the project for evaluation	
Concept Development	• Explore alternate designs that embody concept • Identify clear direction of development • Refine concept based on evaluation results • Establish final design	
Testing	• Construct full-scale model • Play developed games and invent new games • Observe test subjects playing on model	
Communication	• Create model to demonstrate final design • Create games book • Generate control drawings • Prepare content for presentation • Organize documentation of process	

Chapter 3: **Implementing the Approach**

The following chapter outlines the application of the design approach presented in previous chapter. This project took place at Auburn University in an industrial design studio course sponsored by PlayCore, a leading playground manufacture.

3.1 Introduction

The playground design project began with an introductory meeting with PlayCore representatives. The mission and value of PlayCore were presented and the existing product line was introduces. Areas of the product line in need of development were identified, including adult physical fitness apparatus, equipment for special needs children and new innovative equipment. Students were tasked with designing new playground equipment that could be integrated into the PlayCore product line.

3.2 Exploration

In an effort to explore play and gain inspiration, time was taken to engage in play. Activities included tossing the Frisbee and kicking a soccer ball with friends. Visits to local playgrounds also provided opportunity to play. Other trips to playgrounds were observational, where children engaged in play were observed and playground structures were examined. Exploration into game play and the creation of simple games was also part of the exploratory process. Some of these games even took place in the studio, like setting up targets that were to be hit with crumpled up balls of paper. These explorative activities provided inspiration when it came time to put ideas into a sketchbook.

3.3 Research

Market research included the study of PlayCore's existing product line as well as products of other manufacturers. This research provided insight into the style of PlayCore products and areas of need were identified. A trip to the manufacturing facilities provided valuable knowledge of available materials and process.

The CPSC Public Playground Safety Handbook (2008) was supplied for review. Study of these safety guidelines provided basic knowledge of the safety standards that needed to be met.

3.4 Concept Generation

The ideation process began during play time and play observation, and these ideas were documented in a sketchbook. Initial sketches (Figure 10 & Figure 11) were quick and loose with more emphasis on the movement of children rather than the form or function of equipment.

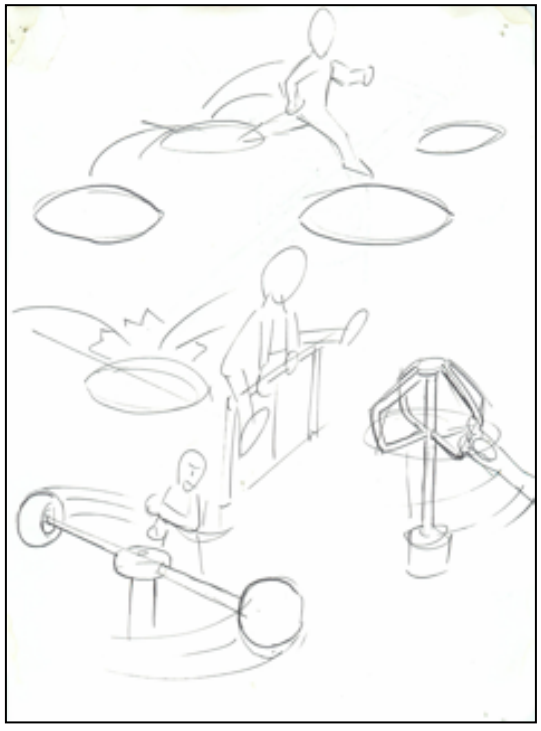

Figure 10 – Bodies in Motion Idea Sketch 1

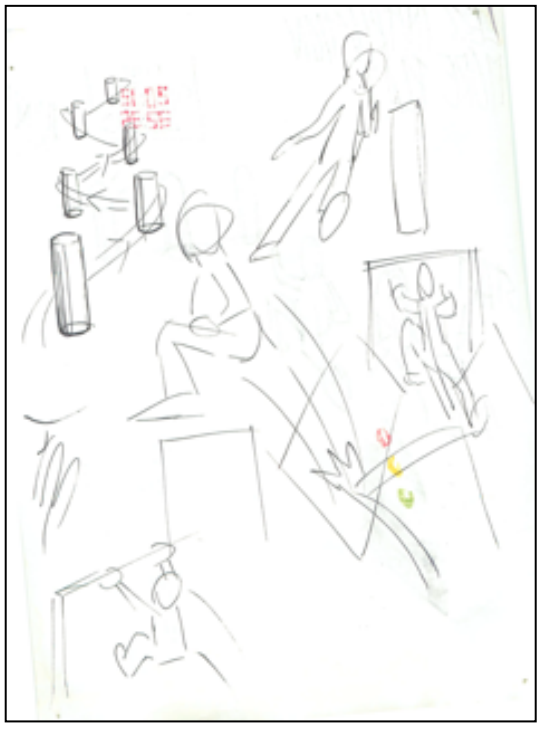

Figure 11 – Bodies in Motion Idea Sketch 2

Continued exploration and sketching led to a focus on targets as seen in Figure 12 and 13. Targets were identified as an element to promote game play due to the symbolism and various options of use. Targets can be struck with a hand, foot, or ball, to name a few. Targets can also act as markers, such as a home base or the finish line in a race.

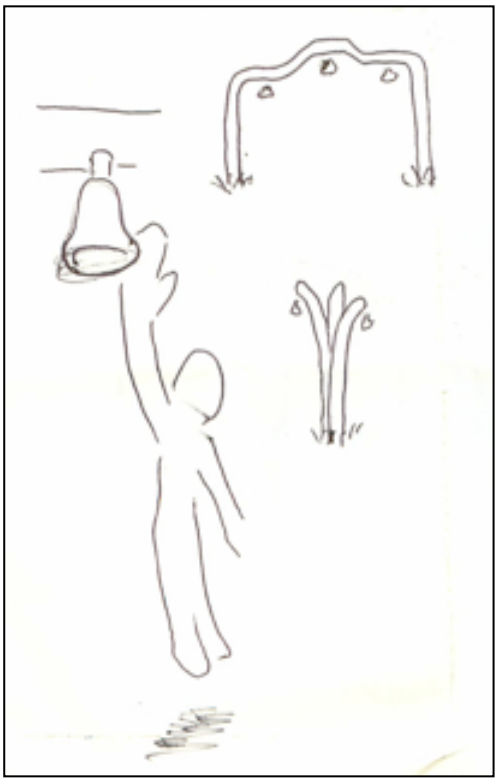

Figure 12 – Target Idea Sketch 1

Figure 13 – Target Idea Sketch 2

After establishing targets as important element within the design, the formation of targets was explored as demonstrated in Figure 12 and Figure 15. Color was added (Figure 13 & Figure 15) as means to increase possibilities of play and enhance communication during play. Figure 15 shows targets attached to poles. Each pole is a different color and each pole hosts four targets, one of each color. By combining pole color and target color, each target can be verbally identified. This concept became an important feature in the design.

Exploration of different formations led to poles with targets arranged around the outside of a circle (not drawn) as seen in Figure 16. This set up creates a primary playing field within the circle created by the poles

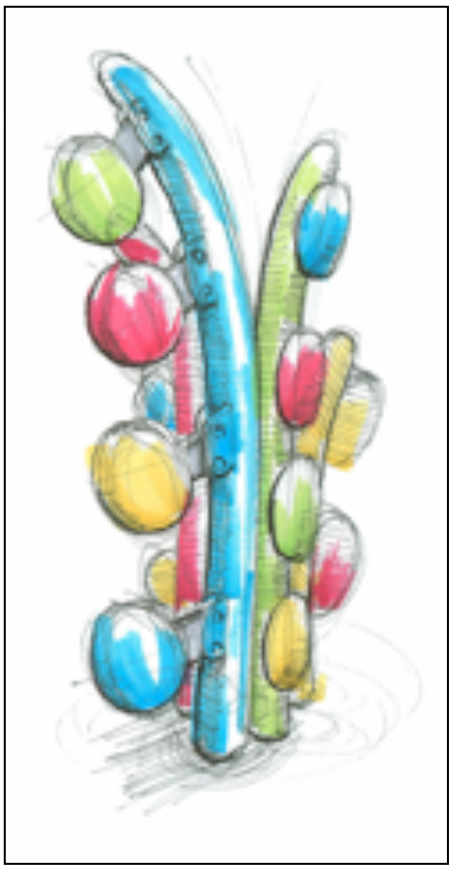

Figure 14 – Target Formation Idea Sketch 1

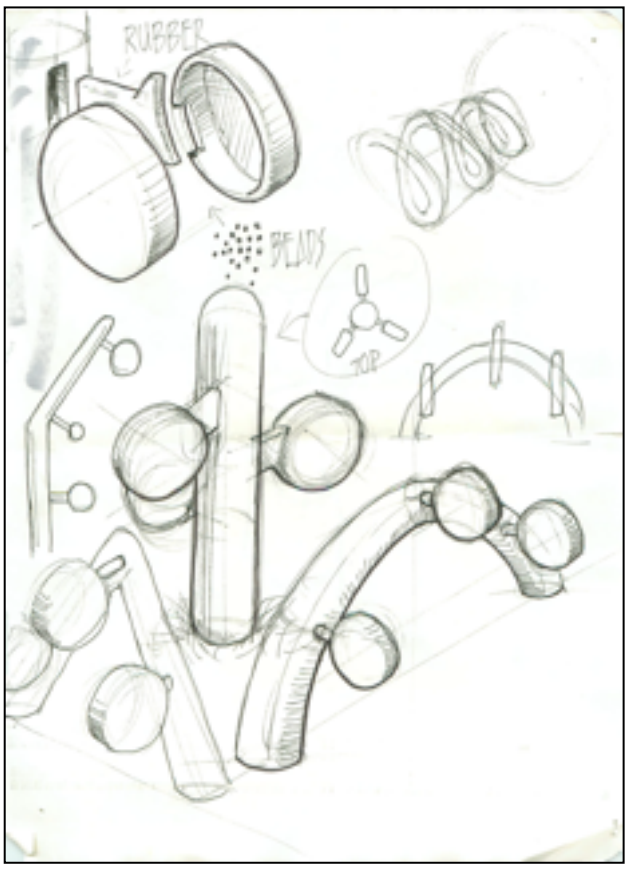

Figure 15 - Target Formation Idea Sketch 2

The Quick Colors concept (Figure 16) was presented to PlayCore representatives. Quick Colors features four curved steel poles, each hosting four plastic targets linked to the pole with a think rubber attachment. The flexible attachment was designed to give the user feedback when the target is struck. As referenced above, the coloration allows for each target to be identified verbally by combining target and pole color. The ideas for games involved verbal commands to get players moving quickly from one target to the next.

Evaluation against the design criteria and positive feedback from PlayCore representatives led to the selection of the Quick Colors concept for further development.

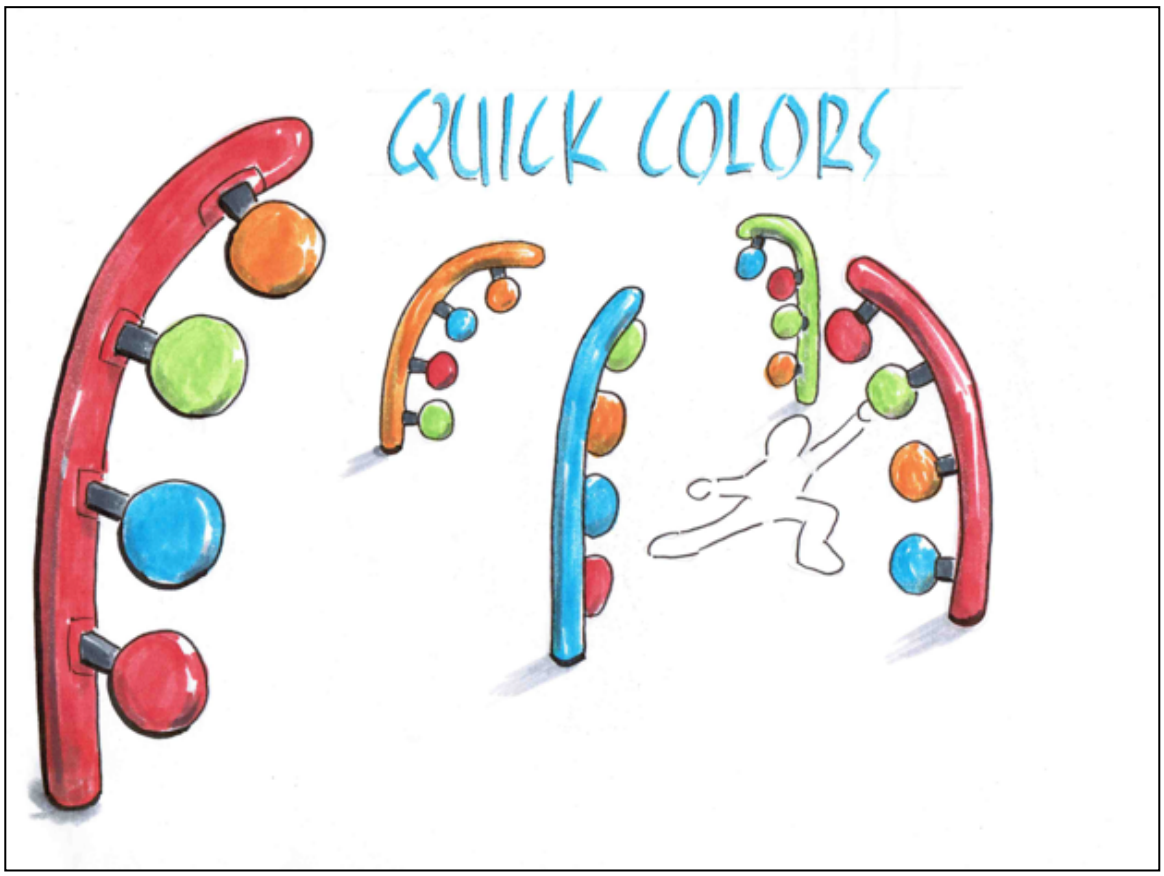

Figure 16 – Quick Colors Concept

3.5 Concept Development

The concept development phase began with the creation of a scale model (Figure 17). This model includes five poles instead of the four in the Quick Colors concept. The decision to add a fifth pole was inspired by the star pattern progression used when tightening lug nuts on a car wheel. This allows for a play to move from pole to pole indefinitely without ever going to an adjacent pole. This feature resulted in the concept taking on the name Star Play.

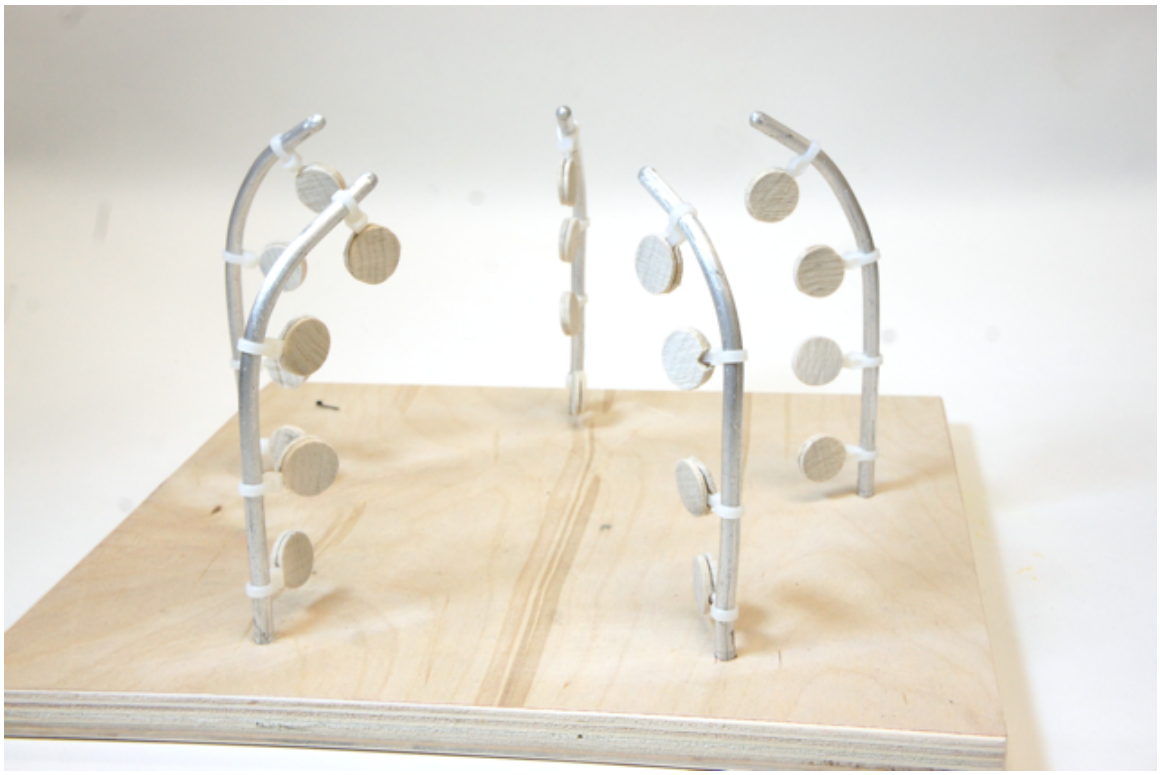

Figure 17 – 1:15 Scale Model

Due to safety constraints, it was determined that a unitary rubber surface would be implemented into the design of Star Play. This surfacing provides safety as well as design opportunity. Unitary surfaces allow for the use of multiple colors. The surface is poured in place and with the use of dividers, different colors can be poured in different areas. With this development, the surfacing became a key element of star play.

The initial surface designs focused on the star shape. Figure 18 demonstrates a simplistic approach to incorporating the play surface into the playground. Figure 19 and Figure 20 show a Birdseye view of surface designs that incorporate five different colors. These more complex designs offer more design elements that can be incorporated into games.

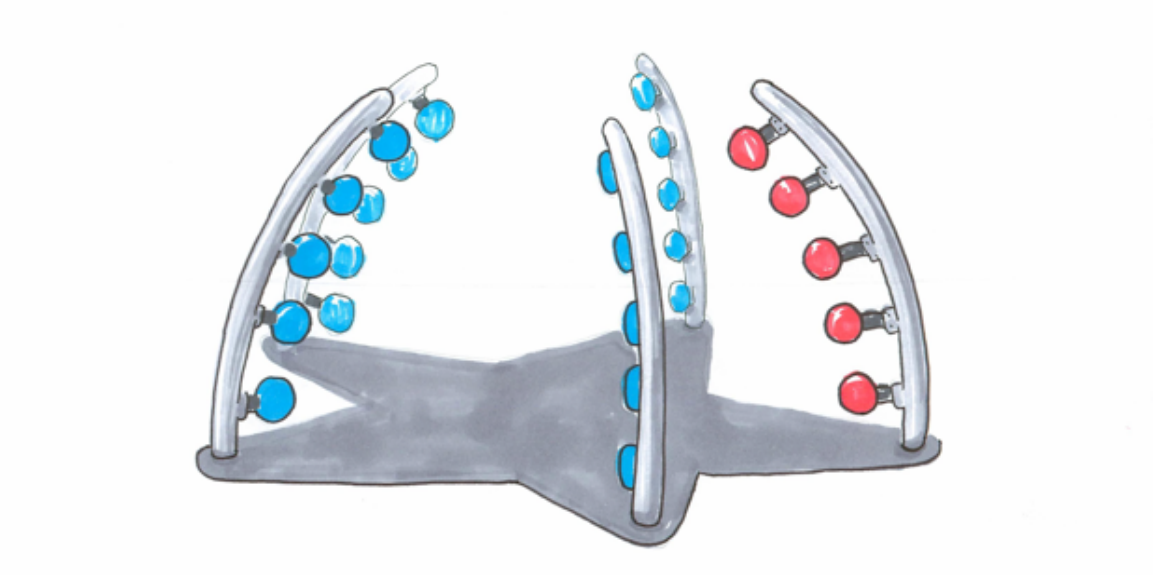

Figure 18 – Star Surface Design 1

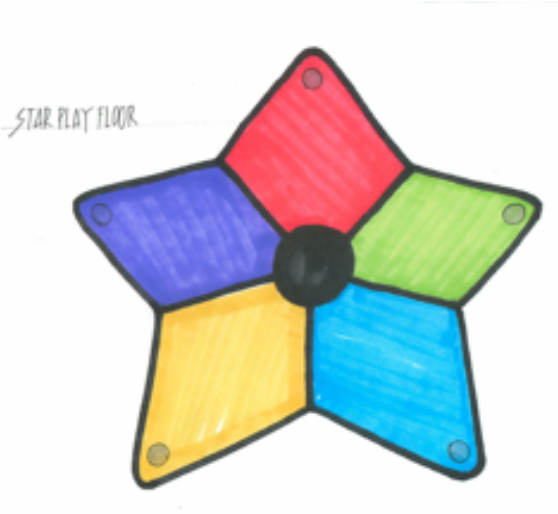

Figure 19 - Star Surface Design 2

Figure 20 - Star Surface Design 3

Figure 21 – 1:10 Scale Model, Star Shapes

The star shape was further explored in a scale model that included star-shaped targets (Figure 21). Figure 22 shows a more complex surface design and Figure 23 demonstrates exploration of multiple shapes. Both designs allow for more options during game play. In line with multiple shapes in the surface design, Figure 24 shows targets of different shapes. The incorporation of simple shapes adds another identifiable element to Star Play.

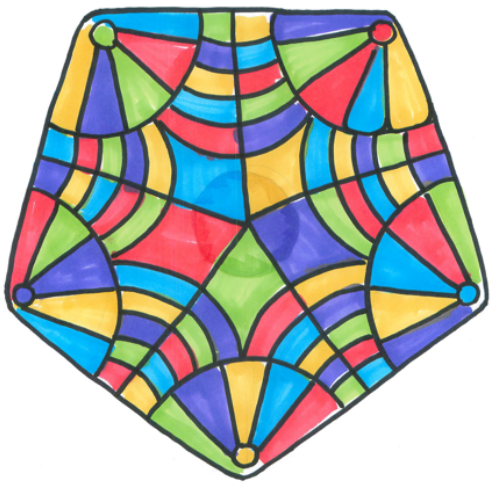

Figure 22 - Complex Surface Design

Figure 23 - Shapes Surface Design

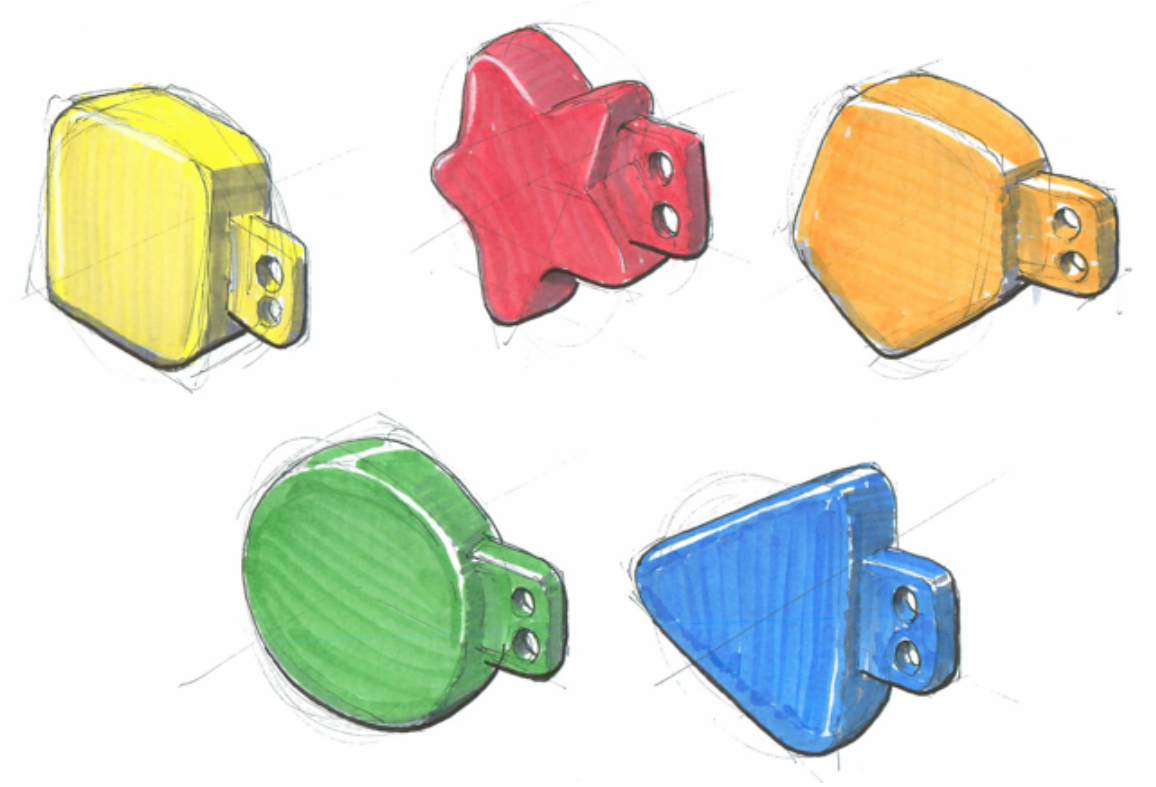

Figure 24 – Target Shapes Sketch

Exploration of shapes and colors culminated in the model pictured in Figure 25. This model includes shapes of different size and color in the surfacing and shapes of different color on the polls. While this concept may have more identifiable points, it was identified as a playground for preschoolers by almost all who saw it. The randomness of the surface design also proved to be too chaotic.

Figure 25 – 1:10 Scale Model, Various Shapes

After exploring various shapes, the decision was made to return to circles as the common shape for Star Play. Figure 26 shows a surface design incorporating circles. Figure 27 and Figure 28 show the exploration of a plastic clamshell design of the targets. Recessed bolts hold the two-piece target together and attach it to the thick rubber piece that is secured to the pole.

Figure 26 – Circles Surface Design

Figure 27 – Target Model

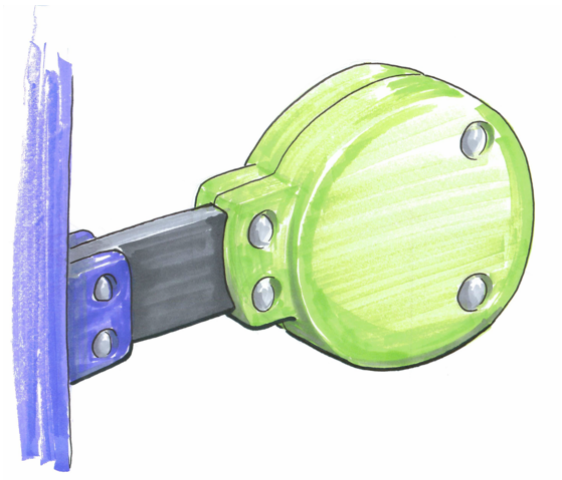

Figure 28 – Clamshell Target Sketch

Proposal of a hollow clamshell design for the targets led to exploration of providing audio feedback when a target is struck. Figure 29 shows a target filled with pellets to make a rattling sound when struck. Figure 30 shows an exploded view of a target with an encapsulated bell.

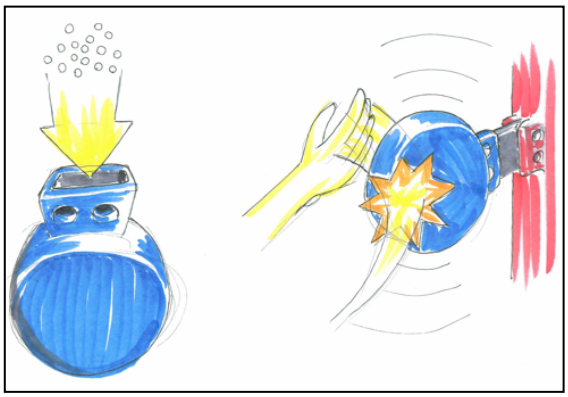

Figure 29 – Audio Feedback Target Sketch 1

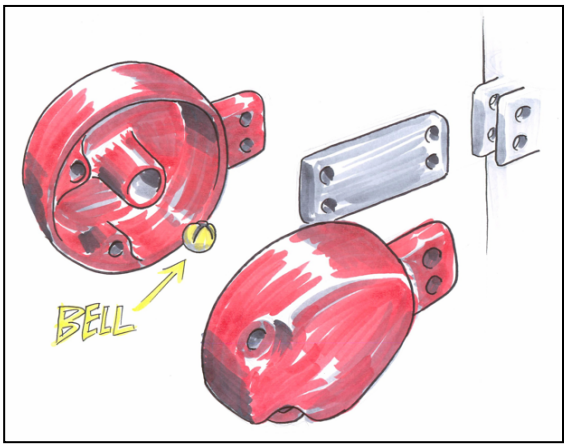

Figure 30 – Audio Feedback Target Sketch 2

After consulting with PlayCore representatives, the decision was made to change the targets in order to reduce production cost. The proposed clamshell target design would be manufactured using a rotational molding process. The expensive tooling cost of this process led to exploration of alternatives.

An early idea associated with Star Play was that the moving parts would be the children. This concept helped in making the decision to fix the target to the pole. Figure 31 and Figure 32 propose a method for mounting targets, consisting of a steel plate that would be welded to the steel pole and a colored piece of HDPE bolted onto other side. The HDPE used in this approach would be cut from a sheet. The production of this design would be drastically cheaper than that of the clamshell design.

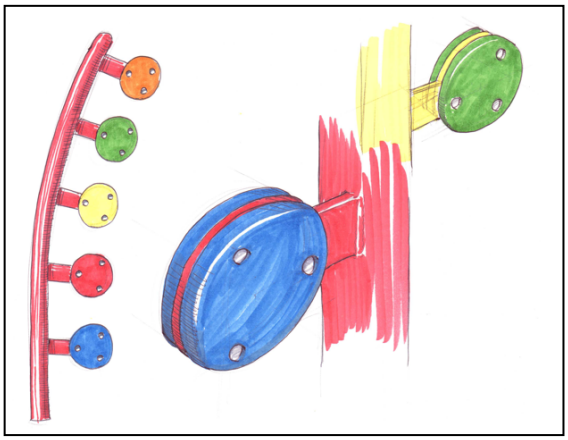

Figure 31 – HDPE Targets Sketch 1

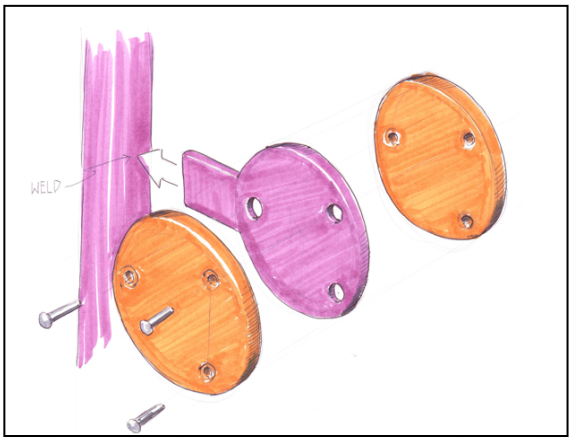

Figure 32 – HDPE Targets Sketch 2

The final scale model (Figure 33) features circular targets and a circular pattern on the surface. Multiple patterns exist within the surface design and the circles appear in three distinct sizes. The various sizes and colors allow for communication during games play and creation of rules. For example, a game may call for a player to locate and touch the green circle, and the player could then stand on any green circle regardless of size. Alternatively, the game may specify that a small green circle be located. Furthermore, the circles on the ground reflect the shape of the targets, thus connecting the elements that exist in different planes.

Figure 33 – Final 1:10 Scale Model

At this point in the design process, it was clear that Star Play offered good opportunity for the creation of games. In order to evaluate this, game ideas were developed (Figure 34). Athletic games, games of skill, games with props, and games of memory were explored.

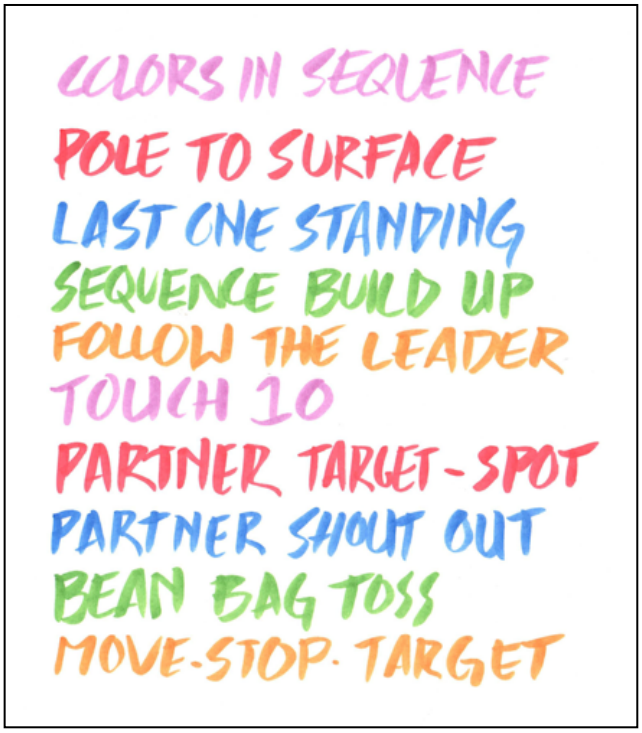

Figure 34 – Games List

One of the games on the list in Figure 34 includes a beanbag. The game calls for players to toss beanbags on the designated spots on the surface of Star Play. The inclusion of outside props led to the exploration of ball games within Star Play. After exploring this idea, the decision was made to change the orientation of the targets. The targets were turned so they face the center of the ring. This allows for a player inside the ring to throw a ball at a target and the ball will bounce back to the center of the playing field. Figure 35 shows the surface design to be implemented in the full-scale model. The design features small, medium and large spots in a star formation.

Figure 35 - Final Surface Design

3.5.1 Full Scale Model

A full-scale model of Star Play was created for presentation and evaluation. Bent PVC pipe and plywood were used to make the poles and targets (Figure 38). Thin plywood circles were cut to represent the surface spots (Figure 37). All parts were painted and arranged (Figure 38).

Figure 36 – Poles and Target

Figure 37 – Surface Spots

Figure 38 – Full-Scale Model

Presentation of the full-scale model received some positive feedback. Perhaps the most valuable evaluation was in the play test (Figure 39). With the help of classmates, predetermined games were played and new games were created. It was an enjoyable and insightful experience. The rapid creation of new games and ideas for other suggested that Star Play could indeed promote creative game play amongst children.

Seeing Star Play in full-scale also allowed for an aesthetic observation. Most observers found Star Play to be visually appealing. The response from those passing by indicated the enticing nature of Star Play. Attractive qualities of Star Play exhibited in the full-scale model suggested that Star Play would encourage children to play.

Figure 39 – Play Test on Full-Scale Model

Based upon the design criteria and the positive feedback from PlayCore representatives, the full-scale model was chosen as the final design.

3.6 Design Communication

The final design of Star Play was confirmed through evaluation of the full-scale model. The design communication phase focused on preparing the design for presentation to PlayCore representatives. The final design was represented in a 1:6 scale model constructed of MDF and 3-D printed parts (Figure 41 & Figure 40). A 3-D rendering of Star Play was generated using Rhino and rendered in Key Shot Pro (Figure 42). A Power Point Presentation was prepared. The model was displayed during the presentation, and the 3-D Rendering appeared in the slides.

Figure 40 - Final Design 1:6 Scale Model

Figure 41 - Final Design 1:6 Scale Model Construction

Figure 42 – Final Design 3-D Rendering

3.6.1 Game Book

The Star Play Game Book was created to inform players of the elements and nature of the Star Play Experience. The book is compact at 5”x5” and is simple. The goal of the Game Book is to introduce children and adults to the Star Play experience and offer sample games to get started. The book encourages players to create their own inventive games based on the elements of Star Play.

Figure 43 -Star Play Games Book cover

WELCOME

Star Play is a unique play structure designed to promote creative play. **What is it? What are you supposed to do?** These are the questions we want people to ask, and the answer is up to **YOU**. This book provides some game ideas to get things started but the true value of Star Play lies in the creation of new games or playing with no rules at all. Whether you're a kid or an adult of somewhere in between, you can get involved in Star Play. Here are some ideas for play:

- **Kids**
  Play! Have Fun!
  Make up a game, share it with you friends
  Use your imagination and turn Star Play in a fort or spaceship
- **Older Kids**
  Play! Have Fun!
  Use star play to test you agility, bring a stopwatch
  Test your soccer or basketball skills by hitting targets
- **Adults/Teachers**
  You too can Play! Have Fun!
  Create a game for kids, you might end up in the games
  Teach a lesson on student-designed games*

*Check out: Hastie, P. A. (2010). *Student-designed games: strategies for promoting creativity, cooperation, and skill development.* Champaign, IL: Human Kinetics.

Figure 44 - Star Play Game Book page 1

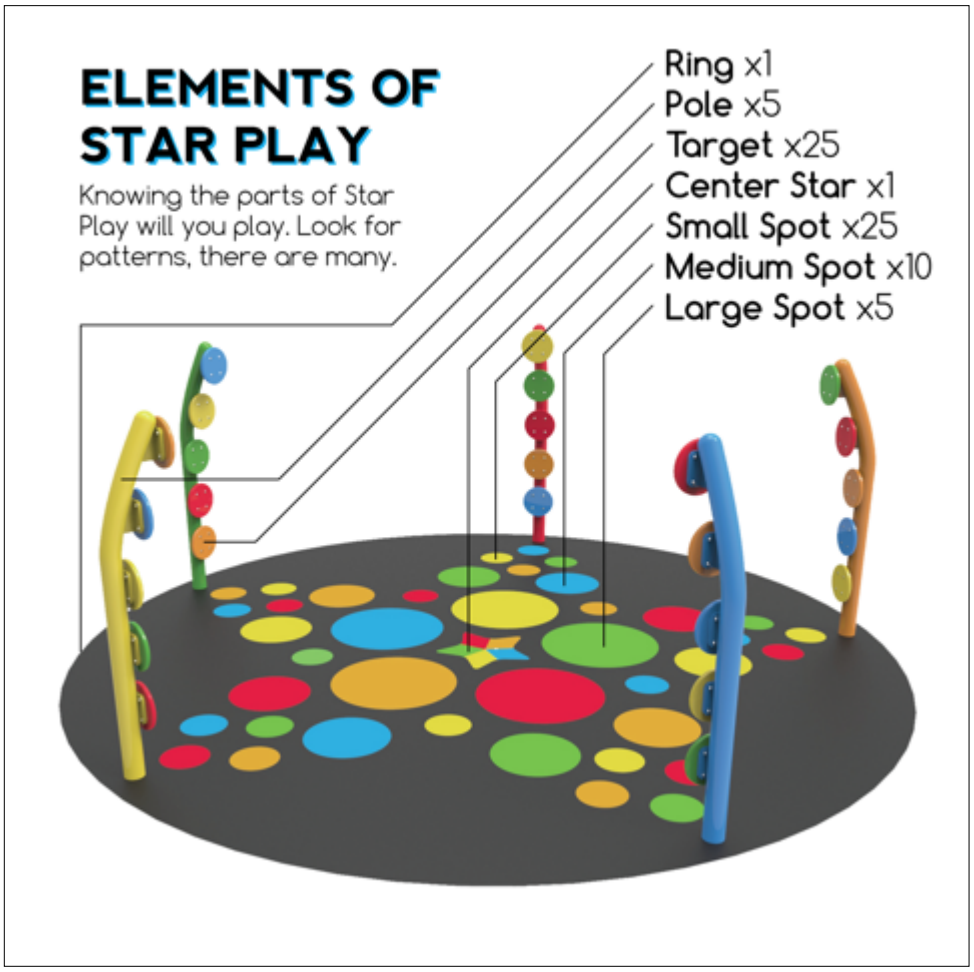

Figure 45 - Star Play Game Book page 2

Figure 46 - Star Play Game Book page 3

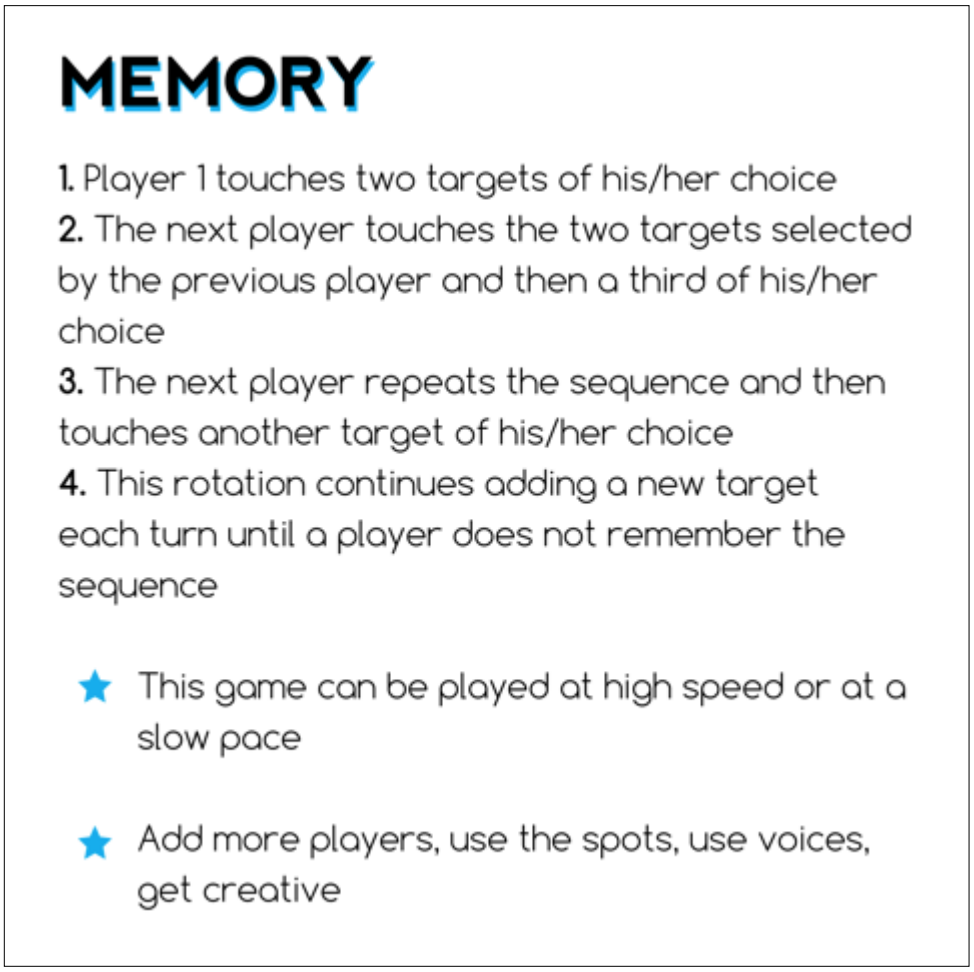

Figure 47 - Star Play Game Book page 4

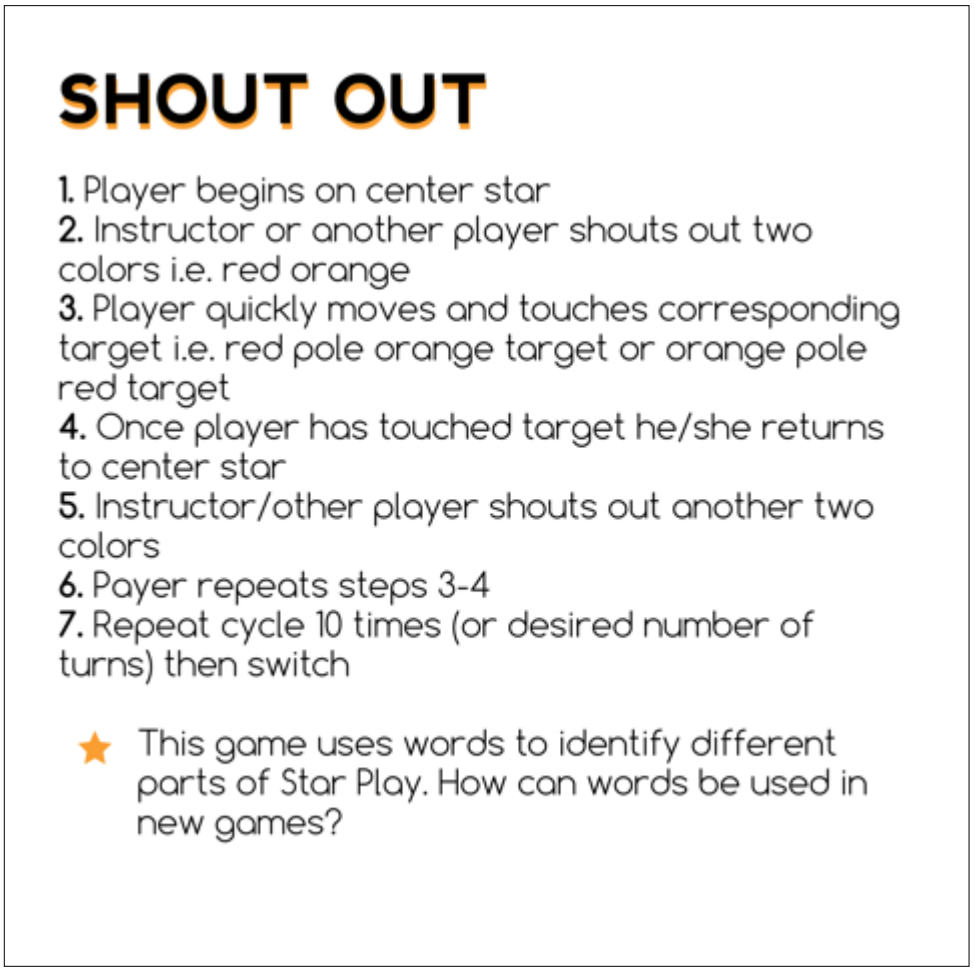

Figure 48 - Star Play Game Book page 5

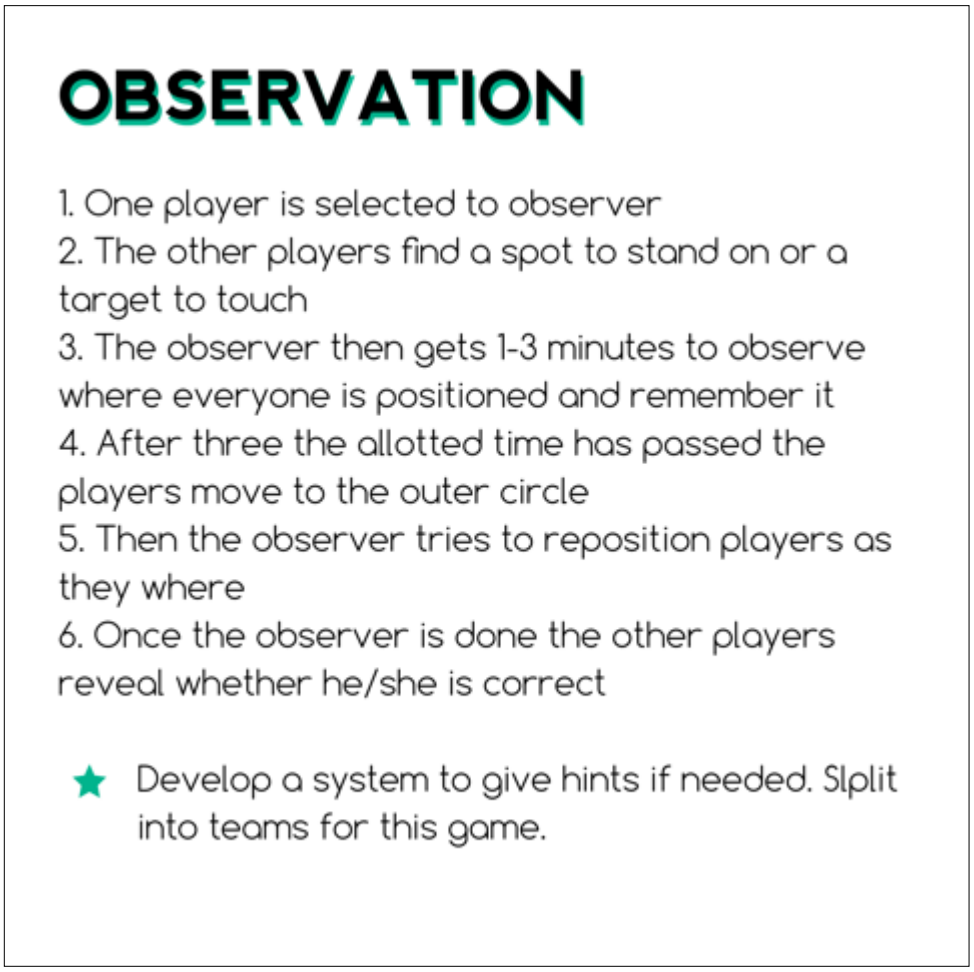

Figure 49 - Star Play Game Book page 6

3.6.2 Control Drawings

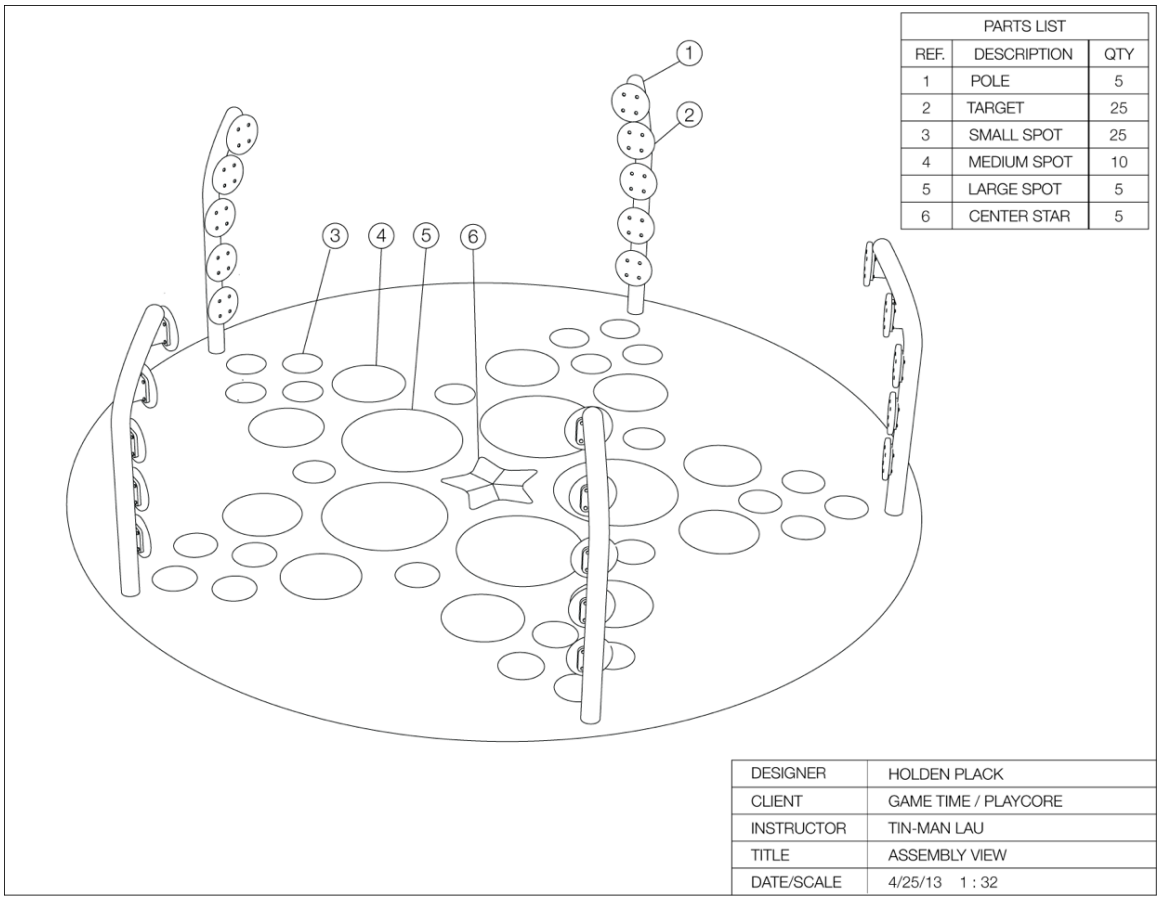

Figure 50 – Star Play Control Drawing, Assembly View

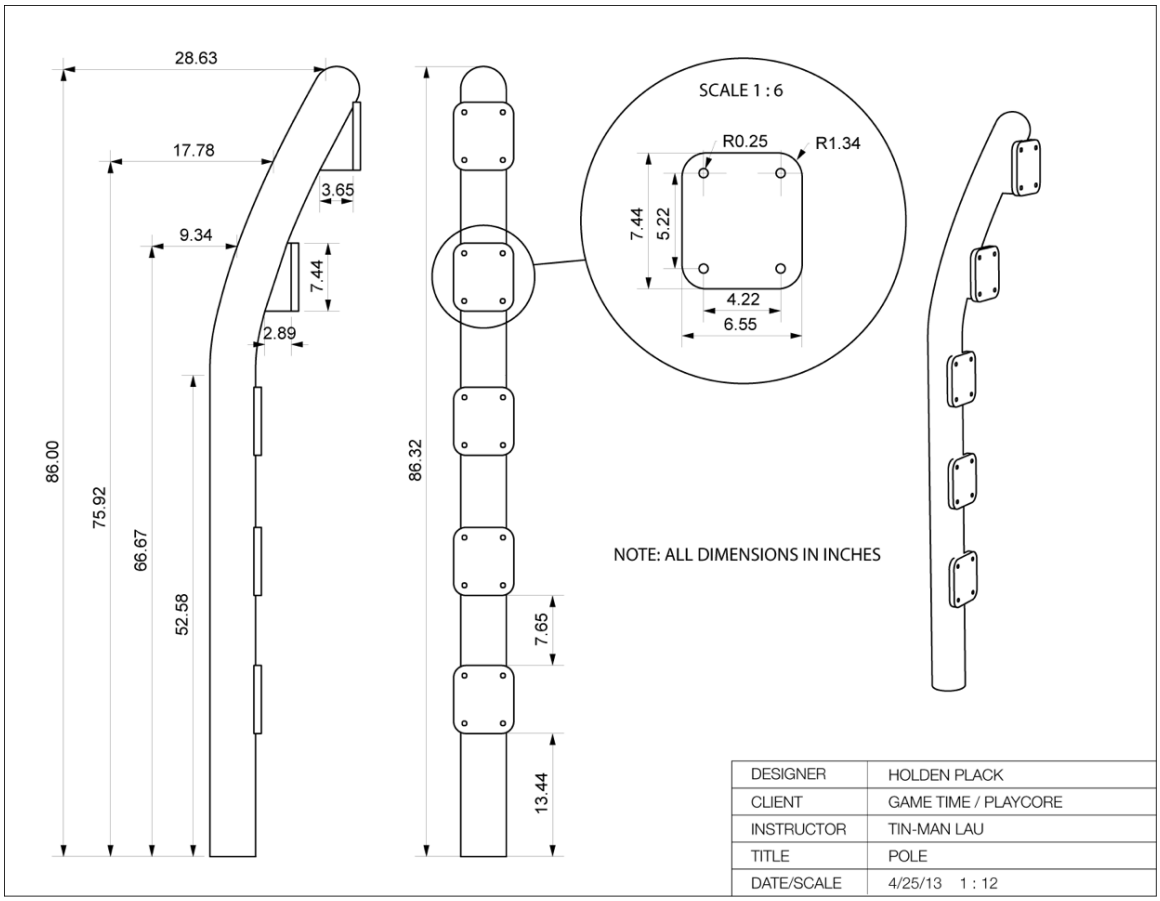

Figure 51– Star Play Control Drawing, Pole

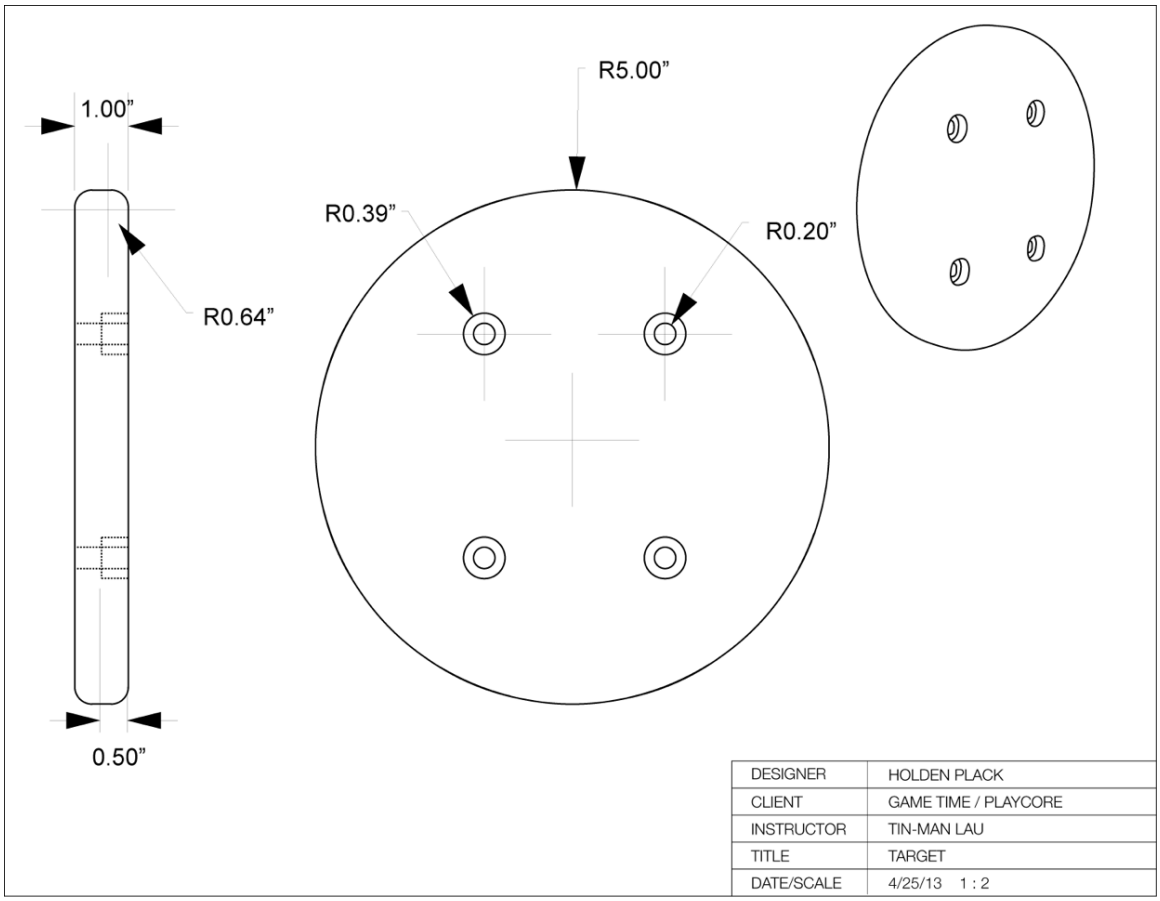

Figure 52 – Star Play Control Drawing, Target

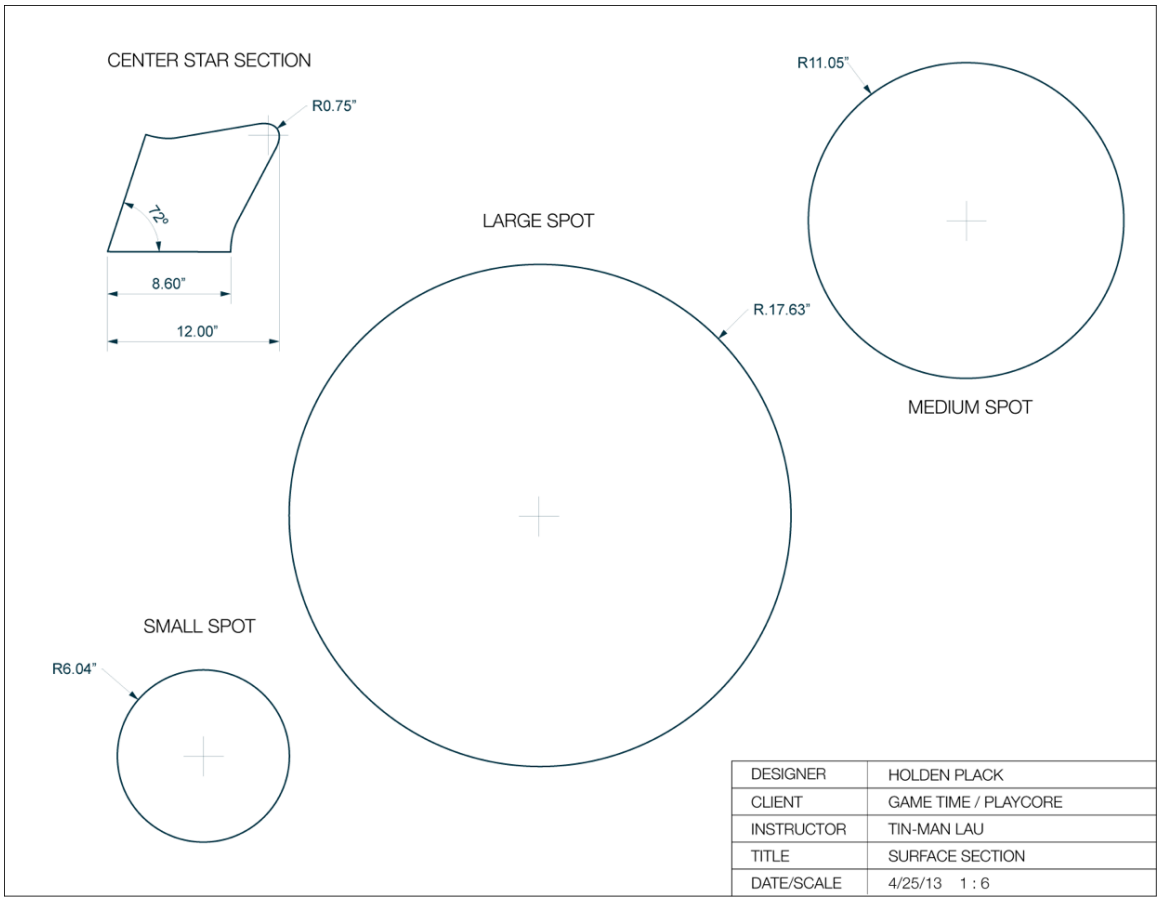

Figure 53 – Star Play Control Drawing, Surface

Chapter 4: **Conclusion**

4.1 Summary of Study

Chapter one presented problems with the current state of play and playgrounds in America. The need for study identified the negative effects of the decline of play in America as well as the developmental needs of children that are too often ignored in approaches to playground design. Literature supporting the importance and value of play and games was presented, and existing approaches to designing structures for games were examined. Procedures and methods were established as a means to meet the objective of creating a unique design approach to structures for the playground.

Chapter two outlines a new approach to designing structures for playgrounds. The approach offers design guidelines for the creation of structures that promote valuable play through the promotion of creative game play. Design criteria and considerations were established based on the findings of the literature reviewed in chapter one. A design process focused on meeting the design criteria was presented.

Chapter three described implementing the design approach of chapter two into a playground design project sponsored by a major playground manufacturer. The project followed the established design process while referencing the considerations and criteria to evaluate ideas, concepts and designs. Chapter three concluded with a final design that offers a solution to the problems discussed in chapter one.

4.2 Recommendations

It is recommended that more testing be included in the design process. The play and games that this approach aims to achieve involve a lot of movement. It is likely that the structure designed with this approach can be represented in full scale with few materials at low cost. The limited play tests performed on Star Play yielded valuable feedback and the creation of the model was relatively simple and could have been simplified even more. Constructing crude full-scale mock-ups of multiple concepts and allowing for extended periods of play should prove to very beneficial to the design process. Children modify game rules on the fly to suit their needs. Similarly, a creative designer could develop a method to modify full-size mock-ups on the fly. Exploring play structures and environments through play testing could play a key role in developing excellent solutions for the playground.

Research on inclusive design and incorporation into the design approach is recommended. Research into the developmental needs of children of different ability and research of an inclusive design approach could lead to an inclusive playground. An inclusive playground offers the valuable benefits of play to a broader range of children. Furthermore, if children of different abilities can play together even more benefits will be experienced.

Further research into the study of games is recommended. This study examines play and games together. Some specific benefits of games are addressed but there is a wealth or literature that focuses solely on games. Some of this literature may not apply to the games in focus here but some stands to offer greater insight into the unique benefits of games. The cultural significance of games, especially traditional games, is another area of research that could expand this study.

The study of cross-generation play is recommended to further explore the role of adults in play. This type of play is different from those researched for this study. The difference in play when old and young play together will result in different benefits experienced during play. Research into this subject could prove useful to this study as adults already play a significant role in this approach.

The creation of games and modification of rules provides children with a valuable play experience. This experience could be further developed through the documentation and sharing of games. Invented games can be shared within a school or across the world using the Internet. The creation of student game books may also be beneficial. Adults can also play a role in the sharing of games. Research into the sharing of games is recommended.

The review of literature, the development of an approach, and the implementation of that approach have led to these recommendations. The literature reviewed for this study represents only a small amount of that related to play. Further research stands to benefit the modification or creation of the design approach.

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