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Learning Objectives:

After reading this article, you should be able to:

- 1 Define seven senses, including the lesser-known senses of body position (proprioception) and the sense of balance and movement (the vestibular sense).
- 2 Explain the benefits of sensory play for child development.
- 3 Identify components of a play area that is accessible, inclusive, and welcoming for children of varied abilities, and which will offer opportunities for supporting sensory and motor development, as well as facilitating positive social communication and active participation.
- 4 Specify playground equipment that creates sensory development opportunities for all children.
- 5 Describe several case studies illustrating how the landscape architect/designer specified playground layout and equipment to serve the needs of all children.

## How to Design Playgrounds for Optimal Sensory Development

Specifying equipment to promote  
development for all children

Sponsored by Miracle Recreation | *By Kathy Price-Robinson in  
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The daily lives of U.S. children are changing dramatically, and not always for the better.

The average 8- to 10-year-old spends nearly eight hours a day with a variety of different media, according to a study by the Kaiser Family Foundation. Older children spend even more time with cell phones, computers, iPads, video games, and television.<sup>1</sup> However, a sedentary lifestyle brings many concerns and risk factors, including significant limits on the chance for children to develop into balanced, confident, well-adapted adults.

For children, time spent actively engaging all of the senses means better physical, cognitive, emotional, and social development. Outdoor play is perhaps the best and most natural way for children to use, develop, and optimize all of their senses, which in turn supports motor, language, social, and even academic skills in meaningful and productive ways.

Architects and landscape architects play a vital role in providing children with interesting and stimulating built outdoor environments. Therefore, an increased understanding of the ways in which sensory motor development can be supported through play is a vital topic of consideration.

In this course, we will explore the seven senses and the real-life impact that positive sensory experiences have on children. We will examine the sensory benefits that well-designed playgrounds offer to children of varied abilities,

and aim to educate architects and designers on how to create and specify play spaces that can amplify these benefits. Finally, this course examines several case studies of well-designed playgrounds and how each piece of equipment specified supports the development of all children, including those with special needs.



*All photos courtesy of Miracle Recreation*

**Architects and designers can play a major role in creating inclusive playgrounds that contribute to the positive sensory development of all children.**

### **How We Grow**

From birth, we learn how to navigate the world through all of our senses. Whether children are climbing up slides, enjoying the “whoosh” of flying high on swings, feeling sand fall from their friends’ hands to theirs, hearing friends call out for them to join them in play, or smelling the rain on the playground, all of these activities feed vital information to their brains and form lasting impressions. While play can seem simple and natural, it is surprisingly complex in terms of the ways in which it supports positive growth and development.

While play is beneficial for all children, using playground equipment can offer unique and impactful sensory experiences that are difficult for children to get through other forms of play. These intense sensory experiences can be especially important to the development of children with sensory disorders.

An inclusive multisensory play environment helps children learn to:

- Problem solve
- Form social skills
- Develop self-confidence
- Learn spatial awareness

Such playgrounds often become community centerpieces and sources of civic pride.

### **THE DESIGNER’S GUIDE TO SENSORY DEVELOPMENT**

While most people generally know about only five senses, there are, in fact, seven important senses that guide our actions through life. All seven senses work together, gathering input and feeding valuable information to the brain.

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Through play activity in a well-designed playground, children develop all of their senses. That includes the five senses familiar to us (sight, sound, smell, taste, and touch) and the two most of us are unfamiliar with (proprioception and the vestibular sense).

### **The Senses We Know**

The five commonly known senses are familiar to us: sight, sound, smell, taste, and touch.

All of the senses are important, though we sometimes underestimate or are unaware of how much we rely on them. For instance, while many parents understand the importance of singing rhymes or showing books to their babies, many are not aware of how critical the sense of touch is for guiding actions that lead to important life skills. Taking in information through the body's largest organ, the skin, the tactile sense provides detailed information about the shape, size, and texture of objects. This sense offers information about the body and the surrounding environment, and is critical in development of body awareness and control of actions. Through manipulation of objects and experiencing different surfaces and pressures, children learn to coordinate motion.

Play features, such as a sandbox, a water sprinkler, or an interactive play panel, capture a child's interest in touch. Incorporating various textures, shapes, and objects is a great way to harness a child's drive for tactile feedback. Varying the textures of equipment is another strategy. The inclusion of objects that children can manipulate and move with their hands also engages touch.

Using different brightly colored components and designs with various patterns and textures and sounds engages both sight and sound. Visual and auditory inputs are also important in early childhood, and those senses develop in an integrated way with the primary senses, such that access to a varied play environment helps to further support healthy sensory integration.

### **The Lesser-Known Senses**

We also rely on two additional senses: our sense of position, called proprioception (pronounced: PRO-pree-o-SEP-shun), and our sense of balance and movement, called the vestibular sense. These are two critical, primary senses that also develop before birth and, along with the sense of touch, give us our most basic understanding of how we move and experience the world around us.

Proprioception provides awareness of the position of our bodies. It helps us integrate touch with movement, allowing us to move effectively through an environment. Proprioception, as it develops, helps children to judge how much force to use, how far or near to place themselves in relation to objects or people, and how to use and move their bodies appropriately. Anything that stretches, pushes, or pulls on muscles and joints supports proprioception. Play equipment that involves activities such as jumping, pushing, pulling, and hanging nourishes proprioception. Swing sets, teeter-totters, and overhead ladders are examples of playground equipment that support this sense's development.

The vestibular sense provides spatial awareness though alerting and informing us about the direction, speed, and rhythm of the various types of motion we experience. This sense makes it possible for us to hold our heads and bodies up against the force of gravity, to keep our balance, to coordinate our eye muscles as our heads move, and to integrate the two sides of our bodies. The vestibular sense is the sense that drives our need to move throughout the day, whether we are young or old. Play equipment and activities that ask children to move in a rotary way, to balance, to spin, or to rock are ideal for supporting vestibular input. Movements that rely largely on the child for propulsion are also excellent. Any play that is bilateral, such as a climbing wall or jumping rope, also promotes this sense.



Development of the senses happens through play. This piece of equipment sits on the ground, making it accessible to children of all ability levels.

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As children develop, their skills and abilities are built upon the ways in which all seven senses are working together and facilitating their ever-increasing interactions in the world. Through this dynamic process, sensory information blends with motor skills, communication abilities, social emotional awareness, and emerging intellectual functions in a process called sensory integration.

The designer can create a playground experience that will be sure to facilitate positive development and participation for all children by ensuring that play equipment supports and challenges all aspects of sensory motor functions, as well as social, communication, and conceptual development.

Even a small playground can feature equipment that engages all of the senses in positive and protective ways. For example, play structures can support the vestibular sense through products that provide opportunities for swinging, spinning, and moving through space. The need for proprioceptive input can be met through equipment that facilitates climbing, jumping, or crawling. Textures on surfaces can facilitate tactile abilities, and colors and sounds can also be incorporated in ways that can be both soothing as well as invigorating without being irritating or distracting.

## **The Increasing Incidence of Sensory Integration Disorders in Children**

Problems in sensory integration were first described by Dr. Jean Ayres, an occupational therapist and psychologist who developed assessment and interventions for these issues beginning in the 1960s. The process of sensory integration operates on a continuum, with some people integrating and organizing sensation more easily than others. Many experts suggest that at least one child in 20 may be affected by sensory integration challenges.<sup>ii</sup>

Autism spectrum disorders (ASD) are conditions in which sensory differences are very prevalent. In fact, the newest diagnostic criteria for ASD now include sensory differences as a defining characteristic. Though symptoms and severity vary, all autism spectrum disorders affect a child's ability to communicate and interact with others. In the last two decades, autism diagnoses have increased significantly. According to some reports, more children are diagnosed with autism each year than with AIDS, diabetes, and cancer combined.<sup>iii</sup>

Many people equate accessible playgrounds with inclusive playgrounds. However, there is a distinction. An accessible playground ensures that there is opportunity of access as required by the Americans with Disabilities Act (ADA).

An inclusive playground goes further than simply providing access. Inclusive play means that children of all abilities play together side by side. The goal is to design a playground in such a way that all children have the opportunity to play together.



Playgrounds should be accessible to all children and inclusive of all children.

### **THE BENEFITS OF SENSORY PLAY AND INCLUSIVE PLAYGROUNDS**

Much of the modern world focuses primarily on visual input, such as from television, smart phones, computer screens, and whiteboards. This can be a problem because while the visual sense becomes highly developed, the other senses remain underdeveloped. Sensory play allows all senses to become developed, and inclusive playgrounds promote that development for all children.

#### **What Is Sensory Play?**

Sensory play, such as what occurs in playgrounds all over the world, engages multiple senses in a creative way, with a particular focus on touch, proprioception, and the vestibular sense. Further, such sensory play can relieve feelings of stress and boredom, connect people in a positive way,

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stimulate creative thinking and exploration, regulate emotions, and boost egos. While sensory play looks like simple fun, it can actually be essential to a child's development and thus to his or her success as an adult.

"The good news is that children are naturally driven to engage their core sensory systems," says Dr. Zoe Mailloux, OTD, OTR/L, FAOTA.

Sensory play contributes in important ways to brain development. Think of it as "food for the brain." A lot of learning can occur while children are doing what they do best: playing and exploring.

It is here that informed landscape architects and other designers have the power to create environments where the child is engaged and developed.

### What Is Inclusive Play?

Making inclusive play possible becomes a critical factor in playground design because children with sensory integration challenges, such as those diagnosed with autism, learn best with peer role models. Opportunities for pretend play, taking turns, and conversation drive their development forward, especially for facing challenges in social situations. Those who design and specify layouts and equipment for playground environments can provide opportunities for children of all abilities to play and develop together.

Consider the following benefits of sensory play:<sup>iv</sup>

**Cognitive development:** Even before children can speak, they begin developing an understanding of their environment by actively exploring with all of their senses. As they become more verbal, they are able to describe similarities and differences in what they see, hear, taste, touch, and smell. Trips to a well-designed playground stimulate multiple senses in children that send signals to their brains, helping to strengthen neural pathways upon which all types of learning rely. In short, interaction with a thoughtfully designed playground improves children's abilities to learn.

**Social skills:** Playing together allows children to observe how others play and to try out the ideas of others. Sensory play encourages children to share their own ideas and discoveries, and to build relationships. Vital relationship skills, such as sharing and taking turns, are introduced and practiced.



Playground equipment can actually encourage social interaction, which helps children develop social skills.

**Sense of self:** As they directly experience things for themselves, children explore and communicate preferences, creating an understanding of the world around them. Likes and dislikes are formed. Children learn to express feelings and emotions in a way that others can understand. By creating a safe place for children to express feelings, play encourages children to learn more about themselves, and to form a picture of who they are.

**Physical skills:** Children develop and strengthen motor skills through activities like running, jumping, climbing, swinging, sliding, scooping, pulling, pushing, and turning. Such actions support the development of small and large muscles. Additionally, these activities send necessary feedback to the brain about joint pressure, force, and exertion. Through play, children not only learn to use muscles, but also how to plan, coordinate, and create new movements.



**Through physical outdoor play, children learn to use muscles and to plan, coordinate, and create new movements.**

**Emotional development:** Sensory experiences can be very calming for some children and can help them work through troubling emotions, such as anxiety or frustration. Working with equipment that requires applying pressure or experiencing the sensation of swinging or rocking can help children release physical energy or tension.

**Communication skills:** Sensory play encourages children to use descriptive and expressive language, and allows them to determine and discover the meaning behind words and terms. Playing also allows children to develop communication skills by learning to hold conversations, express feelings, and hear feedback from others.

### **THE SENSES ON THE PLAYGROUND**

Thoughtfully designed sensory-enriching playgrounds can be transformative for all children, especially those with special needs. The playground can be an important factor in their ability to socialize and play among their peers. On an inclusive playground, all children find themselves integrated easily with other children, playing and relating naturally. However, if the



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playground proves to be a frightening or overwhelming experience, some children are likely to feel afraid, left out, and alone. A well-constructed, sensory-supportive playground allows children, especially those with sensory issues, to engage in the sensory experiences they need in socially acceptable ways. The selection of playground equipment, its location within the playground, and a thoughtful approach to the play area itself are vital elements in developing a sensory-friendly playground.

## **The Sense of Touch (Tactile Sense)**

Children develop their sense of touch by manipulating objects and experiencing different surfaces and pressures.

- Foster a child's interest in touch with play features, such as sand and water tables and rough-surfaced climbing rocks.
- Vary the textures of playground equipment, shapes, and objects to meet the need for tactile feedback.
- Provide interactive play panels or loose natural materials that children can manipulate and move with their hands.

## **The Body Position Sense (Proprioception)**

Proprioception allows children to use their bodies in appropriate, successful, and skillful ways. Are they seated correctly on the swing? Are they about to fall, or are they stable? Did they get too close or too far away from their friends? Activities which provide the sensation of stretching, pushing, or pulling on muscles and joints activate the sense of proprioception.

- Consider play equipment that involves activities such as jumping, pushing, pulling, and hanging to nourish the development of proprioception.
- Include swings, teeter-totters, and overhead ladders to support proprioceptive development.

## **The Sense of Balance and Movement (The Vestibular Sense)**

The vestibular sense offers information about balance, equilibrium, and spatial relationships. It helps children learn whether they are upside down or upright; whether they might be swinging or climbing too high.

- Include play equipment and activities that ask children to move in a rotary way, to balance, to spin, or to rock. All of these are ideal for supporting vestibular development.
- Prioritize play equipment that emphasizes child-activated movement for propulsion versus passive movement generated by an adult, as self-directed action helps to develop this sense, as well as a sense of competency and success.
- Include play equipment that involves coordination of both sides of the body (bilateral movement), such as a climbing wall or a horizontal crawl tube. Using both sides of the body in a coordinated way is integral to vestibular development.



Playground equipment helps children develop their sense of balance.

### Sight and Sound

Visual and auditory also play a key role in early childhood development, so having a varied environment in which to play helps to foster sensory integration in all areas.

- Incorporate the use of brightly colored playground equipment or safety surfacing with various patterns to engage children visually and to make the playground an attractive centerpiece for any park or community.
- Add elements that allow children to experiment with and generate a wide variety of sounds and rhythms. Children will be delighted by the opportunity to make music on the playground, with elements such as chimes and drums.



For best results, position play panels in locations on the playground that are accessible to all children.

### PLAYGROUND DESIGN 101 FOR THE ARCHITECT OR LANDSCAPE ARCHITECT

Few design endeavors can bring more impactful, positive results than a playground project. The skills children develop on a playground can improve their entire lives. We'll discuss the specific types of equipment that bring about the benefits we have discussed, but first, here are the basics for designing superior playgrounds.

**Site integration:** Where possible, allowing the playground to interact with its natural surroundings offers all children the opportunity to engage their senses, as they wish, with irregular shapes, the sound of wind and birds in the trees, the smell of spring flowers, and the sight of fall foliage.

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Preserving vegetation in its place also creates wind, sound, and weather breaks, and can define the play area boundaries.

While the playground should be clearly distinguished from its surrounding environment, those boundary elements should not create barriers. Various types of routes, like steps and ramps, allow easy access without limitations.

**Layout:** If space allows, dividing a play area into one with equipment targeted for 2- to 5-year-olds and another aimed at 5- to 12-year-olds, with a few common areas in between, guarantees a more challenging and exciting experience for older children with an inviting, approachable play area for the youngest playground visitors.

Accessible areas that are isolated from the main space do not communicate inclusivity or interaction. Specific therapeutic activities should be located in the middle of a play area, or interspersed throughout, to truly engage all the children. These pieces should be located within a certain radius of where the action is to encourage engagement. Parallel play spaces are key.

**Variety:** Children enjoy variety in their playground equipment and space. The best design will allow for adaptive and inclusive play that shifts with children's interests and abilities.

Imagine the types of activities that may go on there: physical games, creative games, social games, games that engage the senses, and areas for those children who may wish to play in peace and quiet. Inclusive sensory design will incorporate variety.

Ideally, there will be a mix of equipment, a mix of social and more private spaces, and a mix of equipment for children of various ages and abilities.

**Quiet spaces:** It is very important to have quiet or resting areas in which children can regroup, but where they don't have to leave the playground completely.

Simple strategies can carve out quiet spaces in the midst of gathering spaces. Allowing a break space or a space for a child to retreat to is especially valuable for children with sensory processing disorders (SPD). These children particularly can be touch and sound sensitive, and may find a squeaky swing or clanging stair to be overwhelming. Spaces that allow for solitude or escape within the playground mean that a child can take his or her break, and yet remain within the social space.

Anything that provides a shield from stimuli for the child away from the crowd, sound, sun, or noise can act as a quiet space. This could be a tunnel, a shaded bench under a play tower, or perhaps a cozy nook beside a slide. Creating quiet spaces allows children to actively change their involvement at their own discretion.

**Caregivers:** The needs of caregivers must be considered as well. Benches, ramps, and large equipment invite adults not only to observe, but also to participate easily. Allowing caregivers a place to be close at hand, yet to allow children to explore and interact as independently as possible, is increasingly important in our highly protective world, where children have fewer and fewer opportunities to problem solve and create on their own.

## **SPECIFYING EQUIPMENT TO FOSTER SENSORY DEVELOPMENT**

When children run, walk, or roll excitedly onto a playground, they do not think: "Here is an opportunity to develop all of my senses." All they see is an opportunity for play and fun. But a savvy designer will specify playground

equipment that will not only provide playful fun required, but assist children in sensory development that will have lifelong benefits. Here are some types of playground equipment and their benefits.

### **Swinging Equipment**

Swinging provides both vestibular and proprioceptive inputs. Balance, eye movement, and body position are a big part of the activity. On the playground, children learn to recognize how their movements affect the speed at which they swing, the timing of the activity, as well as where the body goes as a result of these movements.

**Equipment examples:** Swing set, tire swing, multi-user swing, and parent/child swing.



**Swinging is more than just fun. It engages the child's vestibular, proprioceptive, and visual senses, and develops the child's ability to balance and awareness of body positioning.**

### **Spinning Equipment**

Spinning involves balancing and body positioning while engaging the child's vestibular, proprioceptive, and visual senses.

**Equipment examples:** Merry-go-round, pole with standing base, and seated spinner.

### **Sliding Equipment**

Sliding provides children with sensations of movement and speed without requiring any a great deal of additional effort. Sliding down the slide offers vestibular input because of movement, while the hard or textured surface of the slide can provide both tactile and proprioceptive input. Different types of slides provide a variety of sensations, including those brought on by twists, waves, and different textures. Incorporating slides with multiple bed-ways and climbers helps children develop physical skills and muscle tone, along with cognitive skills, such as problem solving and memory, by visualizing where and how to position their bodies.

**Equipment examples:** Roller slide, spiral slide, and tube slides.

### **Climbing Equipment**

Climbing and its related activities help to develop the vestibular and proprioceptive inputs, improving muscle tone and balance.

Fine motor skills and gross motor skills are developed simultaneously when traversing climbing walls.

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Incorporating climbing equipment helps children enhance their spatial awareness, coordination, and body management skills by offering a variety of different types climbing challenges.

**Equipment examples:** Rope tower, rock wall, and ladder climber.



Specifying climbing equipment not only provides a fun challenge on the playground, but it also gives children a chance to enhance their spatial awareness, coordination, and body management skills.

### **Rocking Equipment**

Rocking stimulates the vestibular and proprioceptive systems, while also helping to develop muscle tone. The rocking motion helps establish a sense of timing that is stimulating for a child's sensory system.

**Equipment examples:** Teeter-totter and spring riders.

### **Crawling Equipment**

Crawling helps to develop balance, strengthen muscle tone, and develop eye-hand coordination. The crawling movement is repetitive, and this stimulates brain activity to develop cognitive processes, such as concentration, memory, comprehension, and attention.<sup>7</sup>

**Equipment examples:** Climbing tunnel and crawl tube.

### **Balancing Equipment**

Balance uses both vestibular and proprioceptive inputs along with visual and motor skills. Balance and coordination help children gain awareness of their own bodies by supporting the development of gross motor skills. This type of equipment also supports children's awareness of their center of gravity and equilibrium, essential for physical skills. On the playground, children use their sense of balance to maneuver, while developing muscle tone and using problem-solving skills.

**Equipment examples:** Stepping pods and balance beam.

### **Bouncing Equipment**

Bouncing offers vestibular and proprioceptive inputs along with the use of gross motor skills. The stimulating and repetitive motion provides an exhilarating experience for children.

**Equipment examples:** Stationary pogo stick with spring and standing platform, and stand-up teeter-totter with handle bars.

### **Auditory Equipment**

The ability of children to make sounds from playground equipment aids in the development of their auditory sense.

**Equipment examples:** Activity panels and outdoor musical instruments.

### **CONCLUSION**

To a child, a playground looks like fun. But it can be so much more than that. Thanks to the integration of wisdom from child development experts, equipment manufacturers, and landscape architects, playgrounds can provide vital experiences that foster sensory development. These developed senses make it easier for children to move around in the world, to communicate, to get along with others, and to have a sense of self and self-confidence. Opportunities for sensory development are even more important for children with physical limitations and those who have sensory processing disorders. With knowledge gained from this article, the architect, landscape architect, or designer can ensure that a playground is not only fun, but also a safe, energizing place for children to develop, with lifelong physical, cognitive, emotional, and social benefits.

## CASE STUDY: ROLL AROUND THE PARK WHITE HOUSE, TENNESSEE

The colorful new playground in White House, Tennessee, was created to honor two exuberant brothers: Conner Long, 10, and Cayden Long, 9. The younger brother, Cayden, was diagnosed with hypertonic cerebral palsy and is unable to walk or talk. But that hasn't kept the two brothers from participating in triathlons and other sports. In 2012, *Sports Illustrated* named them "Sports Kids of the Year."

However, until 2014 when the new playground was built, the brothers' parents had to drive them an hour away to a playground that both boys could enjoy and that accommodated Cayden in his wheelchair.

The new inclusive playground, which Connor named Roll Around the Park, is accessible for children with physical limitations, and also inclusive for children with sensory processing disorders, such as those with autism.

"It means so much to have an area where Connor and Cayden can play together," said, Jenny Long, the boys' mother, as quoted in *Playground Professionals* magazine. "The playground represents the spirit that motivated the boys to participate in triathlons together: that all children are created equal."

Here is a look at the playground, and equipment specified to help all children develop their many senses and social skills:



**BASKET-TYPE SWING**

- transfer (assisted) onto it from a wheelchair or walker
- multiple users
- encourage social and cooperative play

**TUBE SLIDE**

- sensory experience of moving through an enclosed space
- completely fenced with railing
  - test limits in a safe environment

**"PULL ALONG" PIECE OF EQUIPMENT**

- low to the ground
  - accessible to children of all ability levels
- slide back-and-forth
  - deep-muscle pressure and stimulation
- overhead climber
  - challenges upper body strength

### BALL POPPER

- motor planning stimulation
- visual and auditory stimulation

### SPINNING DEVICE

- sensory stimulation
- up to 10 children
- allows for developmental differences
- stimulates balance, motor coordination, and eye and body adjustment



### MUSIC PANEL

- cognitive stimulation
  - teach cause-and-effect
- one child or multiple children
  - group/social play experiences

## CASE STUDY: ARISE AT THE FARM

Arise at the Farm is located at an adaptive horseback-riding farm. The main goal for the designer was to ensure that the playground would serve children with sensory and physical limitations. This meant creating a playground where all children would have the opportunity to play together. And because the ability to compress joints is often prescribed by occupational therapists for children with sensory processing disorders, the playground had to have equipment to meet that need.

Arise at The Farm is a completely ramped play area in a large outdoor setting. Ramps allow access to every deck of the playground, which uses multi-level play towers throughout. The series of ramps and decks creates motor planning through sequencing of events.

Crawling and climbing equipment address children's need for vestibular and proprioceptive input. At Arise, there are simple crawl tunnels as well as more complex opportunities for proprioceptive input, such as a boulder tunnel. Multiple climbing structures are included within the towers' design.

Play panels within the towers engage children by physically inviting them into a massive game of tic-tac-toe, through braille, and, for the hearing-impaired, via sign language.

Centrally located picnic benches and seating create a boundary between the play area for younger children and the one designed for older children, as well as a central place for children to sit quietly without feeling disengaged from play. Having a centralized seating area also allows caregivers to observe children on both sides of the playground and fosters social interaction between both age groups.





With hand peddlers and therapeutic rings, user input stimulates muscles and directs body motion.



Fully rubberized surfaces allow all children to move about and play independently, regardless of how they get around. Ramps with multiple points of entry make the playground accessible to all.



An ADA-accessible articulated see-saw is a great example of a cause-and-effect social play component. Multiple hinged sections of this product move in unison which prohibits the impact with the ground that happens with traditional see-saws. The proprioceptive senses are stimulated as the user's body position and muscle movements are adjusted during play. The up-and-down movement stimulates the vestibular sense. Plus, children love it.



Glider platform at Arise on the Farm is wheelchair accessible with a gentle swaying motion to create a fun group activity. Components are moved through user input. The motion stimulates the vestibular sense and the body positioning. User input creates the sway and helps create stimulus to develop the proprioceptive sense.

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## END NOTES

<sup>i</sup> <http://pediatrics.aappublications.org/content/132/5/958.full>

<sup>ii</sup> Ben-Sasson, Carter, Briggs-Gowan, *Journal of Abnormal Psychology*, 2009

<sup>iii</sup> <https://www.autismspeaks.org/blog/2012/01/31/congressional-briefing-military-children-autism>

<sup>iv</sup> Christine Snyder, "Providing Sensory Experiences That Meet the Needs of All Infants and Toddlers," vol. 25, no. 5, HighScope® Extensions

<sup>v</sup> <http://occupationaltherapyforchildren.over-blog.com/article-crawling-85544642.html>