Hazelwood House

Sensory Experiences in Garden Environments for Adolescents with Dual Sensory Impairment
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Abstract 1

Introduction 3

Investigation

- What are user’s needs? 5
- Possible responses to user’s needs 7

Development

- 5 necessities of a residence for dual sensory impaired 9
- The importance of access to nature 15
- What type of elements should be included in gardens for dual-sensory impaired 31
- What is the role of our senses in garden environments 35
- Sensory design in gardens 37

Conclusion 41

Works / Images referenced 43
abstract_

Sight has become the primary sense with which we experience our world, to the detriment of stimulation in the other four senses (Pallasmaa, 2005). Limited sensory stimuli in our daily lives deprives us of the complete experiential awareness available to us. By engaging all five senses, all persons, but particularly individuals with vision and hearing impairments can increase their knowledge of self and place. Adolescents with impaired sight and hearing senses are apt to place stronger emphasis on those senses with which they do receive information. Holbrook (89) refers to “Inter-sensory Coordination” as the sharing of information from one sense to another which ultimately helps understanding and mapping of place. Garden environments can be especially stimulating through the tactility of pavements or soils, taste of herbs, fruits, and vegetables, and the fragrance of flowers- a full palette of information for comprehension. Even the smell of air after rain is stimulating.

Encouraging adolescents with dual sensory impairment to care for plants and take place in the natural cycle of life can improve mental stimulation and psycho-social well-being as well as physical and nutritional health. Engagement in and exposure to the outdoors exponentially increases understanding, common sense, physical aptitude, and acceptance for life processes and adversity (Louv, 3). Specifically designed settings that support dual sensory impaired young adults are still extremely limited. This investigation focuses on exploring conservatory and exterior garden spaces that encourage interaction with nature.
Sight removed, how would you carry out your day? How could you communicate with others around you without comprehending their meaning through sound? Our senses have determined the way in which we live: the every understanding of our surroundings and society. We learn with our senses and build memories on their combinations. If we had limited use of a sense from birth, would we understand it as a limitation? How would our surroundings, indoors and out, support us as we seek to lead a full life?

Combined with possible other impairments, both physical and developmental, severe sensory impairment is part of life for students attending the new Hazelwood School in Glasgow, Scotland. Completed in fall of 2007, and designed by Gordon Murray + Alan Dunlop Architects of Glasgow, the new building combines two older school’s students together in a space filled with natural light, tactile surfaces, and varying volumes. The facility supports students from toddlers to young adults with special needs in engaging learning environments that any person would enjoy. Bright colors and unique materials with tactile and fragrant qualities are used strategically to orient students with multiple sensory cues.

In a separate life-skills house the older students learn to make meals and perform tasks such as washing dishes and other chores of daily life. Although completed, the life-skills house is only used during school hours and does not fulfill aspirations to offer a full day’s activities to the students. In the spirit of greater independence for users who can never fully be independent, a special project has been given to graduate architecture students at Kansas State University: to investigate a new building type, a residence for dual-sensory impaired adolescents, inspired by the needs of graduates from Hazelwood School.

Alan Dunlop, of GM+AD, the Victor L. Regnier Visiting Faculty Chair 2009-2010 at Kansas State University pre-selected two sites for the project in the neighborhood around the Hazelwood School. Dunlop and Professor Susanne Siepl-Coates, of Kansas State, have both shared their experience in ‘Knowledge Based Design’ to guide students in the Glasgow Studio. It is hoped that the research for this new building type can have a great reach into the design professions and help to guide architects with their designs for this unique and underserved population.
At first glance, the needs of dual-sensory impaired adolescents aren’t that different from those of more normative young adults. All the basics of food, water, shelter, and loving relationships are essential for complete lives. However, care must be taken to understand the similarities in needs as much as the differences. A dual-sensory impaired individual has a combination of major sensory impairments, mostly to vision and hearing. Students at Hazelwood also are likely to have other physical and developmental disabilities. Their potential to become more independent will be ultimately realized through practice in real life environments that exist in their neighborhood and city. Within the special environment of Hazelwood House, variations in disability and severity between each user lend designed space to be designed with ultimate clarity. Good design of spaces for sensory-impaired should not seek to look different; above all, it is still a place where humans are most important, not their labels.
what are some possible responses to the user’s needs?

Alterations to common design practices must include additional sensory cues through senses that are least likely to have been impaired: touch, taste, and smell. Many of the students at Hazelwood School have partial sight or partial hearing and use devices like hearing aids and large type to learn about the world around them. Strong shadows can appear as holes in the floor causing fear and frustration. Those with near to full blindness use canes to guide them through the hallways and around the grounds as well as tactile signage with touch languages like Braille or Moon. A tactile cork and wood wall running through the main circulation hallway has lines that the students follow with their fingertips, mapping the door openings and their location in their mind. Other tactile cues can be given through flooring materials and gentle level changes through shallowly inclined pathways. The sound from footsteps and speech varies according to the space where the sound originates and the volume controlled by ceiling height can give clues to the location of user within the building.

Persons with autism or other issues in learning are likely to be significantly distracted by bright lights. The best light for mental concentration comes through northern clerestory windows, evenly distributing soft white light into used spaces. Artificial lights also need to be indirect, preventing a staring fascination with a bright bulb in a lamp or a circle of light on the desk. Reflection of both natural and artificial light is essential, but the warmth of sunlight on skin cannot be overlooked as an important and comforting architectural gesture.

Organization of materials and labeling is very important for dual-sensory impaired individuals. The knowledge of where to find a favorite sweater or the exact location of the toothpaste is extremely important. A mental note is made of every item in space, laid out as a map within our minds. Whether it is a sofa, a set of chef knives, or favorite pajamas, we all have used this technique. When it is difficult to impossible to visually search drawers, closets, and table tops for items, organization is key. This includes tactile and high contrast labels. If any changes are made in the layout of rooms or items, users must be notified.
Discoveries during the first semester of studio led us to a list of five essential elements we felt every dual-sensory impaired residence should include. (opposite page)

1. Access to Nature
2. Kitchen and Dining as Primary Social Space
3. Color, Texture and Lighting to Enhance Sensory Experiences
4. ‘Landmarks’ and ‘Shorelines’ to Support Navigation and Circulation
5. Social Interaction and Community Involvement

Interests in improving interaction with nature led this project toward a strong emphasis on access to nature and ‘Sensory Design’ based gardens, a concept supported by the works of authors Pallasmaa, and Malnar and Vodvarka. If the intent is to increase the quality of experience by expanding available sensory stimuli, garden environments are the best places. This includes a range of spaces indoor and outdoor which incorporate views, tastes, textures, smells, and sounds into a full palette of usable information for memory and interaction.

It became necessary to select a site for Hazelwood House that had extensive area for surface space gardens as well as single story buildings to accommodate ease of use for those with impairment. Another quality needed was openness for ample sunlight in the gardens and into the buildings. The site selected is very near to the local passenger train stop, the Dumbreck Rail Station, which runs directly from the Glasgow City Centre, a valuable social and learning connection. It is situated between the busy Motorway 77 to the east, and Bellahouston Academy, a school specializing in sports training to the northwest. The south side blends into an established neighborhood, only a ten minute walk northeast from the Hazelwood School, allowing students within the school to help at the Hazelwood House and encourage social interaction with friends made in the school. The physical organization of the neighborhood imitates that of a pinnate leaf, a metaphor for the interaction and resources that each individual residence, including Hazelwood House, takes and gives back to the larger community.
Circulation seasonal shading

Parti

Sun angle

Site context

Circulation

Development_11
Sensory impaired youth need a sense of discovery and exploration just as much as their counterparts. Nature can provide this in bounty. Both gardens and less groomed wild spaces increase fascination with the world and the creatures and plants within it. Each child, bird, plant, berry, and cloud is different. A comfort with diversity is found in nature. A person who loves natural things tend to be less destructive, more calm, and likely to help protect the world around them than those whose experiences are limited to indoor spaces. New studies suggest that exposure to nature may reduce the symptoms of ADHD and can improve all children’s cognitive abilities and resistance to negative stresses and depression (Louv, 35).

Garden environments can range widely in use and enclosure. Above all, these places support the needs of dual-sensory impaired through relation and proximity to plants. Nature environments are anything related to the growth or use of plants and fresh plant products. At the largest scale, an entire forest is a nature setting, but so is the smallest potted houseplant. A window becomes a frame for sun, rain, and moonlight. It may overlook a renegade sapling struggling up through a crack in urban pavement. Even preparing a healthful salad is interaction with nature and its processes.
Developments in outdoor gardens have been developed throughout human history. Gardens for flowers, produce, herbs, and fountains have been cared for. The best outdoor garden spaces for dual-sensory impaired users include a strong emphasis on interaction through senses and seasonal change. Reaching out to touch a waving grass seed head or lavender along a path gives clues to the location of a user within the garden through texture and fragrance. Design of exterior elements can stimulate both impaired senses and give cues for increased orientation and mobility. Use of well chosen plant and shrub heights can facilitate easy navigation of paths and assist rather than impair those with multiple sensory impairment. Surface materials with high contrast and even texture, as opposed to gravel or loose stones, are recommended for the ease of all people (Everson, 129). Gardens that include wildflowers and other local species can teach the young adults more about their own history, perhaps even learning stories of lore and medicinal uses from the past. All gardens provide some type of learning from others. Social interaction is developed through sharing experiences. Places for relaxing are crucial to full enjoyment of nature. Areas for social gathering are much more effective than a singular bench along a path. Interaction and social activity outdoors are fundamental for the improvement of lives and relationships with each other and nature.

Physical activity in gardens ties these memories to health and the senses. Building muscle tone, flexibility, and understanding the application of tools to daily activities, helps residents to learn skills and techniques that they can use when doing laundry, cooking, or cleaning.

Kitchen gardens are highly interactive for those with impairments. All senses combine to form a complete appreciation when finally the plant started by a crumb-sized seed grows from the soil, gathers sunlight, and produces a juicy tomato sliced on the lunch plate. Self-actualization is achieved in knowing that positive results are due to individual contribution towards another living thing. The growth cycle is very fast in small plants like lettuces, herbs, radishes, and strawberries. Residents can check up on these plants daily to feel how nature is progressing. A plant is patient and doesn’t criticize or judge you if you look or act differently; it is a living thing that will survive or die because of the care it receives.

Researches I. Stamm and A.L. Barber wrote in 1978 that “the experience the patient has with his plant world, can be a microcosm for the experiences in everyday life,” showing that working with plants can help humans to contemplate many situations and feelings in a less intense way (Mattson, 164).
early greenhouse concept

greenhouse, ceramics, and sales office
Working in gardens and with plants encourages dual-sensory impaired individuals to become active participants in their world. Helen Keller describes the wonder of nature in “The Story of My Life,” (370):

It is very interesting to watch a plant grow; it is like taking part in creation. When all outside is cold and white, when the little children of the woodland are gone to their nurseries in the warm earth, and the empty nests on the bare trees fill with snow, my window-garden glows and smiles, making summer within while it is winter without. It is wonderful to see flowers bloom in the midst of a snow-storm! I have felt a bud “shyly doff her green hood and blossom with a silken burst of sound,” while the icy fingers of the snow beat against the window-panes. What secret power, I wonder caused this blossoming miracle? What mysterious force guided the seedling from the dark earth up to the light, through leaf and stem and bud, to glorious fulfillment in the perfect flower? Who could have dreamed that such beauty lurked in dark earth, was latent in the tiny seed we planted? Beautiful flower, you have taught me to see a little way into the hidden heart of things. Now I understand that the darkness everywhere may hold possibilities better even than my hopes.

Interior garden environments include herb-filled kitchen window sills, potted African violets, a basket full of garden produce in a kitchen, or a living wall growing tropical plants or edibles of various textures and colors. Circulation paths can be emphasized by tactile connection with plants along the edge of a corridor. Indoor plants temper humidity levels and purify small amounts of air. Nature within our buildings is comforting psychologically; an environment that is supportive for a plant is supportive for a human. Indoor gardens include conservatories and greenhouses, places that extend the regional growing season and offer opportunities for comfort in a nearly outdoor environment. Filled with light, these warm spaces are great places to start seeds, keep citrus trees and vegetables growing through winter, and to socialize in a garden setting.

Encouraging adolescents with dual sensory impairments to care for and take part in the cyclical life of nature improves mental stimulation, physical and nutritional health. Adventure and exposure to the outdoors exponentially increases their understanding, common sense, physical aptitude, and acceptance for life processes and adversity (Louv, 3). Understanding nature as an evolving, aging, and seasonal entity, dual sensory impaired persons can find their own place in the same world.
Learning gardening techniques like composting and water collection helps users to place greater value on their work and comprehend the need for planning for their own future. Around Hazelwood House there are other special facilities for working with all stages of plant life. Residents will be able to assist the head gardener as much as they are able, preparing planting beds, mixing potting soil, transplanting, watering, and many other activities. It is even possible to learn sales skills when selling plants in the neighborhood store situated at the entrance to the site adjacent to the greenhouse.

Socially, residents can decide together what to grow that season and choose with their neighbor what to plant in the raised beds outside their rooms. These patios are kept slightly more private by screening the more public spaces with espalier style grown fruit trees.

This proposal always provides access to nature through views from all public and private spaces to outside, as well as multiple physical connections through patios.
Windows are operable and allow breeze and sound to enter the residence. During the day, the majority of lighting is natural daylight. Various types of controls on the daylight are used in the bedroom and social realms. Curtains and space dividing panels screen lighting while in the bedroom area skylights and openings to patios act as landmarks. In the large social area where the living, cooking, dining, and multipurpose space are, the roof uses a special material that allows light through but insulates from conditions outside. The translucent material is able to diffuse the light so that there are nearly no shadows, spreading an even light over work surfaces and eliminating strong shadows confused as obstacles. It is set atop tactile and fragrant wooden structures inspired by the branching canopies of forests.
residence section perspectives: bath, kitchen, bedroom, living
Around the residence and throughout the site materials are used for their connection to multiple sensory stimuli. Wood flooring and terra-cotta stained concrete flooring provide warmth and contrasting acoustical sounds. Outside, the concrete color is expanded with porous brick paving set in a herringbone pattern. Walls along the southern side of the main corridor and into bedrooms are made with stabilized rammed earth. Soils for the wall are found locally and give visual and tactile interest to users. Solid roofs are softened by a green roof of sedums to blend with the gardens.
Gardens for sensory-impaired youth should not contain obstacles that are dangerous to them, but there is a need for garden items to acquaint them with a world not designed perfectly for their every need. Stairs, ponds, fountains, loose gravel or mulch, and plants with thorns all need to be experienced in the safe atmosphere of the home garden. This is not to say that the garden needs to be full of prickly things and steep hills, but variations to comfort should be considered for their adaptive teaching features.

Healing gardens have been shown to help those suffering from illness and surgery in hospitals. A very old idea, gardens for relaxing and health have begun to make their way into care facilities as well. Meadowlark Hills Retirement Community campus in Manhattan, Kansas has a gated garden attached to Placek House, the specialized Alzheimer’s household. It incorporates all four ancient elements of healing gardens as described by Margarette E. Beckwith and Susan D. Gilster’s article: A Model Garden for Those with Alzheimer’s Disease. This Hazelwood House proposal uses all of these elements, and several of them in different ways. (HH)

1. the enclosing wall
   -this provides privacy and separation from worldly events
   -beneficial to plants and protective of the gardener
   -activities within the garden feel secure
   HH_property wall reflects homes in neighborhood's walls

2. the bower
   -trees or trellis cover portions of the garden
   -symbolic sense of coolness, food, shelter, and safety
   -reduces harsh light intensities and adds pleasant sounds from breeze rustled leaves.
   -creates a sheltering roof over outdoor space
   HH_forest canopy along path and covered patio spaces

3. water
   -cool and soothing aspect to landscape
   -moving adds interest and sound
   -soft flow of water over surfaces and falls stimulates human sensory perception
   -allows for fish, birds, frogs, and other wildlife
   HH_water feature at north of large garden with lilies and fish

4. the mound
   -seen as a spiritual symbol reaching towards the heavens
   -provides variation in floor plane and serves as a landmark
   HH_living wall wrapping site, small amphitheater
Other important garden aspects that can lead to healing include, looped paths for meandering, symbolic imagery, safe seclusion areas, involuntary sensory stimuli, transition through movement of mind or body, and connection to universal experiences.

“It seems to me that there is in each of us a capacity to comprehend the impressions and emotion which have been experienced by mankind from the beginning. Each individual has a subconscious memory of the green earth and murmuring waters, and blindness and deafness cannot rob him of this gift from past generations. This inherited capacity is a sort of sixth sense- a soul sense which sees, hears, feels, all in one”

-Helen Keller (102)

Many eastern garden design philosophies are focused on momentary experience of space changing slightly by view. Spaces blend and lead into framed nooks and to sculptural rock formations, all microcosms of larger earth systems.

Therapeutic activities like horticulture therapy or animal husbandry are other ways to build self-confidence and emotional/physical healing. Dual-sensory impaired adolescents may not be recovering from surgery as ‘healing garden’ may appear, but the challenging and encouraging aspects that garden environments contain are helpful in building confidence and emotional stability for a more healthful individual.
what is the role of our senses in garden environments?

Typically, humans experienced the world with five senses. Historically, we have been conditioned by the necessity of food gathering, hunting, and safety, causing the five senses to equally grow in strength. Sight gave us additional time for fight or flight decisions. The invention of perspective in the Renaissance not only changed architectural design, it manipulated the balanced use of senses, placing a higher values on sight (Malnar and Vodvarka, 12). Technology’s prevalence and virtual reality makes sight even more central to our lives today. We use vision to understand two dimensional images made of light as real things without other senses. When designing for persons with vision impairment, the design objective and challenges become difficult. “What if we designed for all senses? Suppose for a moment that sound, touch, and odor were treated as the equals to sight, and that emotion was as important as cognition?” (Malnar and Vodvarka, ix). Concepts in sensory design focus on the full range of human senses.

Design for human experience must seek to enhance the engagement of all senses. “Comprehension relies on sensory data filtered through memory.” (Malnar and Vodvarka, 21). Those with vision or hearing impairment rely on their other senses as they navigate through and seek to make sense of the world around them.

Helen Keller described her own feelings, “In my classification of the senses, smell is a little the ear’s inferior, and touch is a great deal the eye’s superior” (Malnar and Vodvarka, 152). Children and adolescents with impaired sight, hearing or other senses, are apt to place stronger emphasis on those senses which do receive information. Holtbrook (89) refers to “Inter-sensory Coordination” as the relaying of information from one sense to another. For instance, this coordination is hearing a unique pattern of footsteps increasing in volume, paired with the smell of a familiar perfume, announcing a close friend without any use of sight. William James stated, “The emotional brain-processes not only resemble the ordinary sensorial-brain processes, but in very truth are nothing but such processes variously combined.” (Malnar and Vodvarka, 59). We all use these cues to understand our surroundings. By heightening normative sensory experiences, individuals with impairments and those without, are able to increase their knowledge of self and sense of place.
Our fondest memories of youth are often related to nature environments. Richard Louv argues that this is most likely because of the range of senses used, and the adventure and discovery of being outside the comfort of home climbing trees or splashing through cool streams. These memories are filled with rich sensory stimulation and make our memories comprehensive experiences; for example, imagine the brisk wind (touch), odors of earth (smell/taste), and whistling grey branches of early spring (sight/sound). All the qualities of unique place are of one singular moment in time.

Sight, hearing, touch, smell, and taste collect information from our surroundings. How does this understanding of surroundings develop into an awareness of danger or safety and build memory maps of our homes we use to navigate in the dark? Traditional knowledge of the information transferred through the senses can be used as a checklist to apply to designed environments. The above chart can be used as a guide to select materials and develop spaces with each sense included. It is important to remember that our senses are closely related to our safety and emotions.

“In my classification of the senses, smell is a little the ear’s inferior, and touch is a great deal the eye’s superior.”

_Helen Keller_
“We read and studied out of doors, preferring the sunlit woods to the house. All my early lessons have in them the breath of the woods— the fine, resinous odour of pine needles, blended with the perfume of wild grapes.”

Helen Keller

EV Walter wrote, “A place is a location of experience. It evokes and organizes memories, images, feelings, sentiments, meanings, and the work of imagination. The feelings of the place are... the mental projection of the individual, but came from a collective experience and do not happen anywhere else. They belong to the place” (Malnar and Vodvarka, xi).

Garden environments tend to contain more multiples of sensory stimuli than indoor spaces devoid of plant material. Natural fragrances and dampness, a rustling breeze through leaves, vivid seasonal colors, tactile stimulation by garden material choices and sunlight, and potential for life-skills learning and stimulation through edible flowers, herbs, and produce make gardens and their related environments the ultimate location for dual-sensory impaired individuals.

Carefully designed garden environments can enhance our experiences in nature. Enriching spaces may be filled with edible and productive vegetation. Functional, tactile elements like earthen berms and living walls can also be introduced as effective sound barriers, garden space sculptural elements, and for physical stimulation. Additionally, while special consideration should be given to this user group when thinking about southern sun exposure, south facing garden, conservatory, greenhouse, and courtyard spaces provide the most potential for pleasant warmth and sensation of sun on clothing or skin. This is an especially comforting experience in the wet and cool Scottish climate.
Through the design of appropriate natural environments, dual sensory impaired persons can have access to nature and receive the numerous healing benefits that have been found to be associated with nature interaction and nature play (Louv, 27). Successful outcomes that incorporate outdoor environments for dual sensory impaired persons include skills such as sensory training, way finding, and impulse/stress management (Mattson, 1992; Marcus & Barnes). A balanced sensory environment, designed with the full range of senses, is beneficial to all users. Given a larger range of experiences, there is more chance for the user to fully appreciate and remember the places in our world. Adolescents with sensory impairment should be allowed to experience their natural environment by exploration and natural play opportunities. In this way, young adults can “learn to use sights, smells, sounds, surface changes, and textures to serve as cues” for danger or comfort, to help make decisions and guide themselves safely through space (Holbrook, 99).

Residents at Hazelwood House have the opportunity to make the most of their lives through interaction with each other and the environment around them. Proximity to train lines, national cycle routes, Bellahouston Academy, Bellahouston Park, and to Hazelwood School build greater social connection within the neighborhood and city and provide activities in the big world away from home.

Buildings are arranged on the site like veins in a leaf, running parallel with the pattern of the sun for optimal sun exposure for plants and residents throughout the year. Immersing the residences within archetypal experiences of enclosure and openness, (forest and meadow edges), and creating a sheltering cave-like experience within private bedrooms, contrasts with a daylight filled social open space. This give the users spatial and sensory cues to location on site. Variations in garden spaces and private or social realms allow for use during different moods, weather, and activities.

Working in the gardens, greenhouse, kitchen, multipurpose art space, selling handmade items in the store, or creating pottery give experience in creative and highly sensory activities engaging all senses.

Materials like rammed earth, brick, concrete, glue laminated timber ‘trees’, wood rain-screen siding, and green roofs replicate nature and local building traditions. Sectional qualities, roofing materials, and overhangs control day lighting.

Within the building volumes there are many opportunities to grow small herbs and flowering plants if the users wish to do so. Access to nature is emphasized through physical openings, activities, and framed views to the outside.


