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Design Clues for a Sensory Garden

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The best classroom and the richest cupboard are roofed only by the sky.
Margaret McMillan

Abstract
Individuals with disabilities require special rehabilitation to fulfill their daily needs, to participate in educational activities, to develop social commitment and for socialization. Rehabilitation centers include indoor educational areas for individuals with disabilities. In this study, an outdoors sensory garden was envisaged that would allow the interactive enlightenment of individuals with disabilities. It was observed that the Isparta Özel Hayat Special Education and Rehabilitation Center, which provides special education and rehabilitation services to students with mental and physical disabilities, did not have a therapeutic area where out-of-class education activities could be conducted. In the present study, planning and design criteria for sensory gardens to meet the physical and psychological requirements of individuals with disabilities were investigated and feasibility of the field was determined to serve as a therapeutic outdoor space for the students in the rehabilitation center. Based on the interviews conducted educators in the rehabilitation center, literature review and occupant needs, the facilities that should be included in the rehabilitation center garden and the problems associated with the space were determined, a conceptual diagram was developed, and the modules were visualized using illustrations. The sensory garden was conceived for both fun and learning.

Keywords: disabled children, landscape design, sensory garden, space organization

1. INTRODUCTION

Despite the advances in science and technology, problems in the organization of physical environments that should contribute to the well-being of individuals and communities have also increased. Desired natural environments are surrounded by buildings that complicate life instead of making people happy. Thus, gardens, which could serve as a tool to improve psychological health in sustainable cities, are important spaces for urban residents.

The concept of garden has been developed since historic times due to the belief that gardens psychologically and physically relax individuals in a natural environment. Nature and gardens have been used in rehabilitation and treatment of individuals to improve their well-being and quality of life. Designs that prioritize the senses are important for mobilization, humanism and social equality. One of the issues neglected in rapid urbanization was the sensory gardens.

Most health institutions in the world provide gardens for therapy and development. Although it has been discussed in Turkey during recent years, there are no examples of

sensory gardens. This special design concept, which is conducted for the development of visual, tactile, auditory and olfactory senses, should be developed in such special areas.
It is known that landscape attributes such as the presence of green spaces, the calmness of rural areas, bird calls, the scent of flowers and soil have positive effects on individuals (Balode, 2013). It is also known that the employment of the educational, developmental and therapeutic effects of nature, plants and soil supports the well-being of individuals who are treated in hospitals due to physical or psychological disorders (Uslu & Shakouri, 2012a).

It could be suggested that sensory gardens are designed especially for individuals with disabilities. The sensory gardens aim to determine the design criteria for adequate and accurate occupancy to improve the physical and psychological health of individuals with physical or psychological disabilities or who have lost certain faculties. In these gardens, individuals with disabilities could learn without experiencing difficulties or exclusion. All children have the right to play, and children with disabilities have the right to play without discrimination from the typical children. Typical children attend curricular activities such as sports, clubs, fine arts programs, etc. These activities play a key role in encouraging them after school.

However, children with disabilities rarely have the chance to participate in outdoor activities due to their physical or psychological problems, health reasons, transportation problems, indifferent guardians, and lack of an accessible park (Scheuermann, 2010).
Children with disabilities could have a space with full inclusivity, comprehension, and solace. A sensory garden with accessible facilities, adjustable playground equipment, smooth pavement, interactive features, hikes and seasonal variations could serve as a complete educational environment. A sensory garden that could be described as an open-air classroom is quite important for children with disabilities.

Children could benefit from the facilities in a therapeutic garden in many ways. The infinite bounty of nature embraces children with colors, textures, flavors, smells and movements, stimulates curiosity, and motivates the passion to learn (Moore & Cosco, 2005). Therapy occurs via the direct interaction between the patient and the natural environment in the garden (Marcus & Barnes, 1995).

It is known that the organization of the garden and playing with children in the garden allow children to participate in life (Moore & Wong, 1997), games organized with natural elements (topography, animals, plants, water, soil and sand) in disabled children's playgrounds have positive psychological effects on children (Pouya et al. 2016), and outdoor games allow children to explore their social environment, to have enjoyable sensory experiences with water, sand and mud, to find or create spaces for unique games, and to collect objects and adopt hobbies (Clements, 2004).

These gardens in educational spaces should be designed especially based on the needs of different occupant groups (Kılıç & Şahin, 2019). Thus, the present study aimed to develop such a garden in a rehabilitation center. In Isparta Özel Hayat Special Education and Rehabilitation Center, the outdoor space in the rehabilitation center was designed as a sensory garden, and concept diagrams and illustrations were produced based on the needs of the individuals in the rehabilitation center. The study was based on the idea to design an accessible, comfortable, and fun learning space that could be used by individuals with physical or psychological disabilities.

Theoretical Background
The sensory design of a garden motivates individuals to adapt to the requirements of modern life and promotes the sustainable urban development through visual, auditory, tactile, taste and olfactory senses, while guiding future designs (Zheng, 2012).

Therapeutic sensory gardens are therapeutic urban spaces that meet the recreational needs of psychiatric patients. They are increasingly common in health institutions and organizations in a landscape that includes plants and structural design elements constructed in collaboration with the institution for therapeutic purposes (Keçecioğlu, 2014). Studies on outdoor planning and design of therapeutic gardens are important in this context (Ulrich, 2001; Tse, 2002; Elings, 2006; Sakıcı & Var 2013; Açıksöz et al., 2016).

It is known that experiences in nature improve children's sensibility about outdoors and nature, playing in nature provides a basis for active environmental education in early childhood (Wilson, 2008), and sensory gardens should be designed based on social, environmental, ecological, educational and aesthetic requirements (Bilgiç, 2004). Açıksöz et al. (2016) reported that therapeutic gardens are also required in private care centers. Little and Eager (2010) reported that playgrounds that provide safe exploration facilities for children and allow them to acquire experiences, take risks and challenge them would support development of the child and the quality of play.

To support children's development and learning, children's playgrounds should be natural or almost natural, and the equipment should include trees, water, stones, flowers, insects, etc. (Turgut and Yılmaz 2010). The design criteria that allow children with different abilities to play in a shared playground are particularly important (Uslu & Shakouri, 2012b).

Sensory Garden and Design Principles

Sensory gardens aim to improve the individuals' health and quality of life, and to promote therapy with interaction with nature. Rather than implementing special measures for the disabled, sensory gardens aim to integrate sensory stimulation, physical activities, social skills, environmental education, sensory growth and mental development with green spaces.

The difference between a sensory and a typical garden is the combination of hard and soft views, careful selection of colors, textures, forms and all features of the living elements, and the design to provide maximum sensory stimulation in a sensory garden.
Sensory garden occupancy could be classified as passive and active (Gonzalez & Kirkevold, 2016). Passive occupancy means enjoying the fresh air, beautiful floral scents, scenery, sunlight, and various sensory stimulations. Active occupancy means conducting purposive activities in the garden. A sensory garden includes rehabilitation areas for the disabled, surprising panels to stimulate perception, auditory elements such as echo, music, waterfalls, fountains, tactile elements including walkways constructed with various materials such as straw, sand, pebbles, olfactory elements such as plants that release scents when touched next to picnic tables, and fruit trees for the sense of taste.

User profile and requirements, natural environment, spatial potential, aesthetic and ecological parameters are important in the design of a sensory garden. Children experience gardens differently when compared to adults. Furthermore, individuals with special needs experience gardens unlike individuals without special needs (Scheuermann, 2010). Thus, any gard that emphasizes the relationship between nature and other elements than the occupant such as colors, textures, and sounds, adds harmony to the child's world and helps the children to focus their attention constructively (Moore and Cosco, 2005).

In a therapeutic garden, the designer should pay attention to create a balanced and safe occupant circulation, to conserve natural features, to select plants with therapeutic effects (color, size, etc.), and to develop functions with high visibility and preferred by individuals with disabilities (Said, 2003).

Rehabilitation center gardens should have walkways that allow the occupants to be independent and find their way easily. For groups with different diseases, disabilities or disadvantages, it should include informal promenade routes or formal spaces that are convenient for all occupants (Ulrich, 1999). Non-slippery, smooth, and hard pavements should be employed, and paths should be supported with a perceptible pavement. A circulation network should be developed for easy access of the individuals, the legibility of the spaces should be improved, and direction signs should be posted.

Guidance and warning signs should be clear, visible, comprehensible, consistent, and complete. These should be adequate and understandable for all users (Özdingiş, 2007; Eşkil, 2011).

Also, plants that stimulate the five senses should be preferred in landscape design (Şensoy, 2017). The employment of poisonous, allergic and thorny plants should be avoided, and a rich plant composition should be preferred. A balanced composition should be achieved with plant material with different colors, forms and textures in the garden. Different functional and experiential areas with high spatial performance should be developed. All materials and furniture should be natural. In rehabilitation centers, leisure areas should not only serve the students, but also the families, teachers and rehabilitation center employees allowing interacting and communication between all parties.

2. STUDY AREA

The study was conducted in Özel Hayat Special Education and Rehabilitation Center in Ayazmana District, Isparta province, in the Mediterranean region, Turkey (Figure 1). The Rehabilitation Center is a social service organization established to compensate the loss of individual functions that prevent the fulfillment of the requirements of life due to a cognitive, physical or psychological illness or disorder, and to promote the acquisition of self-sufficiency skills or to provide preventive social care services for those who cannot acquire these skills. (Figure 2).

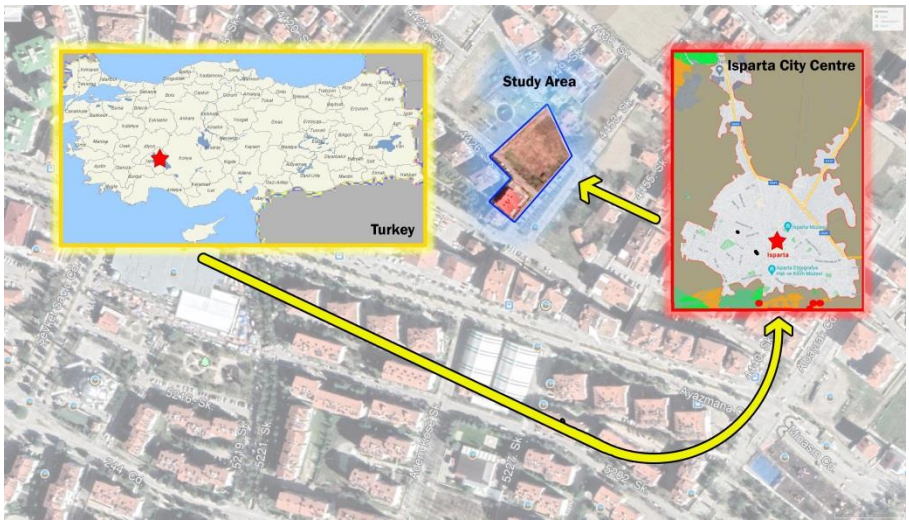


Figure 1. The Study Area

The occupants included 65 individuals with psychological disabilities, 38 individuals with physical disabilities, 16 individuals with hearing impairment, 19 individuals with pervasive developmental disorders, 6 individuals with special learning disabilities, and 8 individuals with language and speech disorders. The employees serve 152 students, excluding the instructors. Students suffer speech disorders, Down Syndrome, hearing impairment, physical disabilities, learning disabilities, psychological disabilities, and autism.

Figure 2. Özel Hayat Special Education and Rehabilitation Center

It is known that students with disabilities attend education only in indoor classrooms in the rehabilitation center. Although the center is in a suitable location, its outdoor spaces are not fully functional. It was observed that a therapeutic garden was required in the rehabilitation center to improve students' senses and perceptions, their physical mobility, and to support their recovery and contribution to the society.

3. METHOD

3.1. Literature Review and Data Collection

In the first stage, a literature review was conducted to determine the basic concepts, related laws and regulations, technical reports and statistics. Articles, theses, proceedings, regulations and technical reports, scientific research projects and books on disability and sensory gardens were reviewed. In the study, sensory garden examples (Park der Sinne, Tao Payoh, Whitesburg Opens, Suneden Sensory Playspace, Westminster Sensory Park, Lucas Gardens School, Children Institute Pittsburg, Leichtag Family Healing Garden, Turenscape) were investigated. The study area plans, and reports were obtained from the relevant institutions.

Furthermore, therapeutic factors for individuals with mental disabilities, autism and Down's syndrome, individuals with auditory, visual, language and speech impairments, and individuals with physical disabilities were identified.

3.2. Study Area & Field Trip

In the second stage, all collected data were analyzed to determine the sensory garden design criteria. In the field study, Isparta Özel Hayat Special Education Rehabilitation Center was visited, and on-site observations were conducted. In addition to the comprehensive field analysis and on-site observations, photographs were taken, and the site plan of the center, related brochures, magazine and press reports were also examined. Furthermore, the structural and plant design were evaluated in the interviews were conducted with center officials, and student and the specialist educator requirements were determined. The availability of the rehabilitation center outdoor facilities for student occupation was analyzed.

3.3. Sensory Garden Concept and Illustrations

Based on the rehabilitation center data, a sensory garden concept was developed to meet the needs and for development of students with disabilities, and different module illustrations were developed.

4. RESEARCH FINDINGS

4.1. Problem Statement

An adequate sensory garden design with improved awareness for children with disabilities should be developed in the rehabilitation center. The garden should not only meet the general requirements of the children, but should include high performance spaces (tactile art installations, etc.) and allow social interaction among the occupants. Because, such approaches and practices that support physical and psychological development of children improve and support the future of the society.

4.2. Spatial Organization

Individuals who require special education in the rehabilitation center are educated in indoor classrooms (Figure 3). These spaces could be used when needed; however, the education of students in the rehabilitation center should be improved with quality outdoor functions and furniture to support the therapy of the students.

Figure 3. Educational spaces in the rehabilitation center

The rehabilitation center is surrounded by an area with hard pavement that serves as the entrance and exit of the student shuttles. There are no waiting areas for parents, leisure spaces for the staff and educators. A small green space is dysfunctional and neglected (Figure 4).

Figure 4. East-West-North-South Front

There is a vacant space next to the rehabilitation cebter building (Figure 5). This area could be transformed into an ideal educational area for individuals with special education needs. This area, where students could learn with fun and which could support their development, could be transformed into a sensory garden.

Figure 5. Vacant land

5. DESIGN RECOMMENDATIONS

The garden was designed based on the differences between the students in the rehabilitation center. In general, the development of natural spaces consistent with individual disabilities and stimulation of visual, auditory, taste, tactile and olfactory senses were prioritized in the spaces.

Thus, based on the observations, interviews and findings, a recommended outdoor sensory garden concept diagram was developed for Isparta Özel Hayat and Special Education Rehabilitation Center. In the diagram presented in Figure 6, the outdoor sensory garden design included a playground that included of textured structures, walls and sandbox, a therapy space with birds and fish, children's playground that included textured walkways, vegetable and fragrance garden, recreation area with an ornamental pool, leisure area for rehabilitation center employees, waiting areas for parents, and a cafeteria.

In general, the outer space in the rehabilitation center was designed to meet the needs of individuals with disabilities and their families.

* Balance games in the textural structures section are important for children with disabilities. Balance is one of the most important concepts for an individual. The individual has fun trying to stay in balance. Games and materials were envisaged in the sensory garden for balance and control.
* The area with textural walls and pavement was designed for the tactile sense. The textural walkways allows the individual to work on her/his body and appeals to the tactile sense.
*The sensory garden included leisure spaces at regular intervals. These spaces were intended for the students, parents and rehabilitation center staff to relax, breathe, and even to instruct courses or conduct educational outdoor activities.
* Playgrounds were designed with material for auditory sense. In the bird and fish therapy sections, students can get closer to animals; observe them, and the section appeals to their auditory sense via the bird calls. The section appeals to the sense of sight as well as auditory. Students have fun as their auditory senses are stimulated.
* Students with disabilities could improve their tactile skills by growing vegetables, touching the soil and vegetables in the vegetable garden. The garden could also appeal to their sense of taste as they can taste the vegetables they cultivated.

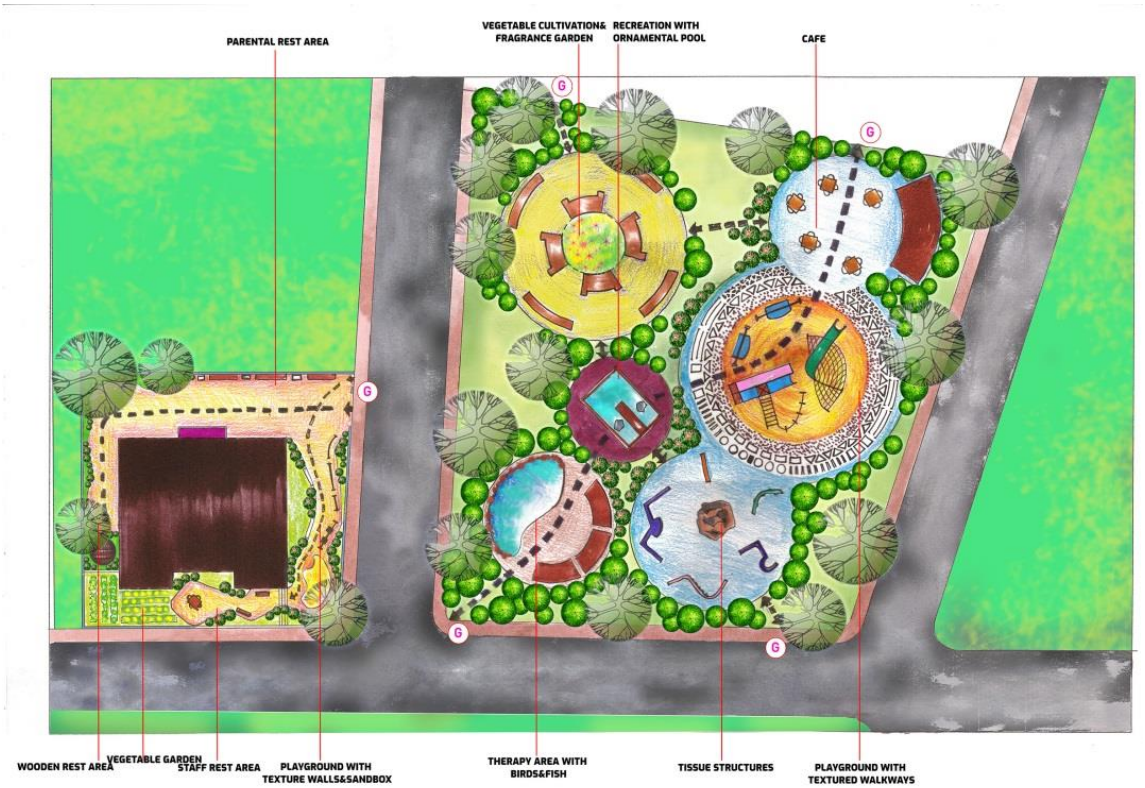


Figure 6. The concept diagram

Materials that stimulate both the visual and tactile senses are very important for students in the rehabilitation center. With materials designed to stimulate both the visual and tactile senses, modules and illustrations were developed in the sensory garden for students to have fun and use their senses (Figure 7).



Modules appealing to the sense of sight and touch



Hearing games

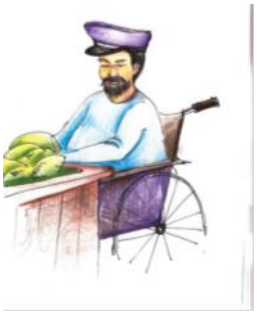

Balance games


Therapy area with fish



Playground & Tissue structures





Vegetable cultivation & fragrance garden


Textured walkways

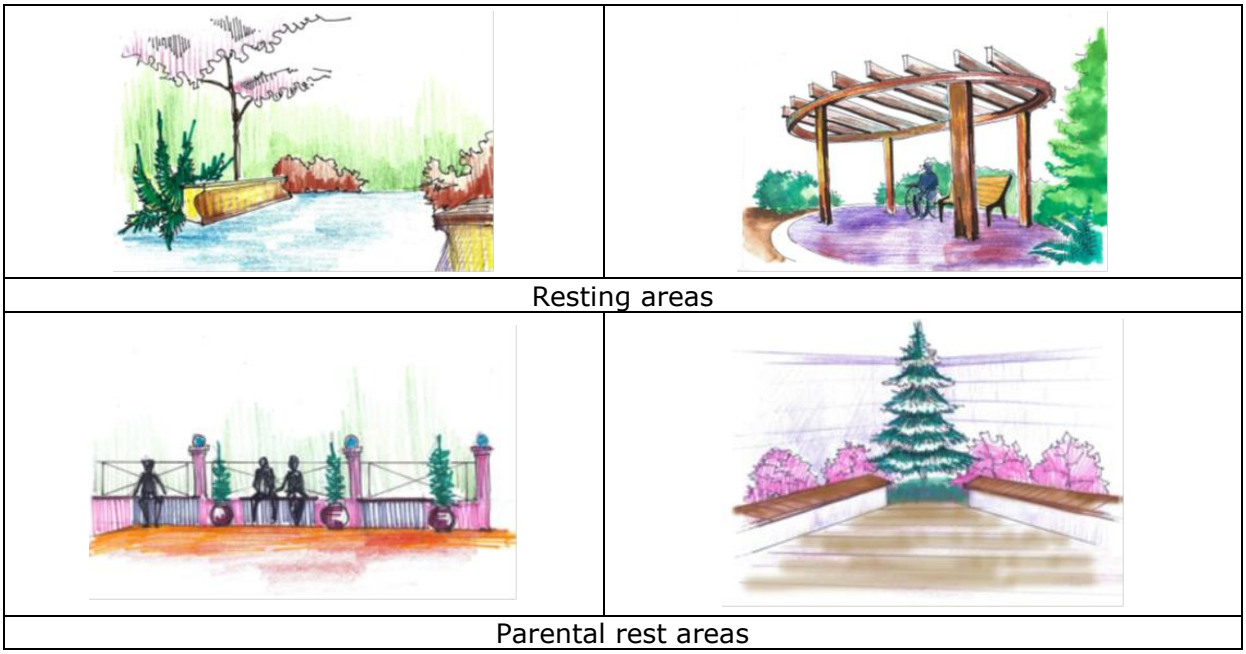


Figure 7. The sensory garden illustrations and modules

6. CONCLUSION

The design approaches that utilize the therapeutic powers of nature have been noticed. Nature is an invaluable opportunity for human beings to improve their lives and environment. Playing outdoor games improves individual skills, learning abilities, and allows the individuals to find their character. In the society, there are both individuals with disabilities and healthy individuals. Children with disabilities have the right to have fun, learn and play, the same as healthy children. Children with disabilities develop a sense of belonging to the society and feel more valuable and special and have fun when playing games in sensory gardens.

For individuals with disabilities, a garden approach that stimulates all five senses should be adopted in sensory gardens. For high performance designs, outdoor spaces should be analyzed based on physiological, psychological and sociological requirements, and a design approach that could serve all should be adopted. Designs should be based on occupant age groups and children with physical and psychological disabilities. Also, the design of outdoor spaces in special facilities such as rehabilitation centers would be more functional and beneficial when the design is based on the needs of the occupant groups and the views of the experts. Gardens should serve various functions to allow sensory explorations by the occupants. Sensory garden design should include design elements such as water, plants and art objects and multifunctional interactive spaces.

The garden design in special facilities such as rehabilitation centers should prioritize the development of senses and include functional, safety and aesthetic parameters, and the designed spaces should be scientific and educational where vital, artistic, symbolic and cultural elements are employed, and that meet the occupant needs. User perceptions should be addressed with physical, social and sensory stimulation spaces. The design of functional, simple and noncomplex spaces should be prioritized and the principle of design for all should be adopted. The inclusion of sensory gardens in the planning decisions for interior and exterior design by landscape architects and architects, psychologists and educators in healthcare institutions and organizations such as rehabilitation centers would provide important opportunities for both employees, patient relatives and patients. It should be noted that any therapeutic potential of the garden

would not only serve a minority of the population, but the whole community in the present and the future.

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