

Unraveling Marginalized Occupancy

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Abstract:

Western designers have presumed that the user of the designed environment is a prototypical body since antiquity. This ostensibly objective criterion is used to justify who is allowed access or marginalized by design, which includes, among others, women, children, people of color, and disabled individuals with physical or mental exceptionalities. This paper explores how design may be used to empower students with exceptional needs underserved in public schools by creating a prototype for their classroom and then presenting it as an interior design studio project.

Introduction:

Marginalized populations are groups and communities that experience discrimination and systematic exclusion because of unequal power relationships across economic, political, social, and cultural dimensions [1]. As an outcome of design, *who is deemed marginalized? what impact have designers had on their everyday lives? what is their role in improving the lives of people who are still marginalized?*

Women, children, immigrants and migrants, people with differing political or religious beliefs, victims of human trafficking, members of the LGBTQ community, people with developmental, physical, or mental differences, and those who are incarcerated are among those who are affected or marginalized by design. Due to the interconnected nature of these demographic characteristics, many people find themselves facing double or triple exclusion (American Psychological Association, 2018). Children are still marginalized by design, even though today's government policies and rights protect them far better than they did in 1875 (Tauke & Smith, 2020). The legislation in the USA dictates that children with disabilities should be educated in the same school environment as children without disabilities if the classroom meets their needs (Individuals with Disabilities Act, 2004). However, they are often served in a specialized learning environment in public schools called resource rooms or self-contained classrooms. A survey of K-8 public schools in the region indicated that in most cases, these classrooms are typically not designed with consideration for the sensory needs of the children served within them. Classroom environments must meet the sensory needs of students to provide them with the opportunity to feel physically comfortable, encourage self-regulation, and focus on the tasks. This calls for designers, researchers, educators, and the community at large to explore interior design as a tool to understand and represent all voices (Zingoni, 2018). This paper focuses on how to use design to empower children with exceptionalities who are disadvantaged by

designing a prototype for their special needs classroom based on research and then offering it as an interior design project studio project to raise awareness among students.

Literature Review: Marginalized by Design

Since antiquity, Western designers have presumed that the user of the designed environment is a prototypical body, one that is by default white, able-bodied, cis-gender, and male (Sanders, 2021). From Vitruvius to Le Corbusier, architects have thus designed buildings based on the proportions of an '*ideal*' male body, which eventually gave way to a new conception: the '*normal*' body in the nineteenth century (Imrie, 2000). This body could be examined and quantified, and the results would serve as the basis for ergonomic design standards that are still in use today in architectural guidelines and regulatory codes. This seemingly objective criterion is used to explain who is granted access or denied/marginalized by design, including women, children, immigrants, people of color, and disabled individuals with natural physical or mental exceptionalities, among others (Webb, 2000). Children with disabilities (visible or invisible)/exceptionalities are typically served in a different classroom in public schools called special needs classrooms or a classroom for a specialized program. This enables the intervention specialist to design a program that is tailored to the student's specific educational needs. Most public-school environments have not been designed to suit the unique sensory challenges that many children with exceptionalities such as Autism Spectrum Disorder (ASD), Intellectual Disabilities (ID), and Emotional Disturbance (ED). In most cases, these classrooms are typically makeshift arrangements with no consideration given to the sensory needs of children with education and health disparities. For students to feel physically comfortable, develop self-control, and focus on their learning activities, their sensory needs must be addressed in the classroom (Kern and Clemens, 2006).

Marginalization is not a neutral or objective fact, it is made and remade through everyday feelings, experiences, and encounters (Boys, 2014) and human beings are not *stereotypes*. As leaders of inclusion, we designers need to embrace the margins, the edges, and the borders to bring about equity and empowerment through design. This means unraveling why marginalized individuals appear to be invisible in architectural discourse and practice, despite the wider contemporary turn in the subject towards concepts centered around the body, such as embodiment, affect, difference and hybridity. This paper has two folds, first part focuses on the development of sensory design guidelines utilizing a qualitative method, which provided a foundation for the development of classroom prototypes that address the sensory needs of students with ASD, ID, and ED. The second part of the paper describes a pedagogical approach that was employed to help students explore users' experiences to develop conceptual approaches to a learning center to serve students with ASD from early childhood through high school.

Part 1: Research and Development of Prototype

The observation in K-8 public schools in the region showed that special needs classrooms catering to children with exceptionalities such as Autism Spectrum Disorder (ASD), Intellectual Disability (ID) and Emotional Disturbance (ED) are typically makeshift arrangements with no consideration given to students' unseen sensory needs. Several authors have expressed surprise

that little research is available to inform designers on how to create supportive environments for them (Irish, 2019; Khare, 2010; Shabha and Gaines, 2011). The first part of the study aims to bridge the gap through an extensive literature review from the publications on this topic in architecture, interior design, and special education journals to generate a sensory design guideline that correlates interior design strategies with sensory issues of children with ASD, ID, and ED. Intervention Specialists from area elementary and middle schools were asked to rank the impact of the sensory design guideline on student learning, which provided a baseline of the important strategies that influence the learning and behavior of children with disabilities. Results from the structured interviews with these specialists helped refine the sensory design guideline for classrooms serving students with the disabilities mentioned above (as shown in Table 1 and Table 2, See end of this article pp.7 and 8).

These results informed the design of a virtual prototype for a special needs classroom (as shown in Figure 1, pp 9 and 10). A prototype is a physical model that tests the designed idea and if the prototype is successful, it is mass-produced. The five intervention specialists were asked about the classroom's capacity. They all agreed that a special needs classroom in a public-school system usually contains 6 to 8 students at any given moment. The prototype is in response to the proposed class size. The classroom space is divided into four quadrants. The first quadrant acts as a transitional zone, with cubbies and storage for learning objects and materials, and breakout space for small groups. This transitions into the main learning space which contains a variety of areas including group learning, individual sit-to-stand workspaces, reading zones, and bean bags. The sensory and restorative zone is in the quietest part of the classroom, giving students control while also providing teachers visual access. This prototype is not meant to be the only option; rather, it demonstrates one way in which the classroom may be arranged to serve the needs of children with special needs. This will let the community visualize and provide additional comments so that the design guidelines may be refined further.

Part 2: Inclusive Pedagogy:

The second part of this paper explains how a pedagogical approach was used to help senior interior design students investigate users' experiences, conduct research, and develop conceptual approaches for a 4,200-square-foot learning center that will serve students with Autism from early childhood to high school. Autism, often known as Autism Spectrum Disorder (ASD), is a developmental disorder that affects the functioning of the brain (APA, 2013). Children can be hypersensitive and react to external stimuli that children without ASD may not notice, e.g., smell, noise, and texture (APA, 2013; Dunn, 2008; NIMH, 2008). Conversely, children can be hyposensitive with a high tolerance level and not react to external stimuli that children without ASD normally would (Dunn, 2008; NIMH, 2008). According to the Centers for Disease Control, Autism affects an estimated 1 in 54 children in the United States today [2]. Individuals with ASD are part of a growing population and their needs are excluded entirely from all building codes and regulations. This is a serious concern since these individuals are more sensitive to their physical surroundings.

The author was scheduled to teach the Interior Design senior studio in the fall of 2021 and wanted to seize this opportunity to teach students about the difficulties that individuals with

ASD face when it comes to their bodies and the built environment. The instructor developed a partnership with a local non-profit in the region that wants to create a facility that would provide school programs, and social skills programs for children with ASD ages 2 to 21. The fourteen students, working in teams of two, were challenged to move beyond the perfunctory retrofitting of spaces for these individuals and ask: *how can purpose-built design dignify and fully support people with ASD?* The project centered on research, ideation, and final design presentation, with the objective to train individuals with various sensory needs in meaningful activities.

Design Process:

The practice of design for those marginalized by design should be approached differently (Pal, n.d.). The eight-week project was divided into three modules: research and programming, conceptualization of space, and a design response.

Module 1: Research and Programming:

Research and programming identify not only the needs, but broader issues related to the project such as human factors, environmental responsibility, and social and cultural influences on the design (Robinson, 2020). An external dialog with professors in the special education department focused on behavioral concerns of children with ASD, practitioners from design working on neurodiversity, and the client helped them understand the various programmatic goals, concepts, and issues. The students conducted a literature review on - what is the disability, what it means to be a design advocate for disability, what is ASD, and various spatial needs and parameters surrounding the sensory needs for ASD using various media. The students also explored associated theories, precedents, practices and surveyed the site. The two-week intense research led students to comprehend the issue related to ASD and turn them into a finite design proposal.

Module 2: Conceptualization of Space:

This two-week module focused on the ideation of the project proposal. As observed, students in design studios decompose the broad schema offered by the design program, generate concepts from it, and arrive at a formal articulation of the interior space, which frequently lacks an empathetic design solution (Swaranjali, Patel & Espersen-Peters, 2021). Empathy enables designers to understand other people's realities and perspectives and develop solutions informed and inspired by an empathetic response (Sanders, 2002; Kouprie & Visser, 2009). Role play and empathy mapping are examples of studies that the instructor suggested as heuristic strategies for empathizing with users. Heuristic strategies refer to a problem-solving process in which other device or studies contributes to a reduction in the search for a satisfactory solution and focuses on testing more imaginative outcomes (Rowe, 1998). The role-play activity was designed to show how people with ASD are bothered by things most people don't notice as they are extra sensitive to noise and movement. Second, the students were tasked with creating an empathy map for their users, as shown in Figure 2, pp 10 and 11. An empathy map depicts the users' thoughts, feelings, attitudes, and needs and helped the students connect to their users. The students reassessed the programmatic goals they had set, through the lens of the evolving perspectives as revealed through these studies. Before the development of schemes, they created a collage, depicting the sensory journey of the children with ASD through the

space. According to Spankie (2009), collage becomes an intellectual activity of thinking about space in three dimensions through fragments.

Module 3: Design Response:

The last four-week module focused on refinement of the program and floor plan as per feedback and three-dimensional development. The outcome took the form of a digital presentation communicating the essence of their design proposal.

Student Project Outcomes:

Through this project, the students had an opportunity to study the sensory needs of individuals with ASD. The synthesis of two student team project showcase research, studies, and design solution.

This student team wanted to provide pliable spaces throughout the center after learning about the user group's sensory needs. Pliability allows for flexibility to varying conditions. It is implemented through the manipulation of forms, movable surfaces, and spaces within spaces, as seen in figure 3, p 12. Students move through active zones and slowly transition into less stimulating zones. This gives them control over how much stimuli they interact with, allowing them to thrive in a flexible environment that caters to their own needs. The transitional sensory spaces create zones to recollect and focus while creating a neutral support area encouraging social interactions.

Following extensive research, the second team's prototype aims to create an environment that allows children with varying sensory needs to learn and interact with others seamlessly. To fulfill the different sensory needs moments of interaction and seclusion were generated by manipulating surfaces. Additionally, transitional spaces, way-finding, and logical spatial sequencing lead to a welcoming and inclusive environment to learn, collaborate, and interact. The color scheme was desaturated and used as a wayfinding device as well. Small patterns and light woods are included to add textures and patterns throughout the center. Their design response is shown in figure 4, p 13.

Implications:

Through the research, development of the prototype, and design pedagogy, we had an opportunity to study the sensory needs of children with exceptionalities and the interaction of these needs with the built world. We developed empathy for this user group, bringing them more intentionally into the design processes and imagining a future that will meet the extraordinary range of their collective sensory needs. It broadened our awareness of design thinking, which is more than just creation of an artifact. As a result, we are forced to examine our creativity along with our desire for design to be accessible to a wide range of individuals. Among other methodological advantages, working with this type of diversity in user research helps designers become better interviewers and design observers. It helped us realize, as designers, we must move beyond the perfunctory retrofitting of spaces and consider how can purpose-built design dignify and fully support ones marginalized by design (Harris, Hyde & Marcaccio, 2021).

ENDNOTES

- [1] *Glossary of essential health equity terms*. Marginalized populations | National Collaborating Centre for Determinants of Health. (n.d.). <https://nccdh.ca/glossary/entry/marginalized-populations>
- [2] Autism Statistics and Facts. Autism Speaks. (n.d.). <https://www.autismspeaks.org/autism-statistics-ASD>.

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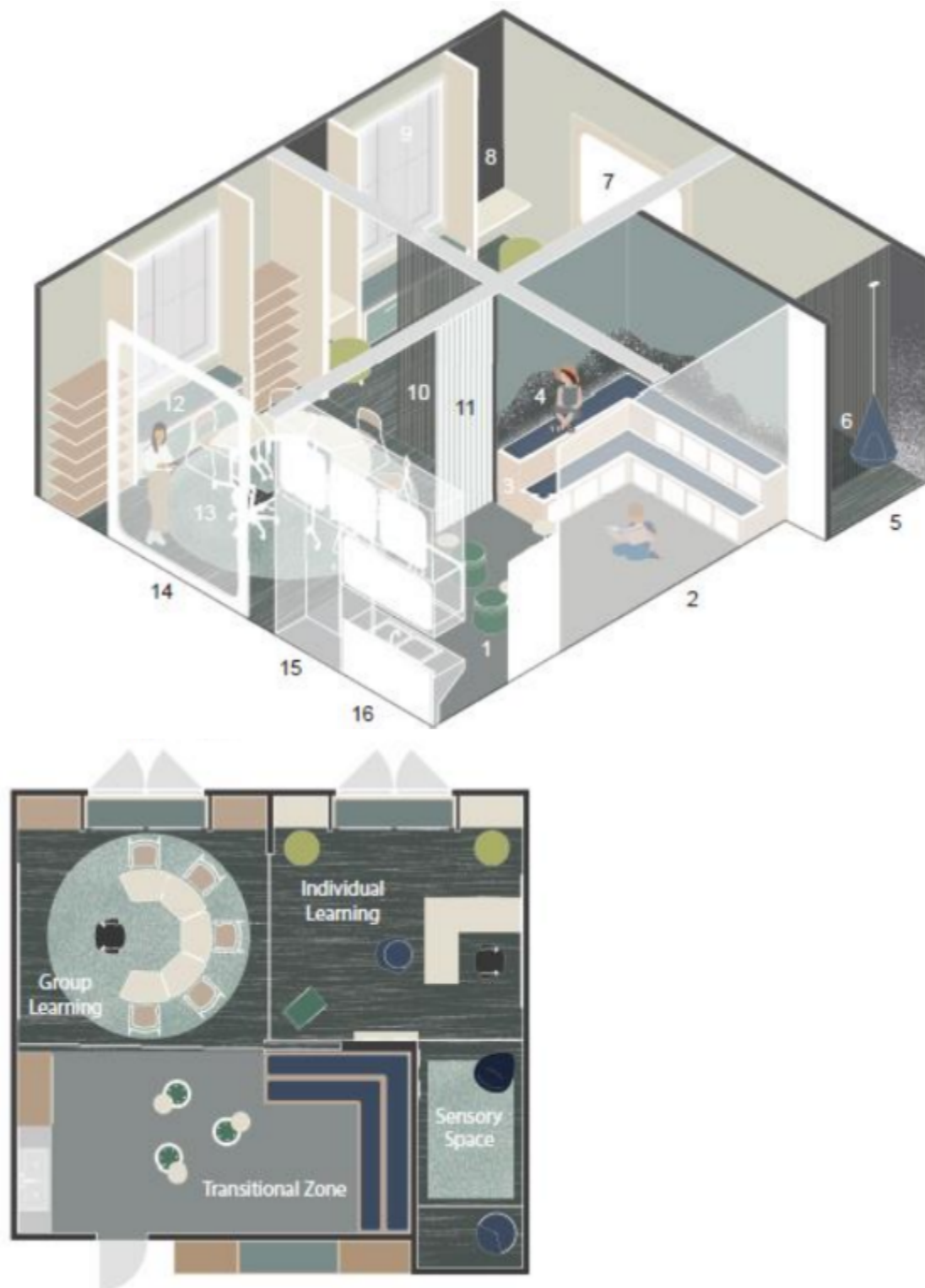
Table I: Summary of Findings from Focus Group Interviews

	Preferences	New Information
Space Planning	<p>Separate classroom into different functional zones – instruction, reading, sensory and escape. Using physical structures for boundaries for clear distinction between rooms and their function.</p> <p>Minimize clutter and number of items within the classroom. This can be contained within storage that is accessible only to teachers, not students.</p> <p>Promote control and privacy while still maintaining visual access in the sensory heads down or escape space.</p> <p>Sensory space should be self-regulated and customizable. Teachers should always have visual access to the sensory space.</p> <p>Use focus spaces for one-on-one instruction Focus is strengthened through visual barriers to avoid distractions.</p> <p>Reflection and restoration within the classroom. One example for how this could be achieved is by creating a designated space for children to retreat to when they feel overwhelmed. This space could be defined by a boundary such as a curtain, partition, rug, carpet tiles, or furniture.</p>	<p>Hallways should not be used as escape spaces as they are typically stigmatized and lack privacy. It is best if the escape space is still integrated within the classroom for children who cannot focus.</p> <p>Use focus spaces for one-on-one instruction. Focus is strengthened through visual barriers.</p> <p>Give students a way to understand what their body and minds need and how to prepare for that, hence providing a sense of ownership and self-control.</p> <p>Observation rooms with windows are not preferred.</p> <p>Include vocational spaces in classrooms to learn jobs and recreational spaces to release energy (i.e., pushing a book cart).</p> <p>Escape spaces should not have windows as this suggests a lack of privacy (ED especially). A mobile escape space could be helpful so that it can be accessible in many locations, including the hallway.</p>
Shape and Form	<p>Symmetrical spaces and simple shapes are preferred especially for assistance in walking.</p> <p>Lines on the floor are desired for body awareness. Diagonal lines present different perspectives.</p> <p>Nooks permit small group instruction.</p> <p>Provide visual boundaries for group learning and workspace.</p>	<p>Sensory Rooms – No corners in this space</p> <p>Dividers allow for a visual block using moveable pieces. These dividers could be constructed from PVC pipes for a lightweight and flexible design.</p> <p>Students enjoy curved or circular shaped areas due to the softness in play, but they are accustomed to the square and traditional structure of walls.</p> <p>Pull out rooms are ideal for make-up work or individual instruction. By making this space accessible for multiple classrooms, it promotes sharing, collaboration, and a more economical use of space.</p>
Shape and Form		<p>Racket ball – A program that some schools have adopted to help students focus, concentrate, and develop body awareness. The routine involves bounce, clap and bounce, which can be completed alone or with a partner. A designated space for this activity to be included in the classroom.</p> <p>Diagonal lines are not preferred as they skew perspective.</p>
Furniture and Objects	<p>Rocking chairs, floor rockers, cocoon swings, pedal chairs, bouncing balls, wiggle pads, workout bands on chairs, bean bags, sit and spin, and Rifton chairs are all ideal seating options and allow for flexibility.</p> <p>Carts in the room allow weighted blanket storage.</p> <p>Chair legs should have exercise or resistance bands. Teachers often use latex bands, but some schools are completely latex free.</p> <p>Stand to sit tables, horseshoes tables, and tables for group work with individual sliding panels are preferred desk styles. There should not be any attached seats or hard edges on the desks. Lips on the sides of desks and padded edges are preferred. Velcro on the undersides of desks meet a sensory need and help students regain control in their environment. Individual desks need an organization system to provide cues for tasks that need to be completed.</p> <p>Preference of rockers over exercise balls.</p>	<p>Cover and hide outlets to only allow access to teachers.</p> <p>Cubbies and cabinets are important. Proximity and mobility are key for this item. Slots can represent the next step to task and allow the student to complete each step independently.</p> <p>Carts filled with books or heavy items – the child can push the cart to expand energy, refocus and calm down.</p> <p>Reduce the glare of screens.</p>

Table II: Summary of Findings from Focus Group Interviews Cont

	Preferences	New Information
Lighting	<p>Dimmers are highly preferred.</p> <p>Fluorescent lighting is the least preferred type of lighting. Use covering devices when applicable.</p> <p>Incandescent and natural, diffused lighting is preferred.</p> <p>Matte surfaces are preferred to reduce glare.</p> <p>Consider sight lines from the window as this can lead to visual distractions.</p>	<p>Currently, classrooms are almost always too bright.</p> <p>Blue and purple light covers are used by teachers on fluorescent lights.</p> <p>There is a need for light covers that are fire retardant.</p>
Color	<p>Think about the colors of all pictorial materials displayed on walls for information as this leads to visual clutter.</p> <p>Colors with a low reflectance are preferred.</p> <p>Neutral tones and calming colors are preferred (i.e., warm or cool tones).</p> <p>Strategic use of colors allows for wayfinding and fading.</p>	<p>Red and yellow are less desired colors. Purple, blue, and green are preferred.</p> <p>Clothing and hairstyles are also impactful uses of color in the classroom and can lead to distraction.</p>
Texture	<p>Strategic use of textural zoning can accommodate sensory needs such as touch. i.e., fine, coarse, and smooth textures.</p> <p>Carpet is ideal for sitting and stretching (yoga).</p> <p>Students enjoy pressure of certain textures (i.e., swings, mattress, weighted stuffed animals).</p>	<p>Picture frames with different textures allow for exposure to new materials. Include these pieces on sliding or removable panels to hide textures from children with hypersensitivity.</p> <p>Some items to possibly include are teepees with rubberized mat on the inside, textured toys within color coated boxes, brushing options, bean bag chairs, couch, swing, pillows, weighted blankets, fidgets.</p> <p>Texture boards in hallways, specifically on lockers, for students to drag hands and shoulders across. This assists in wayfinding and adds a sensory comfort in crowded hallways.</p>
Acoustics	<p>Use sound dampening surfaces such as dividers with acoustical properties.</p> <p>Background/white noise is good but can distract hypersensitive children.</p> <p>Fluorescent lights distract and overstimulate children.</p> <p>High ceilings and open areas can be acoustically challenging.</p>	<p>The PA system, lunchrooms, gyms, and auditoriums can be overstimulating.</p> <p>Quiet closing doors and cabinets (padding) help lessen noise.</p>

Figure 1: Prototype for the Special Needs Classroom



- 1 Play Area / Writing Stools and Rubber Flooring
- 2 Encouragement Wall (Magnetic Chalkboard)
- 3 Student Cubbies and Cushioned Bench
- 4 Textural Application with Acoustical Properties
- 5 Escape Space / Darker, Enclosed, Comfortable Seating, Acoustically Sound
- 6 Hanging Swing
- 7 Individual Teaching Area with White Board
- 8 Chalkboard Wall with Task Organization and Sit Stand Desk

- 9 Adjustable Shades / Provides Partial Lighting
- 10 Slightly Transparent Curtains
- 11 Sliding Panels / Classroom Division, Privacy, Acoustical Application
- 12 Window Seat with Colorful Storage Cubbies
- 13 Group Learning Defined by Area Rug and Classic Carpet
- 14 White Board for Group Learning
- 15 Teacher Storage
- 16 Inclusive Sink with Above Cabinetry

Figure 2: Empathy Maps by Students

Example 1 of Empathy Map

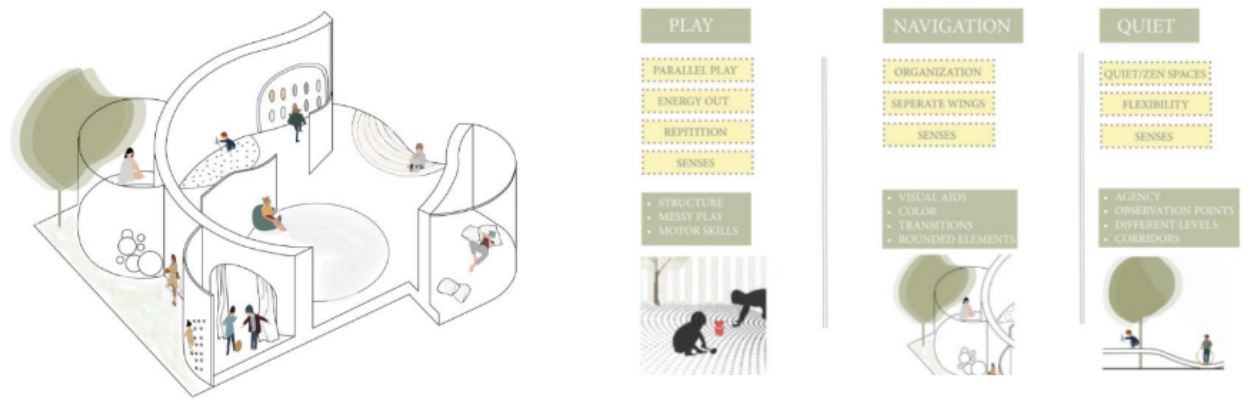


Example 2 of Empathy Map



Figure 3: Student Team 1 Project

Conceptual Diagram- Pliable Interiors to Meet Sensory Needs of Children with Autism Spectrum Disorder



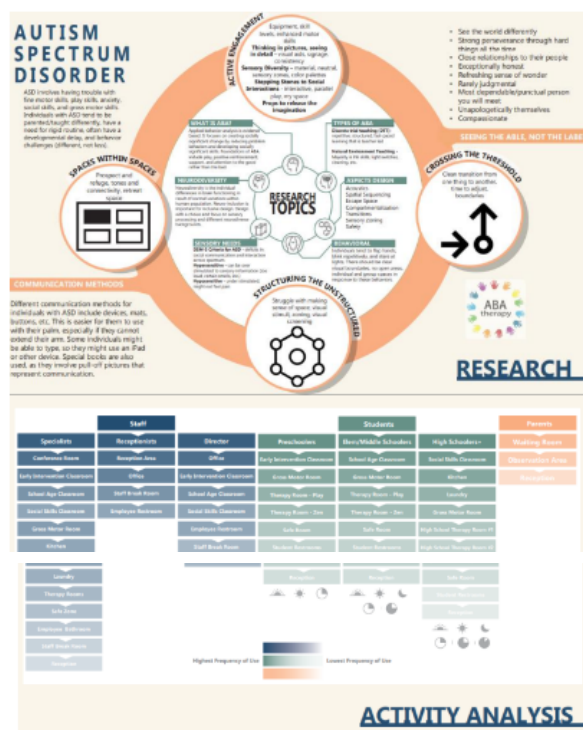
Floor Plan



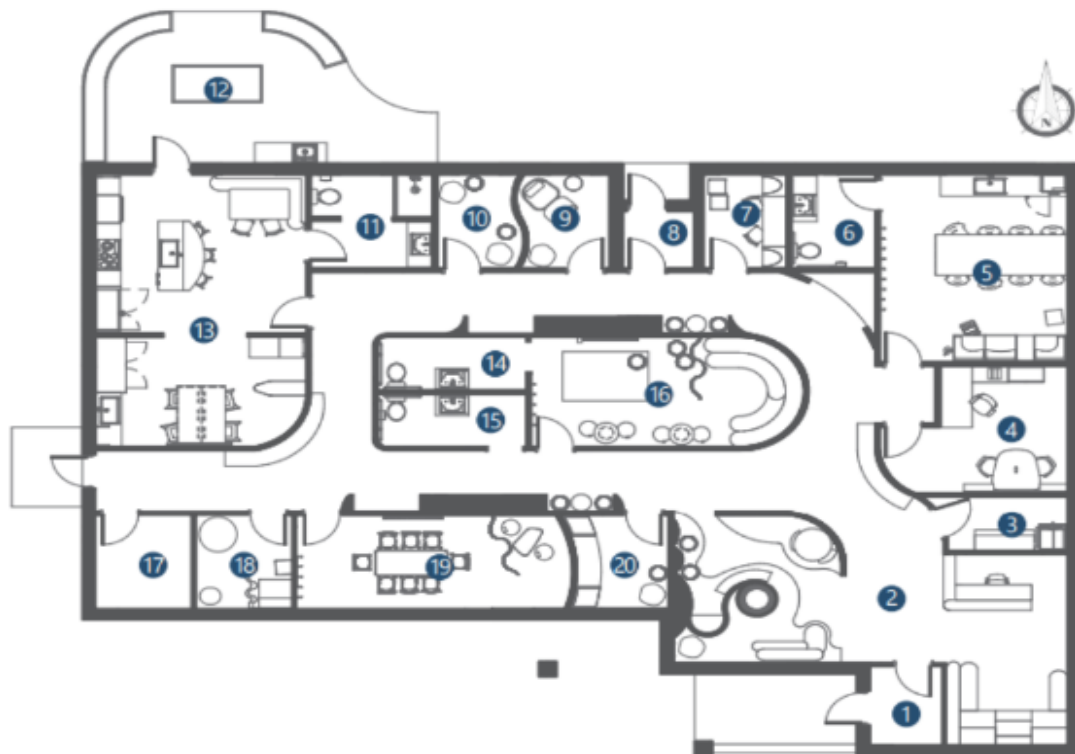
Figure 4: Student Team 2 Project



Conceptual Diagram- Surfaces used for interaction and seclusion



Research Summary



Floor Plan

