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ACKNOWLEDGEMENT

I am grateful to my institute - National Institute of Design for all the exposure, training, challenges and friendship that I have received through the academic tenure. I thank my guide, Amresh Panigrahi for his constant support and encouragement through the course and for introducing me to Prabhat Education Foundation, Ahmedabad. I am thankful to our course mentor, Shimul Mehta Vyas for her guidance and for pushing me out of my comfort zone. I am very grateful to Rajeshree Ben for teaching us to work with leather, fabric, paper and other materials and to use tools and techniques in the right way. Prabhat is a new family to me and I thank Keshav Chetterjee for agreeing to this graduation project. I thank Divya, Bhavisha Ben, Kashmira Ben, and all the staff and children for allowing me into their school during working hours and making me a part of their routine there. I thank Saaqib Sheikh for smiling at me when I first went to his school and home, I thank him for his love and friendship. I am thankful to Saaqib's parents and neighbors for sharing their stories and tolerating my intrusion. I am thankful to Anand for patiently understanding the design project and fabricating well finished prototypes. I thank all my friends for being there, specially Mohit Bhatia, Amisha Bajpei, Deepak Panda, Debanshu Bhaumik, Nithya Subramanian, Madhumitha Chandrasekharan and Souvik Bhattacharya. I thank my family for being the pillars always.



LIFESTYLE ACCESSORY DESIGN AT NATIONAL INSTITUTE OF DESIGN

Lifestyle Accessory Design (LAD) is one among the post graduate programmes of NID that specializes and trains students to think of design through a lifestyle. The word 'Lifestyle' is inclusive of a research process that spans from field research to an in depth study of social, cultural and psychological aspects of a subject. After the understanding of a subject's lifestyle, LAD translates this understanding into the most enjoyable and suitable object by exploring and playing with materials, finishes, colour and form. LAD also emphasizes on understanding and supporting traditional crafts around the world because of the vast knowledge in techniques and design process that each craft has and encourages students to bring the old into the new and vice versa.

PROJECT SUMMARY

The degree project is a case study of a child named Saaqib Sheikh who is a student at Prabhat Education Foundation based in Ahmedabad that provides alternate education to children with special needs. Saaqib is a nine year old boy and diagnosed with Spastic Cerebral Palsy. The project takes shape from a broad understanding of the infrastructure in India for special needs, learning about developmental disabilities in children; to a deeper understanding of Cerebral Palsy with the support of Saaqib, his family and Prabhat Foundation. Looking at special needs in the context of an Indian urban settlement facing challenges in finances, social stigma, physical space, etc., gives designers a sense of urgency and responsibility to design systems, services and products that suit best. We are headed towards a more inclusive approach to design that enables an individual to think through a broader spectrum of users. Hence, the outcome of this project is a product that is inclusive of Saaqib's lifestyle and surrounding which also mirrors the lifestyle of many other people with special needs.

PROJECT BRIEF

To design a product that is inclusive of individuals with physical and economic challenges in India.

PROJECT METHODOLOGY FOLLOWED

- step 1: Becoming a friend at the center by frequently visiting and participating in the activities.
- step 2: Observing children's routine, activities, abilities and disabilities. Taking notes, sketching, taking photos and videos.
- Step 3: Concentrating on Saaqib for a more detailed understanding of his activities at the center and ergonomics.
- Step 4: Observing Saaqib's routine at home and learning more about his family, neighborhood and social circle using storyboarding.
- Step 5: Mapping the collected data into activity chart, stakeholders chart, etc.
- Step 6: Learning about disabilities in India, about cerebral palsy, about aids and appliances for special needs through books, published papers, articles.
- Step 7: Visiting institutions that are well known for education, rehabilitation, research and innovation for special needs.
- Step 8: Identifying possible areas for design intervention
- Step 9: Initial ideation in three possible areas and presentation to guide and Prabhat team
- Step 10: Narrowing down on one area based on multiple iterations and feedback and ideating in detail.
- Step 11: Paper models of suggestive products
- Step 12: Feedback from guide and Prabhat team and based on it making the first prototype.
- Step 13: Testing at the center and making adjustments for ergonomics and ease of use.
- Step 14: Material research, form study and implementation of final product at the center.
- Step 15: Observation for a month and making alterations if required.



1.1 Introduction to Cerebral Palsy

Cerebral Palsy is a group of conditions related to movement or postures occurring due to a brain injury or irregular development of the brain before, during or soon after a child's birth. It is not a progressive disease, however the physical condition of the child maybe permanent. There is no cure as of now, but the movements and posture of a child can be improved with early intervention and consistent care.

The extent to which a child's body has been affected depends on the location and extent of brain injury. This could range from minor fine motor alterations to impairment to all four limbs leading to a severe disability.

The severity is broadly divided into three categories of Cerebral Palsy

- Hemiplegia
- Diplegia
- Quadriplegia

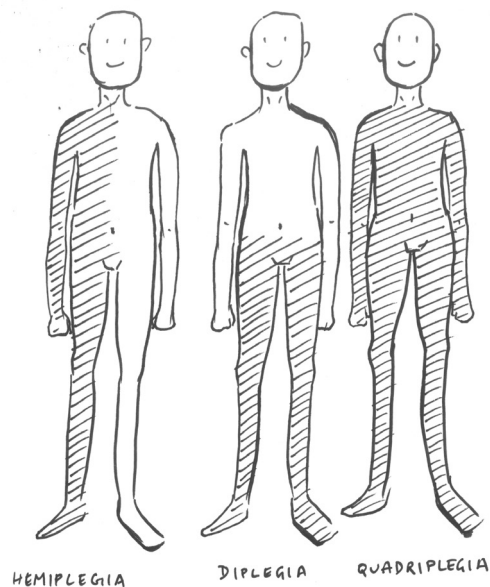


Fig.1

The above classification is made broadly based on the limbs affected. Other body parts may also be involved leading to slurred speech, low hearing and weak bowel control.

Movement and posture of a child could vary from stiffness to uncontrolled movements. Based on this, Cerebral Palsy is divided into three types -

- Muscle Stiffness or Spasticity
- Uncontrolled movements or Athetosis
- Poor balance or Ataxia

Muscle stiffness or spasticity also referred to as Spastic Cerebral Palsy ('Spastic' translates to muscle stiffness or muscle tension) is a condition where the body is rigid or stiff, movements are slow and awkward and the position of the head triggers abnormal postures of the body. The body is more stiff when the child is upset or excited. This is the most common type of CP (Cerebral Palsy) affecting more than 70% of children with CP.

Uncontrolled movements or Athetosis also referred to as Diskinetic Cerebral Palsy has slow, wriggly or stormy quick movements and reflexes of the child's feet, arms and face muscles. Sometimes the limbs may also resort to twisting and repetitive movements. This condition is called Dystonia. Most children with Athetosis have normal intelligence. About 15% of children with CP are often diagnosed with Athetosis.

Poor balance or Ataxia or Ataxic Cerebral Palsy affects the child's balance and co-ordination leading to shaky and clumsy movements. There is difficulty while sitting and standing and may continuously fall. To keep balance, the child may walk with legs wide apart taking irregular steps 'like a sailor on a rough sea'. This kind of CP is rare.

Causes of Cerebral Palsy

The earliest research on CP dating back to the 1830s was done by a British surgeon William John Little. He identified the condition and it was later termed 'Little's Disease'. 'Cerebral Palsy' was the name given by Sir William Osler based on the latin words for 'brain' and 'Paralysis'. Both researchers suggested birth complications or injuries during birth as the cause for CP

In 1897, neurologist and Psychiatrist Sigmund Freud disagreed to the theory and suggested that the cause for CP roots back to the developmental stages of the foetus and affected the children before birth. This was supported by recent studies when only 10% of cases were found to be due to birth injuries.

Therefore, the possible cause of CP fall in one of the three stages-

1. Causes of Pre-natal / Congenital (Before birth) -

- Viral infections
- Malformation of blood vessels
- Mis-match in blood-type of the mother and child
- Placental factors leading to poor supply of oxygen to the brain

2. Causes of Peri-natal (During birth) -

- Birth asphyxia or suffocation
- Damage to white matter of brain
- severe untreated jaundice
- Meningitis, encephalitis
- Multiple births

3. Causes of Post-natal (Soon after birth) -

- Bacterial and viral infections
- Traumatic brain injury
- Very high fever
- Poisoning from lead glazes on pottery, pesticides and other poisons

All the above mentioned causes may result in damage in different parts of the brain and to different extents. Let us now study the relation between different parts of the brain and parts of our body.

Brain and Body

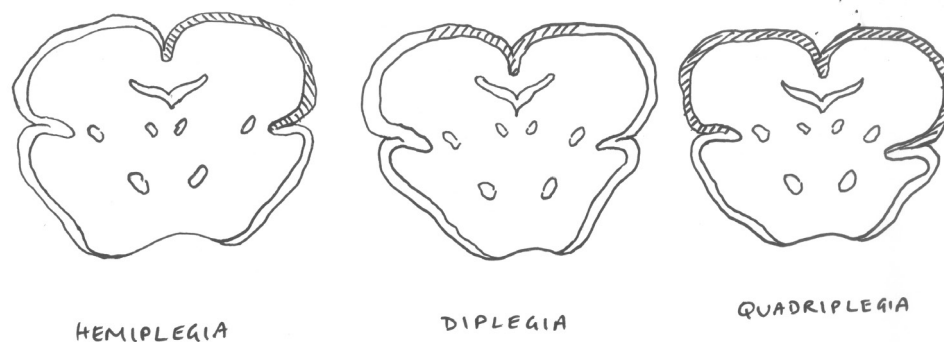
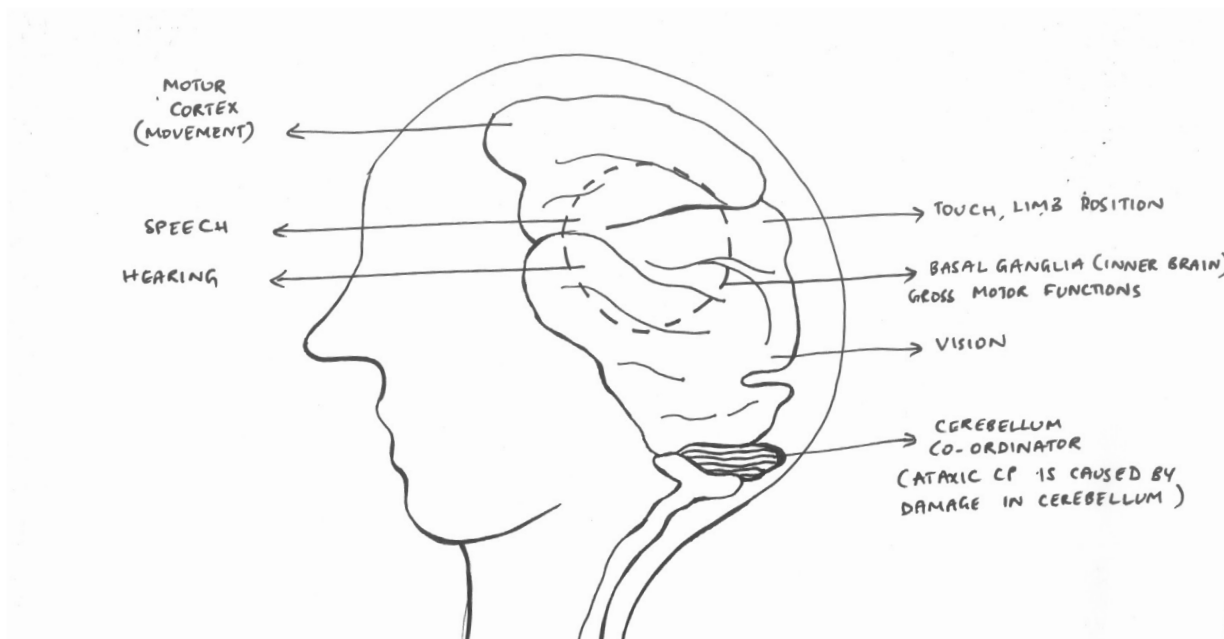


Fig. 2

The damage in different parts of the brain results in one or more of the following physical disabilities -

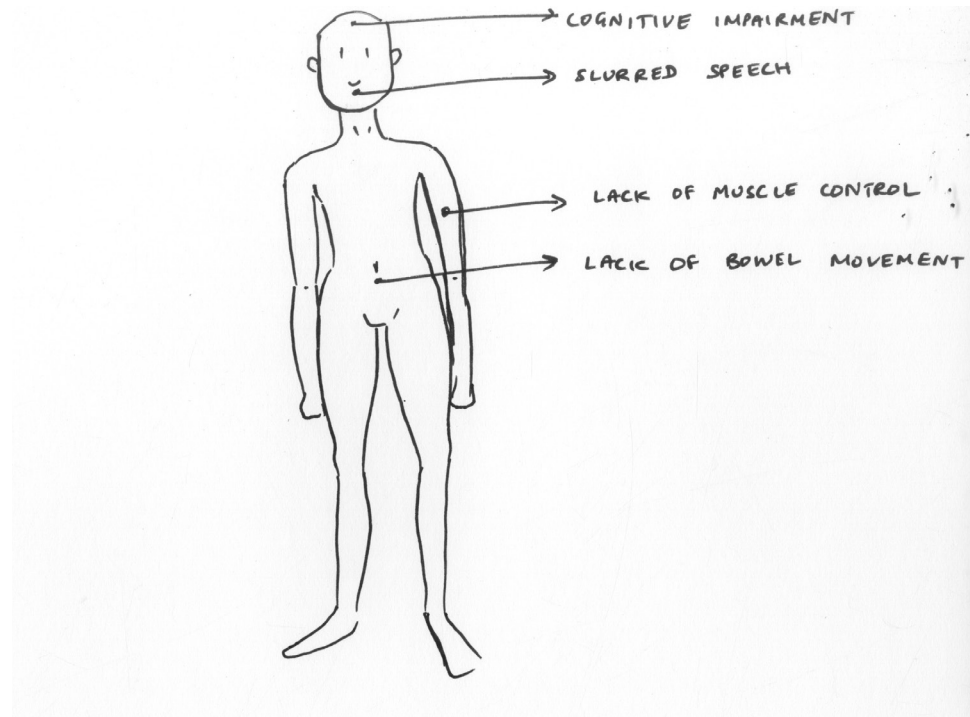


Fig. 3

The condition is not progressive, but one may have to live with the physical condition throughout. the brain damage is not curable as per the current clinical researches, therefore one needs to focus on what best can be achieved with the abilities of the child.

The child will need support. Special support in terms of physical object-based support, support of family and social circle in terms of acceptance, adjustment, patience and emotional well being, and support from the government and statutory bodies in terms of inclusive reforms, aids and development.

1.2 Disability in India - Statistics and Infrastructure

The number of disabled people in India is, without an doubt, very high. The manner in which support is given in urban and rural set-ups is contrasting and continuously changing. Though our focus here is Cerebral Palsy, there is a common thread running with respect to facilities, aids and institutions for Persons with Disabilities (PwD) in India.

'Disability' is defined by World Health Organization(WHO) as -

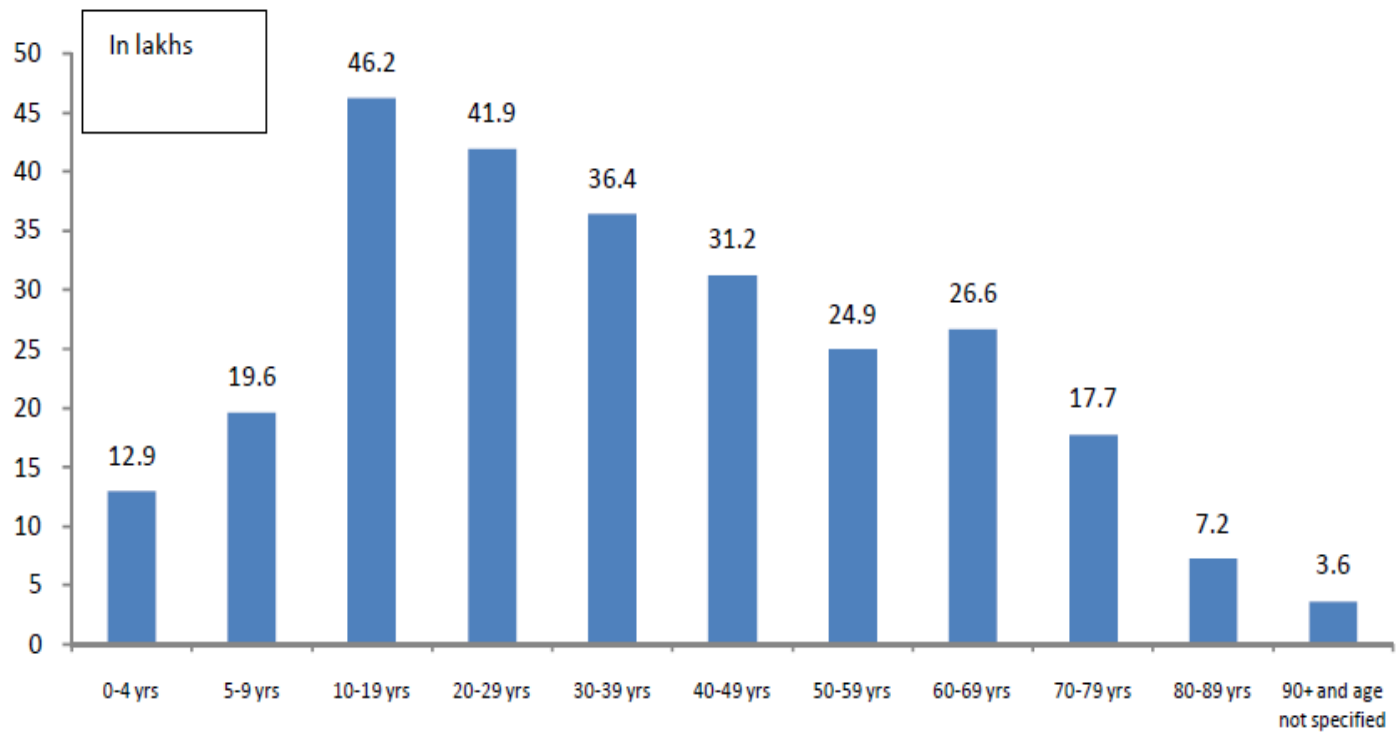
Disabilities is an umbrella term, covering impairments, activity limitations and participation restrictions. An impairment is a problem in the body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations.

Disability is thus not just a health problem. It is a complex phenomenon, reflecting the interaction between features of a person's body and features of the society in which he or she lives.

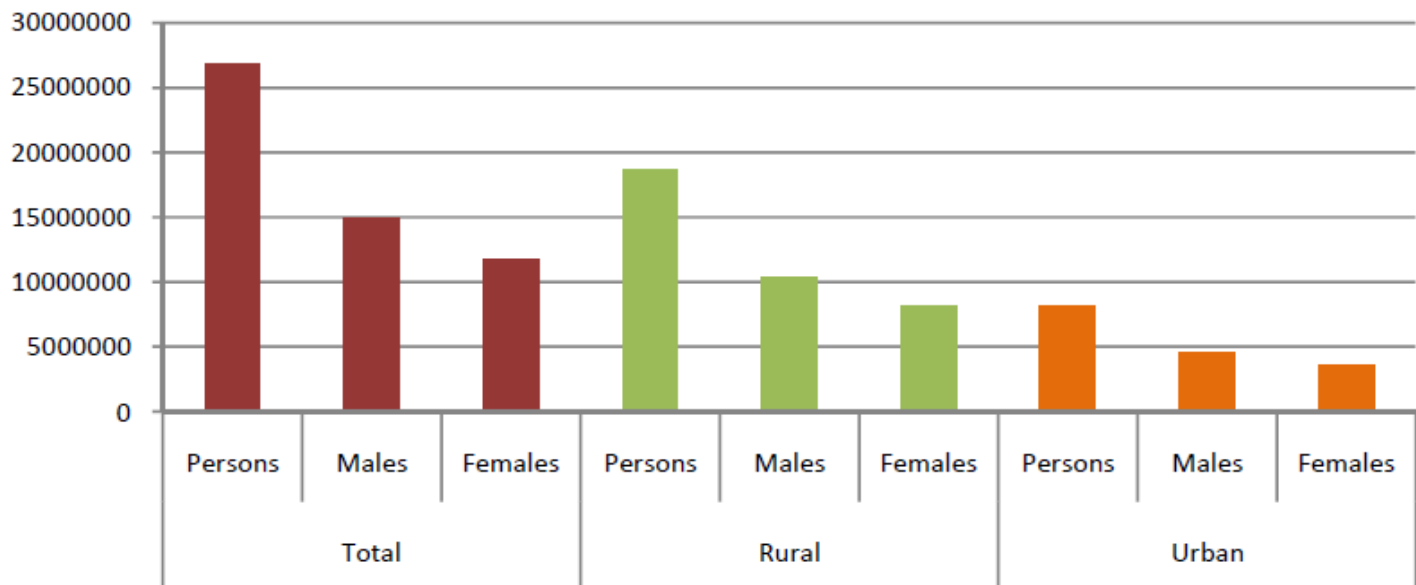
In 2016, the Social Statistics Division of Ministry of Statistics and Program implementation drafted with a publication titled - 'Disabled persons in India - A statistical profile 2016'. It is a detailed analysis of the 2.21%(Census 2011) disabled population in India.

Presenting a few excerpts from this publication -

The study is based on Census 2011. In India, out of the 121 Crore population, about 2.68 Crore people are 'disabled' which is 2.21% of the total population.

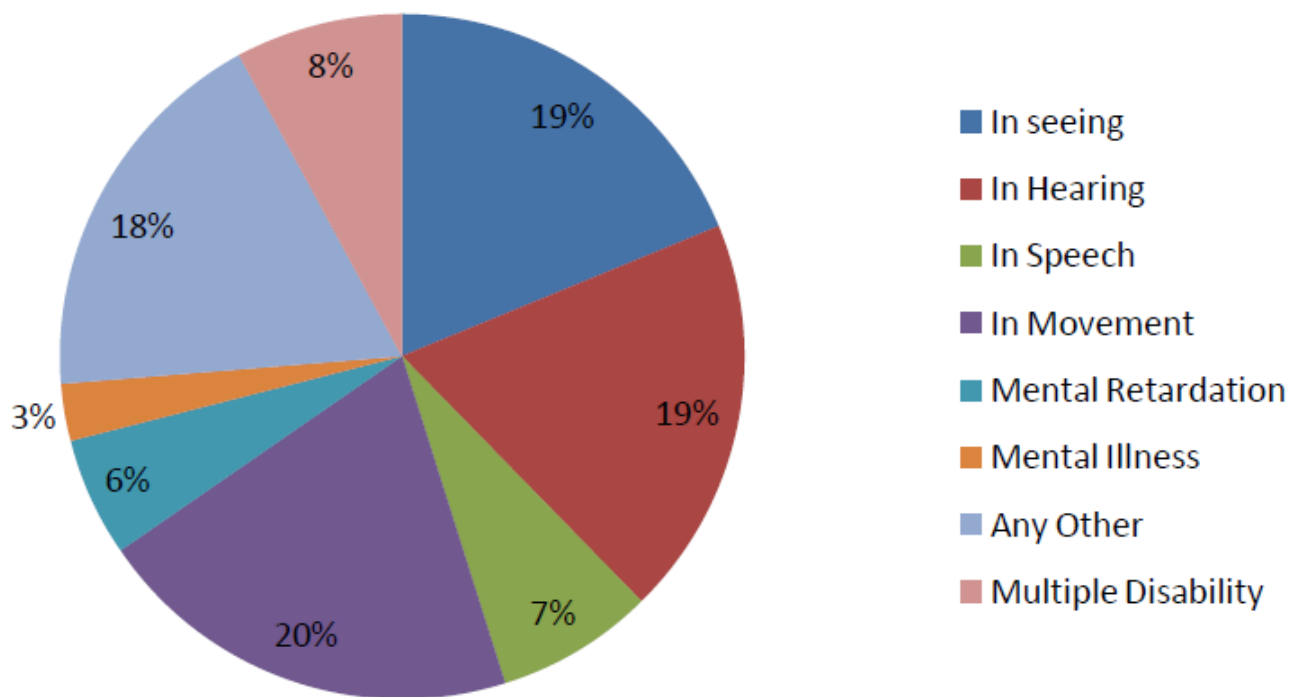


Disabled population by age group in India- Census, 2011

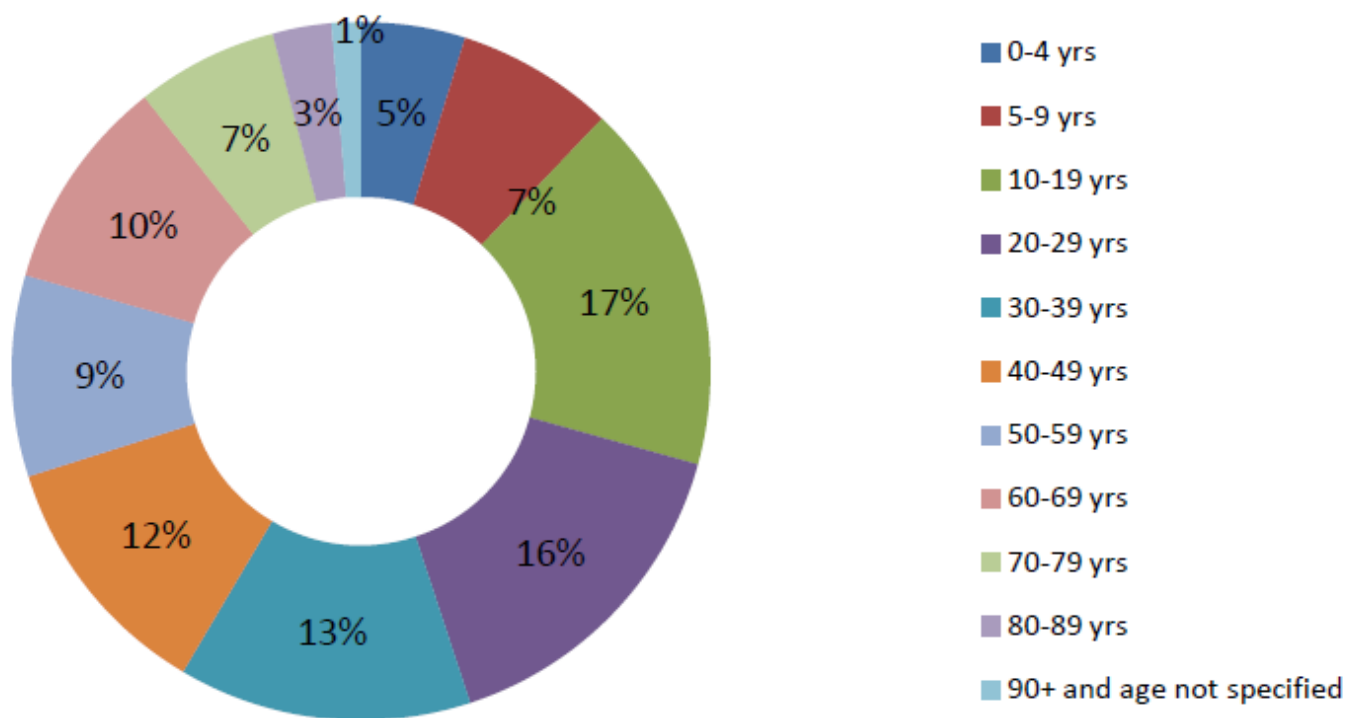


Disabled Population in India - Census 2011

Fig. 4



Disabled population by type of Disability in India -Census, 2011



Percentage distribution of Disabled population by age group in India - Census, 2011

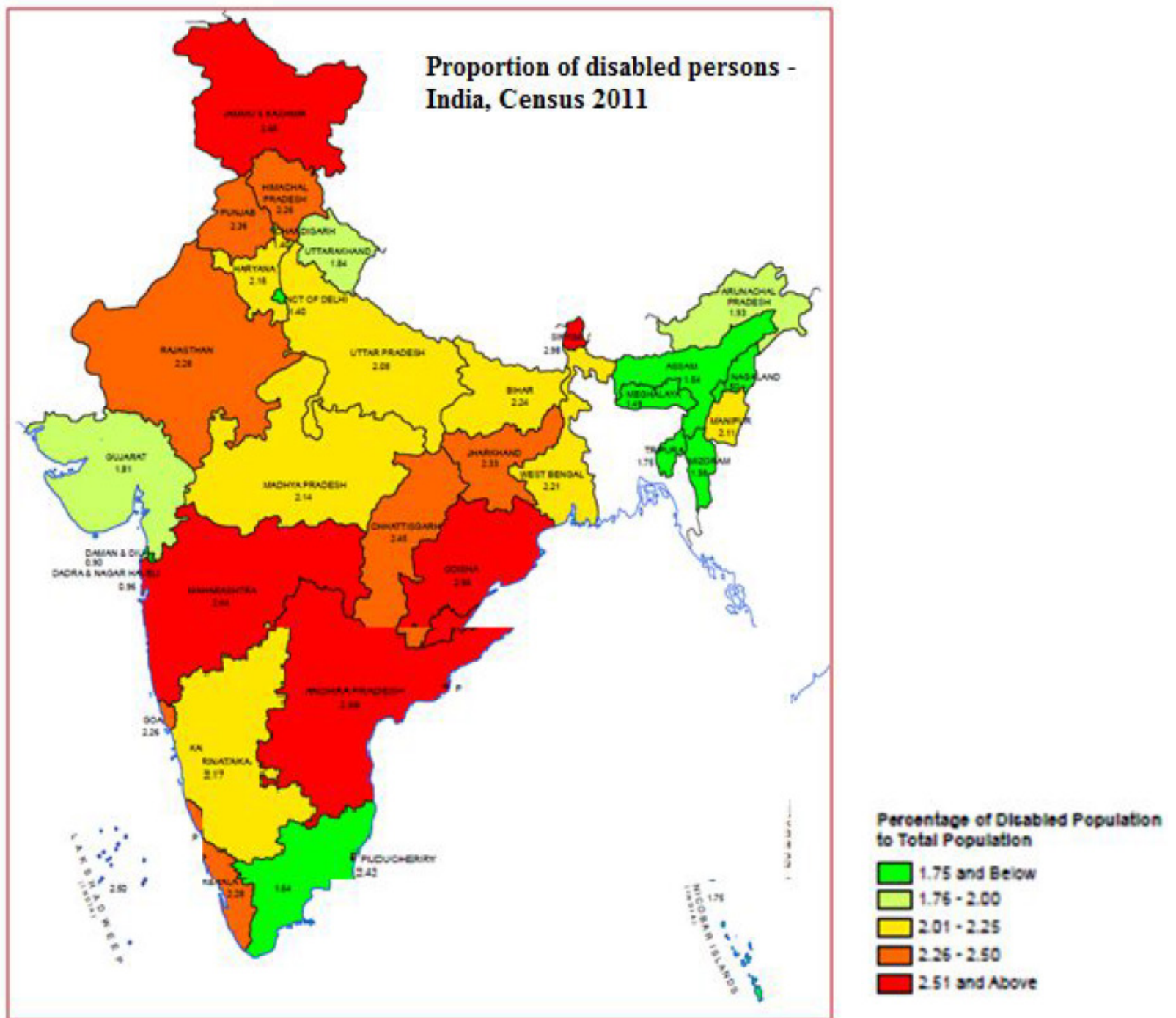


Fig. 5

The charts illustrate disability against various parameters such as- 'urban and rural', 'male and female', age group, education, employment, type of disability and marital status

Coming back to CP, In India, nearly 15-20% of the disabled population is affected by CP, which is an estimated 3 out of every 1000 births. Out of this the most common form of CP is Diplegia (30%-40%), the Hemiplegia (20%-30%) and Quadriplegia (10%-15%). In an analysis of 1000 cases, about 61% of cases were found to have Spastic Quadriplegia, with a majority being boys and more often in the first born.

There is an Infrastructure that is constantly evolving for persons with disabilities in our country. It involves various acts and legislations as part of the constitution of India and other statutory bodies, national policy making, schemes and various models to suit different socio-economic strata of our country. Please turn over to have a look at the various aspects of planning in our country.

The list may seem exhausting but maybe still insufficient or coordinated poorly to reach out to the magnitude of people requiring special care. Having said that, the effort for prevention of disabilities through education and awareness has had a positive effect at least in many urban cities. The question now is- How do all these facilities reach the folks in need? Rehabilitation models that are also constantly evolving may be an answer to this.

Infrastructure in India for Persons With Disabilities

<u>CONSTITUTIONAL PROVISIONS</u>	<u>ACTS & LEGISLATIONS</u>	<u>STATUTORY BODIES</u>	<u>SPORTS, RECREATION, & CULTURAL LIFE</u>
Article 41 - Right to work, Education & Public assistance	Persons with Disabilities Act, 2016	REHABILITATION COUNCIL OF INDIA (RCI), 1992	The Dept. for Empowerment of Persons with Disabilities (DEPwD)
Article 243-G on Social Welfare	Rehabilitation Council of India (RCI) Act, 1992	Chief Commission for Persons with Disabilities (CCPD), 1995	Ministry of Social Justice & Empowerment.
Article 243-W on Safeguarding interests of weaker sections	The National Trust for Welfare of Persons with Autism, Cerebral Palsy, Mental Retardation & Multiple Disabilities Act, 1999	The National Trust for Welfare of Persons with Autism, Cerebral Palsy, Mental Retardation, Multiple Disabilities Act, 1999	

Schemes

<u>REHABILITATION</u>	<u>AIDS & ASSISTIVE DEVICES/ RESEARCH</u>	<u>EDUCATION</u>
Peen Dayal Disabled Rehabilitation Scheme (DDRS)	Assistance for Disabled Persons for Purchase / Fitting of Aids / Appliances (CADIP)	National Fellowship for Students with Disabilities
Scheme for Implementation of Persons with Disabilities Act 1995, (CSIPDA)	Central Sector Scheme for Braille Presses	<u>EMPLOYMENT</u> Incentives to Private Sector Employers for providing Employment to Persons with Disabilities
District Disability Rehabilitation Centers (DDRC)	Central Sector Scheme on Research and Disability Related Technology, Products and issues.	<u>AWARENESS</u> Scheme for generation & Publicity of awareness.
National fund for Persons with Disabilities		

National Policy Statement, 2006

Undertaking:

1. Prevention of disabilities
2. Rehabilitation Measures

Rehabilitation Measures:

Physical Rehabilitation

FARLY DETECTION & INTERVENTION

COUNCELLING & MEDICAL REHABILITATION

ASSISTIVE DEVICES

DEVELOPMENT OF REHABILITATION PROFESSIONALS

Educational Rehabilitation

SARVA SHIKSHA ABHIYAN (SSA) FREE & ELEMENTARY EDUCATION UP TO THE AGE OF 18 YRS.

INTEGRATED EDUCATION FOR DISABLED CHILDREN (IEDC) SCHEME - AGE 18 YRS.

OPEN SCHOOL, ALTERNATIVE SCHOOLLING, DISTANCE EDUCATION, SPECIAL SCHOOLS, HOME BASED EDUCATION, PART TIME CLASSES (UNDER SSA)

COMMUNITY BASED REHABILITATION (CBR) AND VOCATIONAL TRAINING

SCHOLARSHIPS & FELLOWSHIPS FOR HIGHER EDUCATION

Economic Rehabilitation

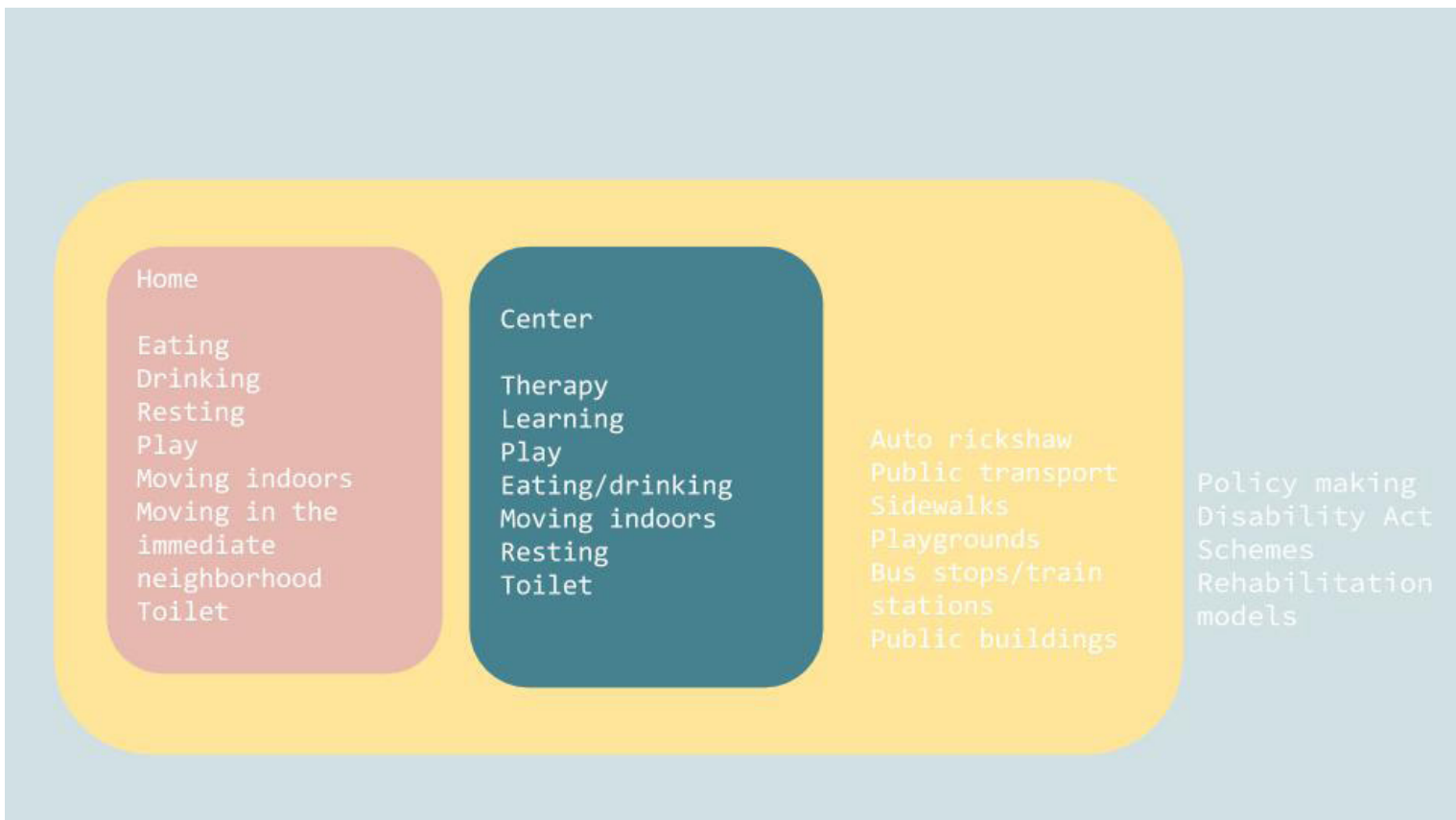
3% RESERVATION IN GOVT. OF INDIA ESTABLISHMENTS

WAGE EMPLOYMENT IN PRIVATE SECTOR

VOCATIONAL REHABILITATION & TRAINING CENTERS

SELF EMPLOYMENT & LOANS FROM NHFDC

INCENTIVES, AWARDS & TAX EXEMPTIONS



An overview of all factors that are interdependent in the area of special needs in India

Rehabilitation Models

Institutionalised services

Institutions for the disabled are recommended for those who have a severe disability and require constant care. The rehabilitation program could last anywhere between three weeks to six months. Not many families can afford this kind of rehabilitation. However, institutionalised rehabilitation comes with a risk of being neglected by the family.

Rehabilitation homes

These are smaller set ups scattered across a city or district. Here, families send the children while they go for work or board them there on a weekly basis. On weekend, the child spends time with the family. These services are however expensive and not so common in developing countries like India.

Day care centers

In India, across cities, there are privately owned and Govt. aided day care centers that are set up for children with special needs. The center takes responsibility of assessing the child and providing suitable rehabilitation that includes physical, educational, medical, social and vocational services. The centers also train teachers in specific areas and make the family aware of the Do's and Don'ts and other facilities that the child can avail. Mostly this is done free of cost or at a nominal fee.

Community Based Rehabilitation

The community based rehabilitation or CBR program was established by WHO to cater to rural parts of developing countries. It is cost effective and makes use of available resources (hospitals, homes, man-power) to provide rehabilitation services. WHO

has provided detailed manuals for parents and doctors to go through and take initiative to support the disabled rural folks in their respective villages. Due to the lack of trained professionals and funds, these services are useful mostly to the mildly disabled population. The aids and appliances suggested are primitive and made with locally available skills, materials and technology. They are useful without a doubt, but the severely disabled require more sophisticated solutions.

District Rehabilitation Centers

The Govt. of India has introduced a scheme for District Rehabilitation Centers (DRCs) across the country to cater to the comprehensive needs of the disabled population in each district. On the primary level, the responsibilities of a DRC is-

- To devise suitable delivery systems to reach the entire population in the district.
- To promote the most cost-effective technologies.
- To restructure the present job of rehabilitation professionals so that minimum number of specialists could be utilized for delivering services.

The DRCs establish several Primary Rehabilitation Units (PRUs) that give primary therapy, education and devices/aids required for rehabilitation to be made available close to the child's home. The idea is also to spread awareness throughout districts to the local population and erase any stigma associated with disability. The employment for running a model like DRC is also given to local folks with sufficient training.

1.3 Accessibility Aids and Technology Available Today

The world is designed around the majority and when a child with cerebral palsy enters it, may feel isolated and frustrated constantly because he or she is unable to do what appears effortless for others of the same age. Confidence is what keeps a child going and lets him or her see beyond disability. Assistive devices help fill some gaps that are created by the restrictions of the body. These devices are devised to increase the chances of success with different activities and tasks. The devices are no different from objects used by everyone. There is a body, there is a wish, and the object bridges these two as gracefully as possible. For children with CP, only the ergonomics is different.

Assistive devices restrict certain parts of the body to amplify the use of certain other parts of the body. With the examples that follow, this can be understood more clearly. Depending on the severity of CP, the kind of device and purpose may vary.

Mobility

For both indoor and outdoor movement of a child, different kinds of devices have been designed - crutches, walkers, wheel chairs, scooters, powered mobility devices, robotic exoskeletons, etc.

Moving in a standing posture





Moving in a sitting and sleeping posture





Posture

Various activities like feeding, learning and therapy demand the child to stay in a comfortable posture for certain time. Different kinds of chairs or 'frames' are designed for specific tasks.

Sitting frames





Standing Frame



Slant or Leaning Frame

Communication

Speech and hearing is often affected in children with CP. As a result, expression and communication becomes challenging. Communication tabs, hearing aids, writing aids and eye tracking devices help a child to express.



Communication Tabs



Writing Aids



Special Keyboards



Cochlear Implant for Hearing



Eye Tracking Screen

Therapy

Physiotherapy is a lifelong routine for children with CP.

Therapy rooms are designed carefully - right from flooring to mirrored walls, and equipped with therapy objects that are used to improve gross motor and fine motor skills. Since it has to be done everyday, it could get boring for the child, therefore therapy is mostly combined with toys and games to make it self driven and fun.



The regular fine motor therapy toys for mind and body co-ordination, fun and learning.

Mirror Therapy Technique

Mirror therapy is used for Cerebral Re-organization and functioning of motor skills.



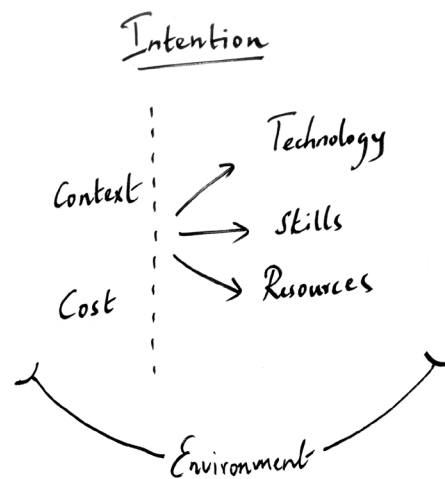
Aqua soft floor tiles along with serving the purpose of soft flooring, these tiles are modular, easy to install and encourage and engage the child to move around and have fun with the colourful liquid.



Sequin Pillow Therapy also involves stimulating sensory organs for smell, touch, taste, eye sight and sound



All the inventions to support the area of special needs are distributed among various groups of users depending on their affordability and usability. While designing, it is a reverse process of knowing the user(s) well and bringing out the most suitable product. Once the intention of the design is finalised, the context plays the most important role in the design process. The same intention maybe addressed by a product that is advance in technology and fabrication process and by a product made with conventional fabrication. They may differ with add-ons, pros and cons.



Spastic Society of Karnataka, Bangalore

Spastic Society of Karnataka is one of the oldest institutions in India set up for children with special needs. Over time, the institute has matured accomodating expert faculty, latest technology and constantly updating and upgrading through its practice and research. It was established in 1983 and was called Spastic Society of India then.

The institute provides diagnostic and rehabilitation services for children with neuromuscular and developmental disabilities like-

- Cerebral palsy
- Mental retardation
- Autism
- Multiple disabilities
- Learning difficulties

The Diagnostic and Research Center (DRC) and education services are the main branches of the institute. Depending on the age and diagnosis of the child, he or she is enrolled for a suitable program. The teacher to student ratio varies from 1:10 to 1:4 depending on the dependency of the child.

At the institute, the purpose of visit was to study certain objects that have been customized in-house as per the child's requirement. The chairs or 'frames' used at the institute were unique.

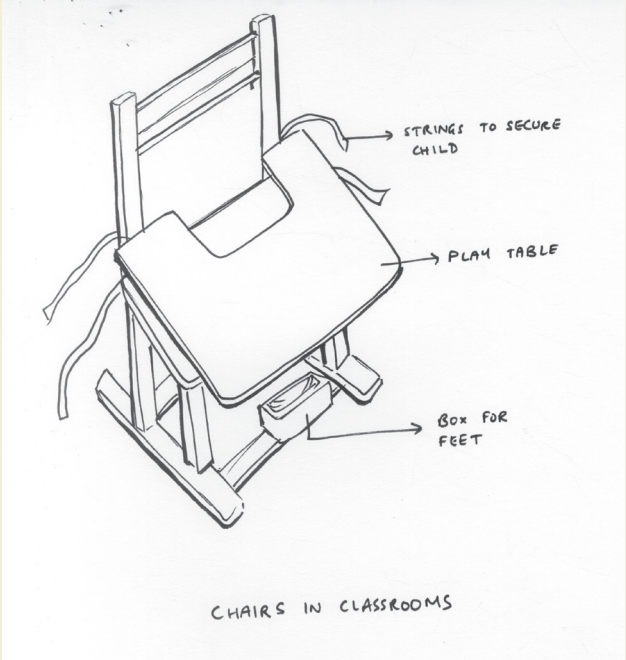


Fig. 6

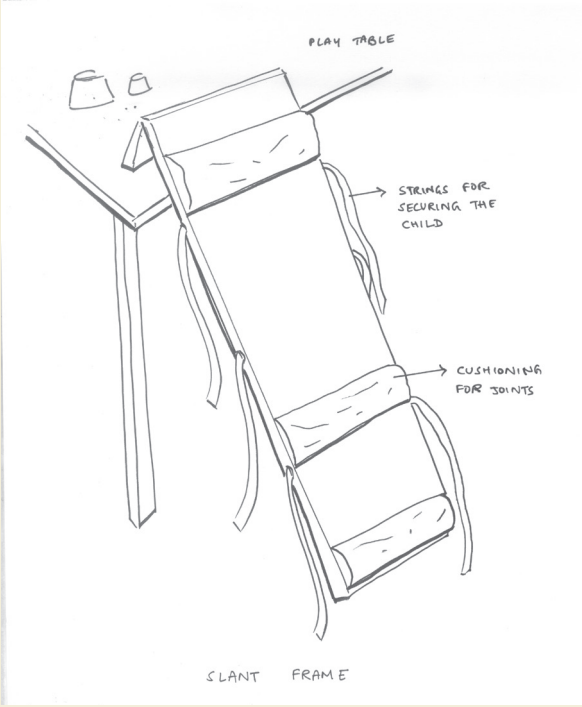


Fig. 7

1.4 Prabhat Center for Alternative Education

Prabhat Education Foundation or Prabhat center for alternative education was established in 2006 in Ahmedabad under the public charitable trust to cater to children with special needs who are physically and economically challenged. There are six centers across the city with a Community Based Rehabilitation facility at all centers to reach out to children with severe disabilities at their homes.

Prabhat has designed various strategies with a vision of a holistic inclusion of children with special needs with the society. Today, about 3000 children across Ahmedabad are benefited by the services offered by Prabhat.

Prabhat center at Vatva, Ahmedabad

The Vatva center is located in the southern rim of Ahmedabad amidst a population with a Muslim majority. There are 35 children and a few adults enrolled at present at the center. The age group ranges from infants to adults, where the eldest of all is 24 years old.

Children below 6 years of age come in the morning with their parents for therapy and basic learning and play exercises. Other children reach by 11:00 am and stay till 4:00 pm. There are four regular facilitators who attend to their respective group of children who are at different stages of learning. A physiotherapist visits everyday by afternoon to attend to children who require physiotherapy.

All children at the center are taught basic life skills - counting, money exchange, wearing own clothes, buttoning, toilet training, locking/ unlocking the door, etc.



Older children are given primary education in English, Hindi or Gujarati for reading and writing. Some of them join regular schools once they are ready. A lot of importance is given to arts and crafts which the children enjoy and liberate themselves through their own imagination. This also could develop certain skills in a child to sustain later. Recreational activities like dance, music and sports to encourage social interaction and exercise are conducted every week.

Teachers take notice of every child's abilities and interests and devise new methods, activities and toys using simple objects and easily available materials to make learning more fun and not repetitive.

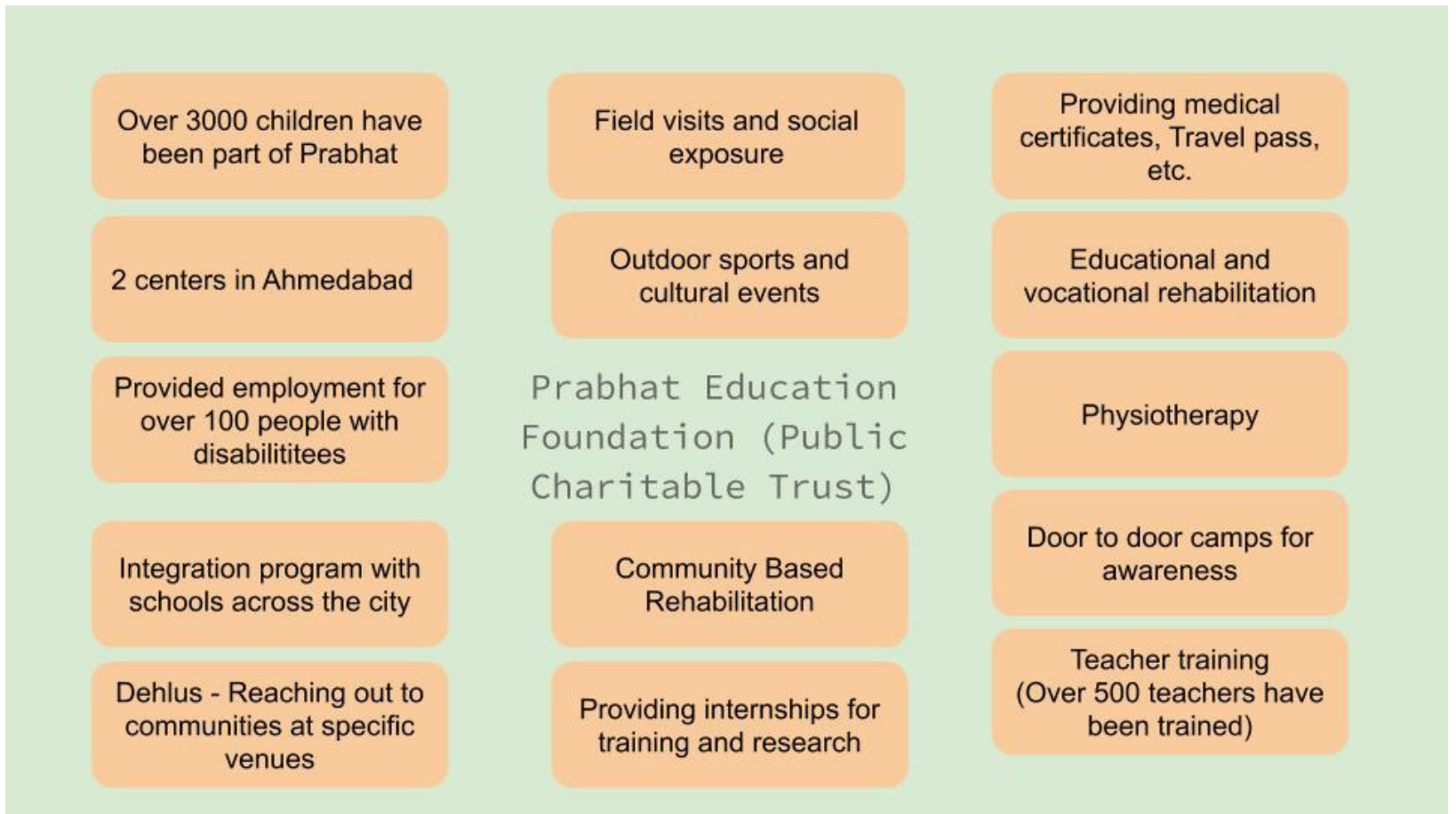
An auto is provided by the center to pick-up and drop the children everyday. Children either bring food from home or are provided with food at the center. During lunchtime they eat themselves if possible and sometimes even feed their friends who have difficulty in eating by themselves. It is amazing to see how children help each other in different tasks - they learn together, eat together, move about together and defeat their challenges together as a group.





Prabhat Foundation runs the centers through rented spaces and customize the space according to the needs of the center.





Initiatives and activities at Prabhat Education Foundation



Sensory room

Made out of easily available house-hold objects



Physiotherapy room:

The center is equipped with aids for gross motor and fine motor development.



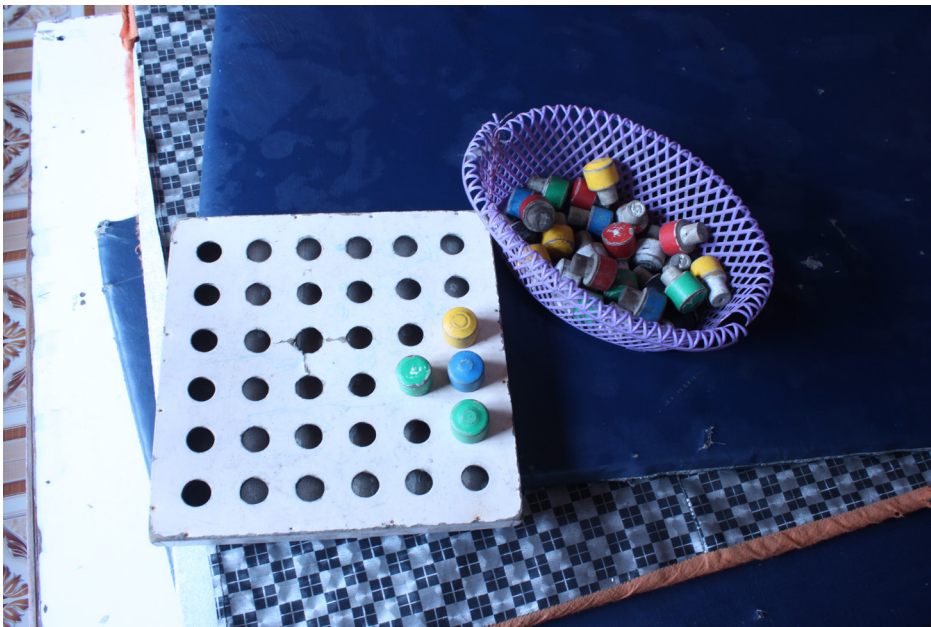




Classrooms:

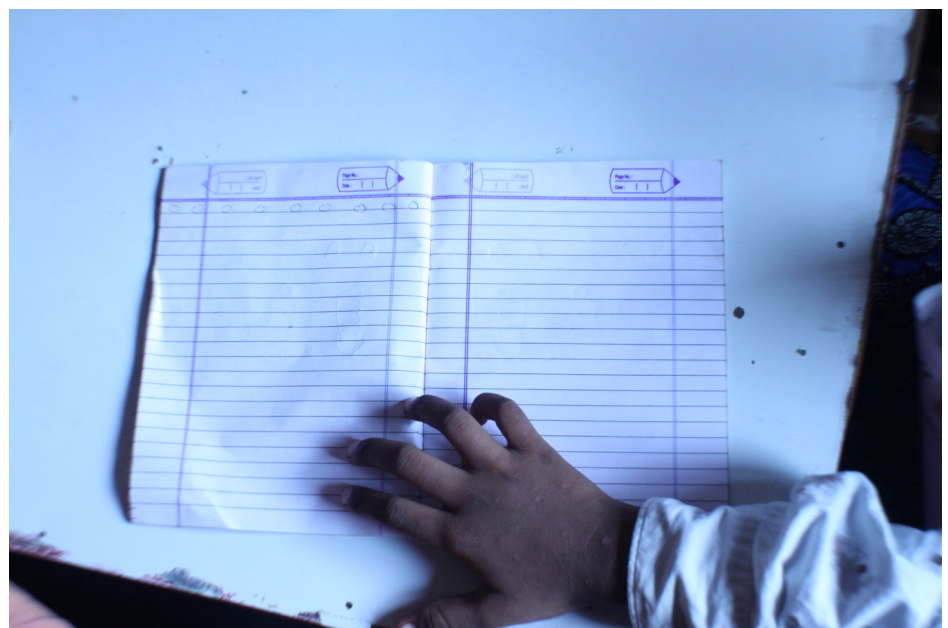
Classrooms are separated according to the age group and learning ability of the children, and the activities.



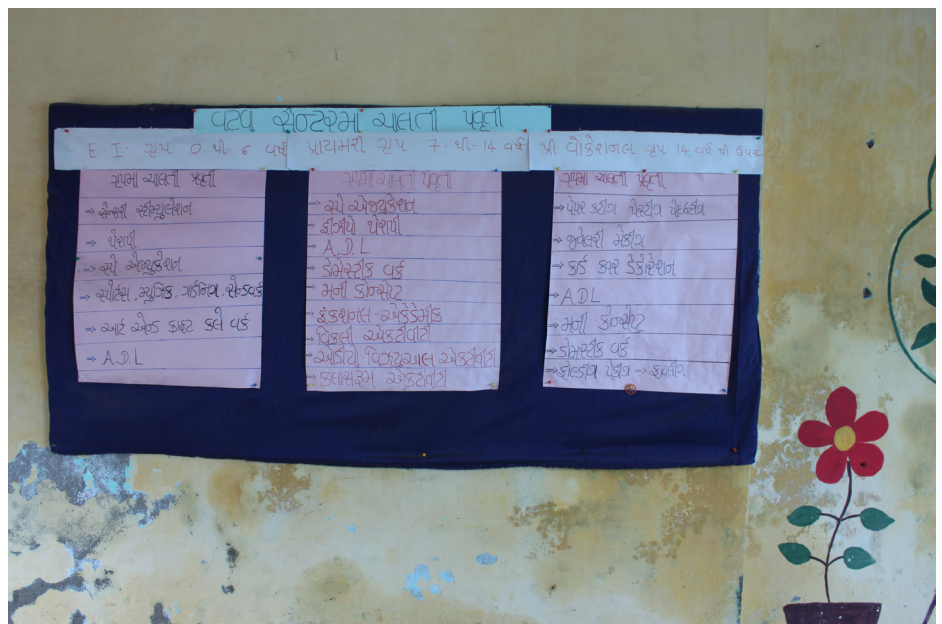


Toys and Tools:

Simple toys and tools to develop fine motor skills















Saaqib Sheik is nine years old. He lives in Vatva Gaanv, in Ahmedabad.

He is diagnosed with Spastic Cerebral Palsy by the Civil Hospital. To be more specific, it is Quadriplegia accompanied by slurred speech and slow learning. He has been a student at Prabhat Foundation for three years now and enjoys his school time.



He can drink liquids by himself using the double eared sipper. Otherwise his mother helps him drink using a stainless steel glass.



Even though there is a toilet inside their home, every morning Saaqib's mother carries him outside into the porch that has water supply, make him lie on his back and lets him attend to the nature's call. She then cleans him up and gives him a bath.



Saaqib can eat roti and chips by himself. Any finer food like rice is fed by his mother. his family is habituated to eat with hands.

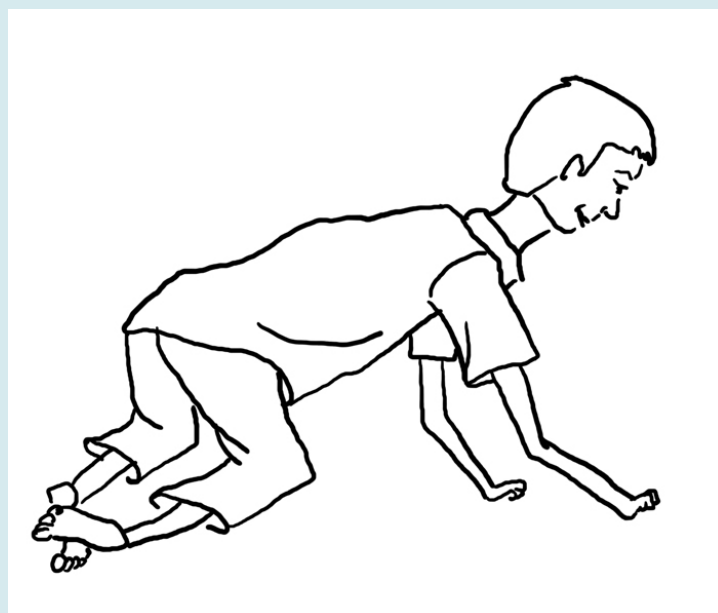


Every morning around 10:00 am, he leaves for school in the school auto rickshaw. His usual sitting posture in the auto is by fitting his legs between the horizontal bars behind the driver and holding on to the vertical bar. Sometimes his older friends carry him on their lap.

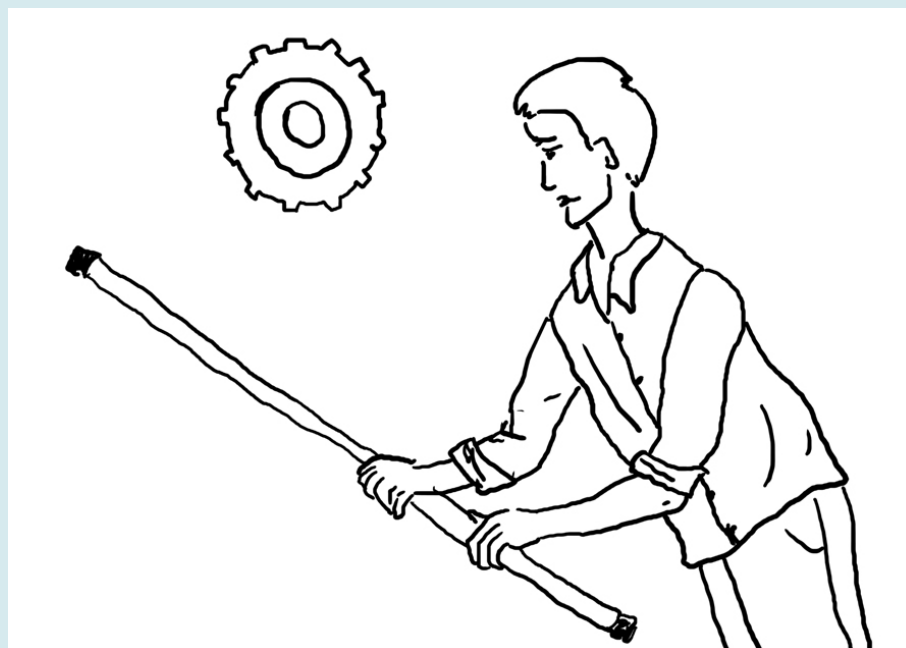




Saaqib moves around on his fours (crawling) and so he is restricted to indoor spaces. When he goes out, someone older usually carries him.



He has a younger sister, who is an infant and a younger brother who goes to school. He takes care of both of them like a big brother. His mother is a home maker. Sometimes she gets orders to stitch laces to burkhas and other dress materials. Saaqib's father works nearby in a tubelight manufacturing company.



When Saaqib's brother returns from school, he plays with him at home for sometime and then goes out to the ground next door to play with his friends. Saaqib sits in his porch and enjoys watching his brother play.





Fig. 8

Given above is the stakeholder mapping of people who play a major role in Saaqib's daily life.

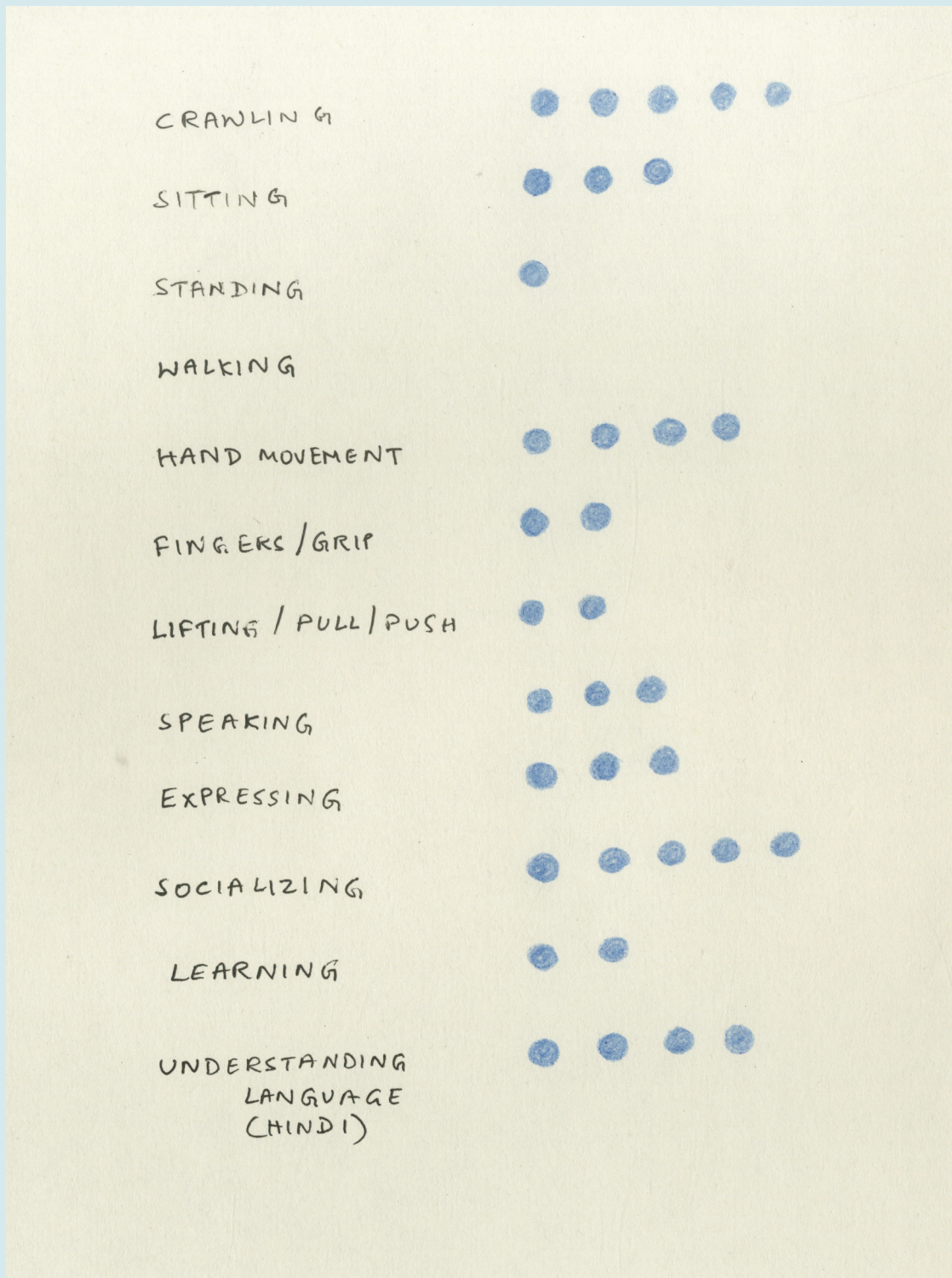


Fig. 9

Given above is the ability chart of Saaqib

ACTIVITIES	DURATION OF A/D/F
MORNING ROUTINE (GETTING READY & EATING)	MOTHER / FATHER
COMMUTE TO SCHOOL	AUTO DRIVER
PLAY & LEARNING	TEACHER
PHYSIOTHERAPY	THERAPIST
PLAY & SUPPORT	FRIENDS
MOVING AROUND & TOILET	CARE TAKERS
COMMUTE TO HOME	
EATING	
PLAY	
SOCIALIZING	
EATING	
SLEEPING	

Given above is an overview of Saaqib's activities during a day and people who are a part of it.

A DAY →

TEACHER

AUTO
DRIVER

MOTHER

BROTHER

NEIGHBORS

MOTHER

Fig.10

Opportunity Mapping

After studying Saaqib's daily routine, his physical and social circle and learning about his background from his family and teachers, the possible areas where design thinking could benefit children like Saaqib have been illustrated in the next page.

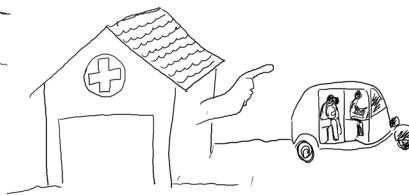


Saaqib's home and family

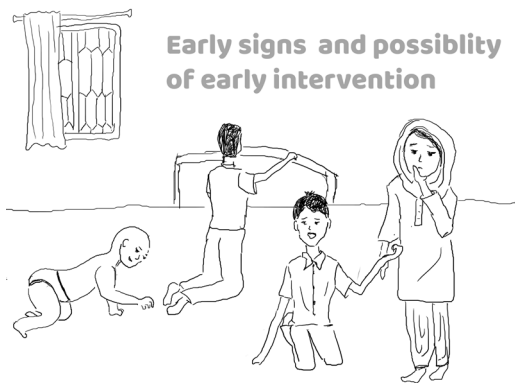


Awareness of pre-natal child care

Availability of well trained facilities for pregnancy care and delivery



Good post-natal child care



Early signs and possibility of early intervention

Clinical examination and accurate evaluation of abilities and disabilities



Social stigma associated with Disability



Awareness of Rehabilitation facilities



Mobility

Eating & Drinking

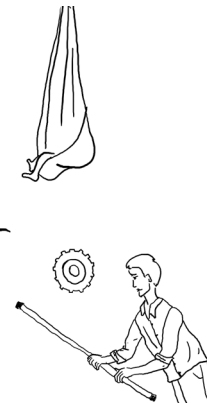


Going to the toilet



Commute to school

Daily routine

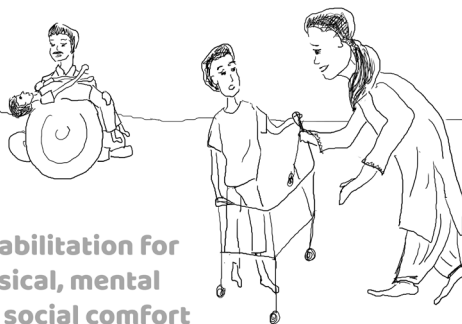


Learning

Gross motor and fine motor therapy



Rehabilitation for physical, mental and social comfort and confidence of the child



Integration with rest of the children and society as a whole



Fig. 11

1.6 Study of Postures



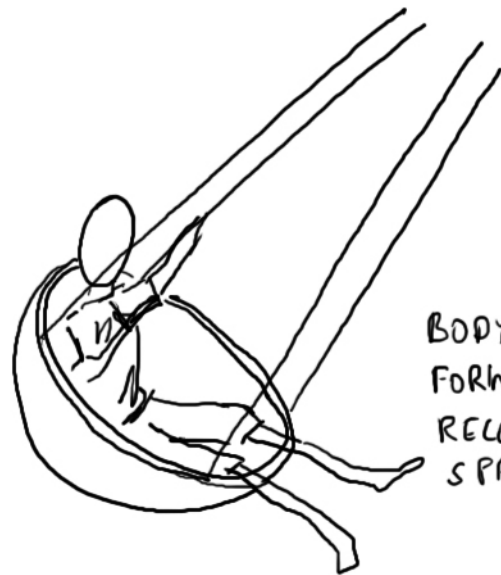
Physiotherapists advice not to rest in this posture as it hinders the growth of lower limbs



Fig. 12



Fig. 13



BODY BENDING
FORWARD
RECOMENDED FOR
SPASTICITY

Fig. 14

L

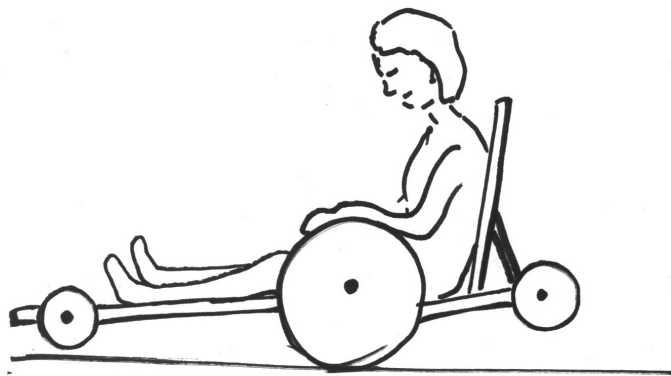
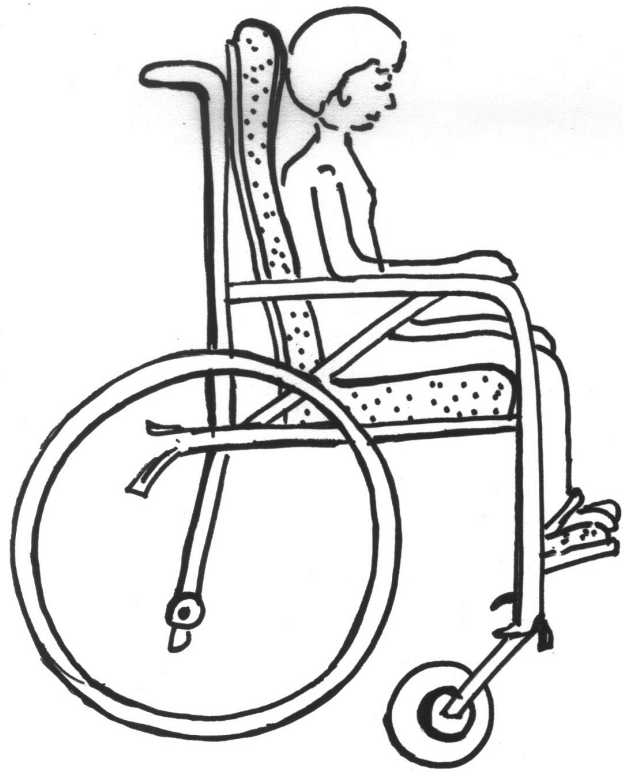
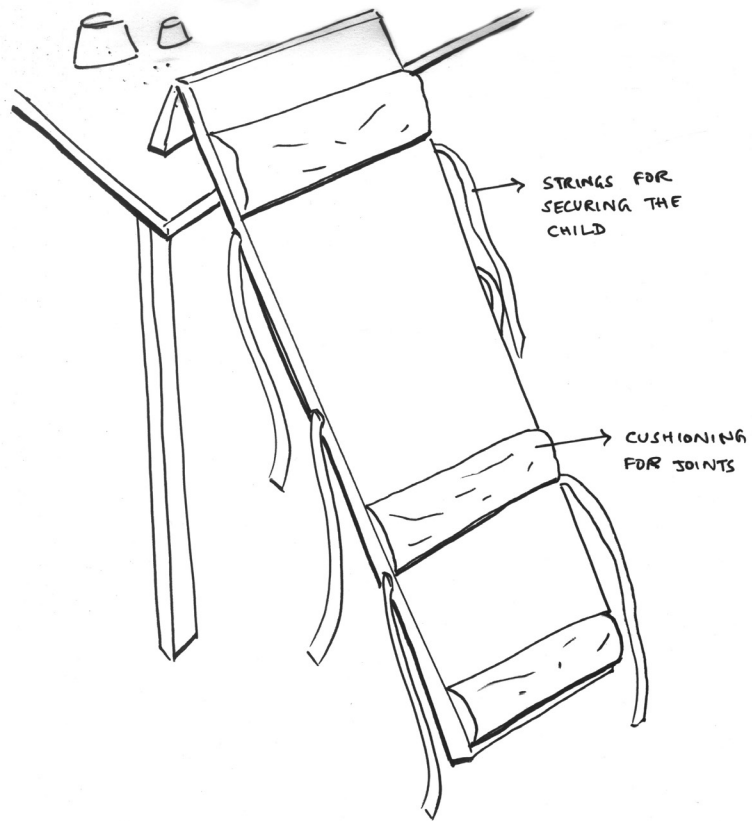
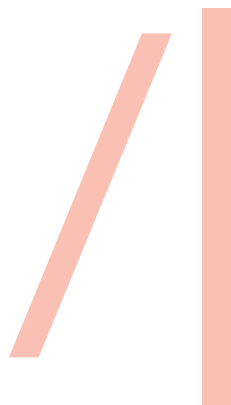


Fig. 15



SLANT FRAME



Fig. 16

Spending time with Saaqib, observing him and his surroundings and learning more about his medical condition sparked a few ideas. There are some aspects, gathered from the study, that formed the baseline of these ideas.

Affordability

Prabhat Education Foundation was set up for providing free alternative education for special children who come from a humble economic background. Saaqib's home is in a *basti*. It is a one room home with very basic amenities. He has two siblings who go to school. His father works at a tubelight manufacturing factory and earns Rs.10,000 per month. The design must easily adapt to the diverse and ever changing economic challenges in India.

Growth

Physical and mental growth of the child is most important for designing a product for children. If the object can reduce dependence in a certain activity, it boosts the confidence of the child and motivates them to take up challenges. At the same time the object must not hinder the physical growth of the child. If the object can help the child socialize and make friends, a lot of barriers are broken and may be the healthiest way for a child to grow up.

Caregivers

All participants of an activity have equal importance; only the roles differ. Making a product that is enjoyable for all to use is the ultimate goal.

Familiarity and alienation

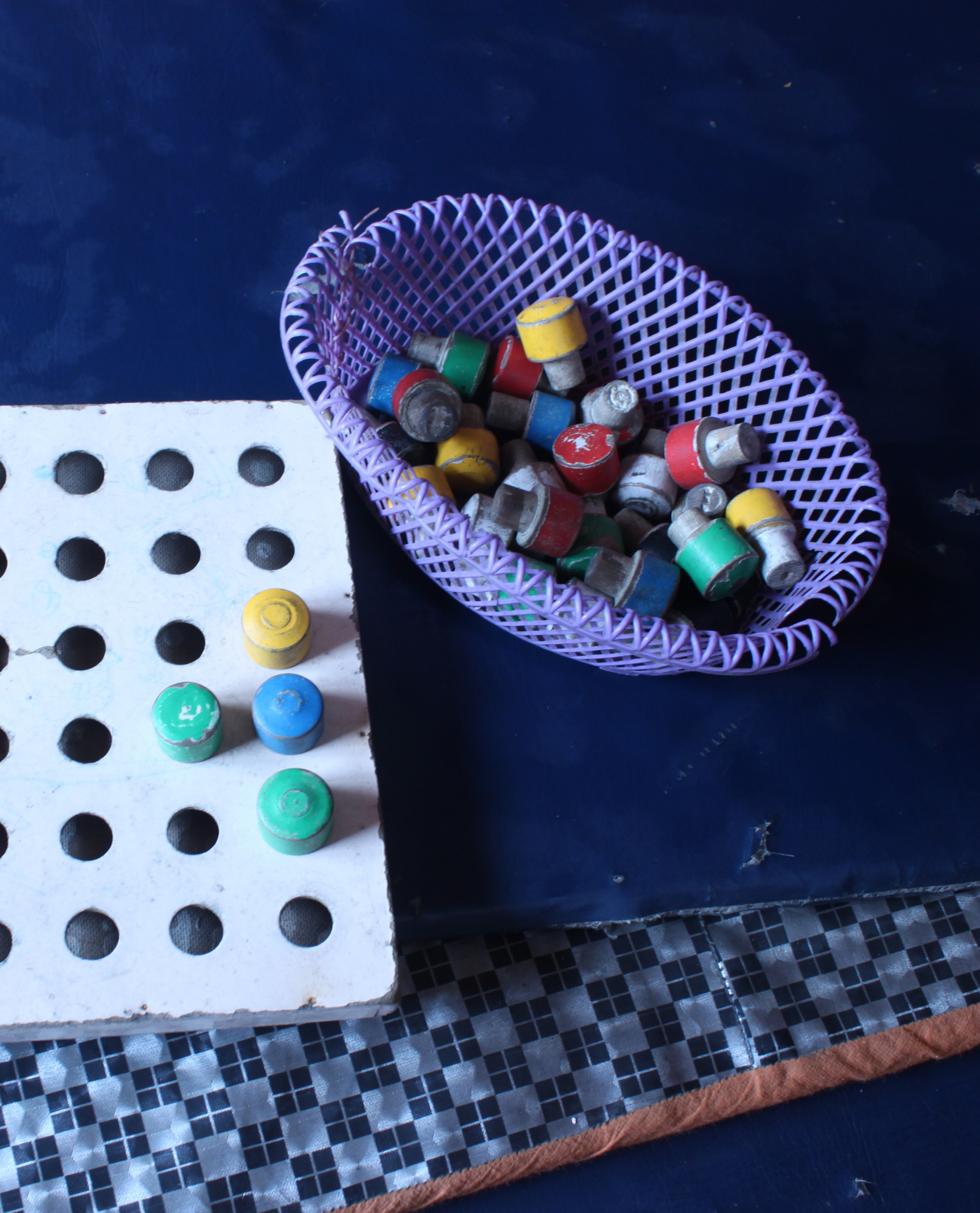
The design should not look alien or alienate the users. Even if it looks alien, it should be a friendly alien. In other words, the material used, the form, etc. must welcome the users and be easily accepted by the surrounding. It is certainly something new, but it must fit into the context well.

Making

A well thought strategy for fabrication and manufacturing process can add a sustainable layer to the design. To be aware of the environment, social eco-system, skills and resources can help in making a good product.



Planting an idea



2.1 Indoor & Outdoor Mobility and Posture Aids

Moving about is a challenge for children with CP. Illustrating a few common hurdles at home and in the immediate neighborhood.



DOOR AT A HEIGHT



STAIRS



DOORWAY



CLIMBING ON THE BED

HURDLES IN THE NEIGHBORHOOD



ROUGH SURFACE & UNEVEN ROADS



WALKERS & SMALL MOTORISTS

Fig. 17

Hand and leg driven vehicles that are playful

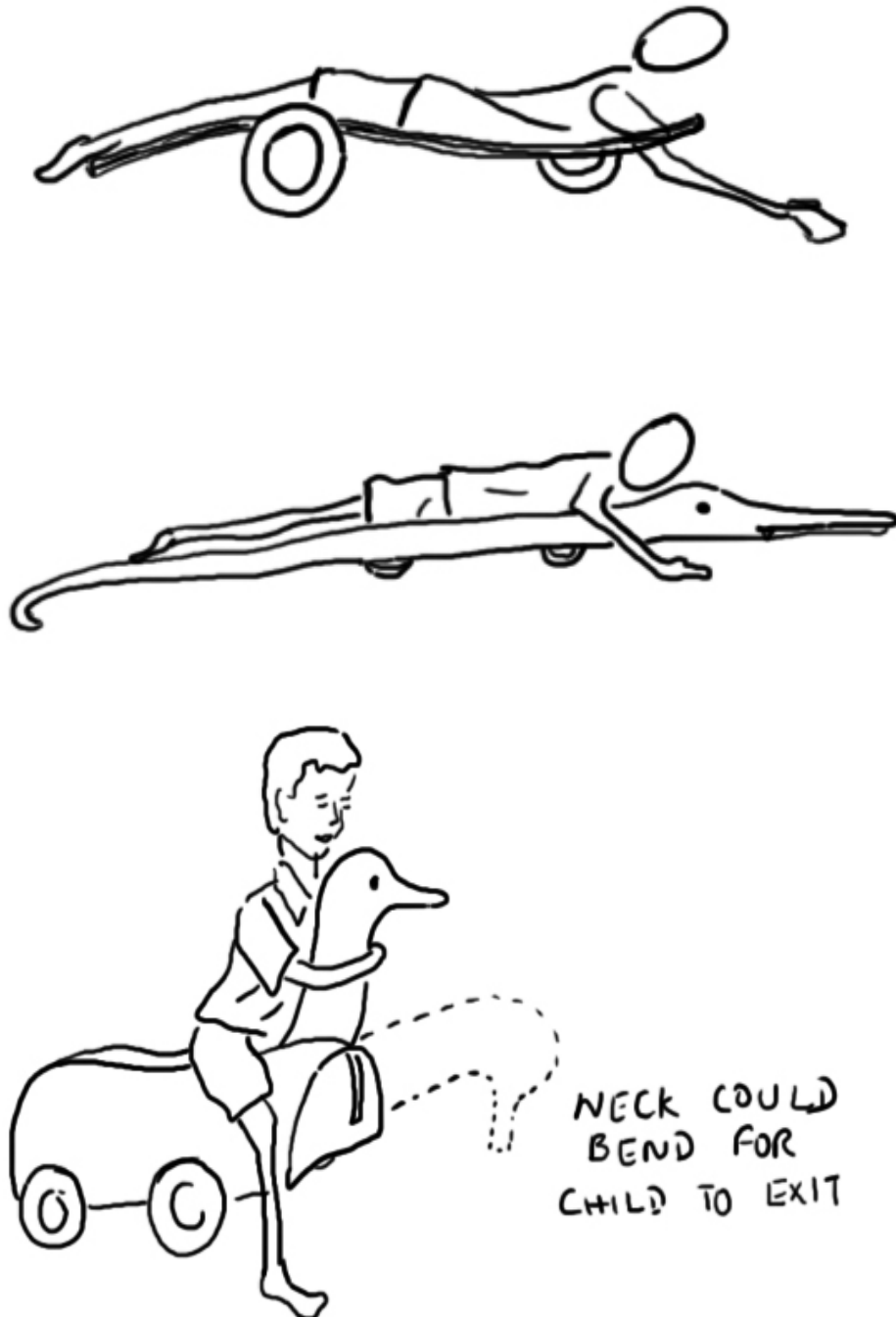


Fig. 18

A DIY Kit for various postures and utilities

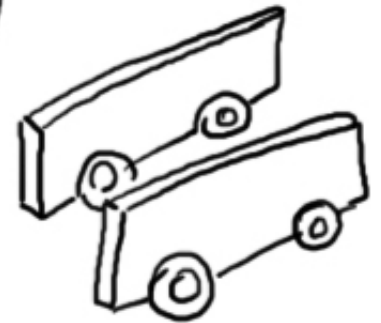
POSTURE KIT

- FOR EATING
- RELAXING
- PLAYING
- TOILET

'W' POSTURE IS NOT RECOMMENDED



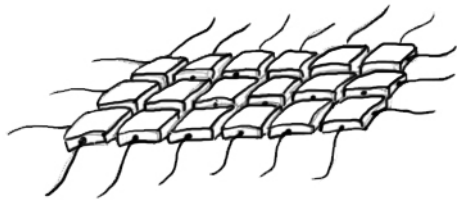
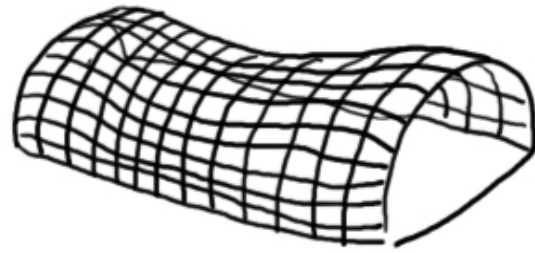
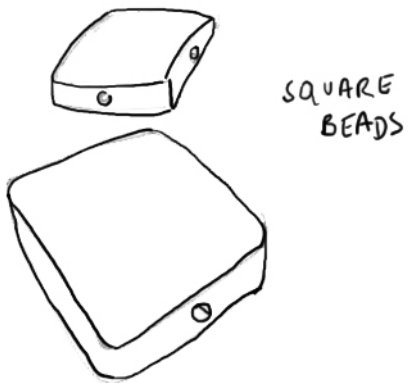
WHEELS FOR MOVING AROUND



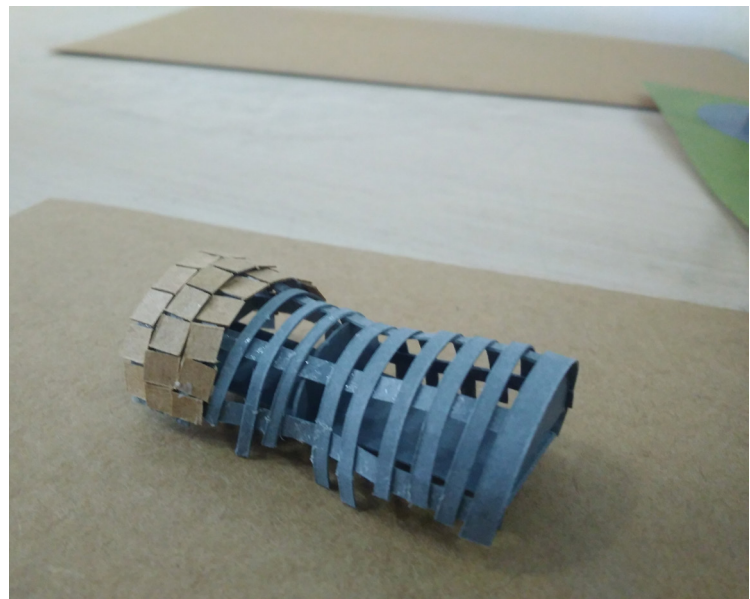
ALL PARTS IN A BOX

Fig. 19

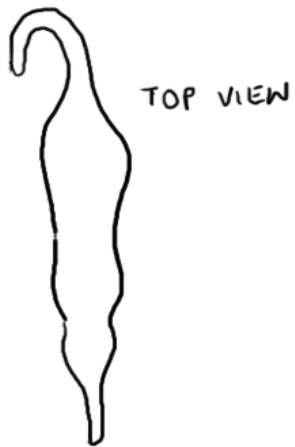




FLEXIBLE HARD SURFACE USING WOODEN / ACRYLIC SQUARE BEADS



SIDE VIEW CROCODILE



DUCK

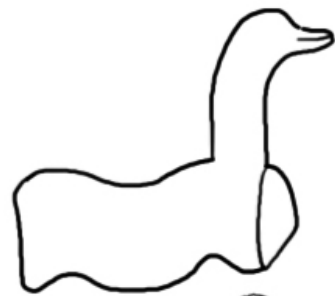


Fig. 20

2.2 Inclusive Playground

A playground accommodating forms that are comfortable for children with CP as well as other children. Simple forms like 'V's, 'C's and slants can keep the child in a comfortable posture to enjoy playing.

SIMPLE SLANTS

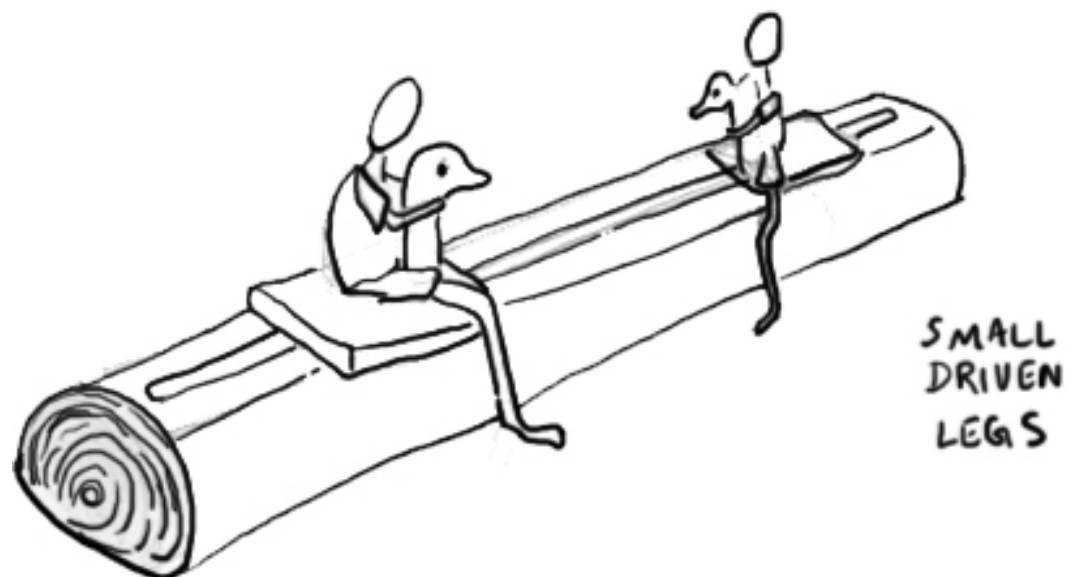
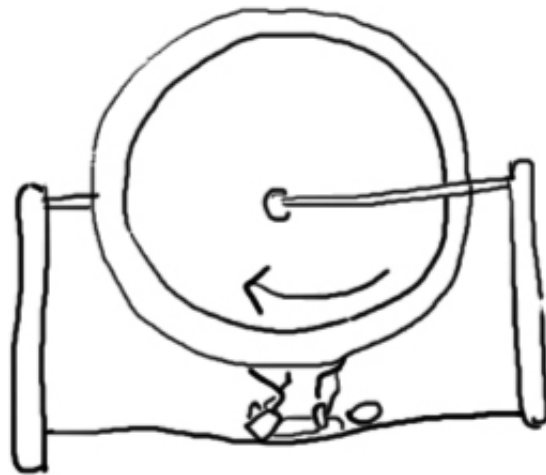


Fig. 21

Play areas and objects that are exciting for all kids and usable by all.

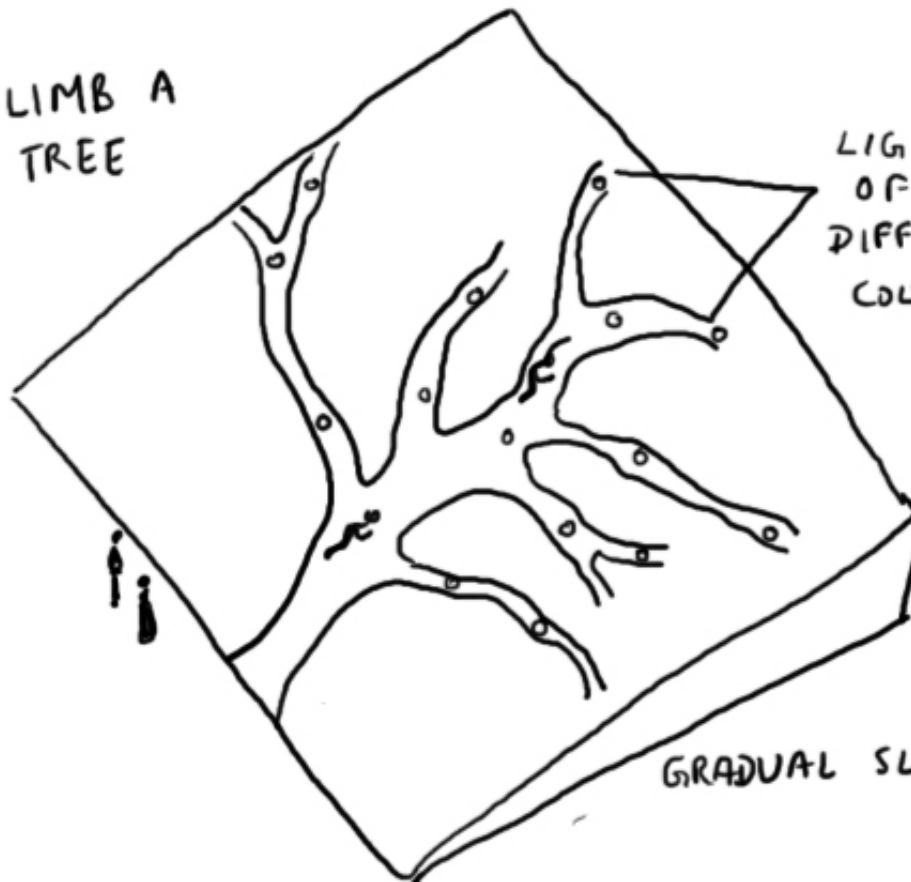
SENSORY GIANT WHEEL



DIFFERENT TEXTURES



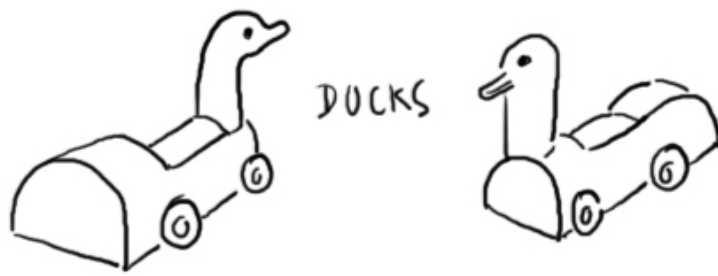
CLIMB A TREE



LIGHTS OF DIFFERENT COLOURS

GRADUAL SLOPE

Fig. 32



Keeping some traditional park objects like swings, however altering the seating to accommodate children with special needs.

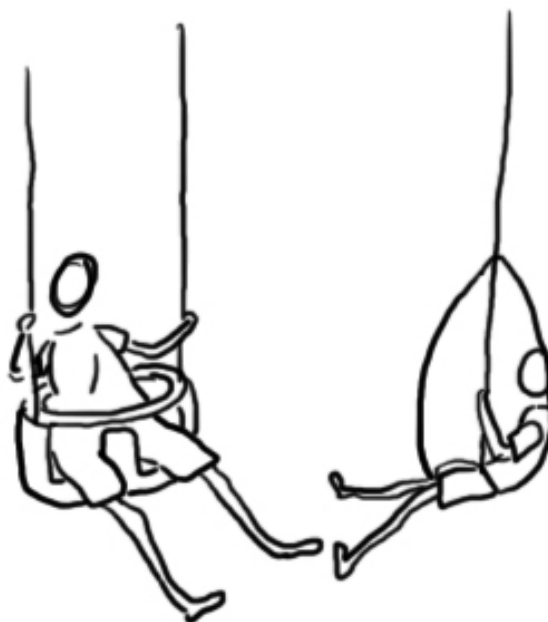
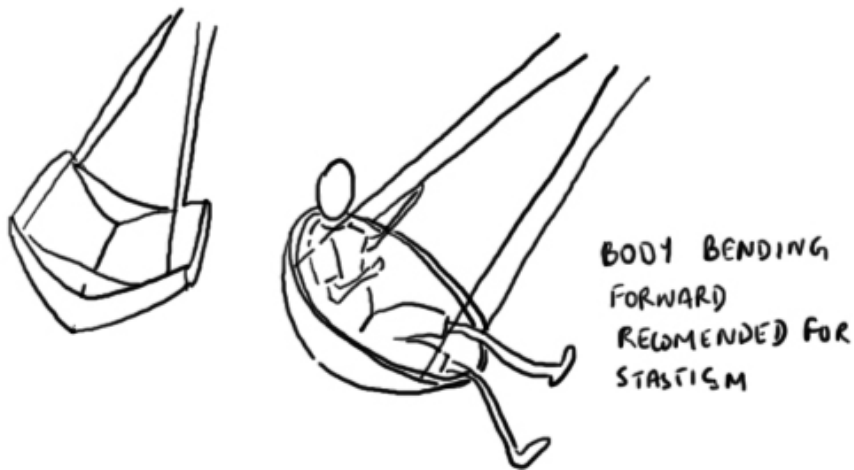
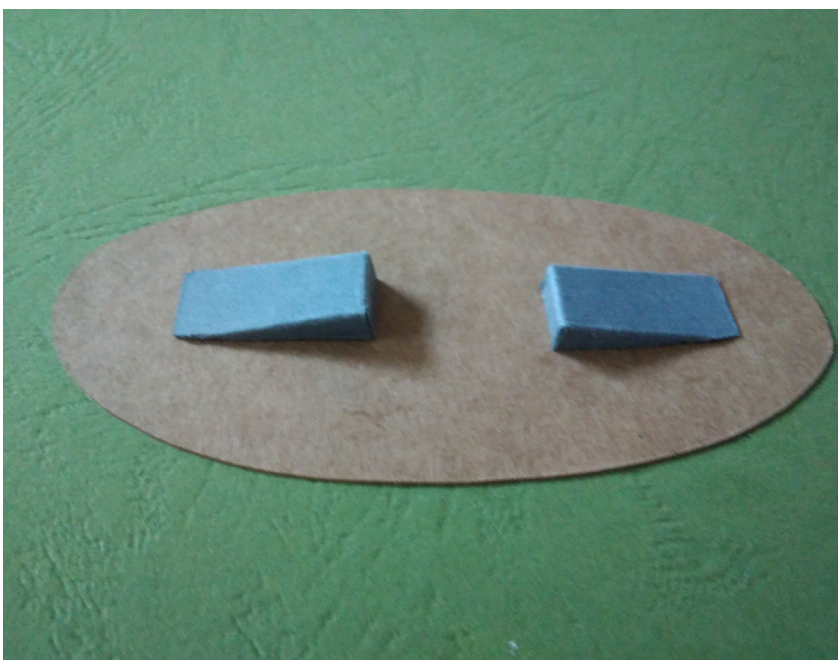


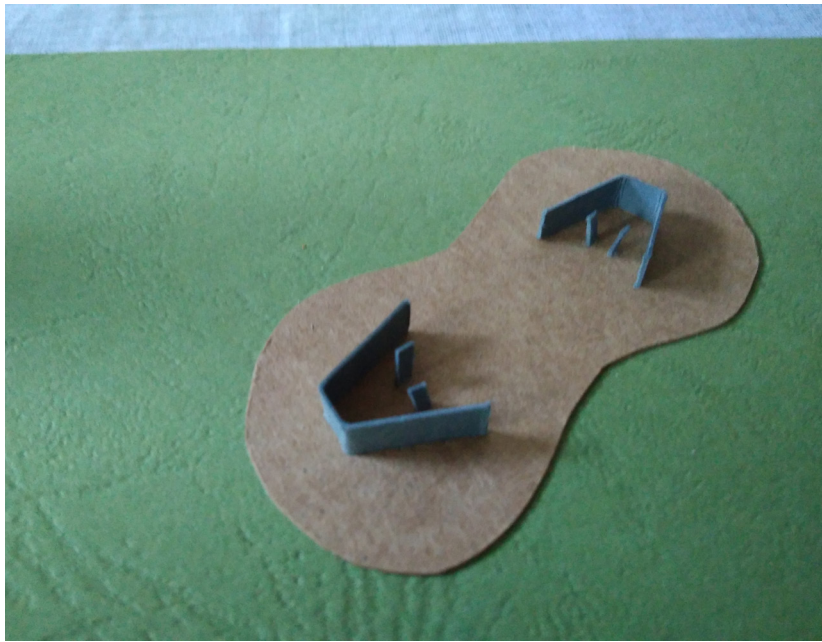
Fig. 23



Jazz Park - Playground for all



'/' or slant posture play areas



'V' posture play areas



Manually rotatable giant wheel



Climb a Tree - A slant platform with a tree and attractive color coded fruits to invent games with.



Swings with seats that can accomodate CP children securely and comfortably.

2.3 Going to the Toilet

Sanitary hygiene is of concern for children with CP. In houses where Indian style toilets are installed, it becomes a challenge for both child and the caregiver. As the child grows, his or her privacy also becomes a concern. Hence, aids to accommodate children and people with special needs in an Indian style toilet will make a significant difference to the child and caregiver.

Going to the toilet refers to-

UNDRESSING -> REACHING THE TOILET -> SITTING COMFORTABLY -> CLEANING -> COMING OUT OF THE TOILET -> DRESSING



Fig. 24

Place a ramp like closet on top of the indian toilet and remove when not required.

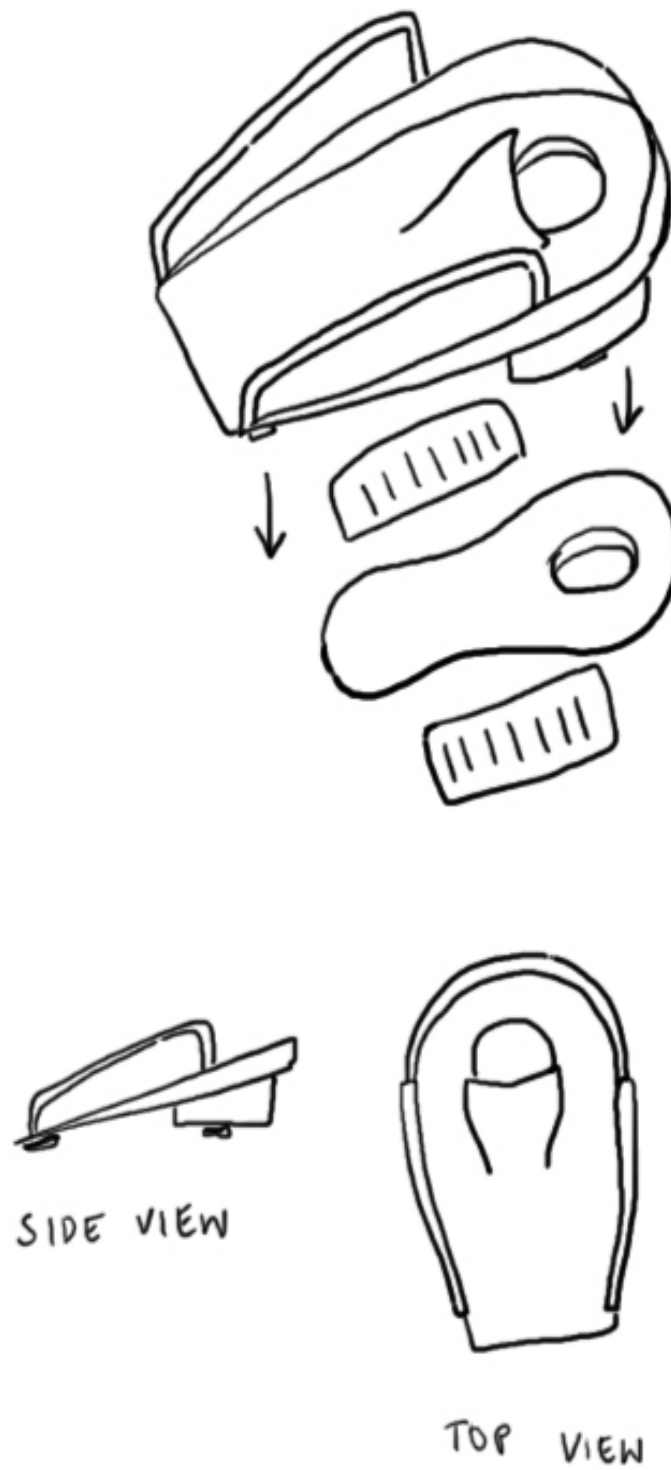


Fig. 25

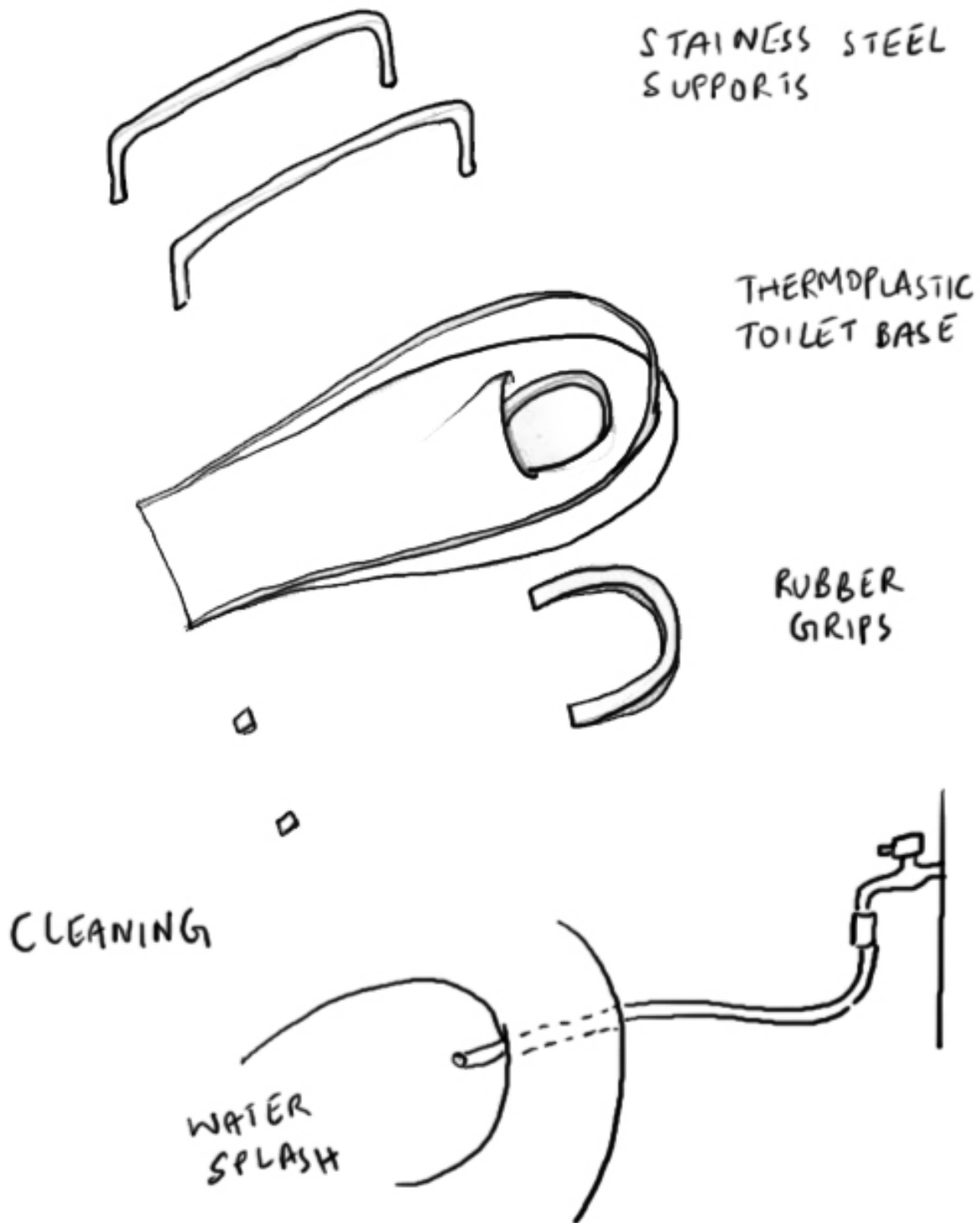


Fig. 26

How much of the process of going to the toilet can be made independent?



PANT THAT HE CAN WEAR / REMOVE HIMSELF

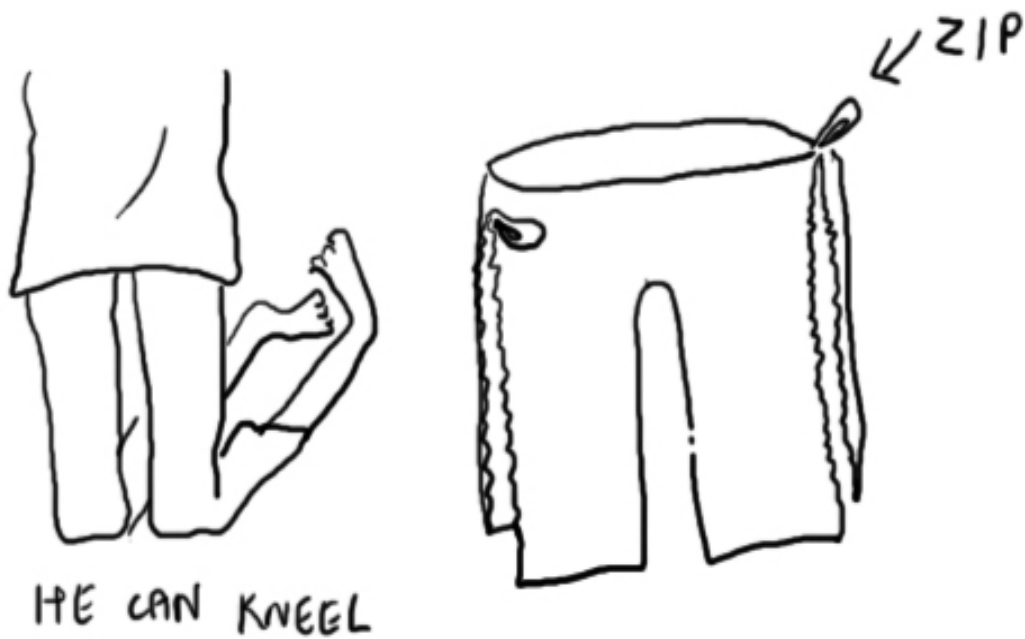


Fig. 27



3. REVISED PROJECT BRIEF

To design a product that comforts the process of going to the toilet for people with special needs and is affordable and acceptable by people from a humble socio-economic background.

The finalised ideas were specific to the Indian style toilets that are already installed at Prabhat Education Foundation center at Vatva and the toilets in the basti where Saaqib lives. Saaqib's neighborhood had very small Indian style toilets that are separated from the bathing area. There is no flush tank installed because of no water supply through pipes. Water is stored in plastic barrels outside the toilet.

At present Saaqib crawls to the bathroom and places himself in the doorway to attend to nature's call and his mother helps him clean up and dress. Hygiene, discomfort and lack of privacy is a concern for Saaqib and the effort put in by his mother may also be reduced.



Saaqib's neighborhood



Entrance to the toilet at Saaqib's home

3.1. Small Toilets 3'X3'



Wall mounted seating with support

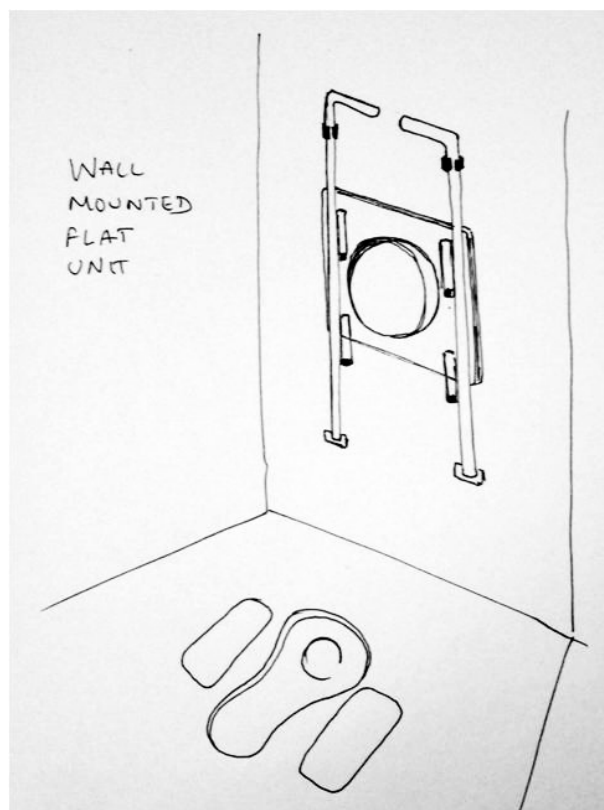
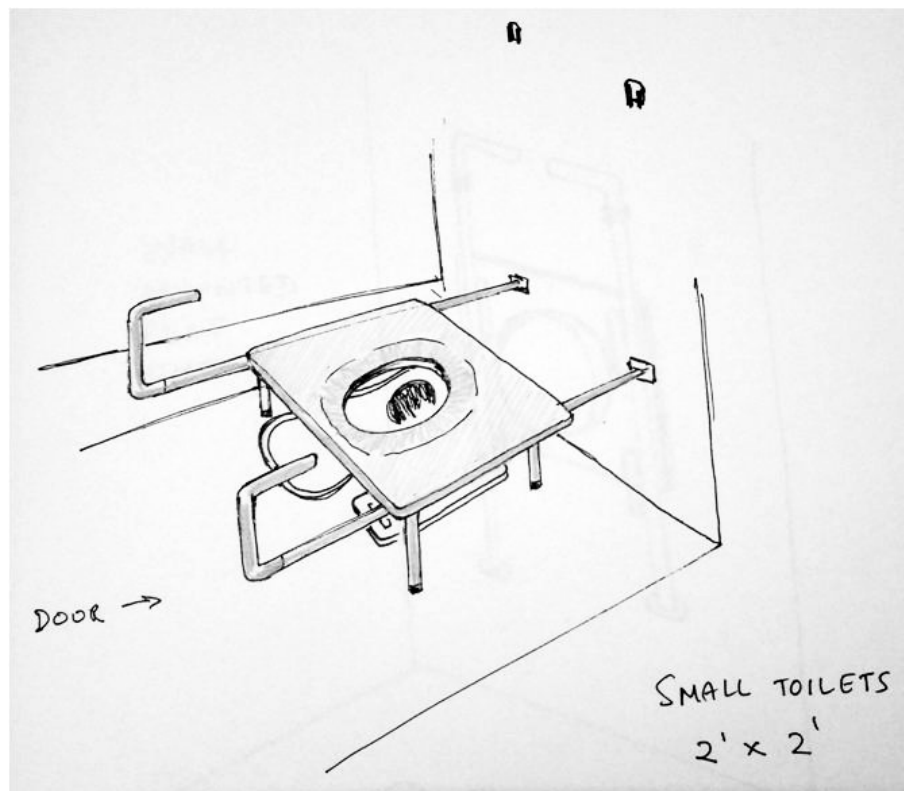


Fig. 28

3.2. Larger Toilets 5'X3'



Door to toilet sliding unit

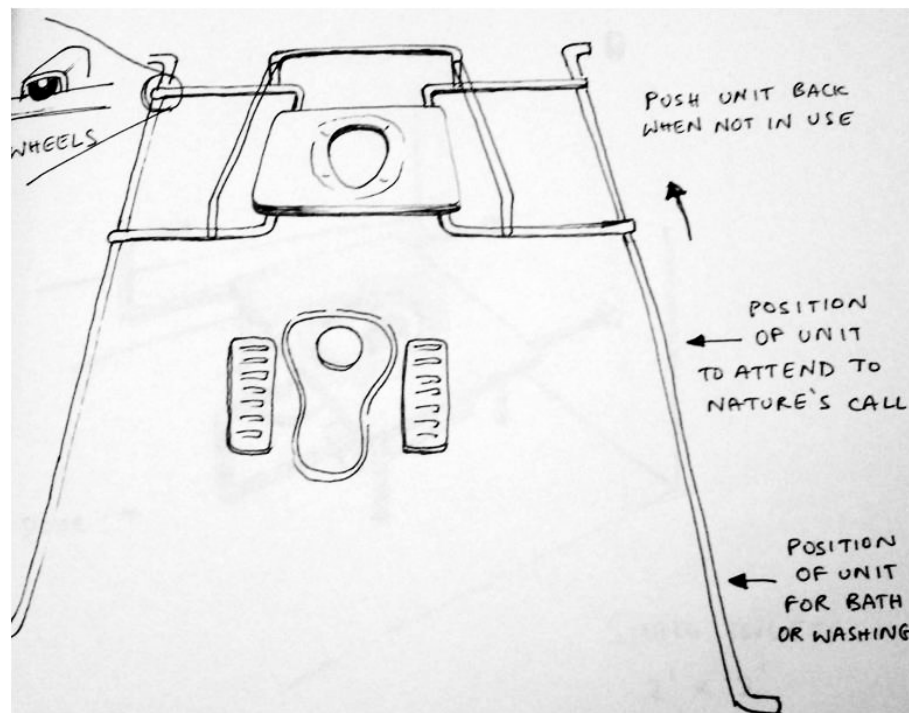
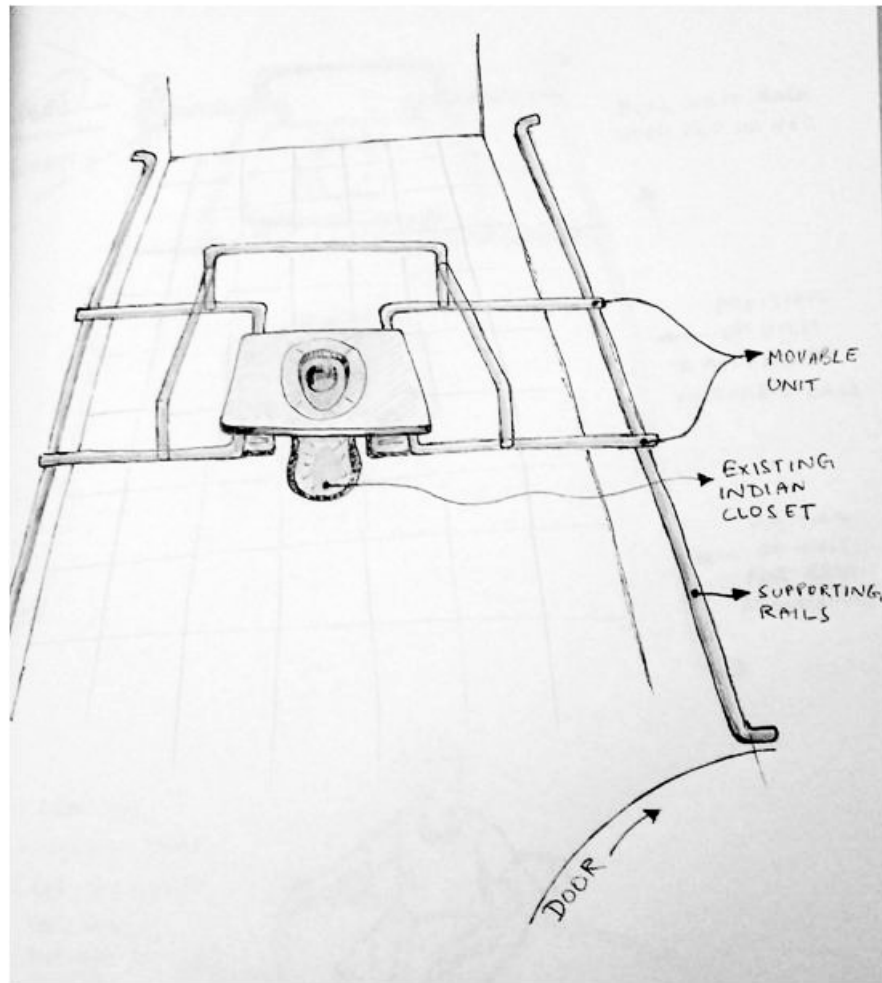


Fig. 29

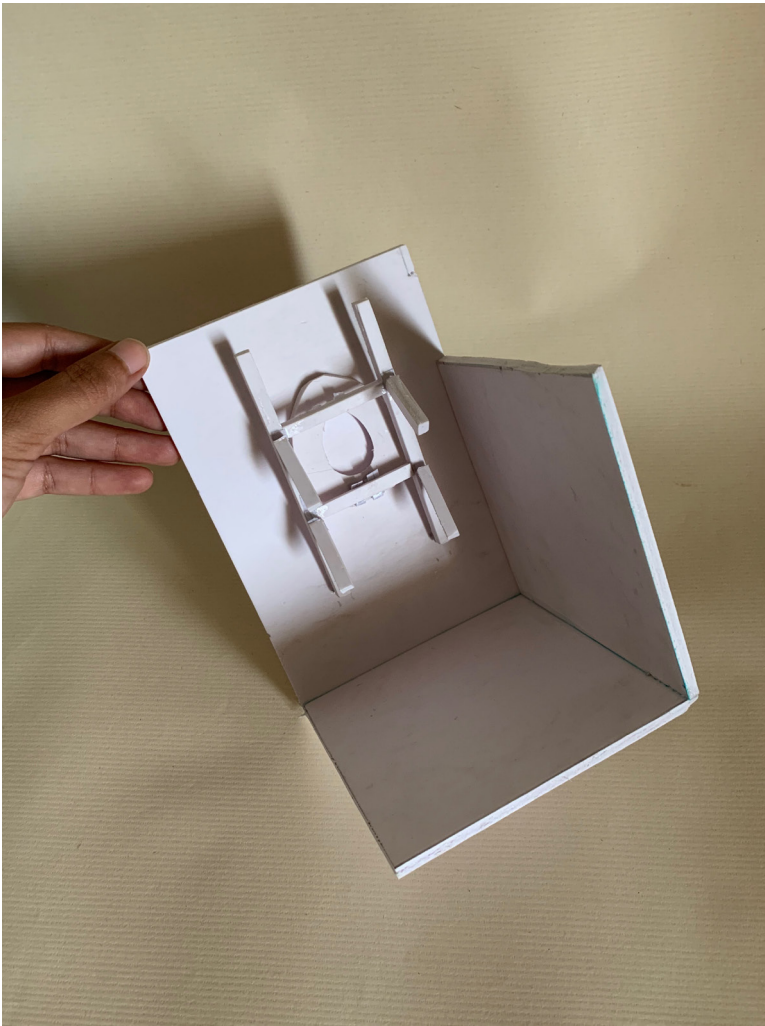
Some challenges made easy -

- Independent access to seat from bathroom door
- Comfortable sitting posture with support rails
- Less stress for caretaker
- Privacy for the child
- Can also be used by the elderly, pregnant women and people with knee problems

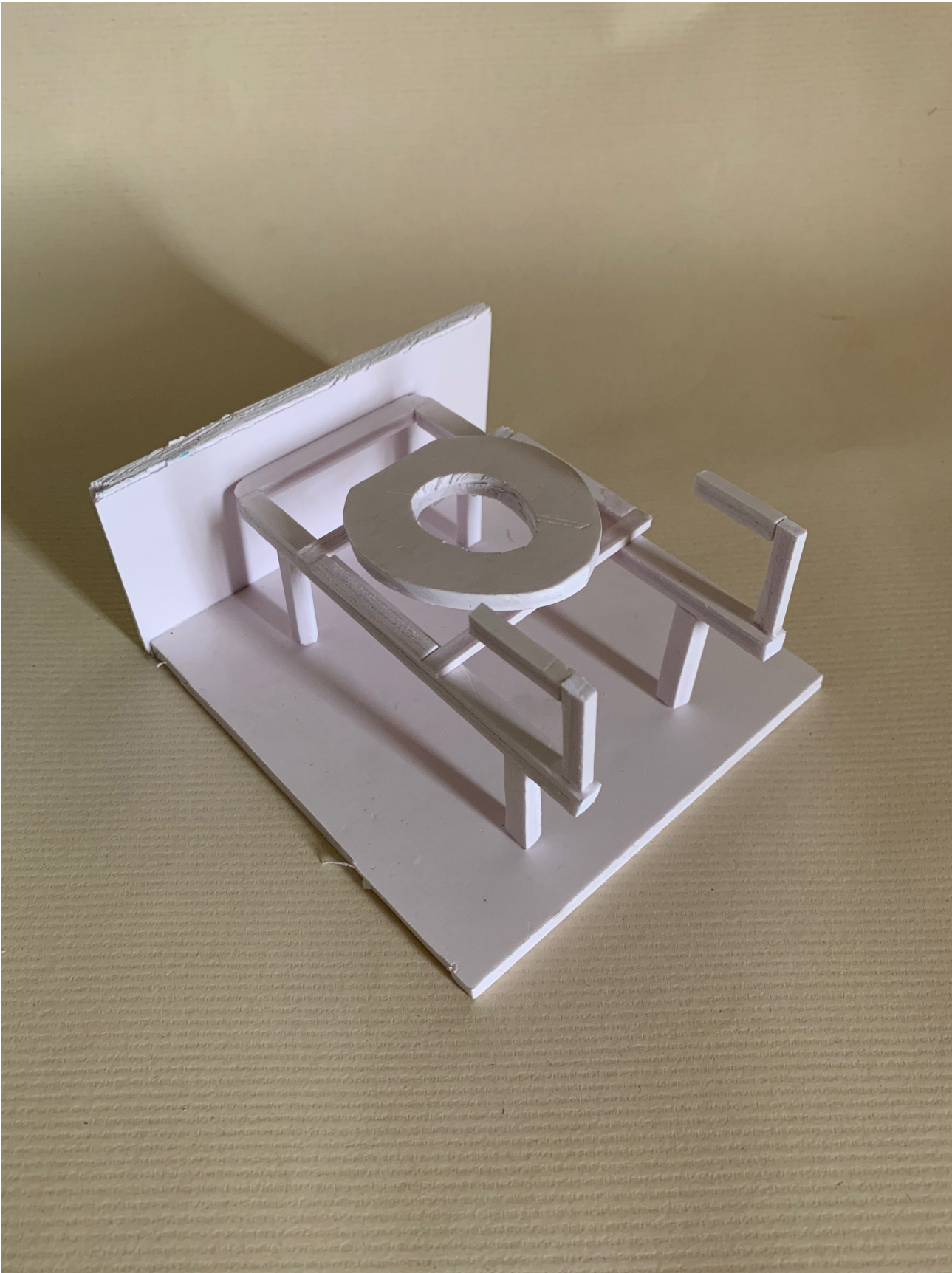


Fig. 30

3.3. Paper mock-ups



Wall mounted seating with support



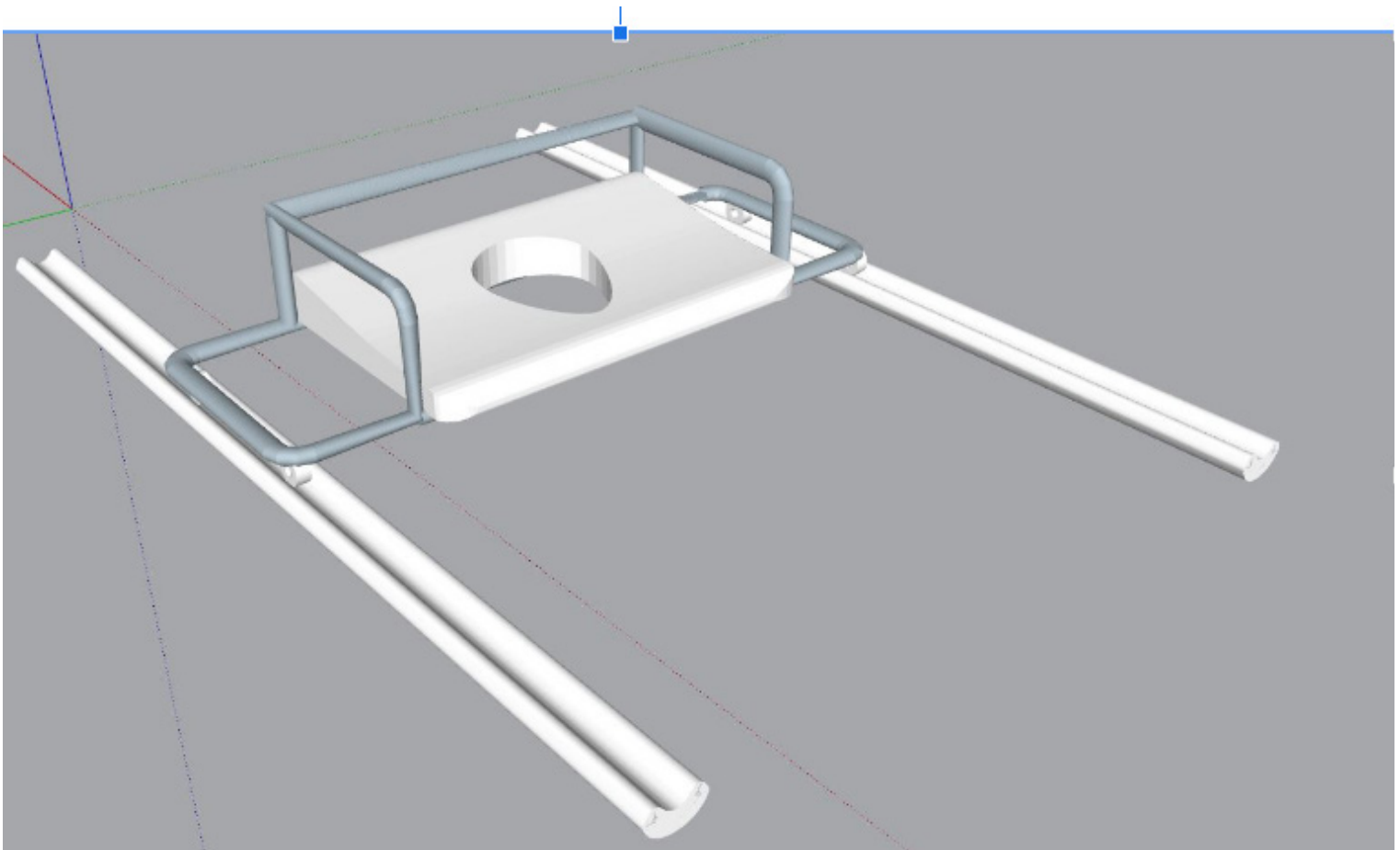
Wall mounted seating with support II



Door to toilet sliding unit



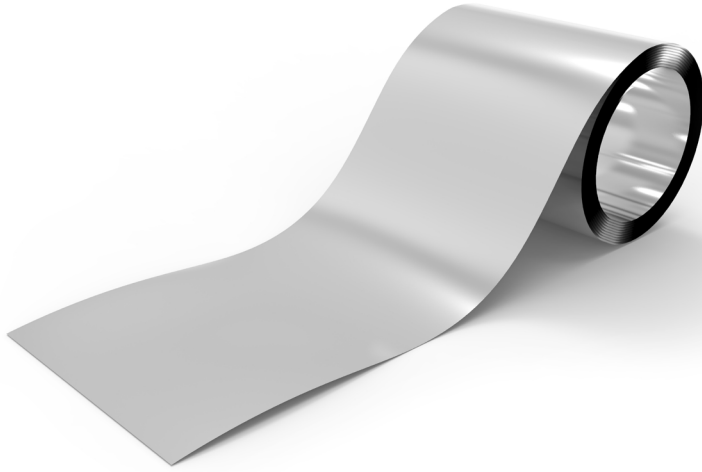
Door to toilet sliding unit II



3D render of the sliding unit

Ideal Materials

Stainless Steel for frame



Powder coated Mild Steel for frame

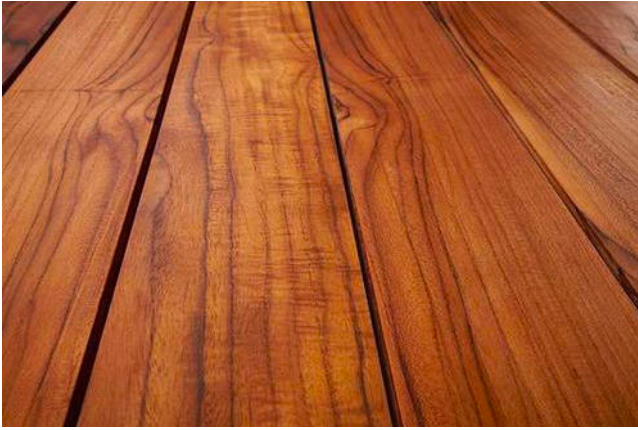


Thermoset Plastic for the toilet seat



Some more options

Treated hard wood for frame



Ceramic for toilet seat

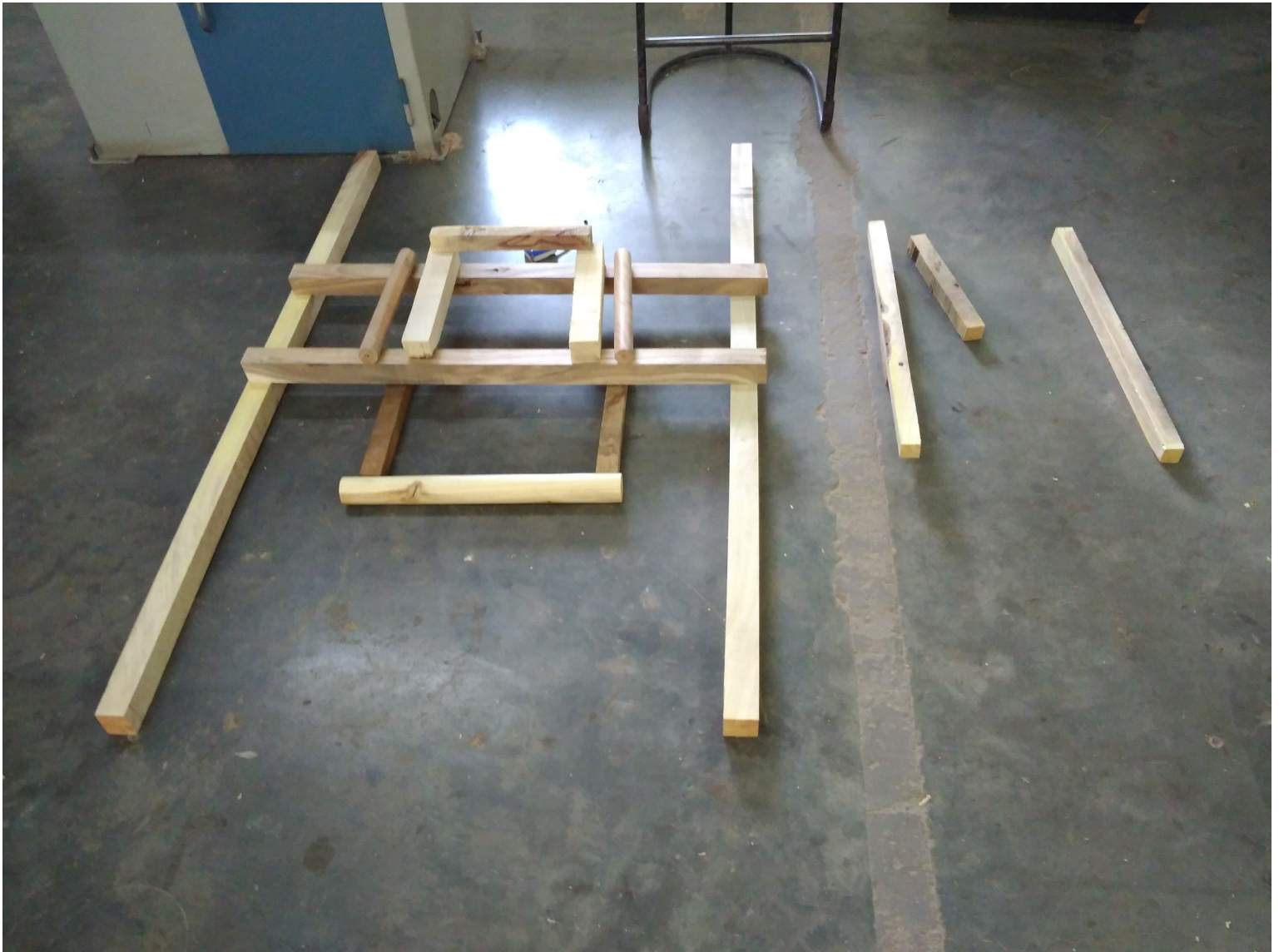




The testing phase included making of life size functional prototypes in wood and trying it out at Saaqib's home. Aspects like ergonomics, ease of use and the child's and family's initial reaction to the product could be guaged through this escercise.

4. TESTING

Wall mounted sliding unit for larger bathrooms in wood









Wall mounted pull-down unit for smaller bathrooms in wood. All handles in both prototypes were rounded off for better grip.





Testing the sliding unit at Saaqib's home





Testing the pull-down unit at Saaqib's home





4.1. Observations

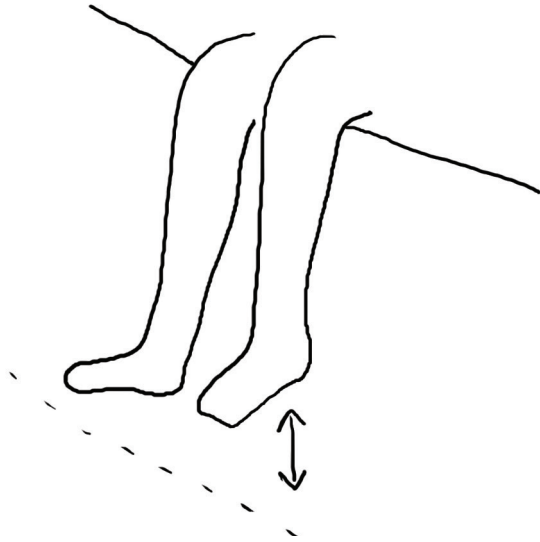


Fig. 31

The height of the sliding unit seat needed to be lower for the child to push himself back and forth.

Saaqib found it difficult to position himself comfortably on the flat bench like seating. A slip-in form for seating could be considered.

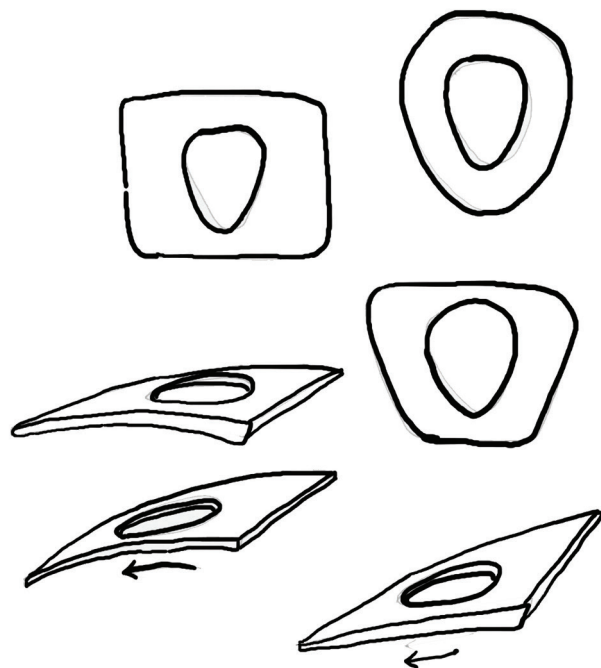


Fig. 32

The diameter of the circular support handles could be larger for better grip.

Also, the turned wood prototypes seemed like toys to the children!

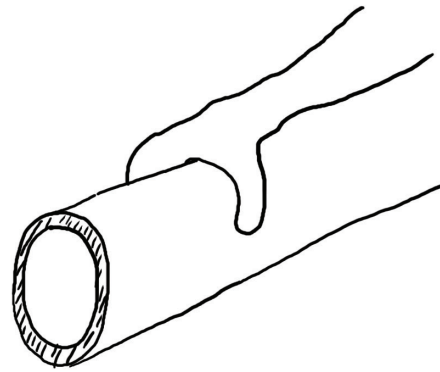


Fig. 33

Alternate forms for the frame could be considered to make it lighter for pushing, keeping urination for boys in mind.

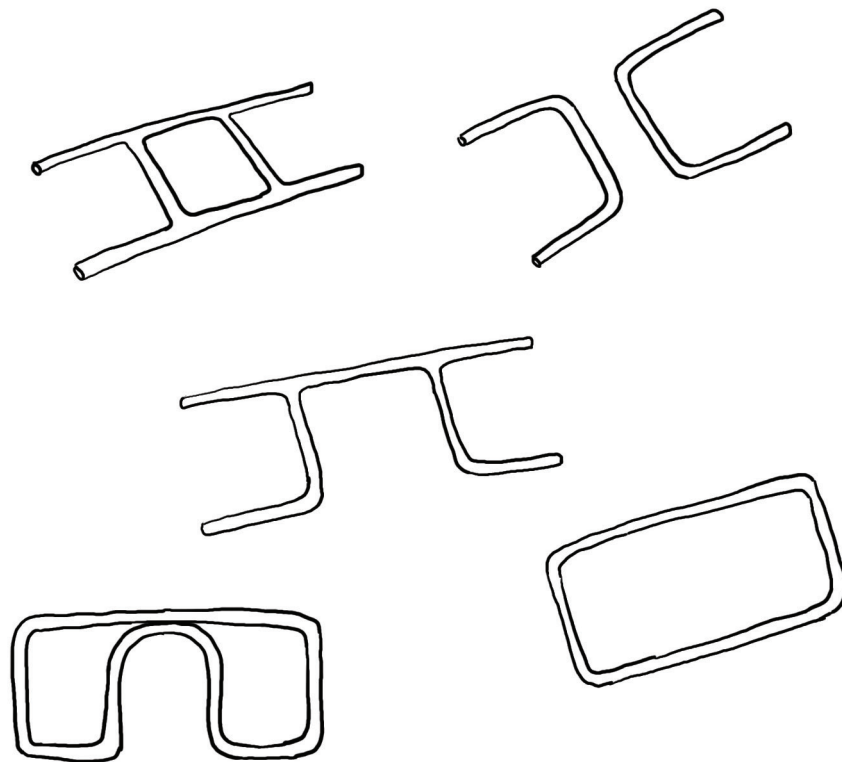


Fig. 34

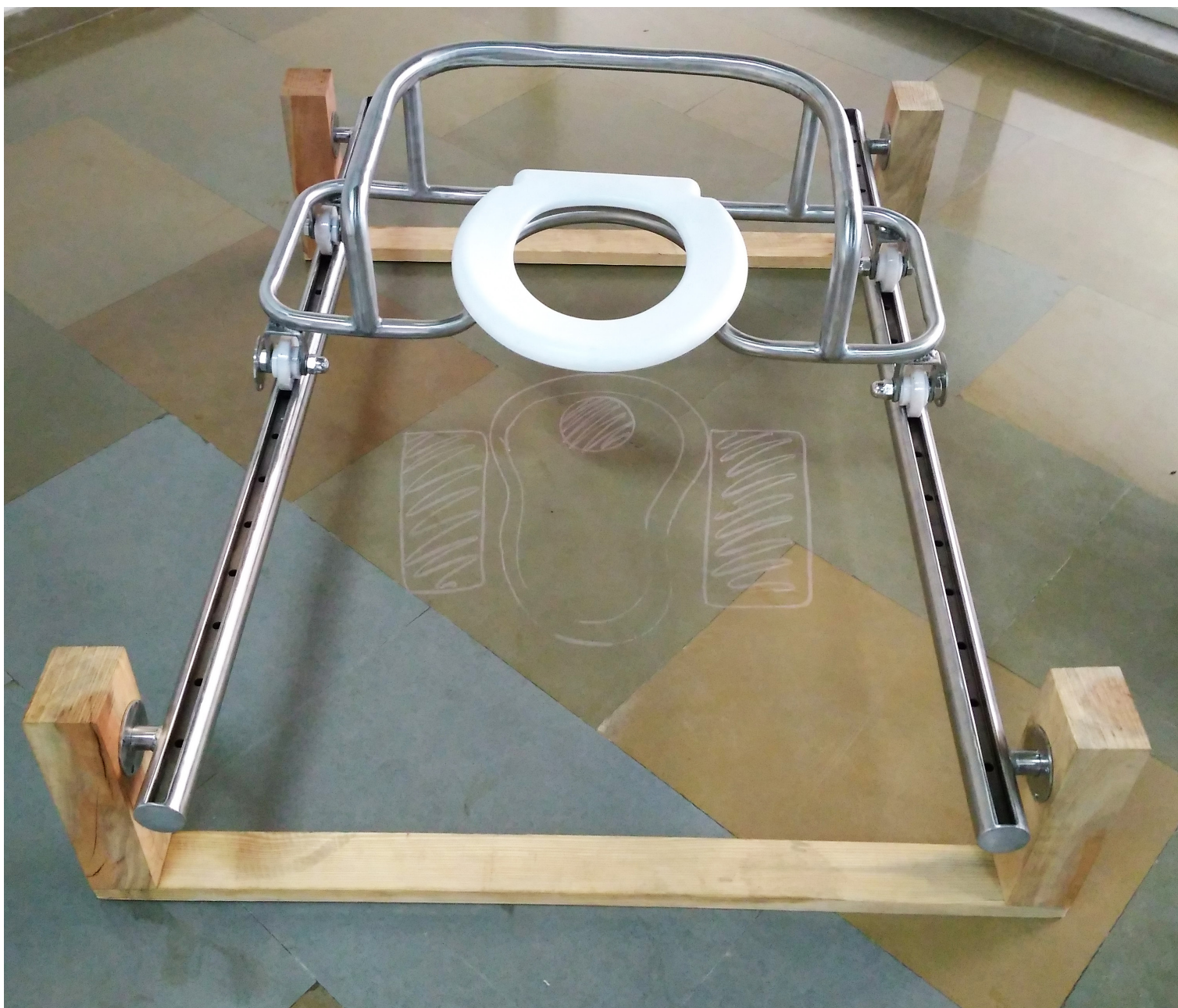


Indian Toilet Extensions for Special Needs

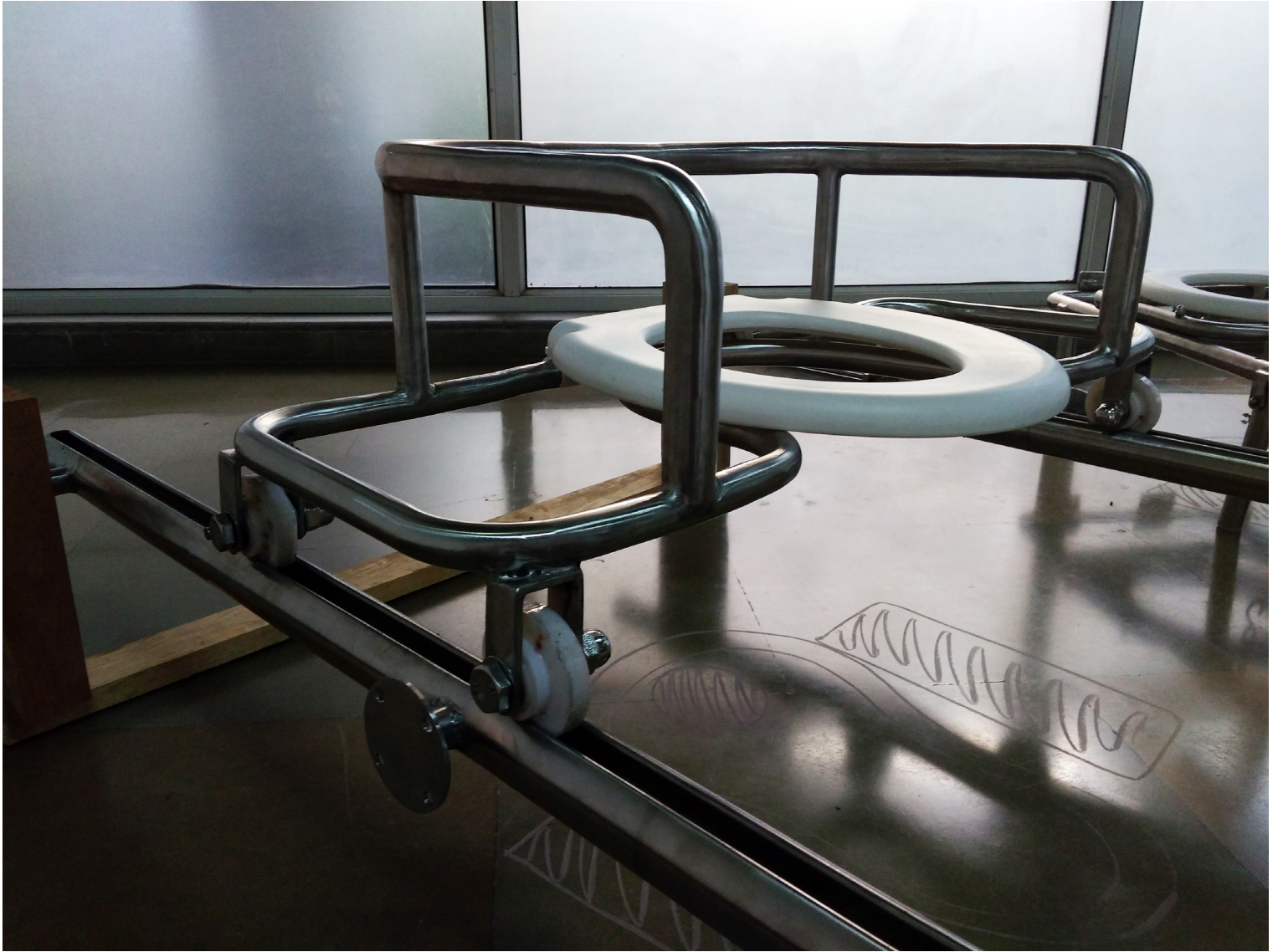
The final prototypes are fabricated in a material closest to the desired material and are fully functional and ready to install in the studied spaces for further observation and improvisation.

5. FINAL PROTOTYPES

Door to toilet sliding unit

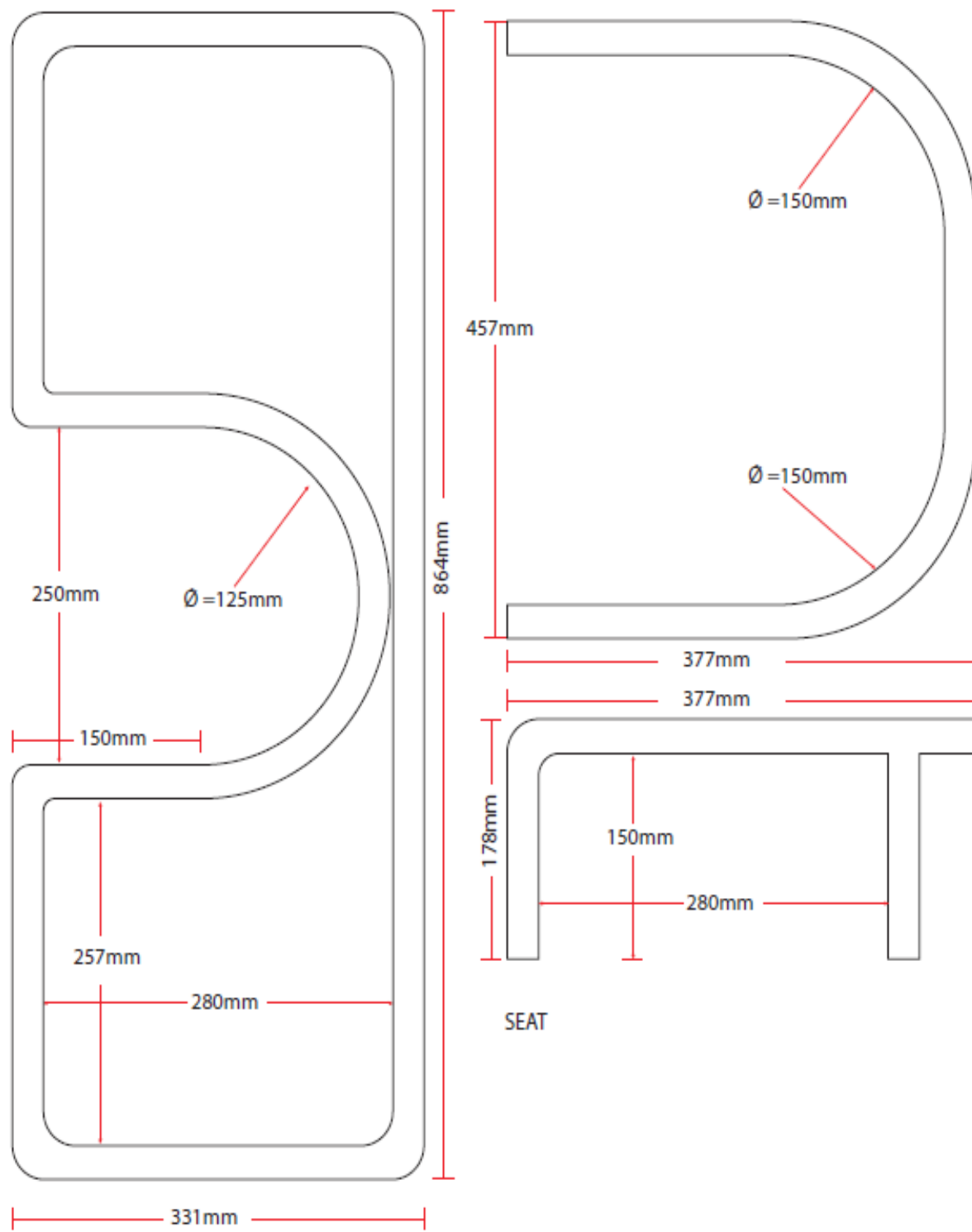






Wall mounted seating with support





MAIN FRAME

SEAT

DESIGN 1
25.4mm SS Pipe
5ft x 3ft Bathroom

Fig. 35

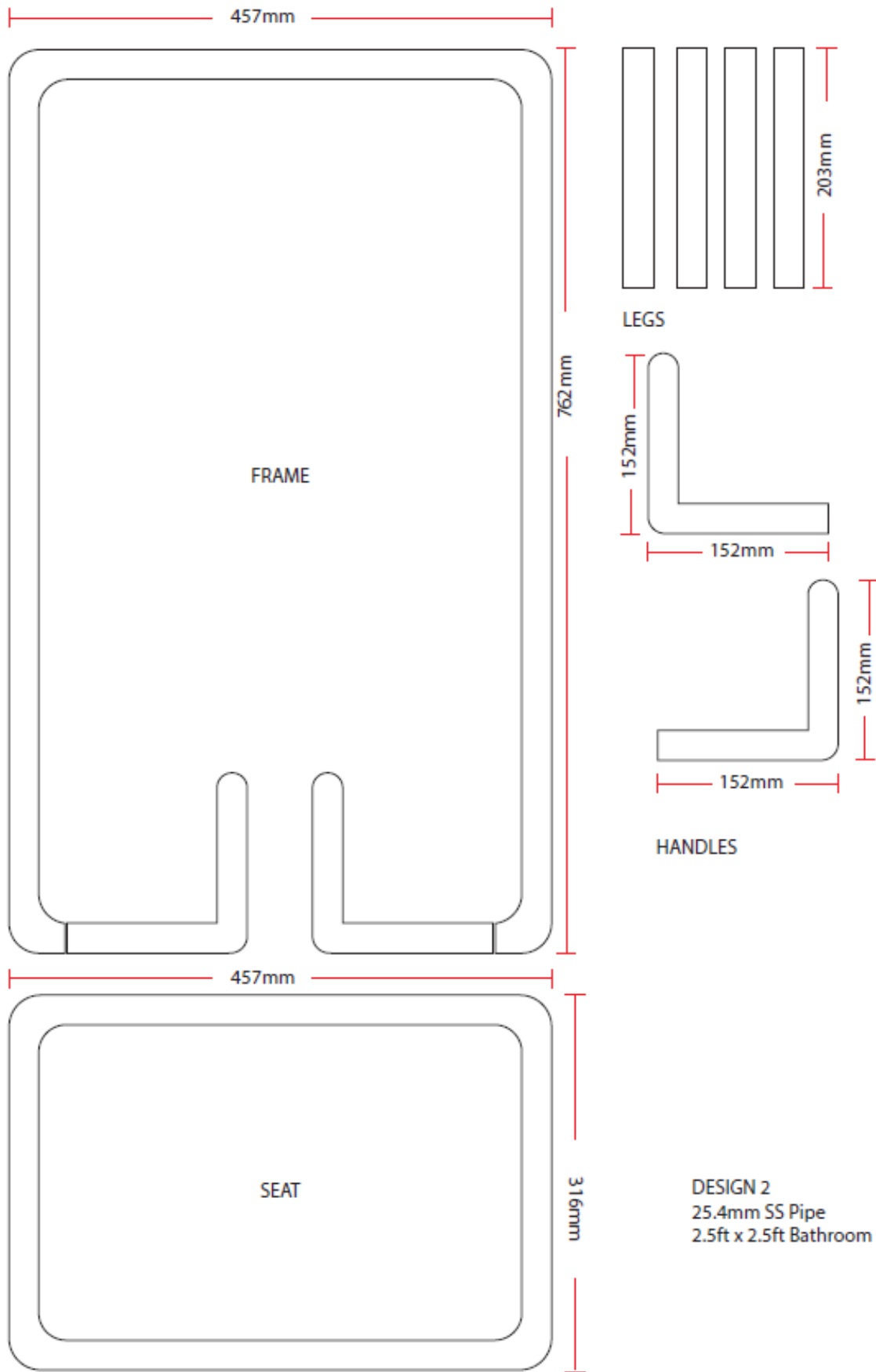


Fig. 36

5.1. Specification

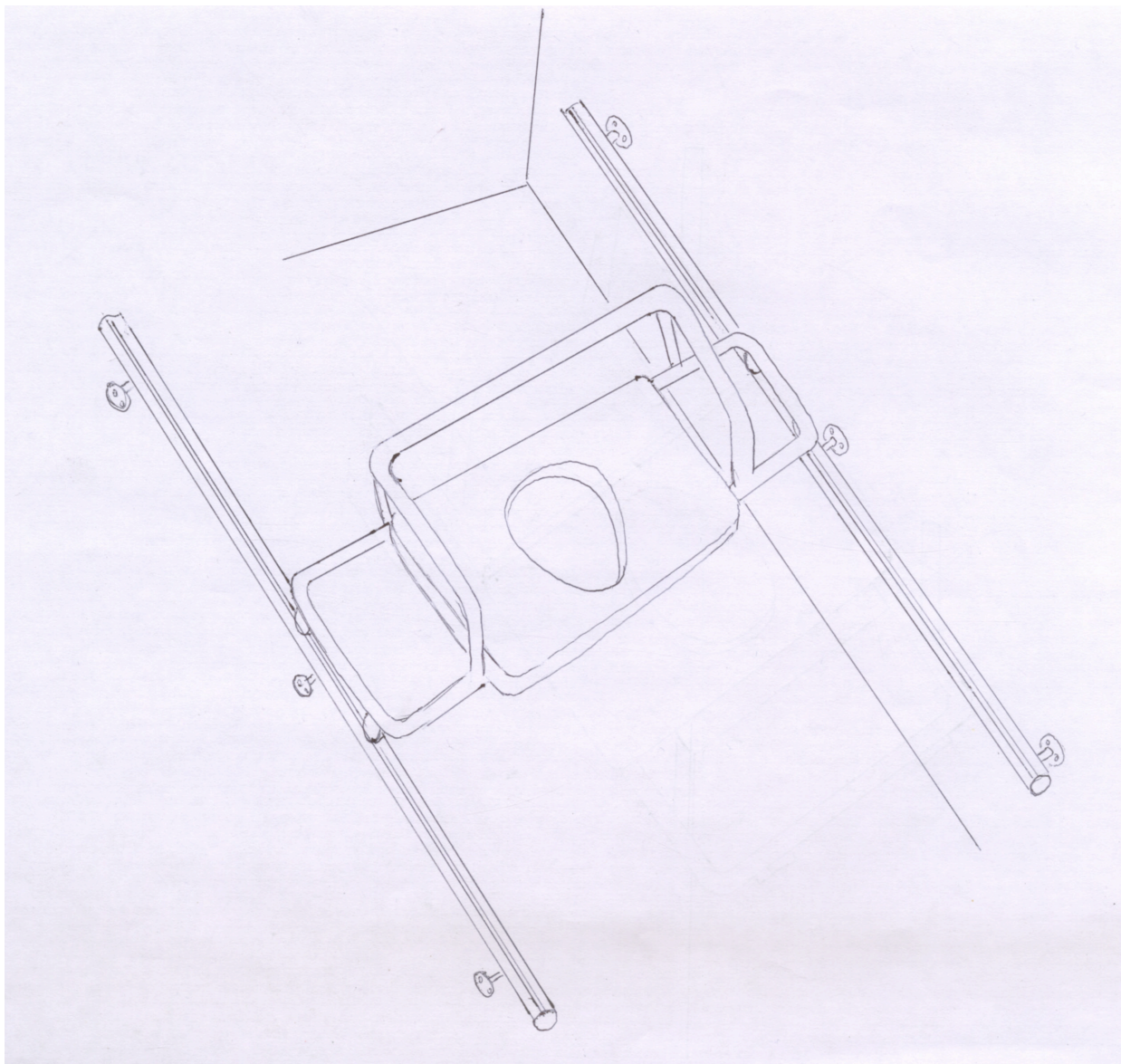


Fig. 37

Bathroom Size - 5'X3'

Product Dimension:

Length 54"

Width 36"

Height 11"

Seat Dimension:

Width (With armrest) 24"

(Without armrest) 18"

Length 15"

Track Dimension:

Length 54"

Diameter 2"

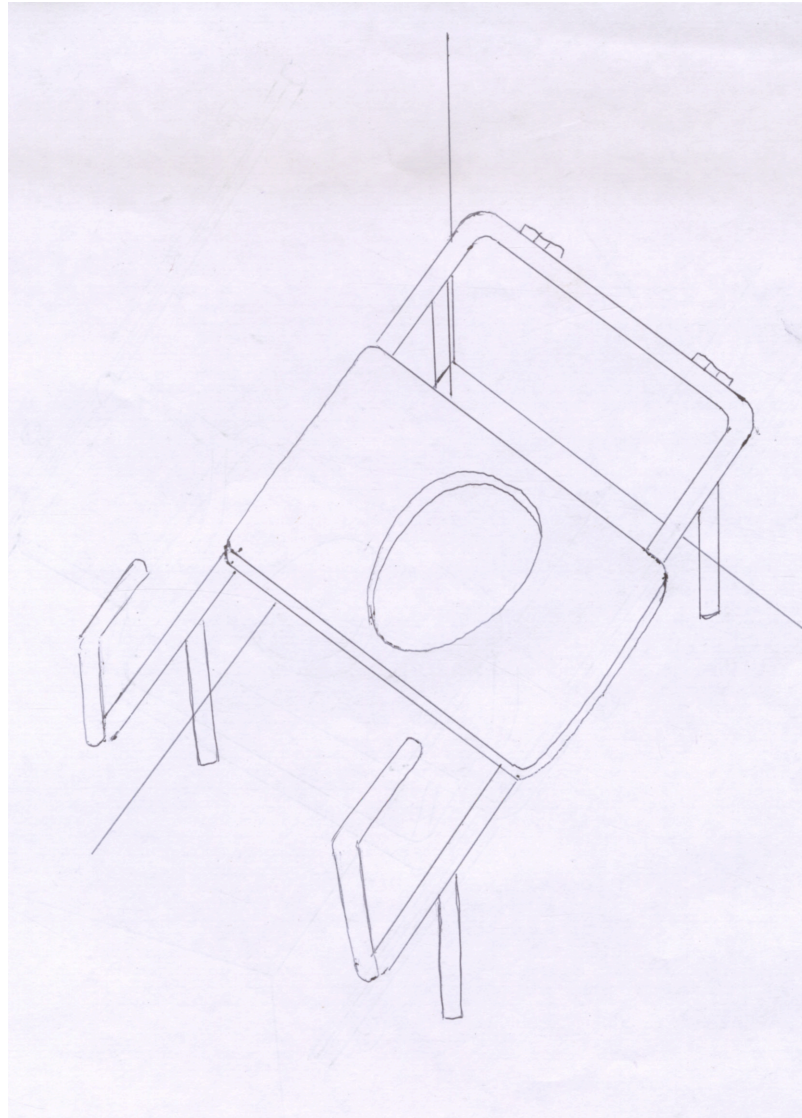


Fig. 38

Bathroom Size - 3'X3'

Product Dimension:

Length 30"

Width 18"

Height 18"

Seat Dimension:

Width 18"

Length 15"



5.2. The next mile

The stainless steel prototypes need to be tested and observed for a few weeks at Prabhat center and Saaqib's home. Once an object is installed, it is exposed to the free use of different users, weather and time.

Children's reaction to a new addition to their toilets may vary from a happy surprise to dislike or even fear. First the caregivers at home or the center need to be briefed on how to use and maintain these extensions. They will in turn train the children. There may be unforeseen difficulties in the use, which need to be noted and reworked on. Standardising dimensions or making a modular design can be considered for a long term use for users of different age groups. Observation in various weather conditions can bring in more improvisation in the material used. For example, in winter stainless steel may be very cold when in contact with the body; grips, handles and support bars may be inconvenient to use. Rubber could be considered for these areas.

The design is intended to support the growth of a child with disabilities and must not at any cost hinder the growth. Hence physiotherapists' and doctors' approval and a certification by the concerned agency that looks after aids for persons with disabilities must be availed before regularising the design.

Improvisation in form can be considered for the extensions to fit in comfortably in small Indian style toilets. Sleeker sections with well thought out, quick drying abilities can be designed with the gathered observations. Hygiene is very important and so, the maintenance of the toilet extensions must be considered. The caregiver's complaints and feedback must be considered in the next iteration of the design.

Indian style toilets are used all over India. In urban and rural set-ups, the materials and manufacturing resources vary drastically. Keeping the financial challenge in mind, alternatives in material and manufacturing process can be devised as per the locality without compromising the intention of these toilet extensions. The design can be split in two parts - one being the core framework considering the functional design and the other considering the making of the design as per the location. This could yield in a more sustainable approach to the product's lifecycle.

6. LEARNING

A design project for special needs has been a new, challenging and special experience for me. Every stage of the project has taught me important lessons.

On writing the proposal-

The proposal of the project that was open ended and titled - 'Lifestyle Products for Children with Cerebral Palsy', though still relevant to the outcome of the project, the scope of the study is not limited to Children with Cerebral Palsy. During the study I understood that the medical condition and the physical manifestation of it are two different things. An object interaction with the body cannot be based on a medical condition alone. I would like to reframe the project today as - 'Design for Special Needs ' because of the broader spectrum any adaptable product may cater to.

The project also focussed on an economic strata with financial challenges apart from physical challenges.

On getting to know about special needs in India-

A stigma and alienation of the world of special needs is a thing of the past. Being part of a different lifestyle showed me that we as humans grow by overcoming different kinds of challenges. The challenges are different person to person, and it is in knowing this in detail that I believe design can be both inclusive and a niche. I made many friends by communicating in a common language, mostly of sounds, smiles and gestures.

Learning about the magnitude of folks who face challenges in their daily lives because of the world that is designed for the majority, gave me a sense of responsibility to consider them in my future design projects.

On design approach-

Every challenge that I witnessed triggered an idea. There were ideas in all directions that also compromised on a focus area. To make a choice and be focussed in that direction would've yielded in a more thought out and resolved product.

On fabrication and prototyping-

Fabrication in the desired material gives a realistic picture of your design. It gives you a check on how many details you've missed and how it can be reworked on. Making a usable prototype and testing it only can tell you if the

iterated multiple times. To be updated with new materials, finishes and fabrication technology is very important to make a fine product.

On feedback and guidance-

Discussing the project details with friends and mentors was always refreshing and opened new windows to think better. Many aspects that I missed surfaced and helped me reevaluate the process and rework when required.

On time management-

Time is health, wealth and goodness in everything.

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Handwritten text on the staircase wall, including the number '5' and other illegible characters.