

Unlocking Potential: Dyslexic Support Tools

A Design Approach towards Learning
Disability

Interaction Design Project 2
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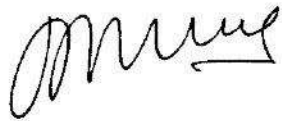
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Project Approval

The Project Titled "Unlocking Potential: Dyslexic Support Tools" by Pooja Kumari is approved for partial fulfillment of the requirement for the degree of 'Master of Design' in Interaction Design at Industrial Design Centre, Indian Institute of Technology, Bombay.

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Declaration

I declare that this written document represents my ideas in my own words and where others' ideas or phrases have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea, data, fact, or source in my submission. I understand that any violation of the above will be cause for disciplinary action by the institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

A handwritten signature in black ink, appearing to read 'Pooja Kumari', written over a horizontal line.

Pooja Kumari

22M2256

Interaction Design

IDC School of Design, IIT Bombay.

Acknowledgment

I want to use this chance to convey my sincere gratitude to everyone who helped this project be completed successfully.

First and foremost, I would want to express my sincere gratitude to Prof. Ravi Poovaiah , who served as my adviser, for their excellent advice, unshakable support, and encouragement during this process. Their knowledge and perceptions have significantly influenced the course of my work.

I appreciate the IDC digital library for giving me the tools and resources I needed to carry out my research. The easy access to relevant literature have significantly improved the quality of this project.

I want to express my gratitude to my friends and Special school members, especially Anuradha Patpatia, Wajeedha J Sayed, Mrs. Meenakshi Balasubramanian, Pooja Thakkar, Sangeeta Santosh Harad, Sunita Prathmesh Shirodkar, for their participation, help, and enlightening conversations. Their suggestions have been really helpful in honing my concepts and enhancing my research.

Last but not least, I want to thank my family from the bottom of my heart for their unwavering support, patience, and love throughout this project. I've been inspired and given strength by their unwavering support.

In closing, I want to express my gratitude to everyone who has contributed—no matter how small—to the accomplishment of this project. I genuinely appreciate all of your help, advice, and encouragement, and I want to thank you all for it.

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Abstract

In this study, we explore the field of learning assistance technologies designed for people with dyslexia, a cognitive disorder that poses particular difficulties for conventional teaching methods. Dyslexia, which is characterised by difficulties in processing information and working memory, requires new approaches in order to maximise the potential of those affected. The study employs both secondary and primary approaches, as well as a thorough understanding of dyslexia, in person observations in special school settings, and insightful discussions with educators and parents.

This project's main goal is to recognise and address the various problems that dyslexic people have.

Secondary study delves into the nature of dyslexia, analysing existing approaches and solutions developed to help individuals with dyslexia in their learning path. This foundational knowledge provides a framework for understanding the issues faced by dyslexic individuals as well as potential opportunities for support.

The primary research phase takes an in-depth approach, observing students with dyslexia in special school settings using the "fly on the wall" technique. The research strives to understand the particular obstacles experienced by dyslexic individuals as well as the tactics used by educators and parents to address these challenges by engaging with special educators, parents, and conducting interviews.

Data from observations, interviews, and encounters were methodically coded, organised, and analysed using techniques like affinity mapping. This process revealed recurring themes, pain points, and opportunity for novel solutions.

Significant opportunities were identified as a result of the mapping process, including Time awareness, Tactile / Multi-sensory learning, Maintaining focus for long stretch of time is difficult, Retaining information, Brain-hand co-ordination, Expressive writing and communication . Students' and teachers' empathy mapping strengthened the design process by generating situations that guided the subsequent ideation phase.

This project is in line with the changing environment of dyslexia support resources, providing creative solutions based on a thorough comprehension of the particular requirements and difficulties encountered by this user group. The findings of this study lay the groundwork for future efforts in the field of inclusive design interventions aimed at unlocking the full potential of people with dyslexia. The study covers the design concepts as well as the importance of these interventions in meeting the unique needs of dyslexic people, with implications for further research and improvements.

Introduction

Dyslexia, a neurodevelopmental condition that affects language processing. Historically its intricacies and impact on learning were little recognised, resulting in instances where individuals encountered difficulties without proper help. Over time, awareness has expanded, paving the door for greater awareness of dyslexia and the development of individualised interventions.

A multi-sensory approach to dyslexia is an instructional strategy that uses two or more senses at the same time to improve the learning experience. This method recognises dyslexic persons' different cognitive processing techniques, addressing difficulties in reading, writing, and language comprehension. The integration of visual, aural, kinesthetic, and tactile aspects attempts to provide a holistic and effective learning environment. Multi-sensory strategies became popular in the mid-twentieth century as educators explored more effective ways to instruct dyslexic students. The Orton-Gillingham method, which combines visual, auditory, and kinesthetic-tactile elements, has become an essential component in dyslexia teaching.

Advances in understanding neurodiversity and learning styles have emphasised the importance of multisensory techniques in recent decades. Modern educational practises increasingly incorporate technology and new approaches to produce multi-sensory learning experiences.

Through a multi-sensory approach, this study tries to completely understand and overcome the obstacles associated with dyslexia learning. After conducting extensive background research on the characteristics and impacts of dyslexia, this project undertakes deep primary research in special school settings, engaging with educators and parents. Data organisation, such as coding, mapping, and card sorting, making it easier to identify repeating patterns and potential solutions. Emphasising on the important opportunities by

using different techniques.

Motivation

The underlying desire to contribute meaningfully to the lives of those who are struggling with dyslexia is what inspired me to take this topic. After Understanding personally the difficulties that dyslexic youngsters face during my travels to special schools fuelled my desire to address their specific needs. The existing gaps in dyslexia learning support tools highlighted the significance of novel approaches, pushing me to investigate the complex relationship between dyslexia and learning. The ability to interact with instructors, parents, and dyslexic people provided essential insights into their experiences, which pushed me even more. Recognising the transforming power of individualised solutions, I am motivated to bridge the support gap and empower people with dyslexia to navigate the educational landscape with confidence and efficacy. As a result, this project is a passionate effort to make a positive difference in the lives of those struggling with dyslexia.

Scope

The scope of this study includes an in-depth study of dyslexia and the difficulties that people with learning disability experience. The study employs both secondary and primary approaches, including an in-depth review of existing dyslexia literature and immersive observations in special school settings. The research intends to methodically organise and categorise the acquired data through interviews with educators and parents, as well as the use of affinity mapping tools. The major goal is to obtain a detailed awareness of the special needs and pain spots that dyslexic people face. The findings of this study lay the groundwork for the discovery of repeating motifs, ultimately contributing to a better understanding of dyslexia.

What is Dyslexia

The word 'dyslexia' is derived from the Latin word. 'Dys' means 'difficult' and 'lexia' mean words. It literally means, "difficulty with words". Below are the definitions given by UNESCO MGIEP and LDA(Learning Disabilities Association of America):



- Dyslexia is a unique learning disorder that predominantly impacts reading and writing abilities.
- Individuals with dyslexia often struggle with accurate and fluent word recognition, reading comprehension, and spelling.
- Dyslexia is a neuro-developmental condition that can affect people of all linguistic and cultural backgrounds.



- Dyslexia is characterised by deficits in accurate and fluent word recognition.
- Individuals with dyslexia struggle with word recognition, decoding, and spelling.
- Reading comprehension is sometimes impaired due to very poor word reading skills.

Types of Dyslexia

Phonological Dyslexia : Phonological dyslexia inhibits a person's capacity to recognise and manipulate language sounds, which has an impact on their ability to read and spell words accurately and fluently.

Rapid Naming Dyslexia : Rapid retrieval and processing of visual information are difficult for people with rapid naming dyslexia, which can have a big impact on reading fluency and comprehension.

Double Deficit Dyslexia : People with double deficit dyslexia have difficulties with both rapid naming (the ability to swiftly and precisely name things, colours, letters, or numbers) and phonological awareness (the capacity to manipulate and recognise particular sounds in words).

Surface Dyslexia : Word recognition and reading fluency may be difficult for people with surface dyslexia, especially when they come across words that don't have clear phonetic patterns.

Visual Dyslexia : Reading and writing skills may be impacted for people with visual dyslexia. This may impact the visual perception, visual-spatial skills, and visual memory.

Categories of Dyslexia

Developmental Dyslexia :

- Genetic/ or present at birth.
- Includes both primary and secondary dyslexia.
- More common in boys.
- Normally decreases as the youngster gets older.

Primary Dyslexia :

- Develops from genetically inherited condition.
- More common among men, especially among men who are left-handed.

Secondary Dyslexia :

- Brain development problem at the early stage of pregnancy.

Acquired Dyslexia :

- Traumatic brain injury or disease affecting the part of the brain responsible for language processing

Additional learning challenges associated with Dyslexia

Dysgraphia : Impact on one's capacity for effective and comprehensible writing.

Dyscalculia : Impacts on a person's capacity to comprehend and operate with numbers. challenges with arithmetic, math ideas, and number manipulation

Left-Right Disorder : Trouble understanding and using the notions of left and right, or difficulties distinguishing between the left and right sides of the body.

Auditory Processing Disorder : Trouble correctly and effectively comprehending auditory information.

Characteristics of Dyslexia

Preschool :

- Late speech
- Trouble with pronunciation
- Trouble finding the right word
- Trouble rhyming
- Difficulty with learning numbers and alphabet, days and weeks, colors and shapes.
- Restless and are easily distracted
- Trouble with Peer Interactions
- Trouble with following and understanding directions and routines
- Slow fine motor development

Grade KG - 8th :

- Letter-sound Connection
- Word Confusion
- Reading and Spelling Errors
- Word Reversals

- Transposed Sequences
- Prefixes, Suffixes, and Root Words
- Avoids Reading Aloud
- Word Problems
- Slow Learning
- Relying on Memorization
- Slow Recall of Facts
- Impulsiveness
- Difficulty Planning
- Trouble with Time
- Poor Coordination
- Unawareness of Surroundings
- Accidents
- Trouble Making Friends
- Handwriting Grip
- Trouble with Handwriting
- Avoids Writing Compositions
- Understanding Body Language and Facial Expressions
- Difficulty Making Friends

High-School to Adult :

- Inconsistent Spelling
- Avoids Reading and Writing
- Trouble Summarising
- Open-Ended Questions
- Weak Memory Skills
- Difficulty Adjusting to New Settings
- Slow Work Pace
- Poor Grasp of Abstract Concepts
- Attention to Details
- Misreading Information

Examples:

Sees and tells “**Cake**”, writes the spelling “**Kake**”.

Sees and tells “**Ball**”, writes the spelling “**Boll**”.

Asked to spell “**Town**”, Misreads and Misspells “**n**” as “**h**”.

Spells “**Nutrition**”, as “**Nutreetion**”.

Spells “**Tion**” as “**sun**”.

Spells “**Photosynthesis**”, as “**Photosintise**”.

Spells “**Chlorophyll**”, as “**Crollofell**”.

Spells “**Saprophyte**”, as “**Saprofit**”.

Spells “**Symbiosis**”, as “**Sumdoses**”.

Spells “**Insectivore**”, as “**Insextwero**”.

Letter reversal problem, “**b**” and “**d**”, **ex abbends** (addends)..

letter inversion problem, “**n**” and “**u**”, **ex aroonn** (around).

When I feel bored, I watch Naruto.

When I am bored naruto.

When I feel scared, I use my phone.

When I get sered I see my phone.

Methods

Orton-Gillingham technique:

The Orton-Gillingham technique is a systematic and structured way to teaching phonics, phonemic awareness, and decoding skills. It entails breaking down language topics into smaller components and repeating practise and reinforcement. It also employs multisensory strategies to engage learners in the learning process.

The Four Principles of a Orton-gillingham technique:

Explicit Instruction

Concepts are taught directly and clearly, with the instructor providing assistance and feedback.

Cumulative and Systematic

Concepts are taught in a planned and orderly manner, building on previously taught material.

Multi Sensory

Using multiple senses increases the chance of learning, especially for people with learning disabilities like dyslexia. Through exercises like listening, writing, and using phonics tools, students use their auditory, visual, and tactile senses to improve their reading and writing abilities.

Responsive

Throughout the course of the programme, the instructor closely watches the student's development and makes any required modifications. This can entail altering the manner or speed of the lessons. Diagnostic evaluations are performed to monitor development and pinpoint areas that require improvement.

Devis technique

According to Ronald Davis, people who are dyslexic tend to think largely in pictures and may have trouble perceiving things like time, vision, hearing, and coordination.

The Davis Dyslexia Correction method provides a remedy that consists of **two essential elements**:

- a method for controlling and managing perceptual confusion.
- a method for addressing and fixing the fundamental issues that lead to perceptual confusion.

The **three main phases of the Davis technique** for improving reading, writing, and spelling are as follows:

- Understand and use alphabets and basic language symbols.
- Recognise and understand words that do not have any meaningful association for the dyslexic individual.
- Comprehend and understand while reading.

Previous Work Done

Maharaj MA

Interaction Design - P3

Interconnecting the words of dyslexia -

Social tools that unburden special need children and spur them

to learn as a playful experience.

Children with dyslexia frequently spend a lot of time at school, in specialised classes, doing their homework, which leaves little time for play like their peers. The project seeks to solve this problem by including a design intervention that aids in assisting dyslexic children in overcoming their emotional difficulties. With the help of the intervention, kids may play and study alongside their parents, ensuring that they can have fun and get better academically at the same time.

Naveen Singh Rawat

Interaction Design - P3

Learning aid for dyslexic children

This project helped me understand the subject of dyslexia as a whole. Additionally, it assisted me in beginning and navigating my project. The user studies that were conducted were really beneficial to me since they gave me a plan for how to do my field study and watch and learn.

The goal of the design intervention was to make the whole learning experience enjoyable and comfortable in learning for a child.

Why Dyslexia?

Social Impact

- Dyslexia is **one of the most common learning disabilities**, affecting a significant number of individuals worldwide.
- Dyslexia is still **misunderstood by many**, and there is a need for increased awareness.

Research

- Dyslexia involves various fields such as: **education, psychology, neuroscience, linguistics, and design.**
- This will help me to delve into the intersections of these disciplines and **integrate diverse perspectives to develop comprehensive solutions.**
-

Innovation

- Dyslexia requires **innovative and alternative teaching methods** to engage learners effectively.
- This can involve designing and experimenting with **creative learning techniques, such as multi-sensory approaches, gamification, and visual aids**, to facilitate better comprehension and retention.

Aims/Objectives

- Improving Accessibility
- Enhancing reading and writing skills
- Develop confidence and self worth
- Improving Accessibility
- Encourage multi-sensory learning
- Explore assistive technologies and their integration
- User-centred research
- Encourage understanding and awareness
- Foster communication and collaboration
- Encourage optimism and resiliency

Scope in P1 and P2

My P1 intended to research several aspects of dyslexic learning, including reading and writing challenges, phonological awareness, comprehension abilities, and the benefits of therapies and educational strategies.

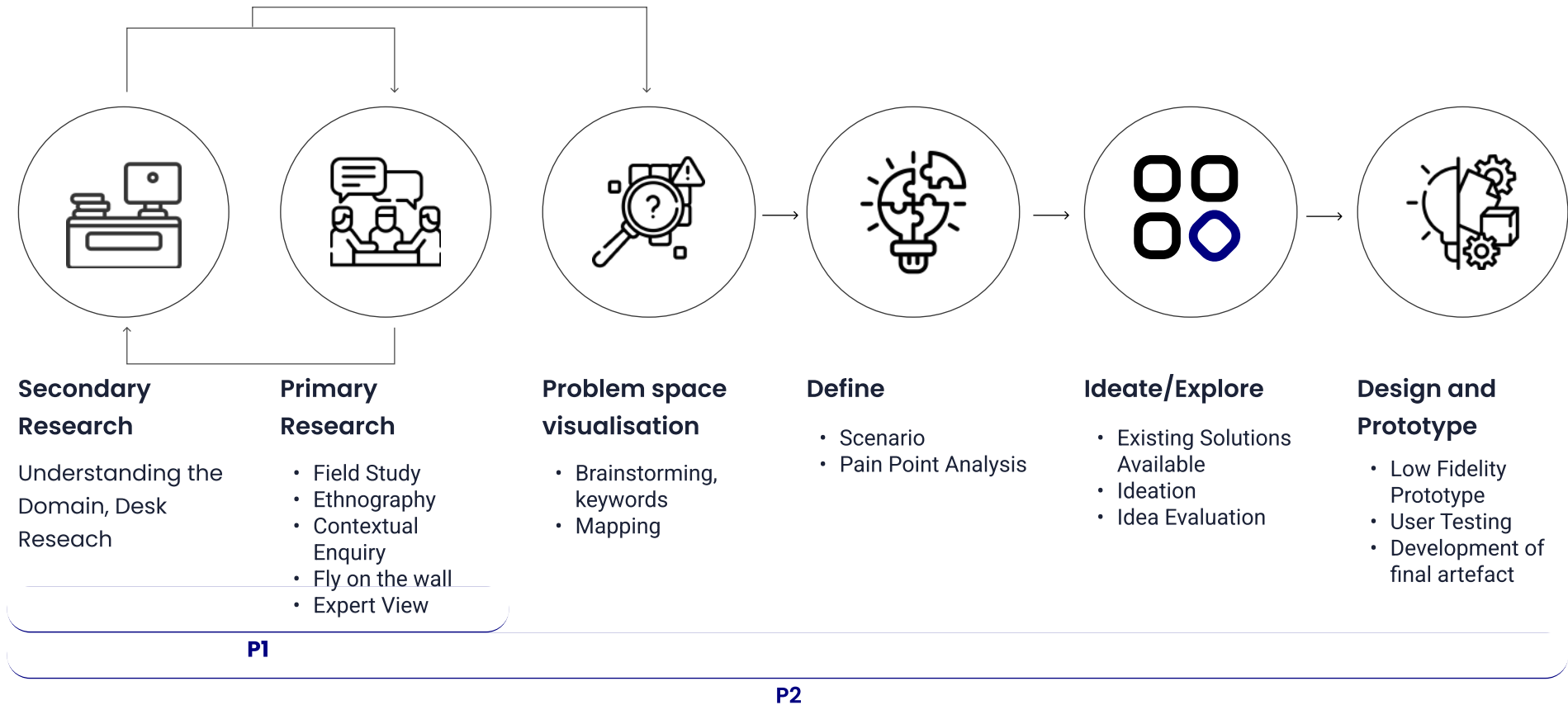
P2:

- Research and analysis
- Finding design solutions for children with Dyslexia.

My main users are :

- Students, Caretakers and Remedial Educators.

Approach and Method :



Field Study

To gain a better understanding of the educational services provided for students with dyslexia, I conducted a thorough study and observation of two special education schools named REACH (Centre for Remedial Education) and MBA Foundation as GODS (Groups of Disabled)

REACH

(Centre for Remedial Education)

Spent 4 days at the centre.

During my observation, I was able to observe the experiences of five students who had been diagnosed with dyslexia.

3 Students

(Diagnosed with Dyslexia)

MBA Foundation as GODS

(Groups of Disabled)

Spent nearly 2 weeks at the centre

2 Students

(Diagnosed with Developmental Delay)

Objective :

The goal was to observe students and teachers in an everyday special school setting. During the course of study, I tried to identify :

- How is everyday routine of classes and different sessions focused for different students takes place.
- Different educational approaches.
- The effectiveness of interventions.
- Understanding students experience.

The Process :

- Received authorisation to conduct the fly on the wall study.
- Approached organisations and teachers with the brief.
- Sit and observe different classes with students.
- Observe and take notes.
- Follow up discussions with teachers after the class.

Field study - 1

I opted for fly on the wall technique to observe students and teachers across a variety of environments. After the field study, I approached teachers and parents with follow-up questions.

Location: MBA Foundation, Airoli, Mumbai, Maharashtra

Classroom Setting:

- 2 to 4 students in one class.
- Spacious as compared to number of student and teachers present during a class.



Morning Routine (10.00 - 10.30 AM) :

- Number of Teachers : 5
- Grade : Early Intervention,
- Age : Mixed

- Class strength : 9 - 10
- Time : 10AM to 10.30AM
- Activity : Prayer, Meditation, Exercise, General Knowledge, Basic information(day, date, month, year), Mat folding, Go to classroom.

Class Routine (10.30 - 11.30 AM) :

- One teacher for two students.
- Helping students with school syllabus, covering the doubts where students face difficulty in learning and making them to practice.

Break (11.30 - 12.00) :

- Action poem.
- Multi sensory activities.
- Dance.

Students Lunch break (12.00AM - 1.00 PM) :

- Teachers help student finish their lunch.

Occupational Therapy class (Half n hour) :

- Ones to twice a week depends on the progress of a student.
- One on one session.
- Memory games.
- Cognitive development activity.
- Eye hand coordination.

Speech Therapy class (Half n hour) :

- Ones to twice a week depends on the progress of a student.
- One on one session.
- Small room.
- Memory cards.
- General knowledge activity.
- Self awareness communication skills.
- Making students aware of the surroundings, for example, objects, profession, fruits, colors, vegetables.
- Helping students communicate proficiently.

Classroom structure :

- Almost all rooms has natural ventilation, except one.
- Lights are all switched on, with One fan and one AC in early Intervention classroom.
- Slightly cramped classroom with around 10 students and 4-5 teachers during the morning class.
- Activity charts, everyday material images, general knowledge charts, are hung on the walls.
- Most desks accommodate 2 individuals, with some accommodating 1.
- Desks are all donated.
- Size of the desk is very small with no space to keep bag or books.
- One storage unit, one almirah, one small cupboard to store all the activity materials, notebooks, etc.
- White board, Mirror, Wall clock.
- Yellow and purple walls seem to give off a more cheerful environment

Material at hand:

- All the teaching materials are available at the centre.

Student:

- School bags with school notebooks, pencil pouch, lunch box, water bottle.

General observations:

Morning class:

- All students from different classes come together.
- While doing the activities, students are more engaged and motivated by seeing others participate.
- Students get distracted by each other very easily.
- Students in the front pay more attention and respond more.
- Students in the back are more distracted and don't participate unless asked.
- There is no competition and no peer pressure because

- every student is treated equally. As a result, they are more willing to participate, take the initiative, and speak their minds openly.

Exclusive class:

- 2-3 students per teacher.
- Open classroom.
- Classroom changes almost everyday.
- All students are at different level.
- Teacher is not able to give attention to every student at all times.
- Students get distracted easily because of other students and when the teacher is attending other student.
- Students are not able to concentrate for longer period of time.
- Students are not able to sit at one place for a longer period of time.
- When given full attention, students focus better.

Occupational Therapy class:

- Since it is a one on one session, students are more focused and interested.
- They are captivated and engaged through engaging lessons that are taught through games, which greatly aids their learning.
- Students show rapid progress during occupational therapy sessions.



Speech Therapy class:

- Initially the student was feeling nervous, later was comfortable as the teacher started some casual conversations to lighten the environment.
- Student is more engaged and focused because it is a one-on-one session.
- Student get tired and distracted after a certain time.
- Student takes time to remember things.
- The teacher offers options for students to choose from when they are unable to provide the correct answer.
- During the picture Identification, student was very quick to answer those which were identical to him.
- The teacher was helping student with forming proper sentence while answering.
- Student was able to identify letters but was unable to construct words using them.
- The student was not able to understand some of the questions asked by the teacher. To help the student grasp the concepts better, the teacher used different examples and situations, which eventually led to the student's understanding.

General Observations:

During occupational therapy and Speech therapy session, students show more interest and progress in creative learning. As teachers pay better attention to student since it is a one on one session.

Students are more energised when it comes to creative learning and fun activities.

Students can focus and sit for long period of time. They get very easily distracted.

Activities:

- Memory game
- shadow games
- sensory activities, for example picking stuffs out of water tub with hand and then with spoon. Adding different levels

- to it, making it more interesting and challenging.
- Concentration games.
- Card games: Identify the image, identify the shadow, etc.



How does the teachers build a healthy learning environment?

- To get the class warmed up, teachers spend some time making simple conversations and activities, for example what day is it today? what month is it today?
- Activity picture cards are used and students are asked to guess what the picture is about.
- These simple conversation seems to wake the students up and help them become excited for the day.

Teacher's habits and practices:

- Teachers use different creative ways to make students understand and remember. For example, using hand gesture and action, associating with image, breaking words to make it easy to understand, providing students with option for them to choose the correct one.

Classroom bulletin boards and decorations:

- Days, weeks, calendar, everyday routine chart, Morning activity chart, pictures of everyday objects, alphabet.

Student seating arrangement:

- 2 to 3 students in a room.

Problems faced by students :

- During the morning session, all the students from different

- class with different disabilities are present in the same classroom which makes it difficult for students to focus and participate in the morning activities.
- This also sometimes boost students confidence to participate and speak-up as they don't feel the peer pressure.
- Students get easily distracted by other students.
- Difficulty remembering or recalling things. Specially which they cannot relate to the real world.

How does the teachers build a healthy learning environment?

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- Activity picture cards are used and students are asked to guess what the picture is about.
- These simple conversation seems to wake the students up and help them become excited for the day.

Teacher's habits and practices:

- Teachers use different creative ways to make students understand and remember. For example, using hand gesture and action, associating with image, breaking words to make it easy to understand, providing students with option for them to choose the correct one.

Field study - 2

I opted for fly on the wall technique to observe students and teachers across a variety of environments. After the field study, i approached teachers with follow-up questions.

Location: REACH, Vile Parle, Mumbai, Maharastra

Classroom Setting:

One big room subdivided into different classes.

Morning Routine (9.30 - 10.15 AM) :

- Number of Teachers : 12

- Number of students with Dyslexia : 4
- Grade : Early Intervention, Intermediate grade (Lvl 1 to 3)
- Age : Mixed
- Class strength : 3 to 5 in each class
- Time : 9.30 AM to 10.15 AM
- Activity : Taekwondo, Yoga, Music, Zumba



Class Routine (10.15 AM - 3.00 PM) :

- 1:5 Teacher student ratio.
- Classes : English, Math, Science, History, Civics, Geography, Computer
- CCA (Co-Curricular Activity) : Craft, Art, Story Reading
- Remedial Classes : 45 minutes

Time	Monday	Tuesday	Wednesday	Thursday	Friday
9:30 - 10:15	English	Math	Science	History	Geography
10:15 - 11:00	English	Math	Science	History	Geography
11:00 - 11:45	B	R	E	A	K
11:45 - 12:30	English	Math	Science	History	Geography
12:30 - 1:15	English	Math	Science	History	Geography
1:15 - 2:00	L	U	N	C	H
2:00 - 2:45	English	Math	Science	History	Geography
2:45 - 3:30	English	Math	Science	History	Geography

Snacks (11.00 - 11.15 AM) :

- Teachers help student finish their Snacks.

Lunch Break (12.40 Am - 1.30) :

- Teachers help student finish their lunch.

Occupational Therapy class (30 to 45 minutes) :

- Ones to twice a week depends on the progress of a student.
- One on one session.
- Memory games.
- Cognitive development activity.
- Eye hand coordination.

Play Therapy class (30 to 45 minutes) :

- Ones to twice a week depends on the progress of a student.
- One on one session.
- Different toys to enhance sensory play.
- Develop emotional awareness and regulation skills.
- Build self esteem and confidence.
- Develop social skills.
- Improving problem solving and cognitive ability.



In House counsellor :

- Ones to twice a week depends on the progress of a student.
- One on one session.

Classroom structure :

- One big room with natural ventilation.
- The room is divided in small sections for 5 classrooms.
- Sufficient day light, with ceiling fans and wall fans.
- Slightly cramped classroom with around 4 to 5 students in each classroom.
- Activity charts, every class routine and students name on a sheet of paper is hung in each class.
- Students artwork, calendar, map of India are hung on bulletin boards.
- All desks accommodate 1 individual, with space to keep books and stationary.
- One open shelf for keeping class materials and books.
- One common desk.
- Three almirah to store all the files.
- Black board, chalk, duster for each class and a wall clock.
- Light yellow walls with wooden dividers having color coded bulletin boards giving each class its own identity.

**Material at hand:****Teacher:**

- All the teaching and therapy class materials are available at the centre.
- For play therapy class the therapist brings her own required

- materials for the class.

Student:

- School bags with school notebooks, pencil pouch, lunch box, water bottle.

General observations:**Morning class:**

- All students from different classes come together.
- While doing the activities, students are more engaged and motivated by seeing others participate.
- Students get distracted by each other very easily.
- Students in the front pay more attention and respond more.
- Teachers are present to keep every student engaged in the activity.
- There is no competition and no peer pressure because every student is treated equally. As a result, they are more willing to participate, take the initiative, and speak their minds openly.

Routine class:

- 4-5 students per teacher.
- Semi open classroom.
- Students are assigned to a class as per their IQ level and not on age basis.
- Teachers are able to give attention to every student.
- Students are more engaged and excited in participating and doing the class work.

Observation of Students in routine classes:

- Friendly interaction between student and teacher.
- Students are not able to sit at one place for a longer period of time hence breaks are given in between.
- Students engage in class-works.

- Interacts and discusses with peer members.
- Students ask and cross question when in doubt.
- Excited and participates in class activities.

Observation of Teachers in routine classes :

- Friendly interaction between student and teacher.
- Hand gestures Used to make the topic more engaging and understandable for students.
- Open minded and gives room for friendly discussions, mistakes, and doubts.

Occupational Therapy class:

- Happens once a week, also depends on the requirement of a student.
- One on one session, students are more focused and interested.
- They are captivated and engaged through engaging lessons that are taught through games, which greatly aids their learning.
- Students show rapid progress during occupational therapy sessions.

Remedial class:

- Happens once a week, also depends on the requirement of a student.
- One on one session, students are more focused.
- Initially feels anxious, but once familiarised, exhibits extraordinary efficiency.
- Students show rapid progress during remedial sessions.
- Sight reading for older students from dolch word list.
- Syllabifying and color coding.
- Proofreading and correcting.
- Sentence formation is done in later stage.
- Students are made familiar with noun, verbs, and phrasal words.

- Students are more engaged and excited in participating and doing the class work.

General Observations:

- During occupational therapy and play therapy session, students show more interest and progress in creative learning.
- Remedial classes if continued for long becomes tiring for students with learning disability. As it requires more concentration and it focuses on the areas where the student is lacking.
- Teachers are able to pay better attention to student since it is a one on one session.
- Students are more energised and engaged when it comes to creative learning and fun activities.
- Students can focus and sit for long period of time.
- Students volunteer to finish the work.
- Transfer of sound is difficult, for example, 'tion'.
- Every word is a new word for them.
- Difficult to make complex sentences.
- Initially students form sentences using only, "I like", "I use" since it is difficult for them to understand the concept of nouns, verbs, etc.
- Trouble phrasing questions.

Activities:

- Taekwondo, Yoga, Music, Memory game, Shadow games, Board games
- Play group activities promotes socialising, and interaction among peers and teachers.
- Physical activity games, example exercise ball, ropes, mini trampoline, etc.
- sensory activities and games, for example hand puppets, crayon, pencil colors, water colors, plastic toys, rubber toys,

- wooden toys, papers, cubes, blocks.
- Asking kids to try new materials and explore different medium. helping them open up and become more expressive.
- Asking questions about their choices and the reasons behind them.
- Getting their permission.
- Motivating them to make choices.

How does the teachers build a healthy learning environment?

- To get the students warmed up, teachers spend some time making simple conversations and asking questions like what we did last time.
- they also use Activity picture cards and ask students to guess what the picture is about.
- These simple conversation seems to wake the students up and help them become exited for the day.

Teacher's habits and practices:

- Teachers use different creative ways to make them understand and remember. For example, breaking words, relating words with hand gesture and action, associating with image, providing students with option for them to choose the correct one.
- Keep on checking each students progress and reading their body language.
- If someone is facing trouble, they give full attention to them and help them.
- Maintains the speed of teaching as per each students pace of understanding.

Classroom bulletin boards and decorations:

- Everyday class routine chart, Students work.

Student seating arrangement:

- Little to no space for movement in class.
- All students are close to the teacher's seating space and



board, hence helps teachers to focus on each student.

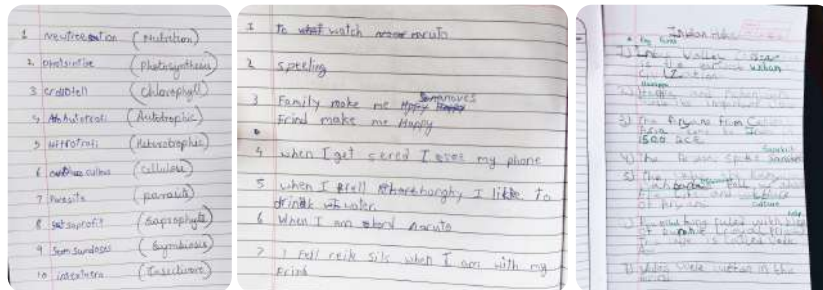
Problems faced by students :

Lots of concentration needed for the words that the student find difficult to read.

- Text heavy activities.
- Less to no creative learning.
- Student gets tired after a certain time.
- Can not continue for long.

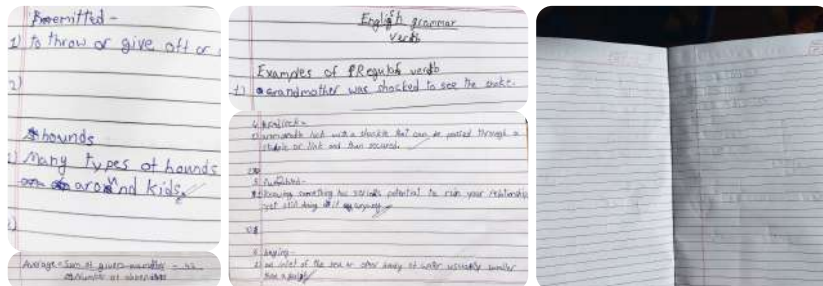
Artefacts

To gain a better insight of user behaviour these artefacts were collected.



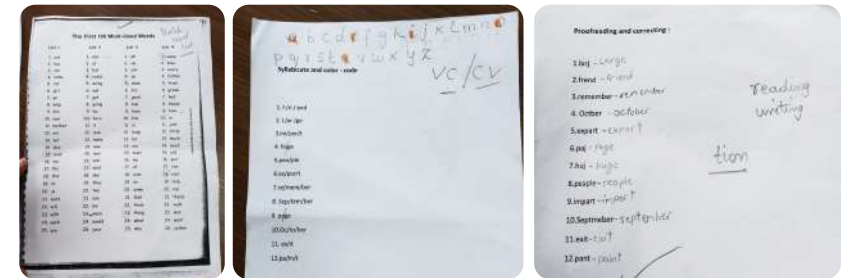
Observation:

- Trouble recognising phonemes.
- Trouble finding the right words.
- Skipping words.
- Misspelling the words and repeats the same with different spelling error for the same word in the same sheet of paper.
- Trouble forming phrases.



Observations :

- Consistent spelling errors including letter reversals (b / d), inversions (n / u), .
- Poor hand writing. Poor pencil/pen grip and puts more pressure on paper while writing.
- Weak memory.
- Slower processing speed.



Remedial Class for student with Dyslexia (Worksheet for higher class students who just took admission) :

Step 1 : Sight words (Dolch word list) :

- Students are made to read out loud all the sight words

Step 2 : Syllabicate and color code :

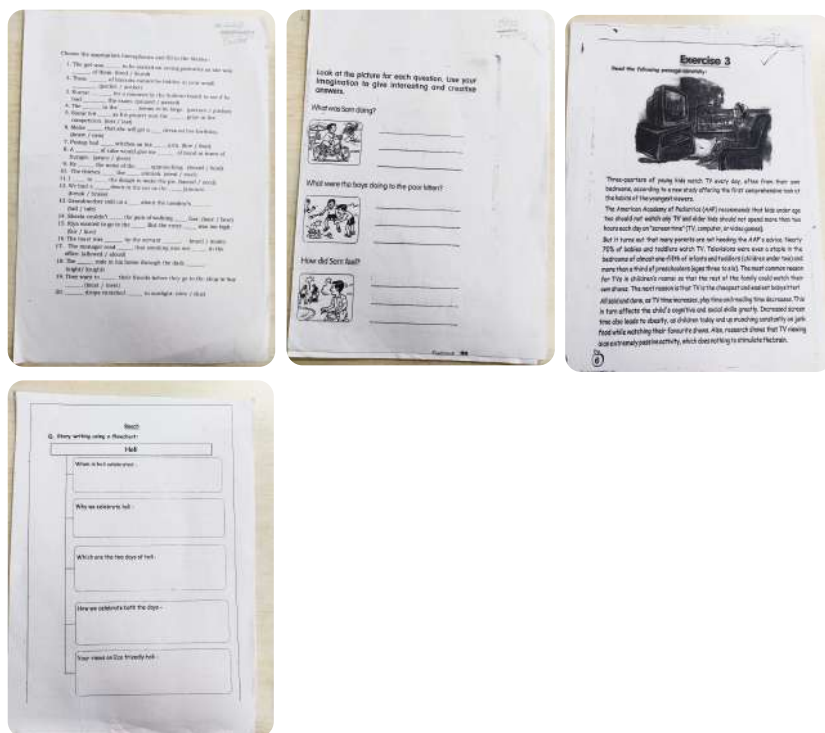
- Students are asked to color code all the vowels,
- Help them pronounce the syllabicated words in the same format.

Step 3 : Proofreading and correcting :

- Students are given with jumbled up words and asked to arrange the letters in order to make sense.

Advantages:

- Dolch sight words are often found in reading and writing, they don't always follow the same phonetic patterns.
- This helps students to learn everyday most used words and gives them an understanding of how a word is formed and how one can break and read any word.
- Syllabating and color coding helps them to recognise and remember these patterns, enhancing their recall reading accuracy and fluency.
- With proofreading and correcting, students can improve their editing skills and become more proficient in identifying and fixing errors in their writing.



Remedial Class for student with Dyslexia (Worksheet for standard 10 students) :

The worksheets are provided to kids with different goal sets:

- Choose the correct option for the sentence.
- Story writing using flowcharts- topics are provided, students have to write point wise and then form story out of it.
- Essay writing
- Image story formation: Forming story from the image cue provided.
- Comprehension writing : After every exercise students are given space to form an essay.

Advantages:

- These worksheets help Improve creative and expressive writing skills.

MBA (GODs school of Disabled) : 1 student with Developmental delay

- **Student : S1**
- Age : 10 year
- Diagnosis : Developmental delay/Learning disability
- **Occupational Therapy Assessment:**
- Rolling, sitting, standing, turning, crawling : Delayed
- Walking : After 5 years
- Grandparent tells:
- Sentence format while writing
- Forgets things
- Becomes irritated, when not being heard
- Feeding and dressing : Independent
- Toilet habits : When in need of help for cleaning, he indicates the need.

Psychologist Assessment:

- Diagnosis : Intellectual Disability
 - Cognitive Ability : Understands basics like, identifying colors(red, yellow, ets.)
 - Attention Span : Able to concentrate for a short while.
 - Intelligence Quotient : 50%
 - Behavioural pattern : Follows instruction, sits in a group, does not take initiative on his own, tend to forget things while doing a particular activity.
- Recommendations :
- Special education(one to one session)
 - Occupational therapy(cognitive activity)

Sees and Does:

- Sees and Tells Mat, guesses the spelling mot.
- Sees cake, Spells kake.
- Sees a ball, Spells boll.
- Sees apple, spells apple.
- Sees car, spells car quickly.

- Sees cat, spells cat quickly.
- Asked to spell cup, spells cup quickly.
- If provided with cues and options, tells the right month, date and day.
- Asked to spell egg, guesses the spelling. Remembers the next day.
- Asked to spell town, misreads n as h.
- When instructed, 'come here or go there'. Understands the action but can't tell what the words mean.
- Gets confused when it comes to writing in Hindi and English because in Hindi, words are written starting from the top line, but does the same apply to English as well?
- Good with image correlation. For example: Identifying the images of Barber, Cooking, Pottery.
- Jumbling up all the words and letters learned. Trouble differentiating words.
- Getting confused with 21 and 12.

Insights :

- Currently in the third grade, the student's age suggests that they should be in the fifth or sixth grade.
- Struggles with working memory, making it harder for them to remember and retain information while reading or completing tasks.
- Processing speed is also affected, leading to slower response times and difficulties keeping pace with classroom activities.
- find it challenging to sustain attention and concentrate on reading or writing tasks, particularly if they involve complex or lengthy texts.
- Becomes easily distracted, leading to difficulties in staying focused and completing assignments.
- Finds it difficult to identify and manipulate the sounds in spoken language, known as phonological awareness.
- This makes it difficult for them to recognize and work with

- the individual sounds in words, which is essential for developing reading and spelling skills.
- Trouble with spelling and writing. Finds it challenging to understand and apply spelling rules, remember letter sequences, and organize their thoughts on paper.
- The written work contain frequent spelling errors, inconsistent letter formations, and poor handwriting.
- Struggles with decoding words, recognizing sight words, and understanding the relationship between sounds and letters.
- Experiences slow, inaccurate, or laborious reading, leading to difficulties in comprehension and fluency.

Student : S2

- Age : 13 year
- Diagnosis : Developmental delay/Learning disability, Borderline, attention and concentration deficit.

Complaints from previous school:

- Unable to sit in one place
- Unable to concentrate
- Academic Backwardness - poor in reading, writing
- Academic behaviour, impulsivity
- Adamant behaviour, Impulsivity
- Anger, Irritability

Academic history:

- Complaints from school began since he was in play school
- He was homeschooled for 1 year, which didn't help.
- He was made to repeat junior K.g. twice due to poor performance

Birth and development history :

- Delayed milestone development - walking(2 years of age,

- Speech after 3 years of age but unclear)

Observations

- Able to read words, not able to read full sentences.
- Able to write with verbal assistance.
- Very slow reading and needs verbal prompts.
- Poor attention, needs physical breaks and prompts to make him to attend.
- Can solve multiple choice questions, but takes time
- Able to do fill in the blanks with choices,
- Able to solve match the columns.

Student : S3

Age : 15 year

Joined recently.

Diagnosis : Dyslexia / Dysgraphia

Birth and development history :

- walking(8 months of age, Speech at 1 years of age)

Mother's concern regarding his difficulties with academic:

- Unable to cope academically at par with his class.
- Has difficulty retaining and recalling academic information in spite of revision.
- Makes spelling mistakes and grammatical errors.
- Has a lot of difficulty with sentence construction skills.
- He is not fluent in spoken languages.

Observations

- Engages in class, discusses with teacher and peer members.
- Asks doubt.
- When not able to understand the topic, feels distressed.

- Struggles in simple calculations.
- Makes spelling mistakes including, letter reversals (b / d), inversions (n / u).
- Comparatively slow in class.
- Trouble retaining what was taught earlier.
- Repeats spelling mistakes of same words in same page.
- Able to read, but very slow.
- Understands small sentences.
- While reading simple words, need lots of concentration.
- Trouble with phonemes.
- Good with retaining information temporarily.
- Good with retaining visual information.

Student : S4 and S5 :

Grade:

- 10th standard
- Has been enrolled in Reach for approximately 1-2.5 years

Observation :

- Engages in classroom activities.
- Interacts and discusses with classmates.
- Discusses doubts and asks question.
- Friendly environment.
- Teachers are open minded and leaves room for doubts and discussions.
- Good with writing down from board.
- Good with verbal rapid word games.

Discover

Field Study :

A specialised and inclusive school offering personalised assistance and interventions to thrive academically and

emotionally.

I carried out a field study utilising the fly on the wall observation method to learn more about the experiences of children with learning difficulties and their teachers in a specialised school setting.

Thanks to this method, I was able to observe them as they went about their regular day in school without being interrupted or interfered with. I tried to record real and unaltered behaviours, activities, and dynamics occurring in the classroom setting while remaining silent.

To get an understanding of everyday happening in a classroom.

To understand how specialists provide targeted interventions and support.

Remedial Sessions

To understand how students are empowered to become more confident and independent learners.

Co-Curricular Activities

To get an understanding of the methods used to help students with learning disability

Identifying the problems

Students:

- Trouble with phonemes (FO-neems).
- Trouble with letter reversions (b / d) and inversions (n / u).
- Trouble retaining any information.
- Ends up memorising tasks but struggles with retention and recall.
- Finds it challenging to understand and apply spelling rules

- (eg. Nutrition / Nutreesun).
- Frequent spelling errors, inconsistent letter formations, and poor handwriting. Poor brain-hand co-ordination. Performs any task in a hurry.
- Trouble doing text heavy tasks.
- Difficulty maintaining focus for long stretches of time.
- Gets easily distracted by peers or other people in the learning environment and struggles to stay focused.
- When dyslexic children are unable to understand an idea, they are shy/afraid to ask for clarification, especially if others appear to grasp it effortlessly.
- Attempts to avoid tasks by saying things like "baad me likh lunga" or "abhi toh bohot time hai."
- Trouble with text accessibility for example, complex fonts, small font sizes, insufficient color contrast, and inadequate spacing.
- Lack of multi-sensory instructions.
- Lack of provision of assistive technologies.

Students face difficulties with the lack of resources available, such as text accessibility and visual overload. Multi-sensory training and the provision of assistive technologies, and a positive learning environment.

Teachers and Resources

- When students with dyslexia have issues or make mistakes in class, they must wait and attend remedial classes to gain additional support and clarification.
- Teachers are not always able to continuously monitor and provide individual attention to students with dyslexia due to the text-heavy and laborious nature of classes.
- Teachers are exhausted when students with dyslexia struggle to understand things even after getting explanations and having their doubts cleared, as these students frequently struggle to grasp the underlying

- reasoning or rationale behind specific concepts.
- Not all teachers have adequate knowledge or experience in efficient teaching approaches intended specifically for students with dyslexia.
- Learning materials that are accessible to dyslexic students are scarce to none.
- There is a lack of multisensory teaching tactics that cater to different learning styles and engage various senses.
- There was no conducive classroom setting that minimised distractions and promoted concentrated learning.
- Inadequate availability of appropriate assistive technologies to aid dyslexic students.
- Failure to incorporate lesson plans and learning activities that address individual obstacles and cater to various learning profiles.

The need for accessible learning materials, implementing multi-sensory instruction, creating a conducive classroom environment, incorporating assistive technologies, and providing individualised instruction, are all challenges.

Through the field study, I learned about the major problems that instructors and students encounter in the special classroom setting.

Conversation

Ethnography :

For the next step of the design process I interacted with 4 remedial educators and 1 parent to get a deep understanding of the challenges, goals, and expectations.

I conducted one-on-one interviews with five remedial educators and one parent from two special education schools,

REACH (Centre for Remedial Education) and MBA Foundation as GODS(Groups of Disabled), to better grasp the topic.

REACH

(Centre for Remedial Education)

2 Remedial Educators

MBA Foundation as GODS

(Groups of Disabled)

3 Remedial Educators and 1 Parent

Questionnaire

REMEDIAL EDUCATORS QUESTIONNAIRE:

- How well-versed are you in the concept of dyslexia and how it impacts a person's capacity to learn?
- What are the most frequent reading, writing, and spelling issues that dyslexic people experience, in your opinion?
- How do you approach instructing pupils that have learning difficulties, and how do you modify your techniques to suit the demands of each individual student?
- Have you observed any clear patterns or recurrent issues among dyslexics? If so, could you provide some illustrations?
- How do you now approach the remedial education needs of dyslexic students? Are there any specific methods, tactics, or resources that you have discovered to be extremely helpful?
- What methods do you use to help pupils overcome their individual learning challenges and advance in their academic work?
- What aspects or elements do you consider while creating a learning plan for a student?
- What kinds of materials and equipment do you use to assist your instruction, and how do you keep updated of new findings and developments in your field?

- What difficulties do you face at work, and how do you resolve them?
- How can you make sure every kid in your class is advancing and getting the help they need to succeed?
- How can you discuss a child's development and any worries about learning impairments with parents and teachers?
- What elements of the current techniques or tools for dyslexia remedial education, in your opinion, may be enhanced from a design perspective?
- Do you encounter any unique design-related challenges or problems when dealing with dyslexic individuals? How do you tackle these challenges?
- What role, in your opinion, may design play in improving dyslexic students' learning and outcomes? Do you specifically employ any design concepts or techniques in this situation?
- Do you have any examples of dyslexic people who overcame their learning challenges? If so, please share your success stories.
- Are there any specific technological advancements or emerging trends that, in your opinion, could improve dyslexia remedial education?
- What positive effects do you think the collaboration between designers and remedial teachers will have on creating inclusive and effective learning environments for dyslexic students?

PARENT QUESTIONNAIRE:

- What steps did you take to have your child evaluated after first realising that they might have a learning disability?
- What kind of specific learning problem does your child have, and what difficulties does your child typically face?
- What methods do you use to promote your child's learning and development at home, and which ones have been found to be successful?
- How do you keep track of your child's progress and what resources and methods do you use to stay educated about

- the specific learning disability your child has?
- What challenges have you faced?
- Which after-school activities or peer support groups have you observed to be advantageous for your child, and how have they influenced their general wellbeing?
- Can you provide any examples of your children's accomplishments?

Challenges:

With the help of field study and conversing with the remedial educators and parents, these were the challenges discovered:

Academic:

- Reading difficulties
- Writing and spelling difficulties
- Challenges in phonological awareness
- Difficulty with comprehension and fluency
- Poor organizational skills in written work

Cognitive :

- Working memory limitations
- Processing speed difficulties
- Challenges with attention and concentration
- Impaired executive functioning skills
- Difficulty with problem-solving and critical thinking tasks

Social :

- Peer interactions and acceptance
- Stigma and misunderstanding
- Classroom dynamics and social integration
- Self-confidence and self-esteem issues
- Miscommunication and misunderstanding
- Classroom dynamics and social integration

Environmental :

- Frustration and anxiety related to academic tasks
- Low self-esteem and feelings of inadequacy
- Stress and pressure to perform at the same level as peers
- Negative impact on overall emotional well-being

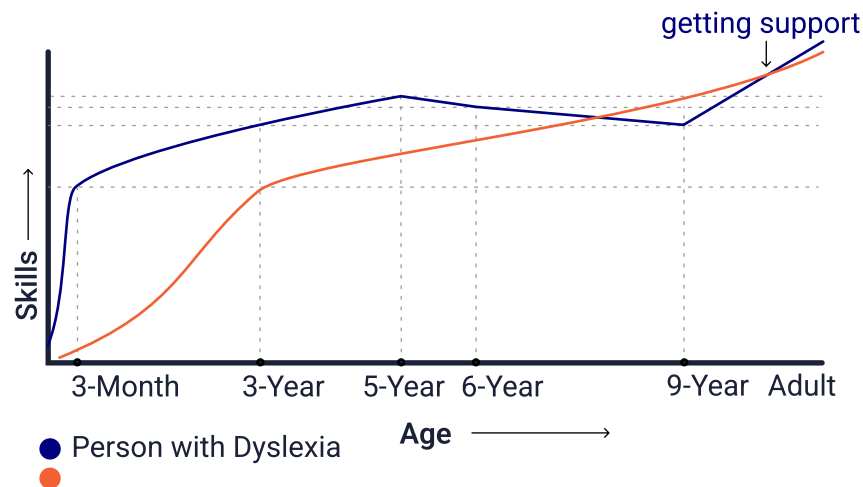
- Potential development of mental health issues

Assessment and Evaluation :

- Discrepancy between actual abilities and traditional assessment measures
- Bias towards timed tests and written assignments
- Lack of accommodations during assessments
- Limited recognition of alternative strengths and talents
- Difficulty in receiving accurate evaluation and recognition of progress

Life trajectory of a person with Dyslexia

Here, I've attempted to illustrate the life trajectory of a person with Dyslexia using reference from the book "The Gift of Dyslexia" set in an Indian setting.



Here, I've attempted to illustrate the life trajectory of a person with Dyslexia using reference from the book "The Gift of Dyslexia" set in an Indian setting.

3 Months old

- The child's **neck muscles have not yet developed control**.
- Babies learn to **recognise facial traits** at this age, according to a psychologist.
- They can only **view particular areas of their surroundings** or a **person's body part** from their vantage point.
- Children with dyslexia are naturally **curious**, and when they come across anything unusual, they trigger their brain cells unconsciously, resulting in a condition known as **disorientation**.
- It is easier for the youngster to focus their eyes and **combine the two mental representations they generate**, for example, adding other traits to the body part they can see and therefore perceiving the person's face.

2 Years old

- Children with dyslexia are **naturally curious**.
- They thoroughly investigate their surroundings, paying attention to every aspect.
- They exhibit environmental awareness by being aware of their surroundings.
- They can change their perception and look at novel items from different angles and directions.
- They use this brain function (disorientation) unconsciously as a technique for object recognition.

3-5 Years old

- Higher intelligence: Dyslexic children exhibit higher intelligence compared to their peers.
- Potential for learning disability: They have a potential for developing learning disabilities.
- Language development: They have learned to understand spoken language and can communicate verbally.
- Rapid speech: Sometimes they speak quickly, resulting in unintelligible speech.
- Visual thinking: They think in pictures, often without realizing it.

3-5 Years old (A normal kid)

- Cognitive development: Developing children start to **analyse logic and hone logical reasoning abilities**, which allow them to consciously **identify individuals based on their body parts**.
- They also develop **speech and language abilities**.

6 Years old

- The **first day of school**.
- **Fearful and overwhelmed** by the unexpected surroundings.
- The **teacher writes "B-A-T"** on the board with chalk.
- Even when pronounced loudly, **unable to make any link with the word "B-A-T"**.
- There is **no mental image of a bat produced**.
- Feeling **confused**.
- **Disorientation** is caused by the brain, leading the **word to be perceived in different configurations in a millisecond**.
- **Blurred vision, floating or sinking sensations**.
- Feeling **sick**.
- **Confusion** has persisted.

BATTABTABBTBATTBATTB
BATTABTABBTBATTBATTB
BATTABTABBTBATTBATTB
BATTABTABBTBATTBATTB
BATTABTABBTBATTBATTB
BATTABTABBTBATTBATTB
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BATTABTABBTBATTBATTB
BATTABTABBTBATTBATTB

9 Years old

- Reaches the **pinnacle of frustration**.
- They risk being **stuck in third grade** unless they **find a solution to their word-related problems**.
- School becomes a **torturous experience**.
- Desperate, they **take matters into their own hands**.
- Develops **mental methods** and procedures such as **rote memorization, sound associations, songs, rhymes, and strong focus**.
- The **limitation gradually becomes a disability**.

Adult

- **Reading and writing become mentally exhausting** for them.
- Learns a lot from **art, music, and science classes**.
- Despite an interest in the subject, **performs poorly on written tests**.

With support :

- They will continue to **observe the world from their unique perspective**.
- They will **develop an instinctive and acute understanding** of how things work.
- They have special talents for **creativity, problem-solving, and unconventional thinking**. With assistance, they can direct these abilities into **creative endeavours and significant accomplishments in the fields of music, business, or invention**.

During my field study tour, I was able to hear multiple success stories of students who, despite significant obstacles, are now leading successful lives. They have not only overcome their difficulties, but are also thriving as a result of excellent direction.

Success Story

With the proper help, many people who have been diagnosed with dyslexia have succeeded and are thriving in a variety of industries. They have discovered their niche in fields like the arts, sciences, entrepreneurship, and innovation, showing their skills and making a positive impact on society.

Following are some conversations with the special instructor telling the success stories:

"There are my students who are there in the **hospitality**, working for **5 star hotel**."

"One is on **cruise** sending me photographs from different parts of the world and standing in front of the ship. There are some

who have **gone abroad**.”

“One is **directing ad films**. He has effectively managed his dyslexia, particularly when it comes to reading scripts, he requests a digital copy of the script.”

“One student, now she is in **theatre**. Performs in dramas and plays.”

“I have someone who’s in **digital marketing** and doing very well. There are quite a few in **visual communication**.”

“One is **BBA in finance** and has **started his own company in the US**.”

“I have one student who is now a **fashion designer**. This was another high moment when she told me that, She had the big models, and today she can walk around and take a bow with the models.”

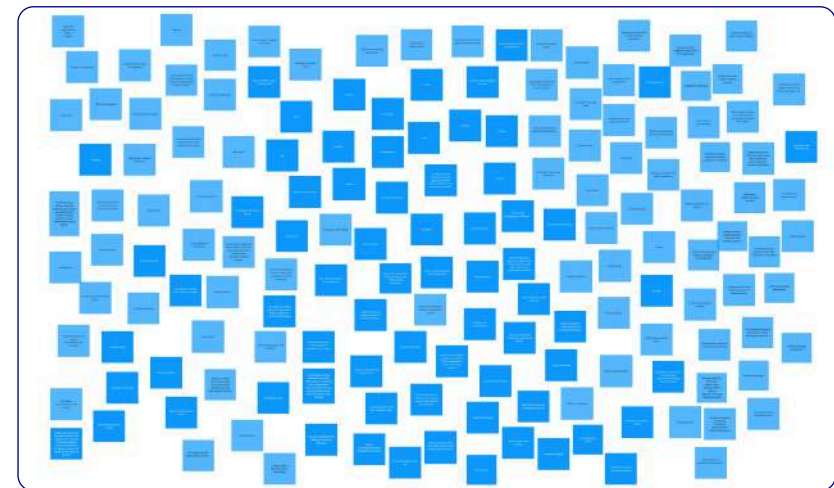
“I celebrated 20 years of my organisation last year, and approximately 70 out of 130 students attended the celebration. It was **wonderful to see how they have become so confident**, more than that **they are earning their living**. It is the **confidence in them that amazes me**. Because I know each one of them from the time they first came to me.”

Mapping

With the data collected from Primary and secondary research, I used the mapping technique to gain a deeper knowledge of the problem and to investigate potential for intervention. This helped me organise and categorise the many data sets that was obtained using affinity mapping. With categorisation of data, I was able to highlight the repeating themes, important pain points, and potential solutions. This helped me gain insight and find opportunities to explore unique solution. The mapping diagram was achieved by writing each concept and arranging them in groups. These concepts were derived

from the initial research which included, Occupational therapists, Teachers and professor and Parents. Many unique opportunities were identified during the mapping, namely–

- Time awareness
- Tactile / Multi-sensory learning
- Maintaining focus for long stretch of time is difficult
- Retaining information
- Brain-hand co-ordination
- Expressive writing and communication



Card Sorting

Subject	Challenges in Regular schools	Challenges and Impact on skills	Assessment and Observation	Therapies and Remedial Approaches	Approaches for improvement	Permitting Impact	Strengths	Weakness	Educational tools and techniques	Challenges with existing resources	Parent aspirations and challenges
Vertical transfer of Open Learning (OLMS)	No space for individualised education	Regular schools are accepting no guest is giving accommodations.	Reading	problems and challenges, writing communication. School collaboration, exam stress, essay questions.	Justifying	Individualised Approach	Parental Guidance,	Self-Development at per-Individuals	Low Self-esteem	Adaptation to regular school	
Non											
Flexibility	Age	But how do parents, what do you do, some people is not comfortable with of learning.	Writing	Translating is difficult, Adaptation Issues (for some students, transferring from an international school to another, which is a very complex and costly, it takes time for them to get adjusted)	Visual	Therapies	Follow regular school curriculum and testing	workshops and seminar on dyslexia	Difficult understanding Phonics/orthography	Confidence	
	Disrupt	no motivation given, don't want to make it a habit.	Comprehension		10 test	Assisted	Segregated on the basis of their difficulties (low verbal, nonverbal, Skill development)	online classes	Treats everyone at the same value and everyone achieves is the same.	Environment effects the behaviour and learning process	
	Strategic schools, educational tools and techniques used for disabled students learn.	difficulty comprehending in regular school	Perception	Visual Perceptive Issues			Inclusive education	Being active and present for kids	Sometimes easy, sometimes difficult with writing.	Feedback	
	Comprehend with special schools	Schools pressure to drop out			Neurological	Unsupervised therapies	Inclusive education	Being active and present for kids	Some are quickly strong	communicating one's issues is difficult	
	Teachers are overwhelmed	Always find difficulties that finding a solution and helping.	Expressive writing	Language Processing	Focus on Skill Development, Step-Based Education	Address and remember concepts better	Regular practice		Visual learners	mathematics problem solve easier, writing others	
	lots of students	difficulty learning on board but in terms what focus is difficulty with supporting.	Reading	Letter Inversions and reversal	Early Intervention/Support	repetition and motivation helps	with tracking the progress		Articles, Audiles, Music Education, Brain Analysis	Difficulty understanding when given instructions but	
	How, learning disability is not accepted just	Academic Struggles	Memory retention	Auditory processing and cognitive transfer (sound recognition) i.e., difficulty with transferring the sound or the ideas from one place to another even though it is the same, for eg, hand	Assessment, Observation, Writing strategy, Sound systems, Early intervention		Tracing on the things which needs to be taught	A non threatening atmosphere	Time awareness (learned time but difficulty with perception of time intervals of course).	Repetitive and summarizing (Everyone is at same level, some performance)	
	If the child is not able to cope in the regular school, Teacher complaints to go for the special setup	They don't understand this difference in learning difficulties	Emotion and communication	Disorder in processing Visual/Aural cues also	problem identification		Special therapies	Comparison with siblings	He will get motivated and enjoy more, but motivation is not the parent's work		
			Recalling words	Surface structure/orthographical and deep structure/hearing	Full assessment and development across the board (orthographic, high verbal, good motor, regular focus, behaviour)			He will learn to recognise and confront, self worth, because he has done it himself without criticism...			
					parent interaction, social interaction						
					3 month observation						
					Internal Assessment Team/assess/Qualify Development						

This helped me to **identify opportunities for intervention** and craft unique design solutions.

Opportunities:

Opportunities	Phonemes (FO-neems)	Letter reversions (b / d) and inversions (n / u).	Retaining any information.	Brain-hand co-ordination	Understand and apply spelling rules (eg. Nutrition / Nutreesun)	Spelling errors, inconsistent letter formations, and poor handwriting.
Time awareness	Not good with Text heavy tasks.	Maintaining focus for long stretches of time.	Easily distracted	Expressive writing and communication	Attempts to avoid tasks	Text accessibility
Some have good creativity or problem-solving abilities	Tactile / Multi-sensory teaching	Sometimes easy collecting but difficulty expressing	Chess, Chinese checker, crosswords. Colour coding and flowchart	Find the right word, jumbled letters.	Muti-Sensory	Some are good with Visual processing, and some with auditory processing

In order to gain a clear understanding, I tried constructing empathy mapping for the teacher and students:

Teacher's Empathy Map

- Asks to do **small tasks in class** after explaining a topic.
- During class time, I can **only take a glance at their work**, and If there is any mistake I **tell them what the correct answer is**.
- Students get **distracted very easily**.
- We try our best with whatever we can **afford**.
- We also take **students who cannot afford** to pay the fees, because I see **potential**.
- **These children** needs to be taught differently.
- Asks to **write in diary** about the topics covered in class.
- Asks student to **write ball**.
- Asks student to **repeat and memorise** spellings.
- What **food** do you like?
- what **time** is your school?

Says

Does

- Gives **tasks that can be done in the classroom**.
- **Notes down** what the student is facing trouble in, and later tries to make them understand in **therapy session**.
- Finds online **free resources** that can be implemented and can help students .
- Asks and **reminds** students what topic was covered in class.
- Shows an **image** of ball to give **cue**.
- Gives **options to answer**, like yesterday was Monday so today is?
- Gives **reference** of the hour hand and minute hand, helps with giving hints.
- Explains with example and gives **scenario examples** to make student understand.



Teacher

- Wish there was less distraction in the classrooms.
- keeping them busy can reduce distraction.
- Why do we have to wait for remedial classes.
- Noting down and keeping track of things is difficult.
- Repeating and memorising can help them remember.
- Can't give individual time to each student as the time is limited.
- Understands students problems and learning style.
- In class it is significantly harder to handle and solve each and every students doubt.
- They are different and not normal.
- Providing image, options and cues can help them remember and recall what was taught.

Thinks

Feels

- **Tired** by students getting distracted.
- **Exhausted** as semi open classrooms causes lots of distraction.
- **Tired** of keeping notes for every students doubts and challenges.
- **Frustrated** as their is only few assigned remedial classes for each.
- **Helpless** as there are only few online free resources.
- **Happy** that students answer correctly when given cues.

Student's Empathy Map

- Write down what topics were covered today.
- Write Ball.
- Tell about your morning routine, what time is your school?
- But, your school starts by 9:30am.
- All other students finishing tasks.
- What do you like to eat?
- Getting instructions come here, now go there.
- These children needs to be taught differently.
- Yesterday was Tuesday, so what day is it today?
- What food do you like?
- When you want to eat what do you tell your mom?

Sees and Hears

Does

- Distracts and starts doing something else.
- Writes Boll.
- Arranges the morning activities in sequence and assigns time to each.
- Trying to cover their answer and observe others.
- Wait for the teacher to tell the correct answer.
- Thinks for a long time.
- Does exactly as asked (come here, go there).
- Answers "Wednesday".
- Tells their favourite food.



Student

- I will write later, there is still plenty of time.
- How to write alphabets?
- What does ball look like?
- How do I spell it?
- Where do I start from?
- What time do I wake up? I wakeup at 7am, freshen up by 9am, take bath at 10am, have breakfast at 11am, make bag by 12pm, go school by 3pm.
- Trying to make sense of words, what? do? like? eat? here? there?
- Remembering the days, what comes after Tuesday?
- Trying to remember/visualise the scenario.

Thinks and Says

Feels

- **Burdened and frustrated**, doesn't like to write.
- **Avoidance**, running away from things that they can't comprehend.
- **Confused** about the alphabets and how to spell.
- **Anxious**, when asked about something they don't understand.
- **Self conscious** of making mistakes.
- **Embarrassed** of not being able to solve certain problems like other students.
- **Low self-esteem**, repeated struggles with learning.

User Journey

Based on the affinity mapping and experiences of people with dyslexia on different school levels i.e., Lower primary, Upper primary, High school, and Higher secondary; user journey map was made. This gave an insight on the pain points that dyslexics have are not only related to reading and writing difficulties but also related to the their surrounding which includes misunderstanding and criticism from family and peer members.

Lower Primary (age 6 to 10) :

At this stage children with dyslexia have no clue about having dyslexia, they attend school as any other non-dyslexic children. Then the characteristics of dyslexia kicks in and people around starts associating them as lazy and slow learning student. At this time, neither instructors nor families are aware that their child may be dyslexic, and they are unaware of the need to have them assessed due to a lack of tools and awareness.

Upper Primary (age 11 to 12):

At this point, children with dyslexia can be diagnosed, and parents can seek assistance from a special school. They are still unaware of the causes due to a lack of knowledge. The obstacles increase as the syllabus becomes more complex. They begin to struggle with reading and writing. They attend special school after regular school to get help with things they don't comprehend. People around them begin to treat them differently than others. Shock and depression begin to set in.

High school (age 13 to 15):

When they seek tutoring, they discover that they need to attend a lower grade than what corresponds to their age. Unfortunately, tutors may lack the knowledge and abilities

necessary to properly teach students with various needs, which can contribute to heightened feelings of sadness and stress among these students.

Higher secondary (age 17 to 18):

They may choose homeschooling instead of schooling that demand lot of reading and writing and begin to explore their own unique learning style. Unfortunately, diverse learning styles are frequently introduced too late in a student's educational experience. Furthermore, their families may be unaware of dyslexia, and it takes time for peers to gain a better understanding of their difficulties.

What can be the best age group to target?

Lower primary (age 6 to 10)	
Upper primary (age 11 to 12)	
High school (age 13 to 15)	
Higher secondary (age 17 to 18)	

With the data collected, I understood that it is best to keep my target user to be lower primary and upper primary with a mental age of 6 years to 11 years.

Further narrowing down my opportunities, following are the topics that I will be exploring:

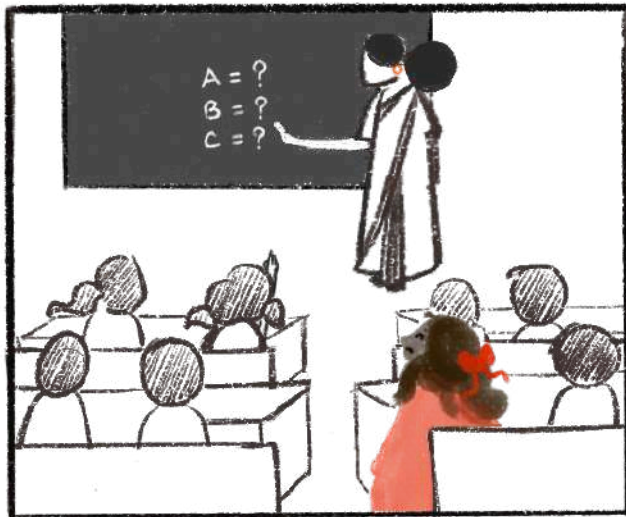
- Improve time awareness
- Tactile / Multi-sensory learning
- Improve information retention

To enhance my empathy, I attempted to generate various scenarios before brainstorming.

Scenario 1.

Diagnosing dyslexia in young children can be difficult. The complexities of this learning problem are frequently disguised, making early detection challenging. When children enter regular schools, teachers are usually unprepared to meet the requirements of students with learning difficulties. Instead of providing specialised assistance, they may knowingly put pressure on parents to look into alternative educational options.

Rakhi a 7yr old first-grade student has been displaying signs of a learning disability, although she hasn't been diagnosed yet. She loves to draw and sing. She eagerly participates in every cultural events at school. These events are the motivation for her to attend school.



During class she sees the board but couldn't quite figure out what is being taught. There are too many distraction and noise that makes her head go dizzy.



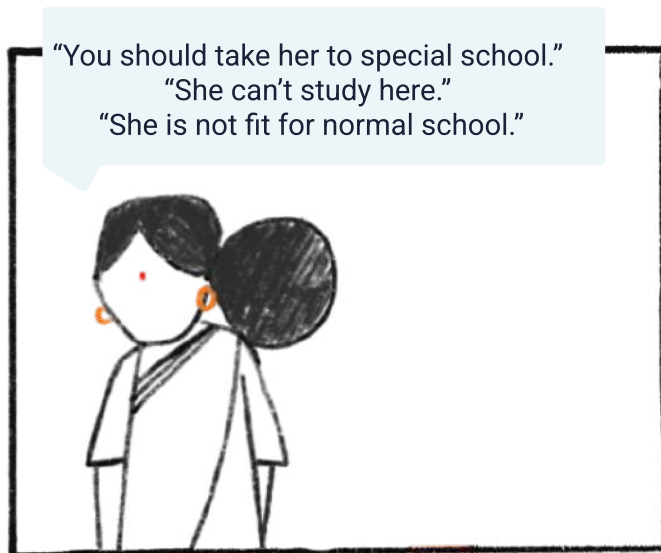
She tries to write what is asked, she knows in her head what to write, but she can't comprehend all that information and how to write them onto her notebook.



**What made her think so much before asking for help?
Why she was facing so much trouble in class?**



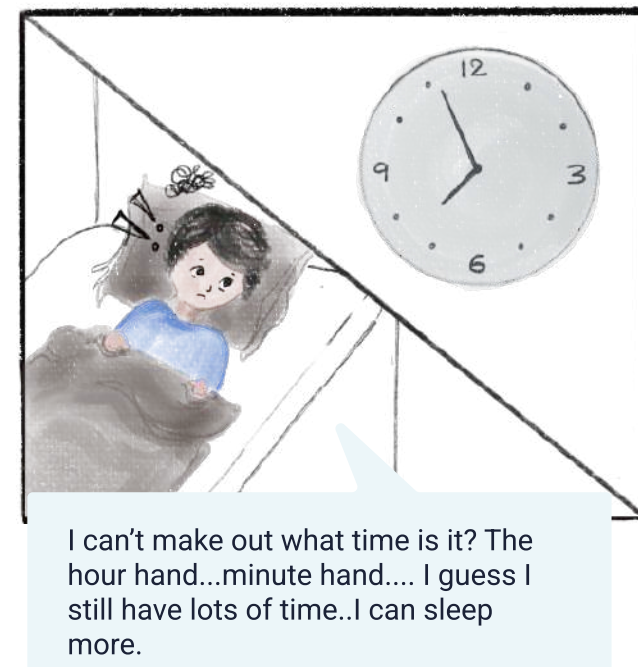
The fear of self consciousness kicks in.

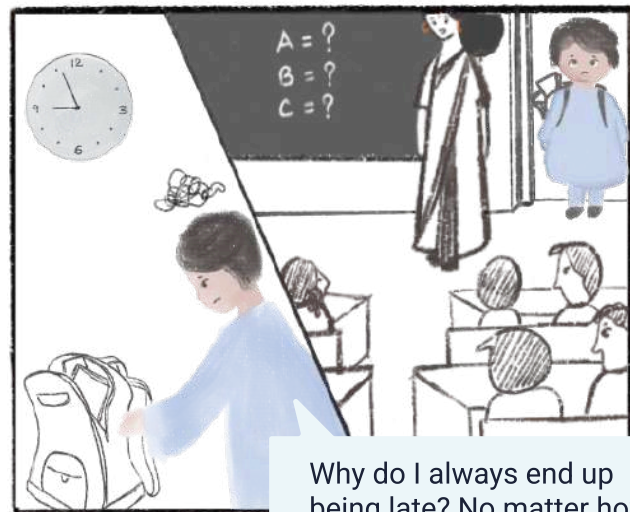
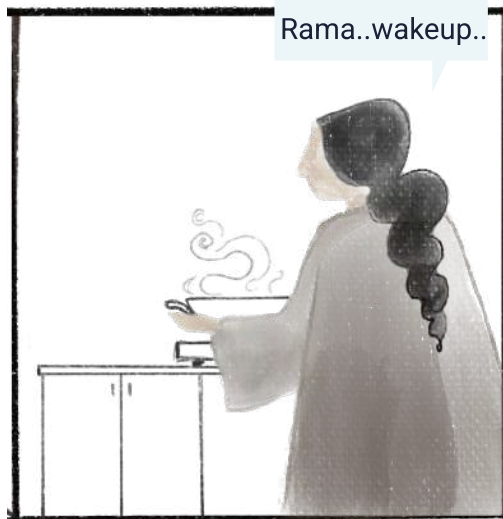


Scenario 2.

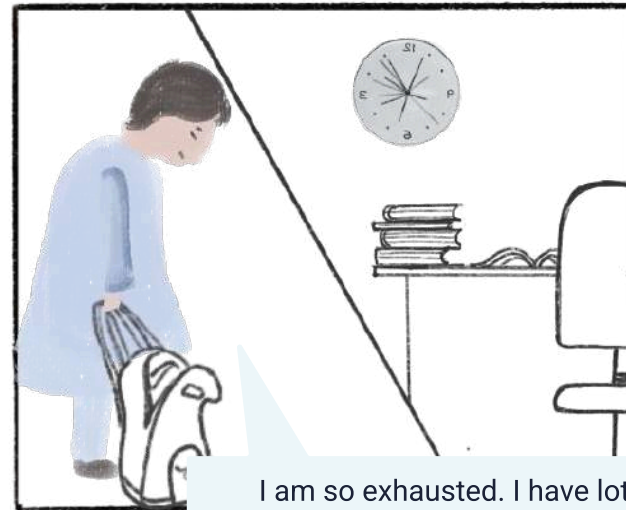
People with Dyslexia frequently struggle with perceiving and managing time efficiently. This problem extends to following and sticking to a timeline, completing activities on time, and moving through their daily routines successfully. As a result, these time-related challenges can result in feelings of frustration and anxiety.

Rama, an 11-year-old fifth-grade student has been diagnosed with learning disability. He has been attending both regular and special schools. He enjoys dancing but does not have enough time to practise it. He enthusiastically attempts to organise his time so that he may do his tasks while also practising some dance. It becomes tough and demotivating for him as he struggles to perceive and manage his time.





Why do I always end up being late? No matter how much I try to manage my time.



I am so exhausted. I have lots of pending tasks to do. I didn't even realise how the time just went by. Today also I will not be able to practice dance.



I will sleep for today and wakeup early to finish all the tasks.

**Why is it so difficult for him to manage time?
Why he has to attend regular and special school together?**

To understand where I can intervene, I needed to understand a dyslexic child's world:

Friends:

- Game
- Play and learn
- Pranks
- Communication
- Stories
- Best friends and groups
- Toys

Regular school:

- Teachers
- Friends
- Labs and activity rooms
- Strategy and play
- Regular Classes
- Extra curricular
- Prayer
- Learn
- Class work
- Lunch breaks
- Travel

Home:

- Parents
- Siblings
- Guardians
- Neighbours and friends
- Homework
- Play time
- Hobbies
- Special school:
- Special teachers
- Friends
- Special tools and resources
- Activities and play

- Regular Classes
- Therapy classes
- Prayer
- Regular school homework
- Doubts
- Learn
- Lunch breaks
- Travel

Opportunities

- **Time awareness**
- **Tactile / Multi-sensory learning**
- **Maintaining focus for long stretch of time is difficult**
- **Retaining information**
- Brain-hand co-ordination
- Expressive writing and communication

Out of all these I will be exploring more in depth on–

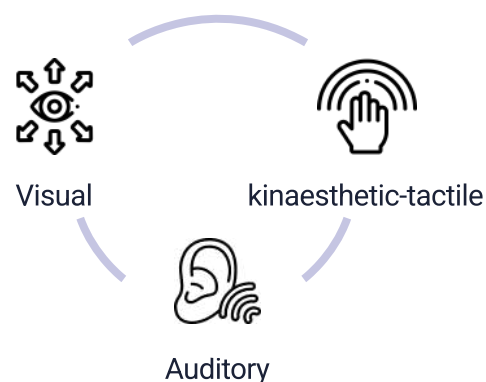
- **Tactile / Multi-sensory learning**
- **Time awareness**
- **Retaining information**

What is Multi-Sensory approach?

Multisensory learning is the simultaneous use of visual, auditory, and kinesthetic-tactile pathways to improve memory and learning of written language. In learning to read and spell, links are consistently created between the visual (language we see), auditory (language we hear), and kinesthetic-tactile (linguistic symbols we feel) pathways.

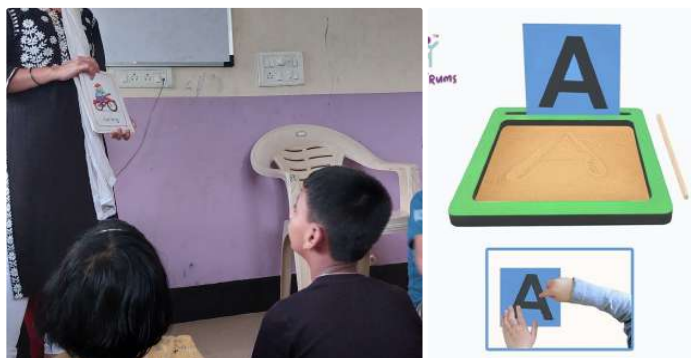
The idea here is to use two or more senses simultaneously. Tracing and speaking the sound at the same time, for example, is multisensory, whereas tracing letters alone is not.

Students are better equipped to perceive, comprehend, and synthesise information with this strategy because they can use more than one sensory input to build connections between facts or knowledge. This considerably boosts understanding abilities.



Multi-Sensory activities involve:

Flashcards, texture tracing, play-dough, air writing, games like written blocks, draw something, puzzle, etc., body spellers game, thinking out loud as we write, associating picture with sound, tapping out sounds.



Time Awareness

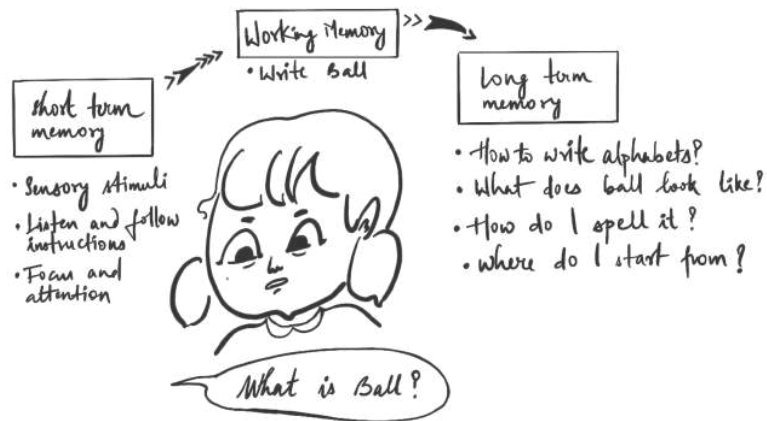
Dyslexics often have difficulties with time management and perception. Difficulties with efficiently processing information, such as decoding written language or estimating the passage of time, might have an impact on their ability to organise work and stick to deadlines. This difficulty with time-related ideas may cause problems with planning, prioritising, and fulfilling deadlines. Furthermore, dyslexics may struggle to perceive the sequence of events, impacting their entire sense of time. These issues can extend beyond academic contexts and into daily activities, potentially affecting their performance in a variety of areas of life. Recognising and addressing these time-related issues is critical in providing appropriate support and accommodations for people with dyslexia.

Dyslexics primary thought process is in pictures ie., 32 pictures per second. Whereas a verbal thinker can have between 2 and 5 thoughts (individual words conceptualised).

Working Memory: Retaining any information

Working memory is an important cognitive skill that allows us to temporarily store and process data in our mind. It helps with everything from problem solving to learning. Dyslexic children often struggle with information processing and cognitive

processing. These challenges affect their working memory and they struggle with memory retention.



Mapping available ideas

Working memory, the cognitive system responsible for temporary information storage and processing, has a significant impact on how users process and interact with products. Recognising the importance of working memory, I began a detailed research and mapping of various concepts for improving this cognitive function.

Memory Games

Concentration (Played with a deck of cards–Matching cards of the same rank)

Simon (Pattern matching game where player must repeat the pattern in same sequence. With time the pattern will keep getting bigger)

Pictionary (A word or phrase is drawn by one and guessed by others)

Guess Who? (remember the physical characteristics of various characters and guessing)

Bingo: (remember the numbers called out and mark them on their cards)

Rummikub: (A tile-based game, remember which tiles have been played and strategize to form sets)

Spelling Bee: (one player starts with a word, and the next player has to repeat the word and add a new one, creating a growing list)

Jigsaw Puzzles: (remembering the image on the puzzle pieces and how they fit together)

I Spy: ("I spy with my little eye, something that is [color/starts with the letter...]")

Kim's Game: (assortment of objects is displayed for a short time, and then players must remember as many objects as they can)

Memory Card Games: (match pairs of cards with the same images)

Go Fish: (find pairs of matching cards)

Uno: (remember the colors and numbers of the cards in their hands to play strategically)

Sequence: (card game/board game, must remember and match the sequence of cards laid out on the board.)

Listening and Recalling : Recalling key details or main points, Lecture, Podcast, Short story.

Drawing or Doodling

Dual N-Back: Remembering and responding to both visual and auditory stimuli.

Chunking; Grouping informations into meaningful chunks

Brain Training Apps: Apps like Lumosity

Mindfulness Meditation

Physical Exercise: Aerobic exercises, like jogging or swimming

Crossword Puzzles

Mental Math (mental calculations): Multiplying, Subtracting, Adding

Sudoku

Mnemonic Devices: Acronyms (VIBGYOR, BODMAS), Rhymes (The ABC song), Visualization (creating vivid mental images of things that we want to remember), Storytelling, Link Method (Creating mental images of things and linking them together).

Juggling: Juggle requires us to keep multiple objects and movements in our working memory.

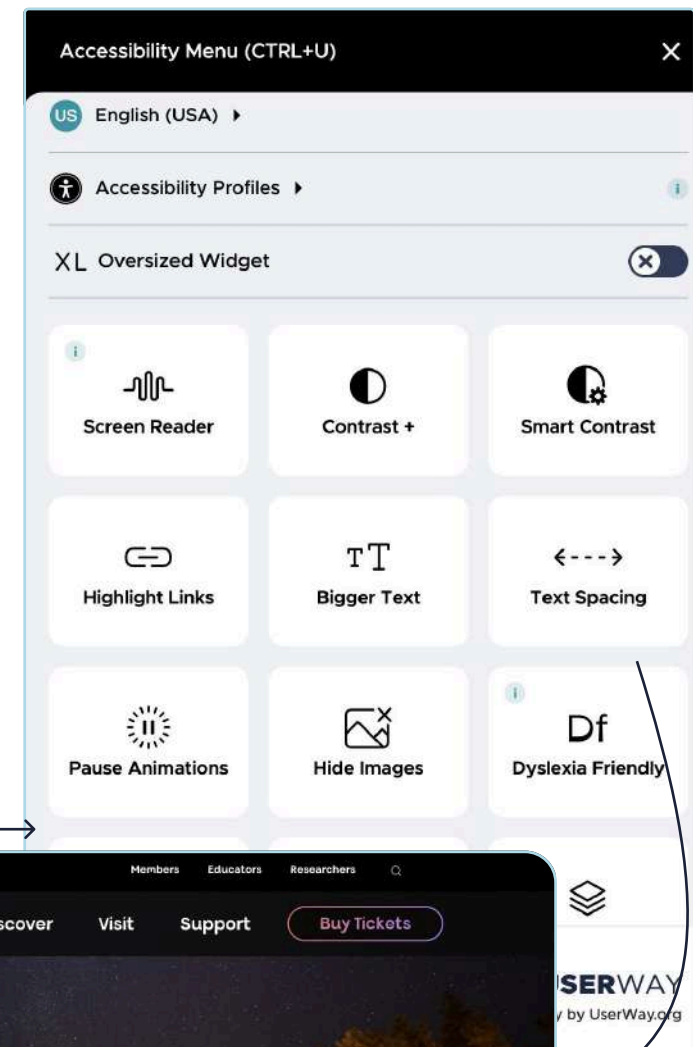
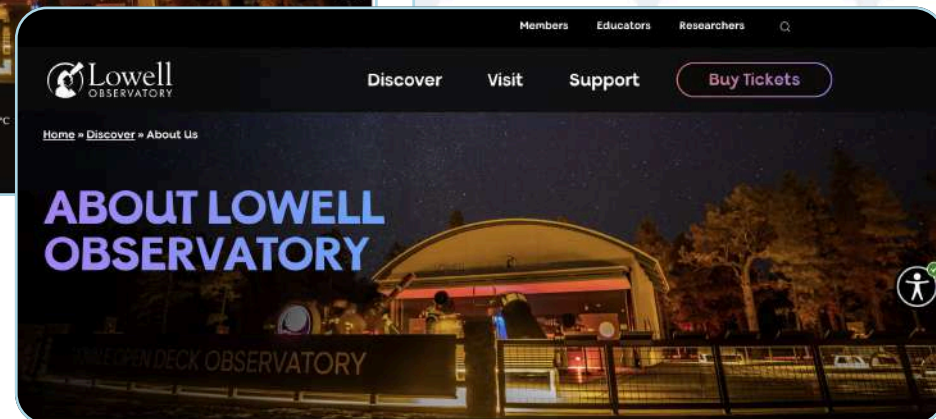
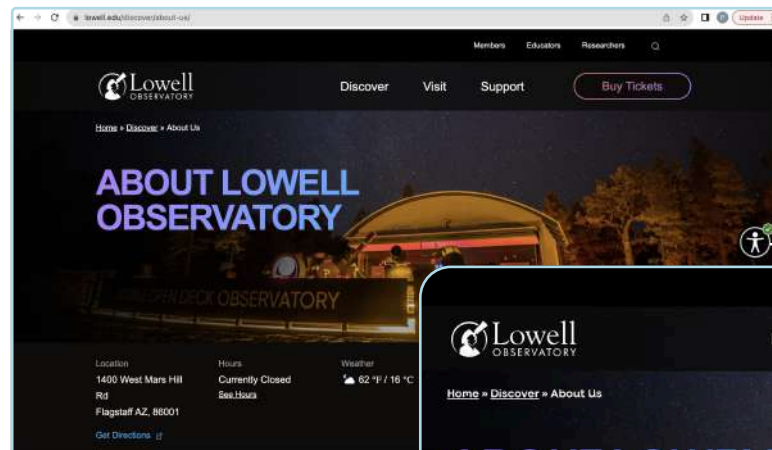
Reading Aloud: Reading a passage from a book and then trying to summarize or retell the information without looking back.

Market study:

Lowell Observatory is an astronomical observatory in Flagstaff, Arizona, United States.

Accessible interface for:

- Motor impaired
- Blind
- Dyslexia
- Visually impaired
- Cognitive learning
- ADHD



<https://lowell.edu/discover/about-us/>

Reference: <https://dl.acm.org/doi/pdf/10.1145/2079216.2079247> | Go

Market study (secondary research)



Tantrums Coloured Sand
Paper with Tray



Sand tray with lid for writing letters



Magnetic tracing letter



Alphabet tracing tile set



Written blocks



Colored Tiblo blocks with children images pinned up

Market study (primary research)

Multi-Sensory Approach



During my school visits, these were some of the exercises and games used to develop eye-hand coordination using a

multi-sensory approach. Various physical tasks were included in the programmes, which challenged the students' body and eye coordination. One significant feature was the ability to select a toy from a wide range of possibilities each day. Soft toys, wooden toys, crayons, and coloured blocks were among the possibilities available, providing a comprehensive sensory and perceptual experience. The act of choosing itself aided in the development of decision-making skills in the children.

The therapists actively engaged with the students during the play therapy sessions by starting conversations and asking thought-provoking questions. For example, they can inquire as to why the children chose a specific toy on a given day or how they felt when engaging with certain materials. These inquiries piqued their interest and increased their awareness of their surroundings. During play therapy sessions, this interactive approach was crucial in growing their curiosity and consciousness.





Wall hangings were created with the assistance of kids as a visual reminder of upcoming activities, the date, the month, shapes, and colours. Some were left open-ended so that students may interact with them; for example, in the everyday activity envelope, students must fill in the activities they have accomplished.



The therapy sessions included a variety of tasks, such as flash cards and reading aloud sessions in speech therapy. These cards provided visual stimulation, which drew the child's attention and interest. The visuals on the card made it simpler for the youngster to associate a word with the image,

comprehend the meaning, and thus retain it better.



Occupational therapy sessions, on the other hand, featured activities to improve memory recall, such as wooden memory match sticks. These tasks improved eye-hand coordination, colour location memorisation, and picking out specific hues when recalled.

Design Brief

- Children with learning disabilities may have **difficulties in obtaining appropriate educational support**. Schools may provide **remedial programmes**, but these are sometimes

- limited to **one hour every day**.
- Dyslexia, in particular, can be **difficult to identify at a young age**, despite the fact that symptoms are frequently obvious.
- My design project's **goal** is to offer **effective learning solutions for children aged 6 to 10 years**.

Design Objective

- **Understand the problems** that children with learning disabilities, particularly dyslexia, experience and **how this affects their educational journey**.
- Explore the **efficacy of present remedial classes** in meeting the needs of these individuals.
- Recognise the **signs and symptoms of learning difficulties** in children who have not been officially diagnosed.
- **Formulate creative ways of bridging the educational gap** for kids with learning disabilities between the ages of 6 and 10.

Ideation:

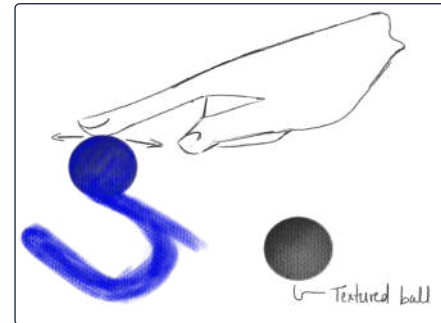
My main objectives through the ideations are:

- Attention and focus
- Repetition and Practice
- Pattern Recognition
- Visualization
- Sequential Processing
- Cognitive Flexibility
- Auditory Memory
- Executive Functions
- Fun and Motivation

- Transferable Skills

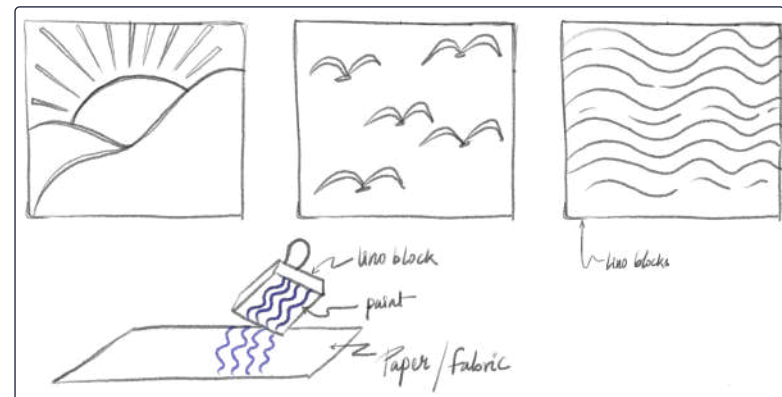
1. Texture Ball

- A textured ball that can be dipped in paint and can be used to trace letters.
- Kinaesthetic-Tactile and Visual sense are being used here.



2. Lino blocks:

- Lino blocks with different pattern cut. This can be inspired from different themes, such as wilderness or fairytale. This can be used to create your own story.
- Kinaesthetic-Tactile and Visual sense are being used here.
- Story from the book.



Time awareness and Tactile / Multi-sensory learning:

- For this I tried to make a self customised daily routine making application with incorporative visual and auditory elements.



My Idea:

- How this will help a Dyslexic user:

-

Time awareness and Tactile / Multi-sensory learning:

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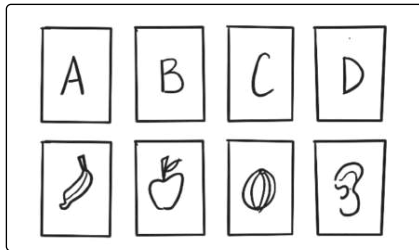
My Idea:

- How this will help a Dyslexic user:

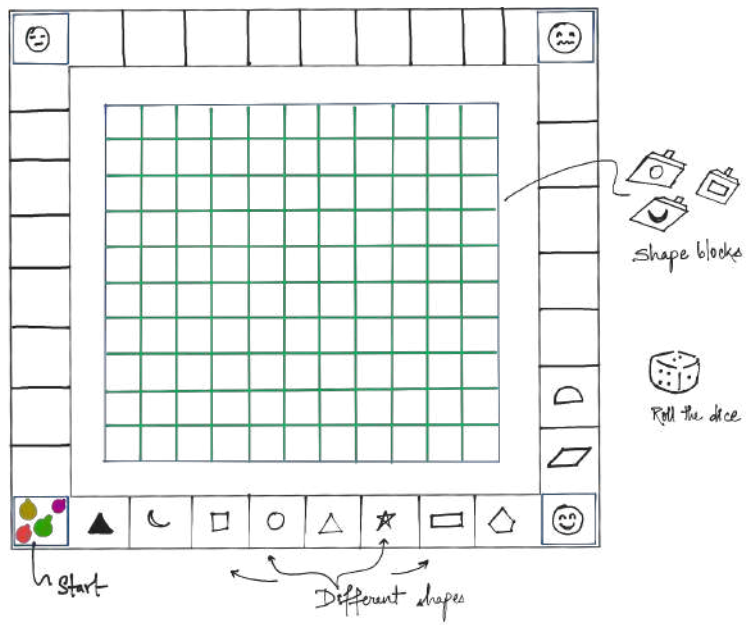
-

		A	B	
	C			

Flip ad match

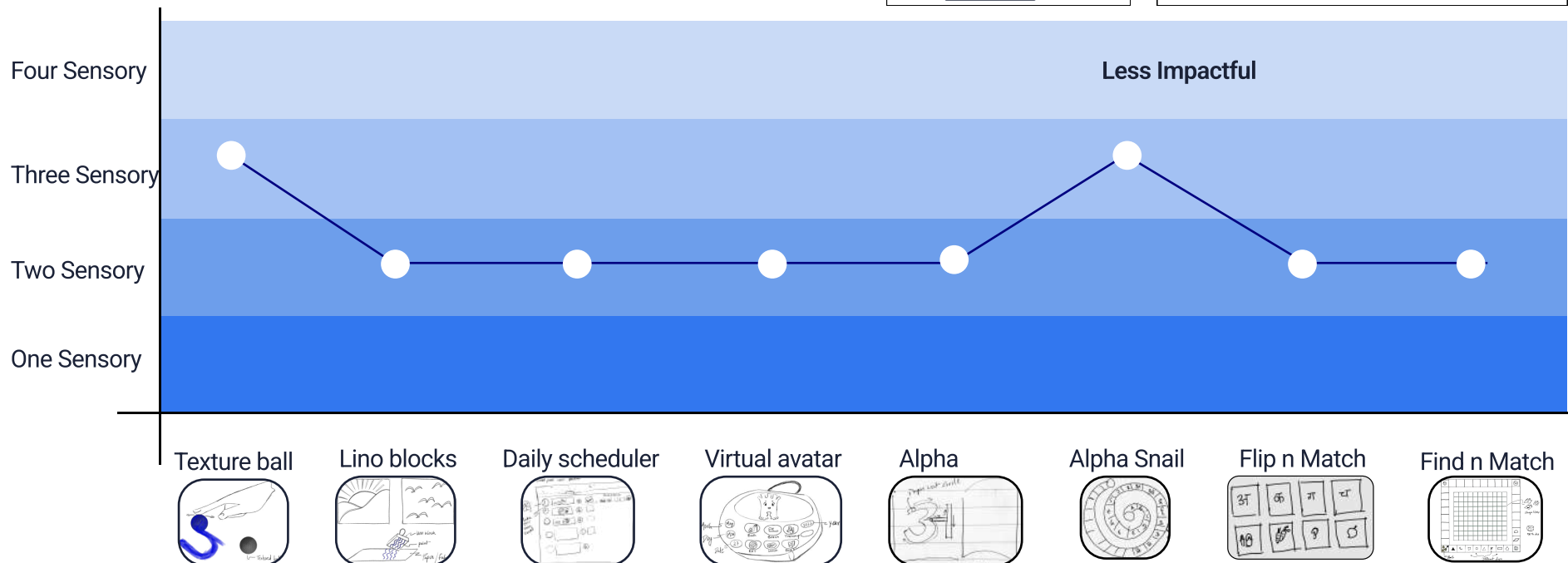
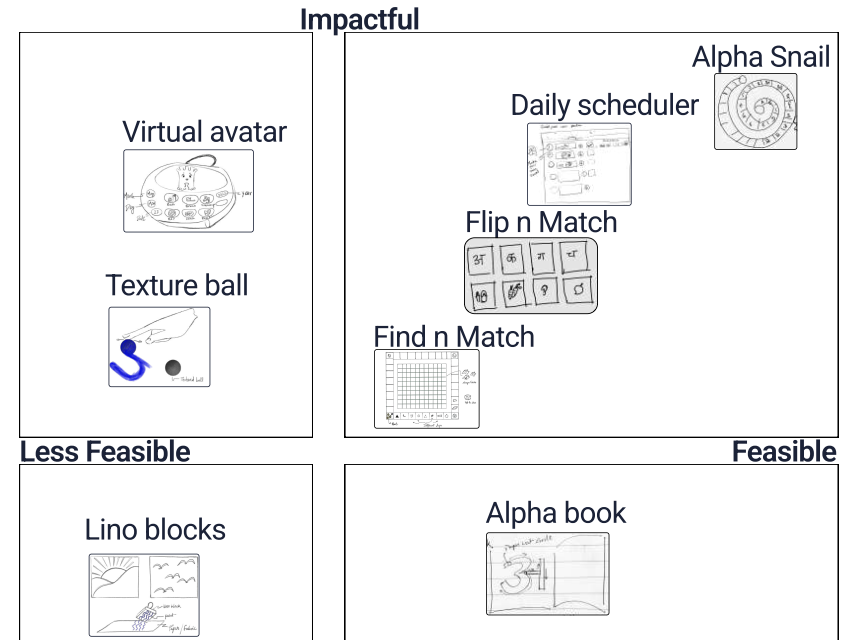


Find and match



Idea Evaluation:

A key step in the process of analysing various design concepts was categorising each idea based on the number of senses engaged and then categorising them based on their feasibility and potential impact. This methodology enabled an in-depth review of the sensory elements included in each proposal, taking into account characteristics such as auditory, visual, tactile, and kinesthetic features. I hoped to gather insights into how well the ideas aligned with a multimodal approach, enabling a more immersive user experience, by determining the sensory participation. Following this categorization, the emphasis switched to evaluating each idea's viability and potential impact. This two-tiered review gave a comprehensive understanding of the feasibility and effectiveness of adopting the proposed design concepts, ultimately directing judgements on which ideas to pursue.



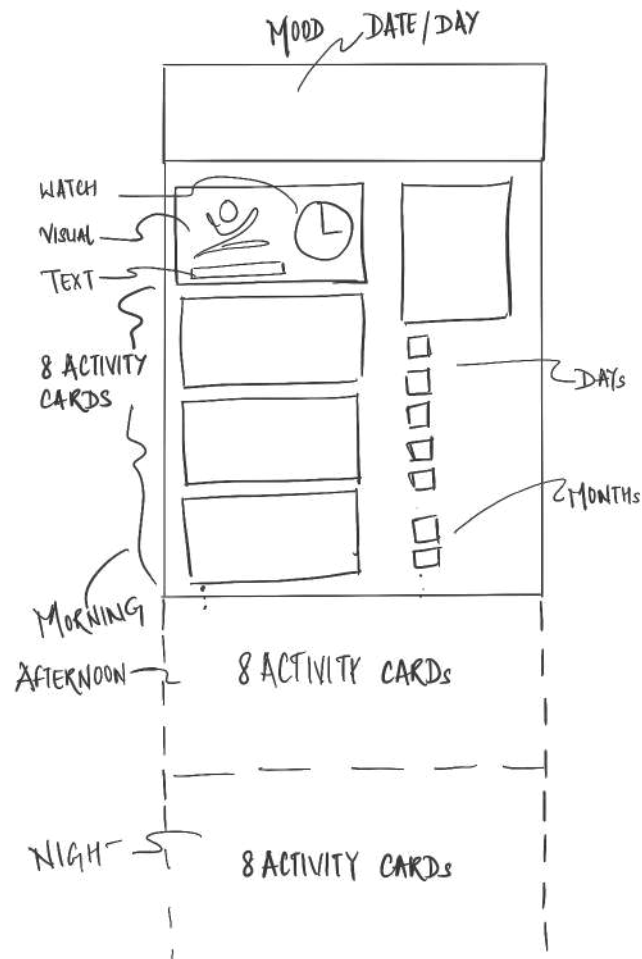
Idea 1

DysLexiPlan: Plan your daily adventure

A daily planner to plan ones day in a more organised way and keep a track of time. Helping kids to perceive time with the help of activities and sun orientation.

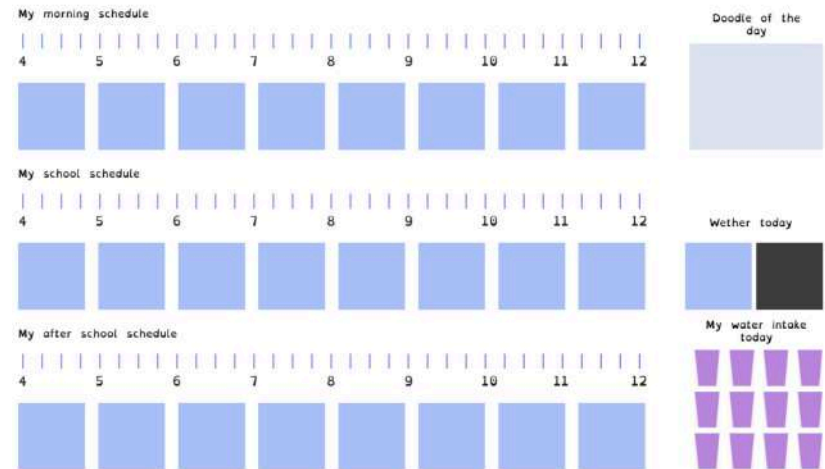
My target user group

Initial idea exploration:



Experts Review:

Experts provided encouraging input on the approach under consideration for addressing dyslexia and its accompanying time perception issues, highlighting crucial features contributing to its success. Notably, the experts emphasised the importance of increased engagement, emphasising the inclusion of visually exciting aspects as well as interactive features. Recognising the different needs of people with dyslexia, the design was praised for offering customization options, allowing users to personalise their experience to their tastes. The introduction of personalised elements was also applauded by the experts, who recognised the importance of catering to individual learning styles.



Why this?

The selection of topic to focus on time perception in the context of dyslexia originates from a profound understanding of the intricate relationship between time and the daily issues that people with dyslexia confront. While dyslexia may not limit the ability to read a clock or tell time, the key challenge is predicting the time required to finish a task and measuring one's productivity within a particular timeframe. Dyslexics frequently navigate the environment using a primary thought method based on picture

thinking, in which their minds generate roughly 32 mental images per second. In contrast to verbal thinkers, who conceptualise things in individual words, dyslexics visualise activities being finished at a rapid pace, frequently overlooking the sequential steps and time required for job completion.

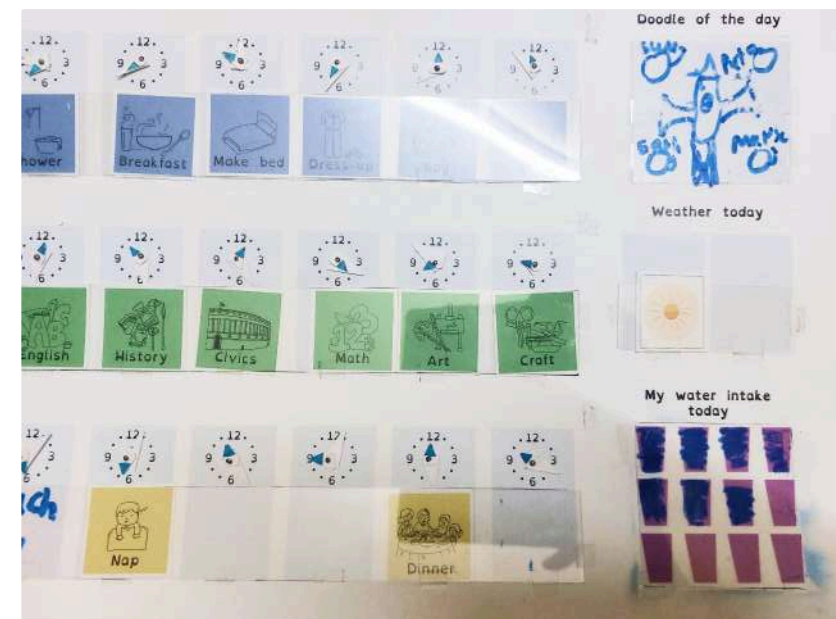
Senses Involved: Visual and Kinaesthetic



Colour coding is used to improve clarity and organisation by categorising activities into distinct periods—morning, afternoon, and evening. The use of legible typefaces and visual iconography improves comprehension by making information more accessible and understandable. Notably, the design emphasises personalization, allowing users to adapt all activities to their tastes. Water intake reminders, activities, and specific doodling areas are thoughtfully incorporated, offering a visual indication for numerous elements of everyday living. The chronological presentation of activities promotes a sense of organisation by facilitating a clear comprehension of the day's flow. Interactive components, such as mood metres and sliders for sun intensity, not only increase participation but also provide sophisticated representations of emotional states and chronological progression. The option to use a marker to mark finished activities adds a tactile and pleasant element to task management. Sliders contribute to a sense of linearity and

direction, while plain and short text improves accessibility. The design promotes working memory improvement by emphasising practise and repetition. Furthermore, including a designated space for doodling adds a personalised touch, encouraging creativity and individual expression within the confines of everyday activities. In essence, the goal of this holistic approach is to produce a visually attractive, configurable, and supporting tool that is specifically targeted to the needs of dyslexic individuals navigating the issues of time perception.

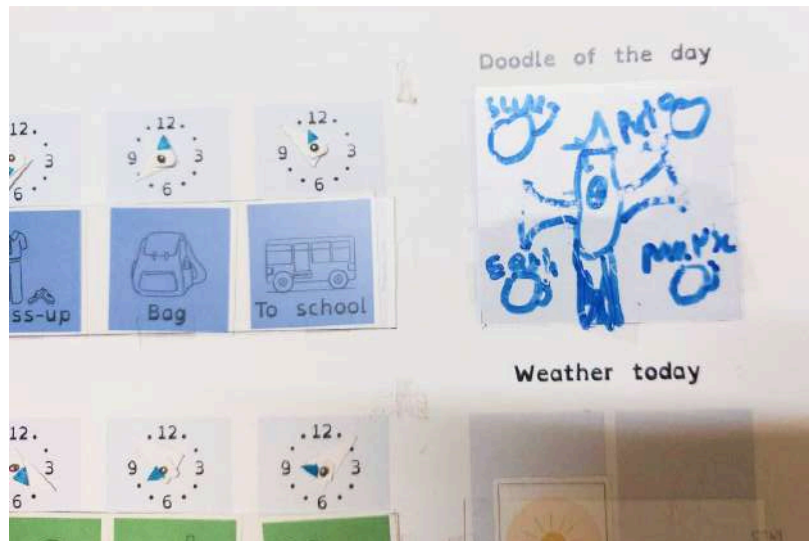
User Testing:



How to use?

- Different activity cards are provided with illustrations and texts.
- The day is divided into three categories, namely, My morning schedule, School schedule, and After school schedule.
- Above activity cards there are clocks provided which can be manually set.

- One has to put the activity cards in the slots provided and then set the time for that activity.
- Along with this there are other elements provided, such as, a space to doodle, what is the weather today slot, mark your water intake space.
- One separate card was also provided with a mood meter, day and date slots

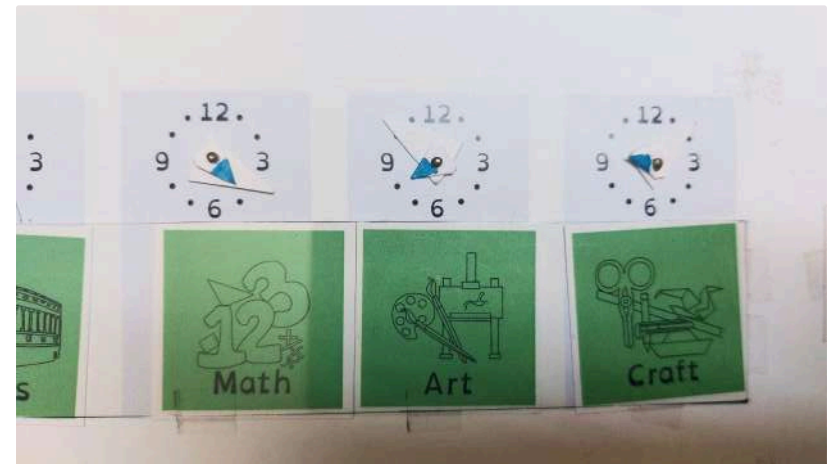


Students Observation:

- Difficult to set the time as it was very small.
- Difficult to carry it around.
- Liked the doodle space and mood meter.
- Difficult to arrange the activity cards.
- Water intake space was helpful as it motivated them to drink water.
- Mood meter helped them with navigating their emotions.

Experts and Parents Feedback:

- It was very difficult and tedious for students.
- They enjoyed doing this along with their siblings.
- Difficult to understand and follow.



- They set the whole activities at once and did not went back to the scheduler to check.

Hi-Fidelity Prototype

Understanding the improvements required in the design it was further improved and developed.

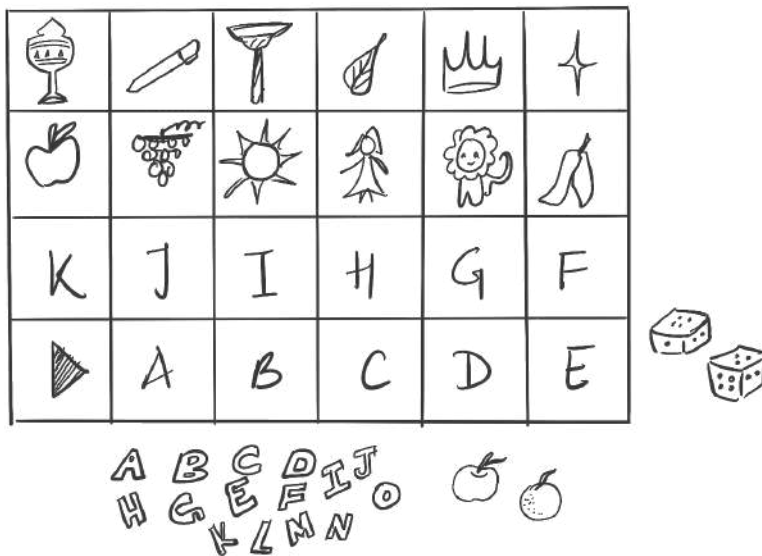
Work in Progress...

Idea 2

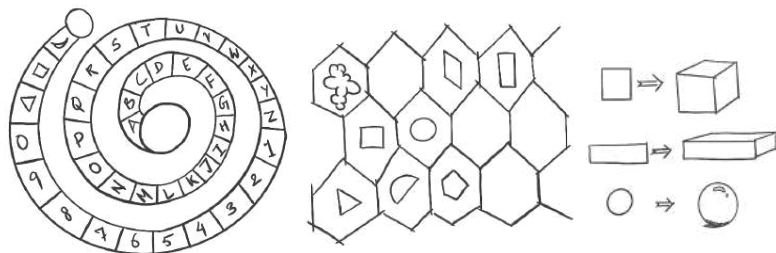
AlphaSnail

Initial idea exploration:

A board activity to help children with Alphabet Rhymes and the sounds associated with the alphabet (Achromphony). Helping them understand different shapes and associate them with their 3-d forms. Education level considered for this activity is Lower Primary.



Form exploration



I tried exploring more concepts like: transformation of 2d shapes to 3d. Also tried exploring different forms for the board activity.

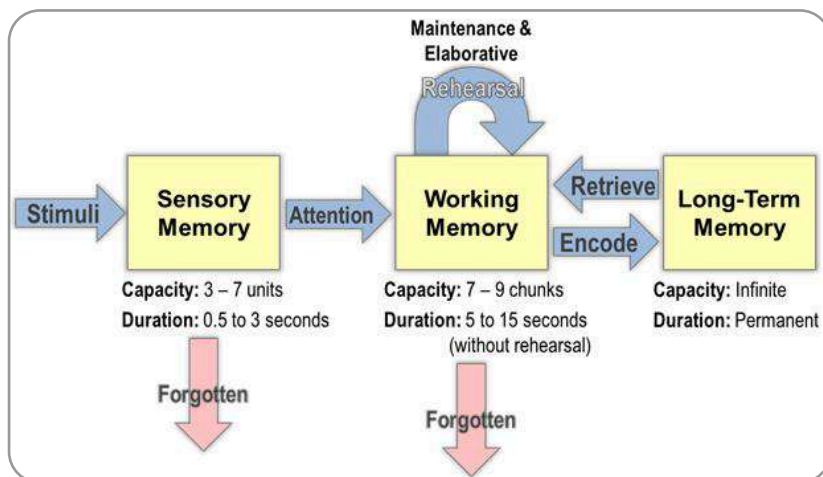
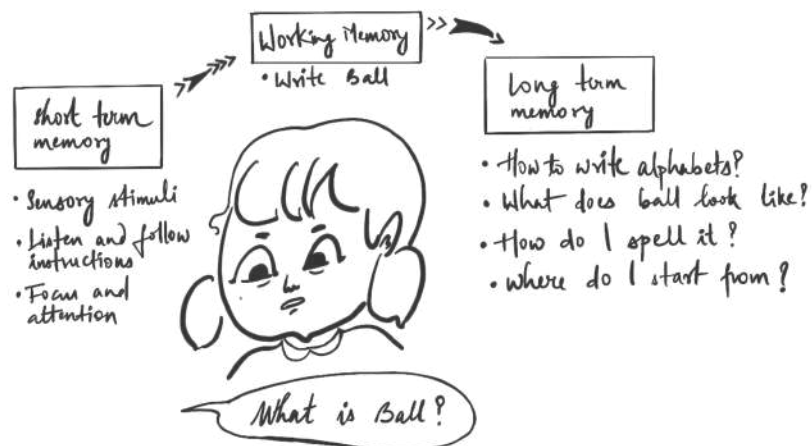
Experts Review:

Expert reviews provided important perspectives into these concepts created. With a particular emphasis on refining the technique of transferring from 2-D shapes to their 3-D counterparts. The experts correctly identified the potential for confusion among pupils if both topics were introduced at the same time. Recognising this criticism, the updated plan suggests a more sequential and targeted process that introduces one concept at a time. This modification tries to simplify the learning process for dyslexic children, recognising the need of a step-by-step approach to enhance comprehension and reduce potential confusion.

Why this?

According to expert input, my board activity for teaching Alphabet Rhymes and Achromphony prioritises simplicity. The design integrates engaging artifacts and interactive components to provide children with an accessible and effective learning experience, promoting a playful and instructive environment.

Dyslexic children frequently face difficulties in efficiently processing information, which has major consequences for their cognitive functioning. These difficulties are most visible in the domain of working memory, where dyslexic youngsters frequently struggle with both information retention and recall. The difficulty with memory recall adds to the complexity of learning, limiting their capacity to grasp and retain important knowledge. By selecting this issue for my design solution, I hope to bridge the support gap for dyslexic children by providing targeted interventions that reduce the strain on their cognitive processes.



Final Idea:

This board activity is intended to take a holistic approach, focusing on several aspects of language development and cognitive skills. Through the creative medium of origami crafts, it efficiently blends alphabet sound recognition and word construction. The exercise provides a holistic learning experience by including components such as alphabet recognition, word construction, and the pairing of alphabets to objects and words. Notably, it also targets working

memory retention, providing participants with a beneficial cognitive exercise. The vocabulary-building component improves linguistic skills, while the integration of visual and physical stimuli offers a fully engaged learning experience. Furthermore, the emphasis on repetition and rehearsal helps to reinforce key linguistic concepts, transforming this activity into a dynamic and powerful instrument for language growth and cognitive advancement.

How to play?

Materials:

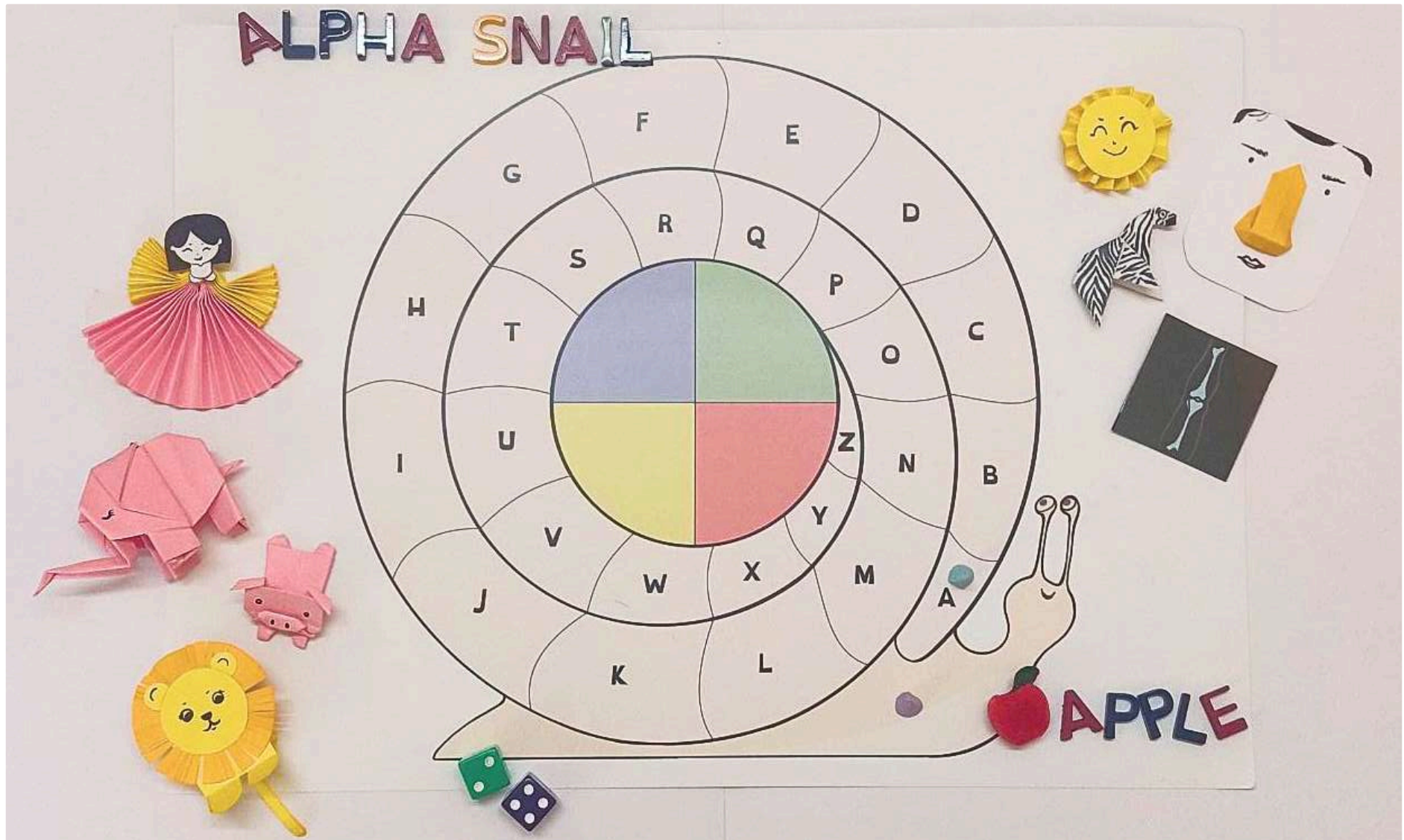
Participants will need following resources to enhance their learning experience in order to facilitate the engaging board activity. The key element is the AlphaSnail game activity, which serves as the board exercise's central subject. Furthermore, two dice will be used, adding an element of chance and unpredictability to the gaming. Tokens or game pieces will be required to identify progress and interaction within the game, ensuring that each player has a different marker for easy identification. It's important to note that the exercise is intended for two participants, encouraging conversation and friendly rivalry. These elements work together to provide a dynamic and engaging learning environment that promotes both enjoyment and instructional value throughout the board activity.

Activity Setup:

Begin by unfolding the AlphaSnail game board on a level place to prepare for the board activity. The game board has a grid with alphabets on it, which sets the tone for an interesting and

informative experience. When the board is ready, each player chooses a game piece and places it at the starting location on the snail's body. This initial arrangement not only announces the start of the game, but also offers a visual and interactive element as

players travel over the snail-shaped grid. The meticulous placement of game pieces at the start assures a fair and organised start, laying the groundwork for the fun and informative action that follows.



User Testing

For the User testing, I went back to the two organisations where I got the opportunity to do my field study, namely, REACH and MBA Gods school of disabled. There I got to do my user testing with a total of 4 students with Dyslexia.

Gameplay:

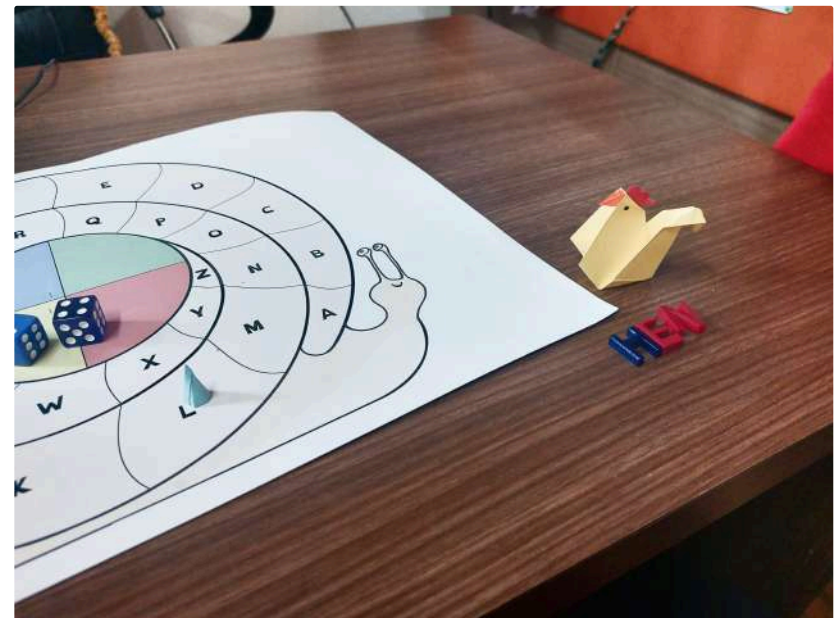
- **Roll the dice:** Decide who goes first.
- **Move your token:** For the initial we can keep the game simple by keeping only one dice to roll and move our token as per the number shows on the dice.
- **Move your token:** To make it more interesting, the player whose turn it is rolls both dice. The numbers on the two dice determine how many spaces the player's token can move. For



- example, if the dice show a 6 and a 3, the player can move their token 3 spaces forward and if the dice show a 3 and a 4, the player can move their token 2 spaces backwards. We can use colour to select which dice we will subtract with the other.

AlphaSnail: The game board will have certain spaces with alphabets. If your token lands on "B", you have to name a word that starts with B, spell it out with acrylic alphabet cutouts and find that object from a pool of objects.

Winning: The goal is to spell as many words one can, the person who spells the most wins the game.



Observation and Feedback:

Students Observation:

- Initially struggling with letter reversals, with time got a better.
- Letter orientation is frequently confused, with letters frequently

being placed upside down.

- Confident with small word formations.
- Repetition and practise increased recall of difficult words.
- Subtraction caused confusion while playing dice.

Experts Feedback: Positive

- This activity would be a great assist in memory and word recall because it requires active participation in spelling and word formation.
- The mix of tactile game pieces with acrylic alphabet cutouts is an amazing concept as it allows for a multi-sensory learning experience.
- This activity is quite beneficial in terms of boosting confidence and improving fundamental abilities.
- This is really good for helping students learn the sight words, letter formation, letter identification, sound symbol association,

- and introducing them with new words.
- With regular practice this can also help with letter reversals and inversion problems, as now also he was understanding and trying to keep the letters correctly.
- Use of origami is interesting as it is helping with cognitive thinking.
- The project was highly praised with positive feedback and some improvements to make it more efficient.

Experts Feedback: Improvements

- Initially the alphabets where not color coded, this made it difficult for students to find and place the letters correctly.
- Options to choose from 2 to 3 objects.
- Jumbled up letters to arrange and form word.
- In the end asking students to keep object and word formed side by side can help them memorise.



- Introducing new articles with new words can make this more interesting and sustain their interest.
- Letters size can be bigger.

Hi-Fidelity Prototype

Understanding the improvements required in the design it was further improved and developed.

Work in Progress...

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[Purnama Esa Dora Tedjokoesoemo- Petra Christian University, Surabaya, INDONESIA](#)