

P3

Designing Interventions to help Engage Parents and Children with Special needs.

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Who are these Children?

*Low adaptive skills, low social skills and a sharp **learning curve is virtually non-existent,***

Slow in acquiring life skills such as **speech development or logic**

They Include, autistic children, Cerebral palsy, Down Syndrome and others.



Officially termed as Divyangs by GOI

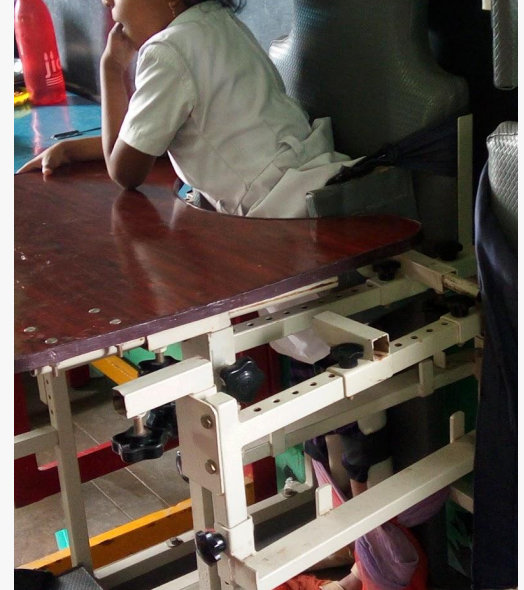
Who are with the Children?



Parent + Child

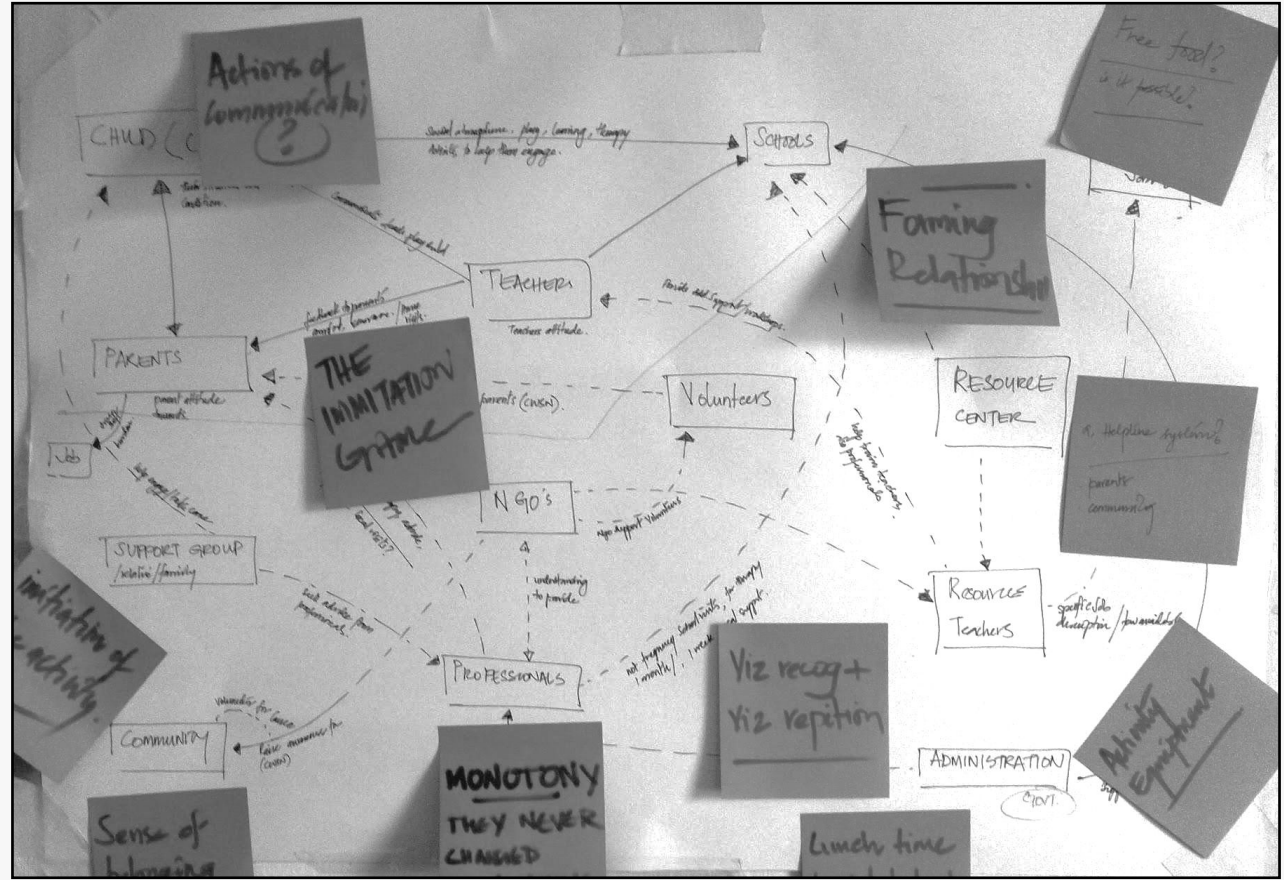


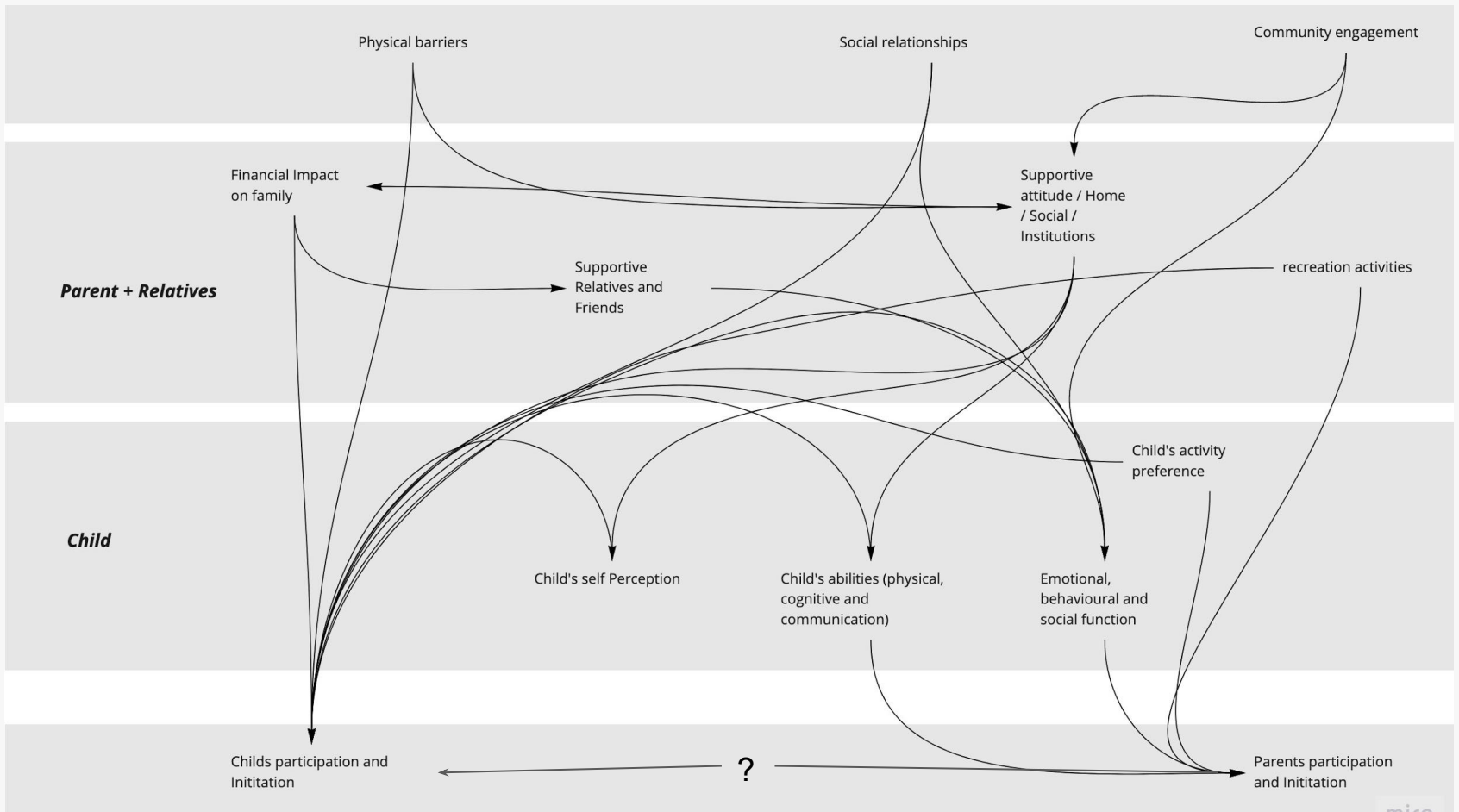
*Teachers/Caregivers + Child
+ Other Children*



Therapist + Child

What Ecosystem are they part of?





Parent Child Relationship network

Where would we be looking at?



Parent Child relationship

Learning | Centers

Schools and centers for the children are a **safe haven for these parents** as they are aware **that the ways of playing is not limited** to the notion of normal play.

Teachers Believe that the centers provides opportunities for other parents to get together, as it helps **community bonding**.

Special schools and centers do not cater to a specific type of disability alone, but a **broad range of children with special needs**.

Chosen area of intervention would be the centers.



Socio-Economic Conditions

Parents | Income | Attitude

Special School / Center

Learning | Activities | Therapy


Social Interaction | Vocational Training

*Discussions with social worker, caregivers, teachers
and observations*



Special Needs Children

Challenges + Opportunities



Help Children relate to the real: what they perceive vs the abstract that is taught.


Explore tools to find color blindness in Children who have a delayed development.

Help parents realise possible ways to practise exercises at home through affordable interventions.

Create tools to help kids increase concentration while performing a task. Designing engaging activities

Objective

Work with the special centers

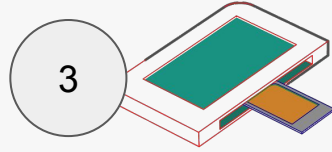
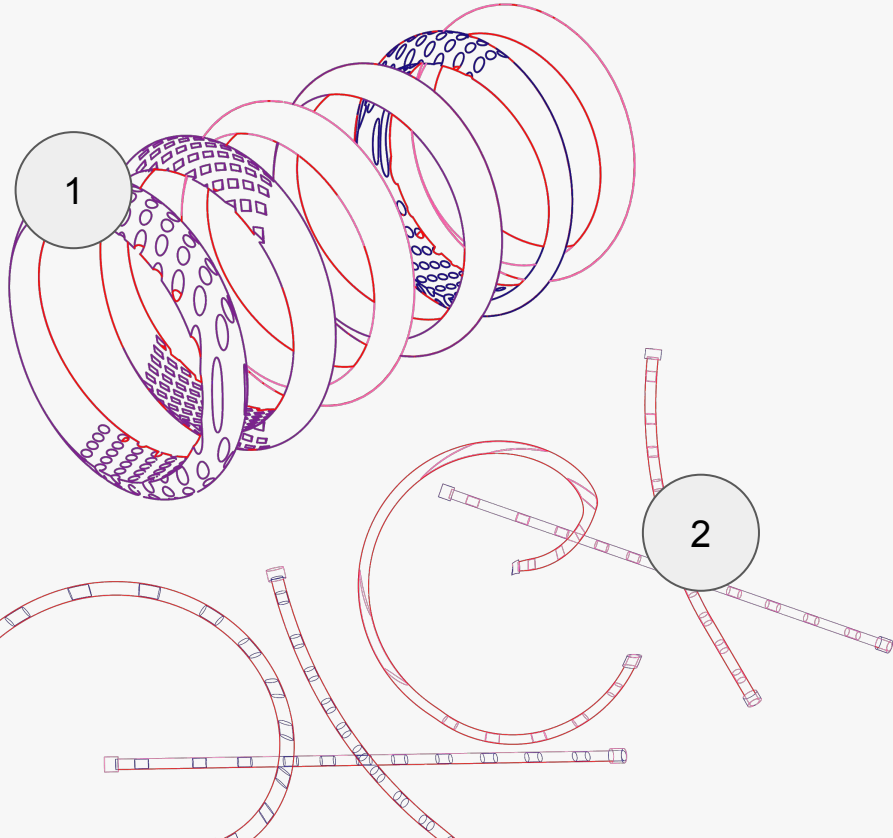


Designing Interventions to help Engage parents, caregivers and children with special needs.

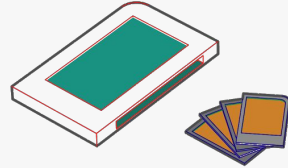
Sensory Approach

Children with moderate intellectual development (MID)

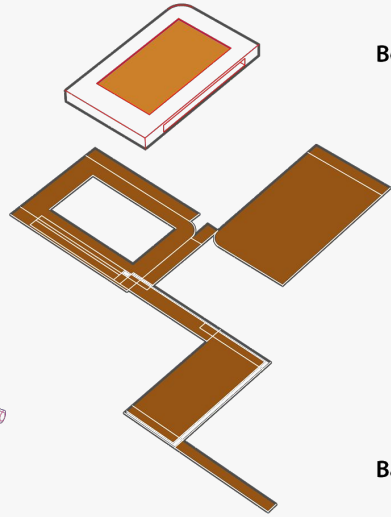
Initial Ideas



Explore the cards by dipping them inside



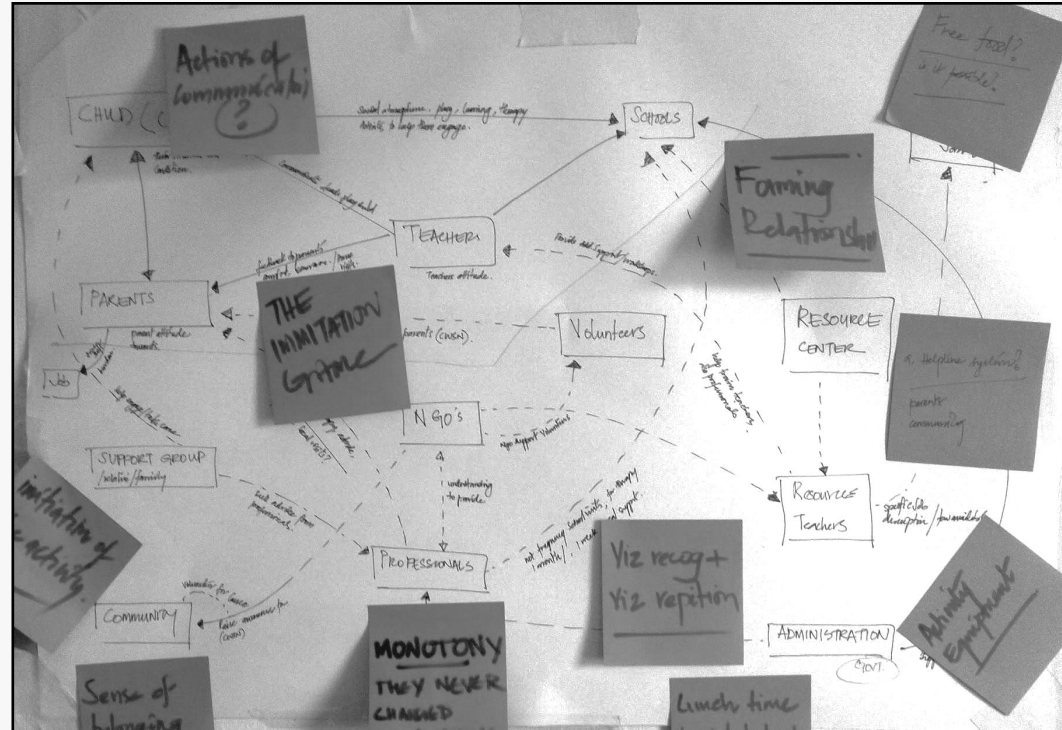
Remove the cards and place the SmartPhone Inside



Box Packed with NFC FlashCards

Basic Cardboard Fold

Concept Development



Design Concepts

Would try to Challenge preconceived notions that



*A MID child can **engage in activities only in a particular way.***

*There is a **need to correct the way** they play (A normal way of playing)*

*There is an **unspoken idea of normality** or standards while playing.*

The design direction would aim to emancipate play activities for the child by focusing on **helping the child engage in spontaneous play.**

Sensory Dev

Perceptual Functions

Visual Perception

Tactile Perception

Spatial Awareness

Body Awareness

Cognitive Development

Energy and Drive Functions

Improve Motivation to act

Feel in Control

Memory Functions

Short term memory

Copying

Mirror and Imitate

Simple and complex movements

Learning Through Action with objects

Ability to carry on action relating to objects

Ability to carry on action Involving Pretence

Ability to engage in make believe activities involving Imagination

Solving Problems

Ability to solve

Thinking

Pretending

Hypothesizing

Global Intellect func.

Understand Cause and effect

Higher Level-Cognitive Functions

Abstraction

Organization and Planning

Cognitive Flexibility

Control wish for or Delay gratification

Attention

Focusing Attention

Attend to human touch, face and Voice

Changes in Environment

Maintain attention

Shifting attention

Diving Attention

Joint Attention

Making Decisions

Decision making ability

Undertaking task

Undertaking simple task

Undertaking Complex task

Communication and Interaction

Voice and speech functions

Articulation function

Communication Pre-talking

Verbal and Pre-verbal communication

Communication Non-verbal

Gestures

Pointing

Basic Interpersonal Interaction

Turn taking

Taking Initiative

Maximize proximity between peers

Gaze shift and eye contact

Response to others

Response to Social Cue

Particular Interpersonal Interaction

Establish therapeutic alliance

Foster a therapeutic relationship

Participation with classmates

Social and Emotional

Emotional Functions

Regulation of and range of emotions

self esteem

Experience of self and others

Sense of self and awareness of one's own body and identity

sense of agency

Engagement of play

From onlooker play to shared play

Understand Play rules

Negotiate Play rules

Change play rules

Motor Development

Mobility - Body

Coordination and balance

Gross motor control

Walk and move using equipment

Mobility - Objects

lift carry place etc..

Mobility - Fine Hand Use

Coordinated hand use

Psychomotor Functions

Physcomotor control

movement,

coordination,

manipulation,

dexterity, grace,

strength, speed

Neruo-musculo-skelatal functions

Coordination of simple movements

Control of simple voluntary movement

Design Approach

Developmental parameters to consider for sensory integration.

Sensory checklist

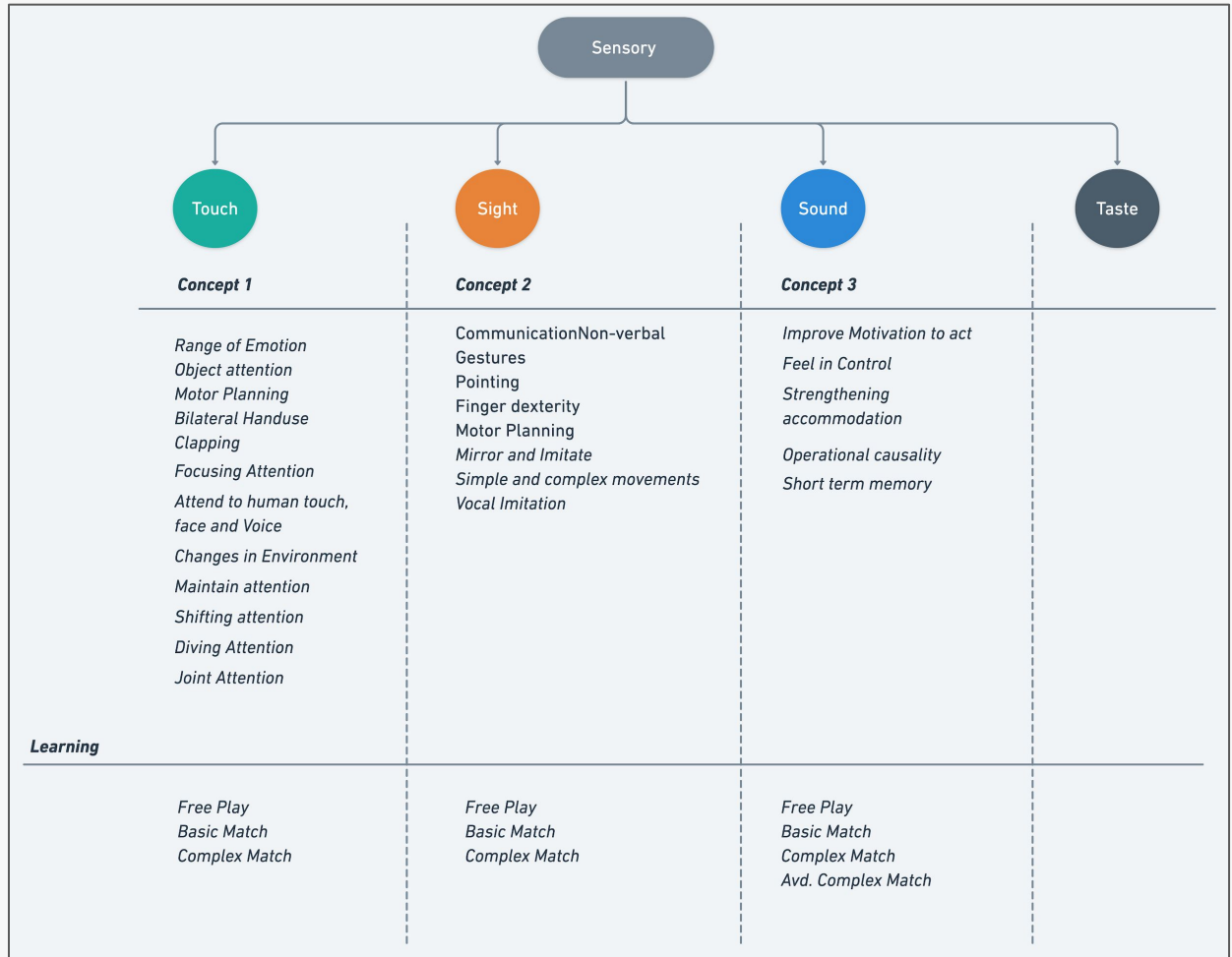
Sensory Integration in a digital platform would require objects that have developmental properties, this checklist provides us with basic areas we could consider while designing.

Sensory exploration	
auditory	Bell, rattle, music, horn, whistle, speech
visual	Color, light, pattern, movement
tactile	Rough, smooth, hard, soft, furry
Motor skills	
strengthening	Increasing muscle power for functional movement
endurance	Increasing muscle tolerance for longer operation
range of motion	Moving hand joints through full range of flexion, extension, opposition
finger dexterity	Dissociating one or more finger from others for in-hand manipulation
bilateral handuse	Using both hands together to play toys
eye-hand coordination	Visually monitoring hands for grasp, manipulation, and release
accommodation	Anticipating and shaping hands to the configuration of the object
cognitive procedure	
object permanence	Visually tracking a object, knowing it still exists when out of sight
Problem solving	Inventing ways to obtain desired events
Vocal imitation	Vocalizing and imitating sounds and words
Motor planning	Using simple and complex motor schemes to interact with objects
Operational causality	Attempting specific steps to get an interesting spectacles repeated
Practical characteristics	
Access considerations	How easy/hard the toy is to be used? Does it need modification for use?
Physical characteristics	Durability and safety should be incorporated into the design of the toy
Adjustability	Does it have adjustable height, volume, and level of difficulty?
Developmental considerations	Is it function and age appropriate? What types of toys can attract these clients?

A Checklist of sensory toy considerations [3].

Design Concept approach : Sensory

Sensory dev: Concept integration



Learning Theory

Vygotsky Scaffolding learning

Scaffolding learning - belonging

FREE PLAY - shape play / no prompt

BASIC MATCH - connect basic shapes

COMPLEX MATCH - Abstract representation (e.g. $A+1/2$)

Adv. Complex Match - Adv. Abstract of shapes in categories

Number Match - Number of

Shape Name Match -

Spoken Number - Promoting recurrent use.....

Spoken shape Name - listening to language - object selection?

Patterns - visual series of patterns for

play therapy
Sessins
Ind vs. Social

Why is this important?
What did these kids imitate?
Do they have a better response?
A+1/2

Materials parents to teach better quality of life
or own comments
Questions?
spending

Parents involvement? mother (etc.)
Fluctuates!

Controlled
Restricted
girl in chain

Design Guidelines

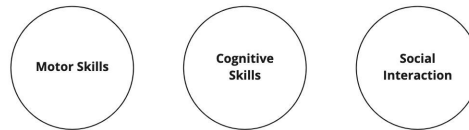
1 Design Guidelines

Free-engaging play	Variations in activity, same task	Character and objects	Prompts	Motivation on rewards	prediction and recall
Kids love watching things move. Non-static activities helps focus attention	Gradual levels of simple complex tasks wrt goal specific areas	characters children can relate to based on context.	Prompt from the caregiver, Explain while they interact.	Personalised triggers for a good job done. HI-Fi*	Repeat the task in different stages for recall.
Levels of complexity	unobtrusive graphics	Sound Preference	One activity for a child.	Discovery within repetition	Unique task based Goal
Levels included, but the child might loose interest. Give a large variation?	Focused graphics on the task, avoid distractions	Sound based feedback to keep attention promotes positivity	Each Child is unique and have their own interest levels	Help the child discover new interactions	Focused one task, to enhance simple cognition for the child

2 Help the child participate and enjoy the interactions

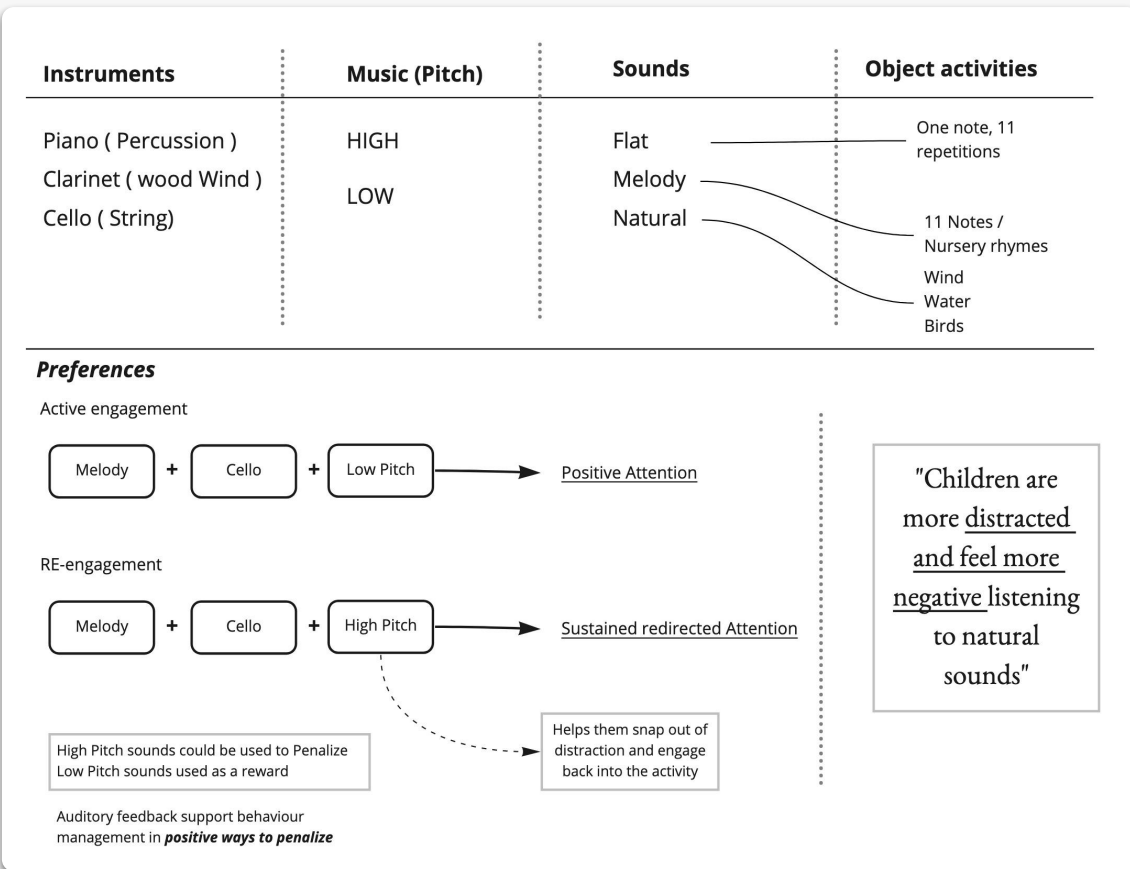
If the child can't participate and enjoy interacting, it will reduced motivation and recall of the task/activity. So even though the game might be interesting, it would be successful.

3 Combine the guidelines with the Developmental areas



modified approach to Laura Bartoli et al [19] designing games for autistic children.

Sound Preferences



Sound preference among the children
MID

Special Design Considerations

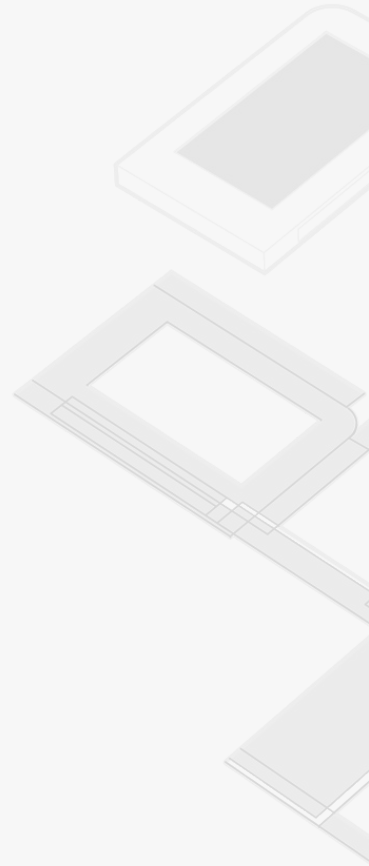
Environment and spatial awareness

Prompts while engaging

Repetition and recall

Interaction

Help in framing and planning design concepts while making decisions on the interactions of the outcomes by the participants.



Early Design Ideas

Idea 1

Sensory Input : **Touch + Sound**

Vocal Imitation / To help open up voices (Creativity through Vocal performance)

Basic Match as a mapping process (a playful cognitive activity) + Free Play



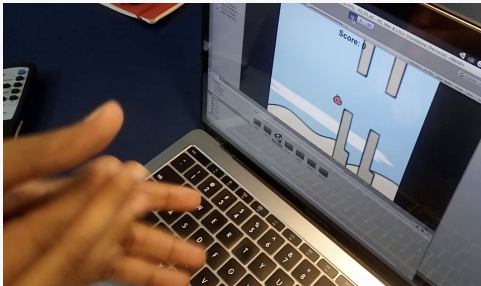
Early Design Ideas

Idea 1

Sensory Input : **Touch + Sound**

Vocal Imitation / To help open up voices (Creativity through Vocal performance)

Basic Match as a mapping process (a playful cognitive activity) + Free Play



Idea 2

Sensory Input : **Touch + Sight**

Imitating through gestures (Creativity through gestural performance)

Basic Match as a mapping process (a playful cognitive activity) + Free Play



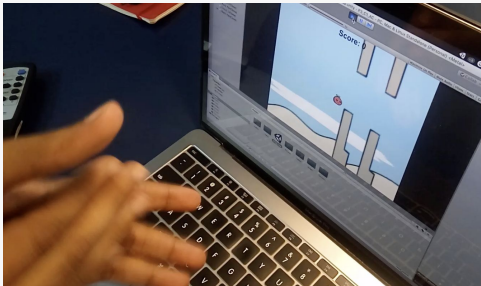
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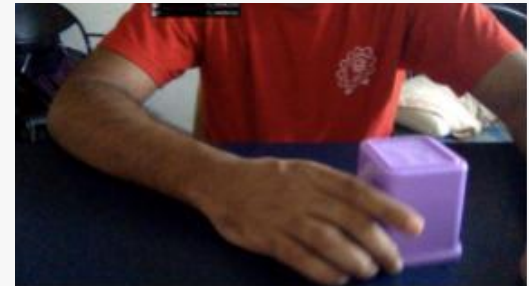


Idea 3

Sensory Input : **Touch + Sound**

Creating Sound to make music (eg. Bird Calls, Water, Bikes etc..)

Basic Match as a mapping process (a playful cognitive activity) + Free Play



//Field-revisit

Concepts | feedback

Revisit to the two earlier field study centers to get expert feedback on the concepts and possible iterations.

Obtain possibilities for future testing



//Field-revisit

Concepts | feedback

Concept 1 : Gesture + Vocal Sound

Children would participate in such activities if interested.

Learning activities Could be incorporated

Basic Shape concepts

Feasibility?

Parents Opinion?



Children have different and specific choices of toys/activities they would prefer to engage in.

Final Concepts

Concept 1 | Walk and Talk



Character walks and collect objects,

Basic Match through vocal imitation |
Gesture | sound

Level of complexity increases by
recognising from color to shapes to
objects

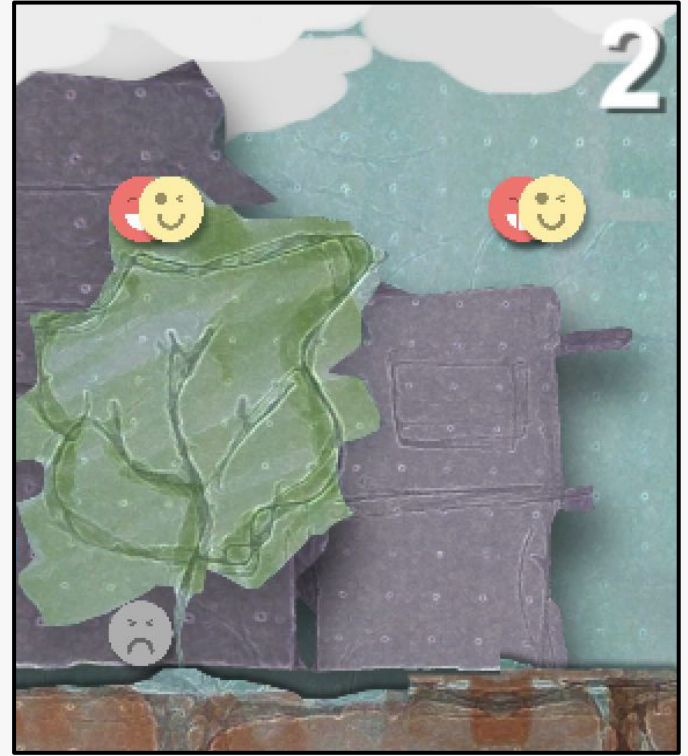
Idea 1 + Idea 2



Character Avatar
Designed to be in focus
+ Animation



Background Art Inspired from
Kids coloring books



Game Object tags and placeholder objects
of play / Latency

Interaction Trigger

When would it activate?

Touch

Single /one child/ Stimulate
self engagement **ACTIVE**

Multiple / Group of kids/
Social Interaction **ACTIVE**

Stimulate Imitation

Sound (Sound+Gesture)

Single /one child/ Stimulate
self engagement **ACTIVE**

Multiple / Group of kids/
Social Interaction **ACTIVE**

Stimulate Imitation

Gesture Only

Single /one child/ Stimulate
self engagement **ACTIVE**

Multiple / Group of kids/
Social Interaction **NOT**
ACTIVE

Stimulate Imitation

Activity Scenarios

Initial Set-up by
Caregiver/Parent

One table set-up on the table

Table

Parent/caregiver +
Child

Open Application,
selects appropriate
level for the Child.

Caregiver/Parent
demonstrates play with
the interface, Child
imitates. free play

Child interacts with the
interface using one or
multiple inputs of choice,
either touch, gesture,
vocal or sound

Levels based of
learning through
matching color and
objects

Repetition of the
tasks to improve
skill development,
motor + cognition +
vocal stimulation

Child + Other
Children

prefers to interact
in their own way,
gesture or vocal

If not Interested, Child
leaves the play area

Interested in the
play activity as a
group, stimulating
vocals and sound to
control character

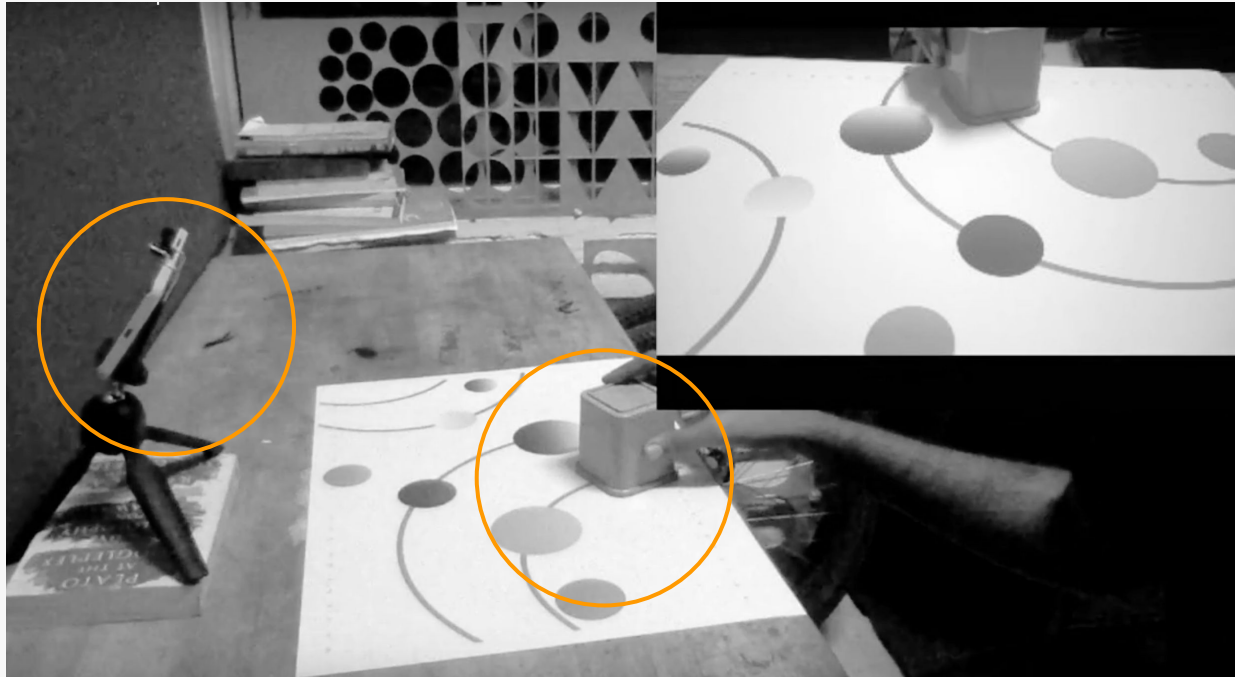
Finds it irritating, if
input isn't taken
default input to
motivate child.

Default vocal input
to help motivate
child when they try
to stimulate
auditory responses

Demo

Final Concepts

Concept 2 | Tosco Blocks (Touch Sound Color)



Idea 1 + Idea 3

Parameter

**Parameter
(Type)**
Front End

**Parameter
(Type)**
Back End

**Sensory
Outcome**

1. Color

- 1. Red
- 2. Yellow
- 3. Blue

Type of
Instruments

- 1. Drums
- 2. Piano
- 3. Flute

Sound / Auditory

Parameter

**Parameter
(Type)**
Front End

**Parameter
(Type)**
Back End

**Sensory
Outcome**

1. Color	<ul style="list-style-type: none">1. Red2. Yellow3. Blue	Type of Instruments	<ul style="list-style-type: none">1. Drums2. Piano3. Flute	Sound / Auditory
2. Size	<ul style="list-style-type: none">1. Big2. Medium3. Small	Volume / Intensity	<ul style="list-style-type: none">1. Loud2. Mild3. Soft	Sound / Auditory

Parameter**Parameter
(Type)**
Front End**Parameter
(Type)**
Back End**Sensory
Outcome**

1. Color	1. Red 2. Yellow 3. Blue	Type of Instruments	1. Drums 2. Piano 3. Flute	Sound / Auditory
2. Size	1. Big 2. Medium 3. Small	Volume / Intensity	1. Loud 2. Mild 3. Soft	Sound / Auditory
3. Action: Capping	1. Cap On 2. Cap Off	Tasking	1. Task On 2. task Off	Touch / Tactile

Parameter**Parameter
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Front End**Parameter
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Outcome****1. Color**

- 1. Red
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Volume /
Intensity

- 1. Loud
- 2. Mild
- 3. Soft

Sound / Auditory

3. Action:
Capping

- 1. Cap On
- 2. Cap Off

Tasking

- 1. Task On
- 2. task Off

Touch / Tactile

4. Shape:
Combination of
Instruments

- 1. Percussion
- 2. String
- 3. Wind

- 1. Flute + Piano
- 2. Piano + Drums
- 3. Drums + Flute

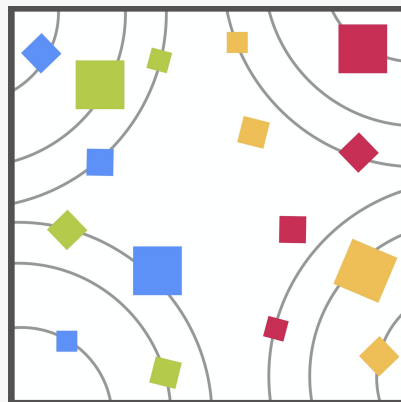
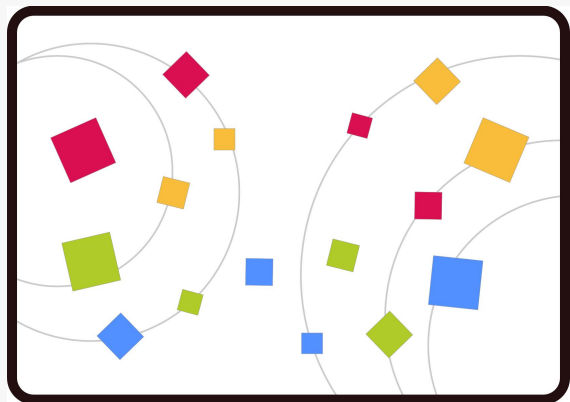
Seeing / Visual
+
Sound / Auditory

Parameter**Parameter
(Type)**
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Back End**Sensory
Outcome**

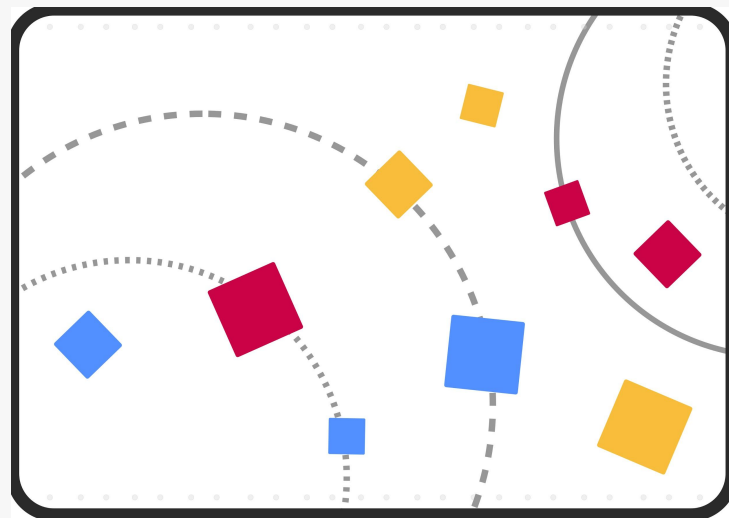
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3.	Action: Capping	<ul style="list-style-type: none"> 1. Cap On 2. Cap Off 	Tasking <ul style="list-style-type: none"> 1. Task On 2. task Off 	Touch / Tactile
4.	Shape: Combination of Instruments	<ul style="list-style-type: none"> 1. Percussion 2. String 3. Wind 	<ul style="list-style-type: none"> 1. Flute + Piano 2. Piano + Drums 3. Drums + Flute 	Seeing / Visual + Sound / Auditory
5.	Movement: Spatial Co-ordination Layers of Instruments		<ul style="list-style-type: none"> 1. Drums + Piano 2. Piano + Drums + Flute 	Touch / Gestural + Sound / Auditory

Parameter**Parameter
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5.	Movement: Spatial Co-ordination Layers of Instruments			1. Drums + Piano 2. Piano + Drums + Flute	Touch / Gestural + Sound / Auditory



Initial Explorations



Final Board

Activity Scenarios

Initial Set-up by
Caregiver/Parent

One Board 40cm x 40cm,
4 color stacked blocks (Total 16)

Smartphone + Phonestand + speaker
Fit Board in the Smartphone camera frame
default stand position inbuilt

Table / Floor

Parent/caregiver +
Child

Child watches and
tries to Imitate the
Playing activity
along with parent /
caregiver

Assisted Play activity
with the Child by
placing and matching
blocks on the shape
sizes to trigger sound

Free Play activity
with the Child by
placing and
matching blocks on
the shape sizes to
trigger sounds

Repetition of the
tasks to improve
skill development,
motor + cognition +
vocal stimulation

Child is bored or
distracted, sound
off. starts when
detects motion on
board.

Child + Other
Children

Child can pick fav.
color or sound to
engage with the
board (free or
assisted)

If not Interested, Free
Play of the color blocks
stacking and grouping

Interested in the
sounds: play activity
as a group,
discovering sounds

Finds it irritating,
sounds stop even if
blocks are in play.
Recong. by physical
signs of agitation
rapid movement on
board

Child Holds blocks
and moves it on
board, Default
sound played to
motivate the child

Demo

Field-Revisit



Evaluation plan

Number of participants: 4

Type of mental disorder: ??

IQ Level : 50-60

Minimum number on skill development board: 12

Each Session : 15mins

User Behaviour	Attention	On Task	Child is engaged	Time
		Off Task	Child is distracted	Time
	Emotion	Positive	Smile	Time
		Negative	Unhappy	Time
		None	No Expression	Time
	User Movement	Hand	Finger	One or More
Palm			One or Both	Freq
Clenched			One or Both	Freq
Vocal		High	Child is engaged	Freq
		Low	Child is distracted	Freq

Evaluation

Concept 2: Task observation

Did the children interact with the board and objects as intended?

Did the participant interact with the board and the blocks according to the intended purpose?

Did the participant avoid the board while playing?

Did the participant interact with the board and the blocks using freeplay?

Were they able to discover the sounds while interacting?

Evaluation

Concept 2: Task observation

Did the children Participate with the design as intended?

Did the participant interact to the intended purpose?

Did the participant avoid the activity while playing?

Did the participant interact with the activity through different inputs?

Did they get bored of the repetition of the colored object and activity?

Did the design stimulate social interaction among children?

Was there a sense of strain by interacting with the medium?

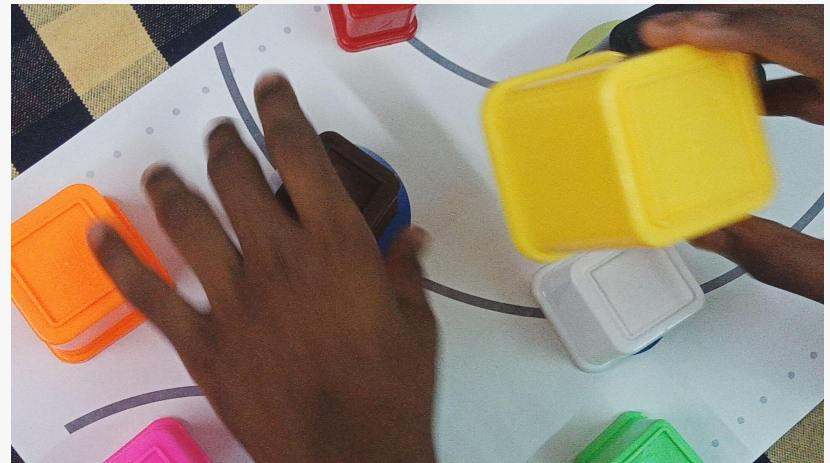
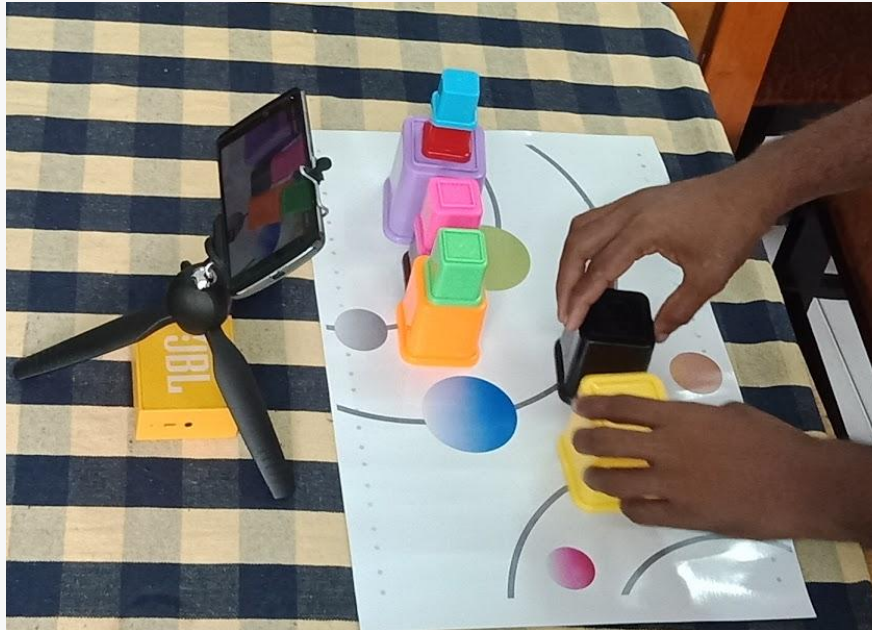
Evaluation

Concept 2: observations



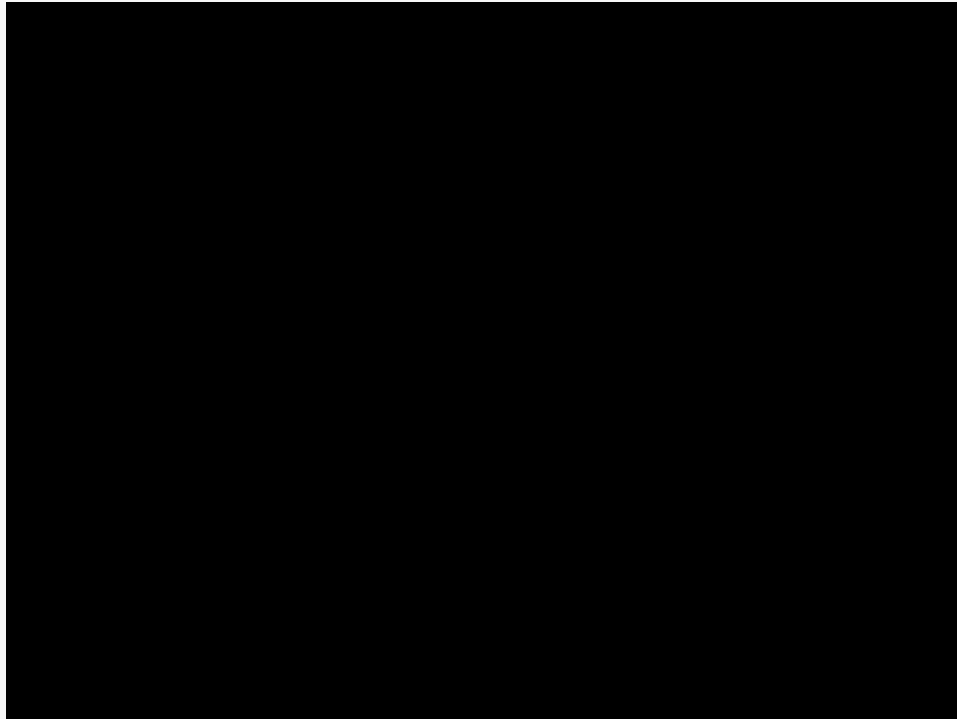
Evaluation

Concept 2: observations



Evaluation

Concept 1: observations



Observations

Concept 2: Blocks and music

Children did use the blocks placing them on the circles as well as few intended free play.

The children did observe the change in sounds to discover other sounds

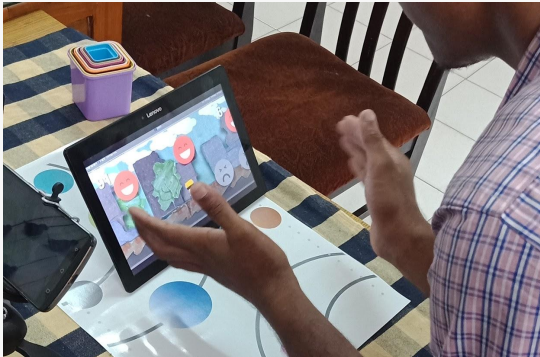
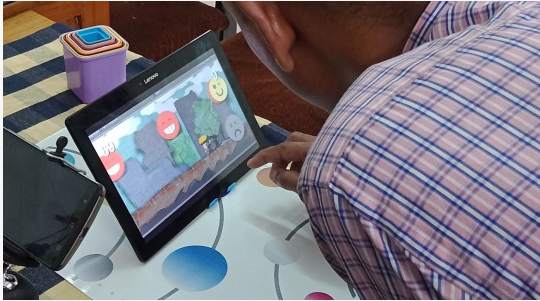
When the number of blocks increased difficulty increased, interest decreased.

Children are engaged by the activity.

Due to the limited number of participants, these observations may not hold true for all, as only children who showed interest to participate engaged with the activity.

Evaluation

Concept 1: observations



Evaluation

Concept 1: observations




Stimulating social interaction between children and encouraging active participation



Observations

Concept 1: Task observation




Children did switch between inputs to manipulate the character, alternative inputs served as defaults when the prototype did not detect a particular sound or gesture.

There is a positive effect on the social interaction between children

Sound as an input along with other gesture shows an increased participation from the children.

Due to the limited number of participants, these observations may not hold true for all, as only children who showed interest to participate engaged with the activity.

Future Scope



Inclusive approaches into small areas for social good.

Kids could play on their own one day?

Thankyou!