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M.Des **|** Interaction Design **|** 2022 - 2024

Nurturing Young Minds in their foundation years through Experiential Learning in the Digital Age

Leveraging technology to connect children with the Environment

Guide Prof. Ravi Poovaiah

Declaration

I hereby declare that the content of this report is the result of my own research and work. All information and data presented in this report are accurate to the best of my knowledge and have been appropriately cited and referenced.

Any contributions made by others to this work, whether through direct collaboration or indirect influence, have been duly credited.

I further declare that this report adheres to the ethical standards and guidelines set forth by the academic institution and follows the principles of academic integrity. No part of this report has been plagiarised, and all sources used in the research have been duly acknowledged.

I understand the potential consequences of academic misconduct and affirm the authenticity of my work. In the event that any part of this report is found to be in violation of academic integrity, I accept full responsibility for the consequences.

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Signature

Approval Sheet

The project titled "**Nurturing Young Minds in their foundation years through Experiential Learning in the Digital Age"** by Amruta Bailke, is approved for partial fullfillment of the requirement for the degree Master of Design in Interaction Design.

Guide :

Chair Person :

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> 12-Aug-24 06:15:54 PM

External :

Acknowledgement

I would like to express my sincere gratitude to my project guide, Prof Ravi Poovaiah, for his guidance, and mentorship through the development of this design project. His insightful feedback, encouragement, and constructive critiques have been pivotal in shaping the direction and depth of my research.

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Lastly, I am thankful to my peers for their camaraderie, stimulating discussions, and shared experiences. Their support and collaborative spirit have been a source of motivation.

Abstract

This project aims to promote meaningful interaction between children and the natural environment through a series of engaging and educational tasks.

Recognizing the growing concern of children's disconnection from nature, the project focuses on cultivating curiosity, observation skills, and a genuine appreciation for the outdoors. The curated set of Nature Exploration Tasks is designed to be accessible, adaptable, and enjoyable for children, encouraging hands-on experiences that foster a deeper connection with the natural world.

Tasks include collecting leaves, exploring textures, identifying bird species, and creating nature-inspired art. Each task is crafted to encourage sensory engagement, observation, and creativity. By completing these activities, children embark on a journey of discovery, gaining knowledge about the diverse elements found in nature while enhancing their cognitive and motor skills.

The project is driven by the belief that fostering a connection with nature during childhood lays the foundation for a lifelong appreciation of the environment. These tasks provide a holistic approach to nature exploration, encouraging children to use all their senses and fostering a sense of wonder and curiosity. Through these interactive and enjoyable activities, the project aims to contribute to the holistic development of the younger generation while instilling a sense of environmental stewardship from an early age.

Contents

Introduction

In the ever-evolving landscape of education, the imperative to cultivate innovative and engaging learning experiences for children during their foundation years has gained unprecedented significance. Recognizing the transformative potential of experiential learning, this design project delves into "Leveraging Technology to Connect Children with the Environment."

As we stand on the precipice of a digital era, the integration of technology into early childhood education becomes not only an opportunity but a responsibility. This project explores how cutting-edge technological tools can be harnessed to foster a profound connection between young learners and their surrounding environment. Through a nuanced exploration of experiential learning methodologies and the judicious use of technology, our aim is to create a symbiotic relationship that enhances the cognitive, emotional, and social development of children in their formative years.

The foundation years are a critical phase in a child's life, laying the groundwork for their future academic success and overall well-being. By intertwining the principles of experiential learning with the limitless possibilities afforded by technology, we endeavour to create an educational paradigm that not only transcends traditional boundaries but also enriches the learning journey for our youngest learners. This report will delve into the conceptual framework, design considerations, and potential impact of our project, aiming to pave the way for a holistic and tech-infused approach to experiential learning in early childhood education.

Literature Review

The increasing prevalence of mobile phones and other gadgets in the lives of children has raised concerns about the potential adverse effects on their physical and psychological well-being, particularly in terms of the diminishing connection with the natural environment. This section reviews existing literature on the multifaceted challenges children face due to their escalating dependency on technology and the consequential detachment from the natural world.

1. Physical Health Concerns: One primary concern highlighted in the literature is the impact of excessive screen time on children's physical health. Prolonged use of mobile phones and gadgets has been linked to sedentary behavior, leading to issues such as obesity, poor posture, and disrupted sleep patterns (Hutton et al., 2020). The diminished time spent outdoors in active play and exploration exacerbates these concerns.

2. Psychological Implications: Beyond physical health, the literature underscores the psychological implications of technology dependence in childhood. Increased screen time has been associated with elevated levels of stress, anxiety, and attention-related problems (Twenge & Campbell, 2018). The constant exposure to digital stimuli may contribute to a lack of focus, hindering cognitive development and emotional regulation in children.

3. Disconnection from Nature: A critical aspect emerging from the literature is the disconnection from the natural environment resulting from excessive gadget use. Children spending more time indoors engrossed in screens are deprived of the myriad sensory experiences the outdoors offer. This disconnection is identified as a significant factor in the decline of children's environmental awareness and appreciation (Chawla, 2015).

4. Importance of Nature in Child Development: The literature emphasizes the crucial role of nature in fostering holistic child development. Growing up in natural environments is associated with enhanced observational skills, improved concentration, and heightened creativity (Kuo & Faber Taylor, 2004). Exposure to green spaces is further linked to positive social behaviors, as

Literature Review

children learn important skills such as cooperation and conflict resolution through outdoor play (Wells & Evans, 2003).

5. Socialization Challenges: The literature also addresses the impact of excessive screen time on children's socialization skills. Reduced outdoor play diminishes opportunities for face-to-face interactions and collaborative activities, potentially hindering the development of crucial social skills (Christakis, 2010). As a consequence, children may face challenges in communication, empathy, and teamwork.

In conclusion, the literature underscores the pressing need to balance the integration of technology in children's lives with a concerted effort to reconnect them with the natural environment. Striking this equilibrium is imperative for mitigating the physical and psychological challenges associated with excessive gadget use, while simultaneously ensuring that children experience the myriad developmental benefits that nature provides. This synthesis of literature lays the foundation for our design project,

seeking to leverage technology to bridge the gap between the digital and natural worlds, fostering a harmonious coexistence for the optimal development of children in their foundational years.

Project Brief

In a world where technology is an integral part of daily life, this project seeks to revolutionise early childhood education by exploring innovative ways to connect children with the environment through technology. This project focuses on leveraging digital tools to enhance experiential learning, fostering a harmonious relationship between the digital and natural worlds. By addressing the challenges associated with children's increasing reliance on gadgets and its impact on their connection with nature, the project aims to create an immersive and balanced educational experience for children in their foundational years.

Objectives

1. **Explore the Impact of Technology on Children's Connection with Nature:** Investigate the current landscape of children's technology usage and its influence on their engagement with the natural environment. Understand the challenges and opportunities presented by digital devices in shaping early childhood experiences.

2. **Design and Develop Tech-Integrated Experiential Learning tasks:** Create innovative, age-appropriate digital tools and applications that complement traditional experiential learning methodologies. These tasks will be designed to enhance children's understanding of and connection with the environment while promoting active participation and curiosity.

3. **Assess the Efficacy of tasks:** Conduct rigorous assessments to evaluate the impact of these tasks on children's cognitive, emotional, and social development. Measure changes in observational skills, socialisation, and environmental awareness as a result of the integrated learning approach.

4. **Provide Recommendations for Implementation:** Based on the research findings and task assessments, offer practical recommendations for the integration of this or similar approaches into early childhood education curricula. Address considerations for educators, parents, and educational institutions to ensure successful implementation.

Secondary Research

1. Technology in Early Childhood Education: Contemporary educational discourse acknowledges the pervasive role of technology in early childhood education. Prensky (2018) emphasises that when used effectively, technology can enhance engagement and contribute to cognitive development. However, scholars caution against over reliance and stress the importance of a balanced approach to prevent potential negative consequences such as developmental delays.

2. Experiential Learning and Child Development: The foundational works of Dewey (1938) and Piaget (1952) underscore the profound impact of experiential learning on early childhood development. Their theories posit that hands-on experiences are crucial for shaping cognitive abilities, fostering problem-solving skills, and laying the groundwork for lifelong learning. The emphasis on active engagement aligns with the principles of experiential learning that form the basis of this project.

3. Impact of Screen Time on Children: Radesky et al.'s (2015) research delves into the impact of screen time on young children. The findings reveal associations between excessive screen time and developmental delays, sleep disturbances, and challenges in self-regulation. This research prompts a critical examination of the potential drawbacks of technology use in early childhood, urging educators and parents to approach digital integration with a mindful and balanced perspective.

4. Nature-Based Learning: Scholars such as Chawla (2015) and Kellert (2005) have explored the positive impact of nature-based learning on child development. Exposure to natural environments is associated with improved cognitive functioning, heightened creativity, and enhanced emotional well-being. This highlights the potential benefits of integrating nature-centric elements into early childhood education.

Secondary Research

5. Balancing Screen Time with Outdoor Play: The American Academy of Pediatrics (AAP) guidelines (2016) advocate for a balanced approach to technology use in early childhood. The guidelines emphasise the importance of balancing screen time with outdoor play and face-to-face interactions. This underscores the need for a holistic approach to children's engagement with technology, recognising the importance of real-world experiences alongside digital ones.

6. Designing Digital Learning Experiences for Children: Takeuchi and Stevens (2011) delve into the principles of designing digital media for young children. Their research underscores the significance of age-appropriate content, interactivity, and alignment with educational goals to ensure positive learning outcomes. This provides valuable insights for the project's task design phase, emphasizing the importance of thoughtful curation in digital-nature integration.

7. Parental Perspectives on Children's Technology Use: Surveys conducted by Rideout (2017) offer insights into parental perspectives on children's media use. The data reveal diverse opinions on the benefits and challenges associated with technology in early childhood. Understanding parental concerns and preferences is crucial for creating an approach that resonates with both educators and parents, ensuring a collaborative and informed educational environment.

8. Technology and Environmental Education: Ernst and Monroe's (2004) research explores the integration of technology into environmental education. The study discusses how digital tools can enhance children's understanding of ecological concepts, contributing to the development of environmental awareness. This research informs the project's objective of utilising technology to connect children with the natural environment, promoting ecological literacy through interactive experiences.

Primary Research

Understanding the Impact of Digital Gadgets on Children's Connection with the Natural Environment

Objective:
This primary research aims to comprehensively investigate the disconnect between 27 children aged 4 to 6 years and the natural environment attributed to the usage of mobile phones and other digital gadgets. The study seeks to understand the reasons behind this disconnection, the impact on children's social skills and overall well-being, and how the content consumed through digital devices shapes their perception of the world.

Experiment Setup:
Sample Set:
- Participants: 27 children aged 4 to 6 years and their parents.
- Selection Criteria: Participants were recruited from urban and suburban areas to ensure diversity in socioeconomic backgrounds.
- Informed Consent: Prior to participation, parents provided informed consent, and children were briefed in an age-appropriate manner.

Interviews:
Parents: Semi-structured interviews with parents to understand their attitudes towards their children's gadget usage, reasons for providing devices, and perceptions of the impact on social skills and outdoor activities.

Questions:
1. Can you describe your child's daily interaction with mobile phones or digital gadgets?
2. Why do you provide digital gadgets to your child, and at what age did they start using them?
3. How do you perceive the impact of digital gadget usage on your child's social skills and outdoor activities?
4. What strategies do you use to manage your child's screen time, and how do you decide what content is suitable for them?
5. In what ways do you encourage outdoor activities that do not involve digital devices, and how receptive is your child to these activities?
6. Have you noticed any specific changes in your child's behaviour or mood after extended periods of gadget usage?

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Primary Research

Children: Age-appropriate interviews with children to explore their perspectives on gadget usage, outdoor activities, and their preferences.

Questions:
1. What do you enjoy doing on your mobile phone or digital device?
2. Do you prefer playing indoors or outdoors, and why?
3. How do you feel when you spend time outdoors without gadgets?
4. Can you tell me about a favorite outdoor activity that you enjoy without using your phone or tablet?
5. How do you think using digital devices has changed the way you see the world, and are there things you learn from them that you don't learn from other activities?
6. What types of stories or books do you enjoy, and do you prefer reading them on a screen or in a traditional book format?

Primary Research

Transcripts:

Parental Responses:

"Our child starts the day with cartoons on the tablet to keep them occupied while we get ready for work. Throughout the day, it's a mix of educational apps and games, especially during meals or when we need them to settle down."

"We started around age 3. It was a way to keep them entertained, and honestly, it's become a bit of a parenting crutch. We never thought it would be this convenient."

"We worry they're missing out on playing with other kids. It's just easier to hand them the tablet than to organize outdoor activities. Lately, they seem less interested in playing outside without the gadgets."

"Honestly, we don't monitor it closely. We let them play until they get bored. As for content, we choose what seems educational, but we haven't paid much attention to the themes."

"We try to take them to the park, but they always ask for the tablet. They seem less interested in running around or playing with other kids."

"They can get a bit grumpy when we take the tablet away, but we thought it was just a phase. Maybe it's affecting them more than we realized."

Primary Research

Transcripts:

Child's Response:
"I like playing games and watching funny videos. It's more fun than playing with toys, and I can do it whenever I want."
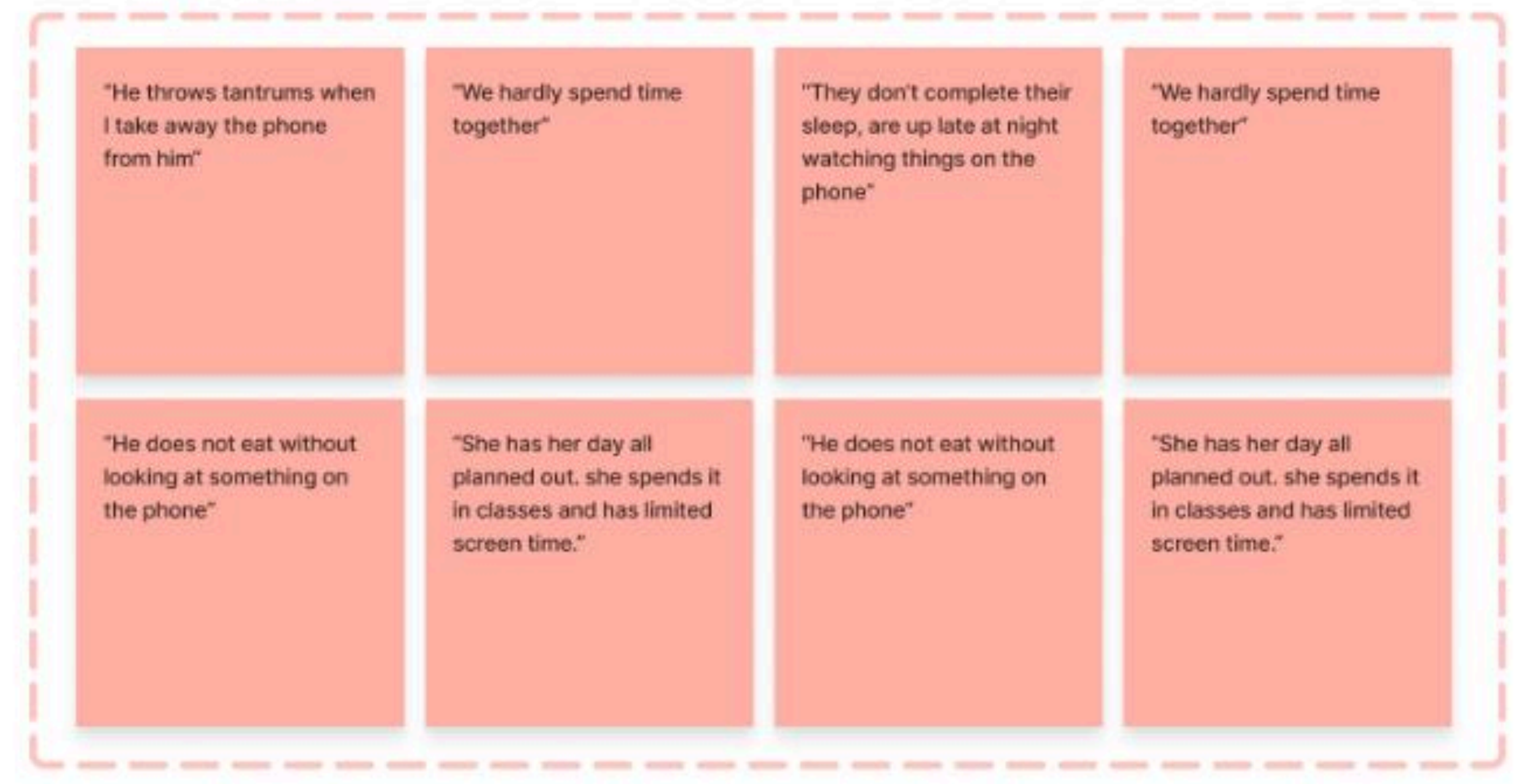
"I like playing inside with my tablet. It has all my games. Outside is okay, but I get bored."

"It's not as fun. I like the games on my tablet. Outside is just trees and stuff."

"Hmm, I guess I like going to the park sometimes. But I always ask if I can bring my tablet."

"I learn cool stuff on my tablet, like animals and numbers. It's more fun than books, and the pictures move."

"I like stories on the tablet. They have sounds and games. Real books are okay, but they don't do anything."

"He throws tantrums when I take away the phone from him"

"We hardly spend time together"

"They don't complete their sleep, are up late at night watching things on the phone"

"We hardly spend time together"

"He does not eat without looking at something on the phone"

"She has her day all planned out. she spends it in classes and has limited screen time."

"He does not eat without looking at something on the phone"

"She has her day all planned out. she spends it in classes and has limited screen time."

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Primary Research

Observations:
- Naturalistic observations of children's behaviour during outdoor activities with and without digital devices.

- Noting instances of gadget usage during family outings and outdoor play.

Health Assessments:
- Collecting data on children's eyesight and reports of any physical discomfort such as headaches or body aches.

- Parent-reported data on the average screen time per day for their children.

Primary Research

Data Analysis:

Qualitative Analysis:
- Thematic analysis of interview transcripts revealed several key themes:

- Parents expressed reliance on digital devices for child engagement due to busy schedules.

- Children displayed a preference for digital activities over outdoor play.

- Concerns were raised by parents about potential impacts on social skills and outdoor activities.

Data Analysis:

Quantitative Analysis:
- Statistical analysis of health assessment data showed correlations between increased screen time and reported health issues such as eyesight problems and body aches.

- Analysis of parent-reported data on screen time revealed that many parents were unaware of the extent of their child's gadget usage, indicating a potential lack of monitoring.

- A majority of children reported spending more time indoors with gadgets than engaging in outdoor activities.

Primary Research

Findings:

Parental Perspectives:
- Many parents acknowledged providing gadgets deliberately to keep their children engaged, often due to busy schedules.

- Concerns were raised about the impact on social skills and outdoor activities, but the convenience of digital devices prevailed.

Children's Perspectives:
- Children displayed a preference for digital activities over outdoor play, citing the allure of games and videos as a primary reason.

- Some children expressed discomfort when detached from gadgets during outdoor activities.

Health Impact:
- Correlations were found between increased screen time and reported health issues such as eyesight problems and body aches.

- Parents, unaware of the extent of screen time, expressed surprise at the potential health implications.
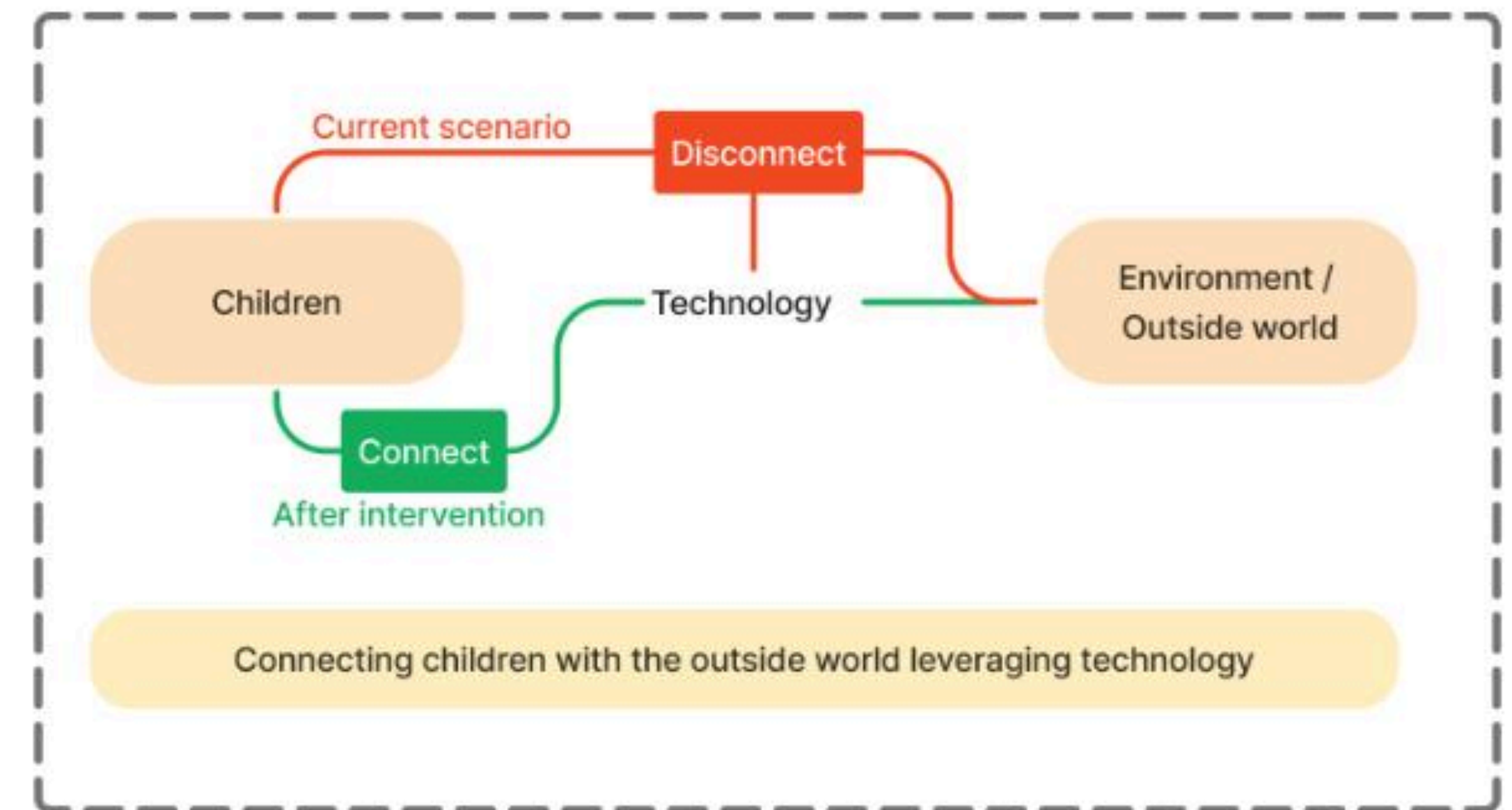
Content Influence:
- Content consumed by children on digital devices was found to influence their worldview and preferences.

- The study indicated a need for awareness about age-appropriate content and parental controls.

Primary Research

Conclusion:

The primary research, combining qualitative and quantitative analyses, highlights the complex interplay between digital gadget usage, the disconnect from the natural environment, and its multifaceted impact on 27 children aged 4 to 6 years. The findings emphasise the importance of fostering a balanced approach to technology use in early childhood, considering the implications on social skills, outdoor activities, and overall health.

Ideation Stage 1

AR integrated application which helps in understanding the nature

Idea:
Using AR to scan through leaves, stones, textures, etc in the environment and tell more about each element.

Limitations:
- Adds on to the screen time
- Restricts involvement of senses
- Requires constant availability of a device
- Limits cognitive development

Status:
Rejected

Ideation Stage 2

Exploring concepts (here water cycle) taught in the school through direct observation in the nature.

Idea:
Building of terrariums through strolls in the nature accompanied by parents/guardians, and collecting soil, tree bark, plants, etc. Observing the small ecosystem and learning about water cycle through processes like evaporation, precipitation and condensation.

Limitations:
- Constant need of adult supervision
- Time consuming
- Resource extensive
- Monetary limitations
- Limited design intervention
- Meticulous maintenance
- Not suitable for 4-5 years kids

Status:
Rejected

Ideation Stage 3

An overlay application for children which limits screen time and fosters connection with the natural environment through fun, learning activities.

Idea:
In child mode, an overlay over the active screen after 15 minutes, displaying a task. completion of the task requires observing the surrounding and environment.
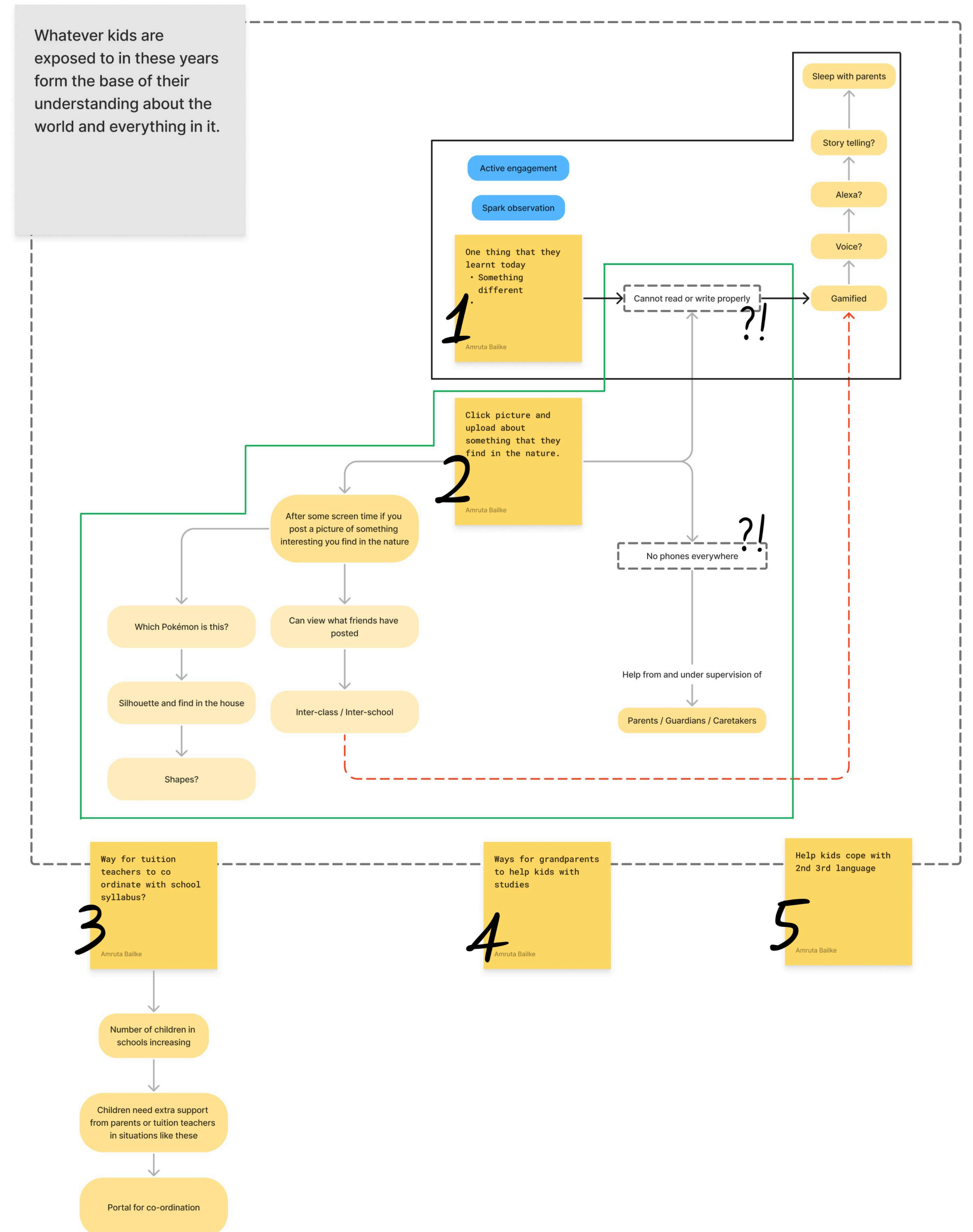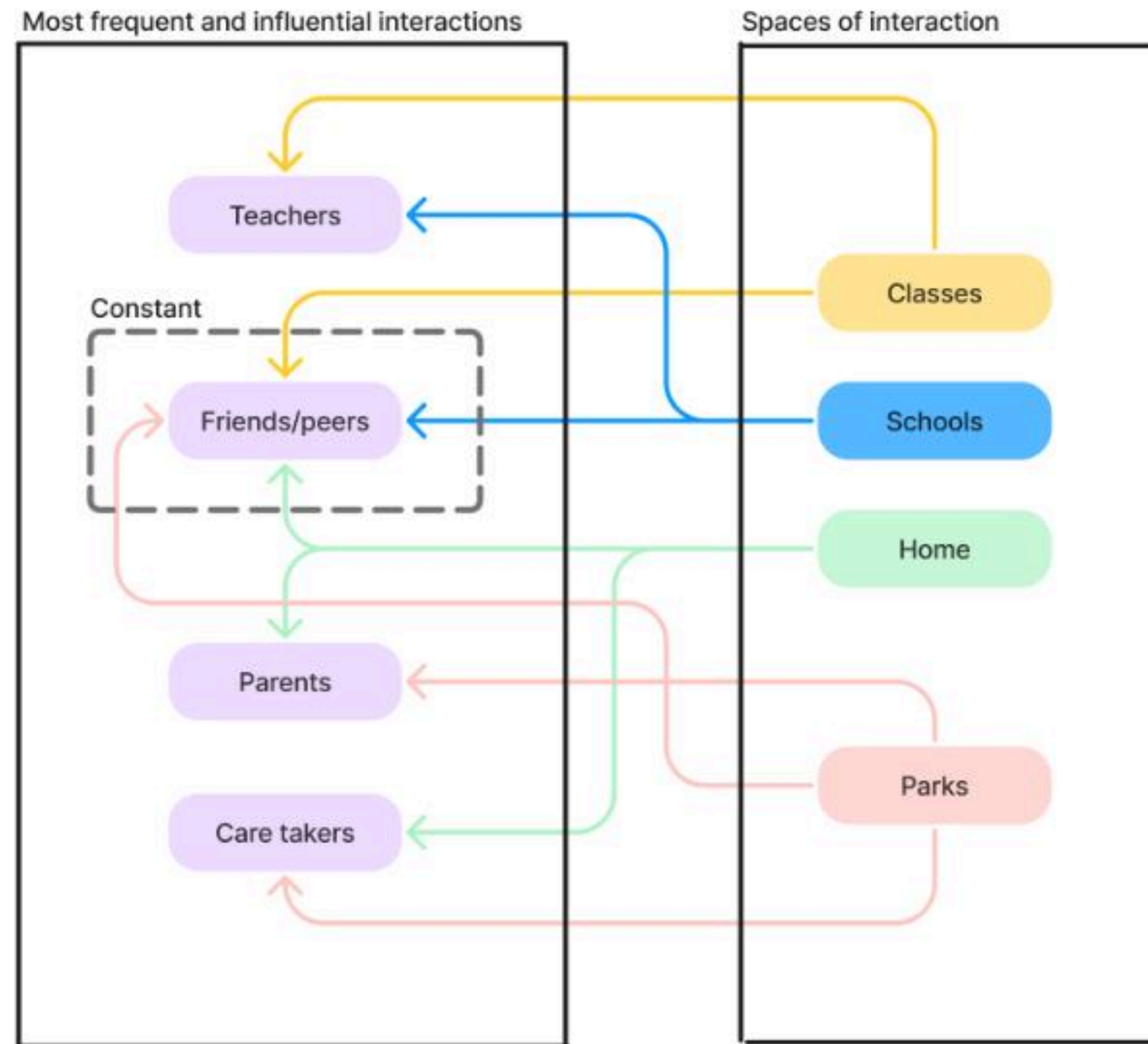Post completion of the task, another 15 mins of screen time gets activated.

Task eg: Collect 5 different types of dried leaves from your balcony or society garden.

Status:
Accepted and further explored.
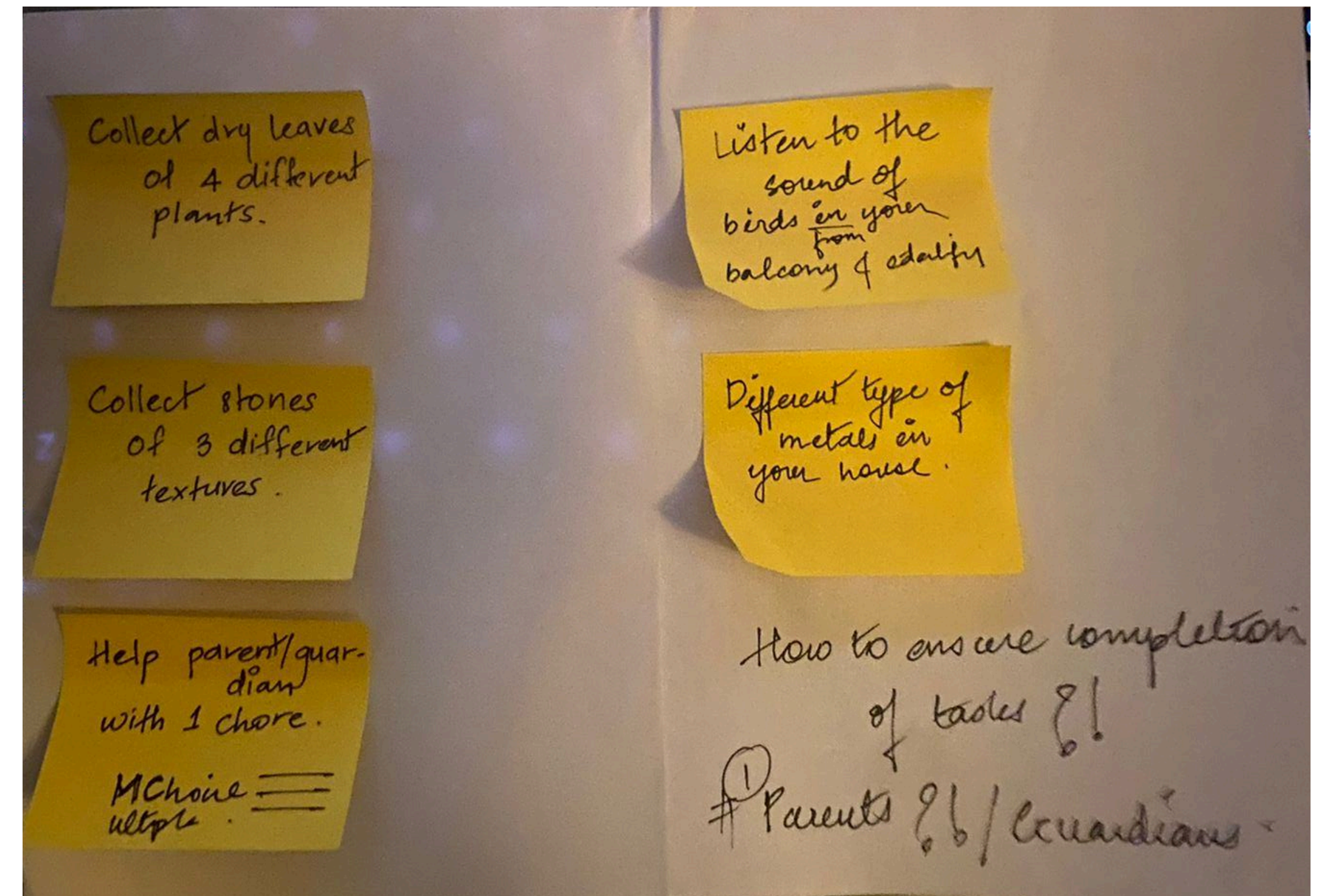
Idea Exploration

Building upon idea

Most frequent and influential interactions

- Teachers
- Friends/peers
- Constant
- Parents
- Care takers

Spaces of interaction

- Classes
- Schools
- Home
- Parks

Whatever kids are exposed to in these years form the base of their understanding about the world and everything in it.

- Active engagement
- Spark observation

1 One thing that they learnt today
- Something different
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Cannot read or write properly ?!

- Sleep with parents
- Story telling?
- Alexa?
- Voice?
- Gamified

2 Click picture and upload about something that they find in the nature.
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After some screen time if you post a picture of something interesting you find in the nature

No phones everywhere ?!

Which Pokémon is this?

Can view what friends have posted

Help from and under supervision of

Silhouette and find in the house

Inter-class / Inter-school

Parents / Guardians / Caretakers

Shapes?

3 Way for tuition teachers to co ordinate with school syllabus?
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4 Ways for grandparents to help kids with studies
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5 Help kids cope with 2nd 3rd language
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Number of children in schools increasing

Children need extra support from parents or tuition teachers in situations like these

Portal for co-ordination

Idea Exploration

Pilot
Objective:
To gauge the responses from parents and children towards such a setup

Idea Exploration

Observations from pilot
- Quickly wanted to finish the tasks and get back to the phone
- Got frustrated on not being able to complete the tasks
- Short tasks - easily convinced to do
- Longer tasks - Frowning
- Parents guardians support and ready to help

Design considerations post pilot
- Mechanism to ensure completion of tasks
- Formulating tasks with gradual increase in involvement of time
- Categorising tasks based on the schedule and location of the child
- Shared device management
- Safety
- Leaderboard and collaboration with peers
- Collaborative activities

Prototyping

Task designing:

- Gradual increase in the duration and involvement of the tasks.
- Starting with short tasks.
- Triggering involvement of various senses
- Fun and learning
- Involvement of peers
- Collaborative tasks
- Gamified interaction for engagement and excitement in children

Prototyping

Leaf Collector Adventure:
Task: Collect leaves from five different trees or plants. Observe the color, size, and shape of each leaf. Bonus points for identifying the trees they come from.

Texture Detective:
Task: Find three different textures in nature, such as rough bark, smooth stones, or soft moss. Close your eyes and feel each texture, then describe it to a friend or family member.

Colorful Rainbow Hunt:
Task: Search for natural items in the colors of the rainbow. Find something red, orange, yellow, green, blue, indigo, and violet. Arrange them in rainbow order.

Bird Watcher Challenge:
Task: Observe the birds around you. Identify and note down three different bird species. Try to imitate their calls or movements.

Scavenger Hunt for Sounds:
Task: Close your eyes and listen carefully. Identify five different sounds from nature, such as birds chirping, leaves rustling, or water flowing.

Rock Art Creations:
Task: Collect five interesting rocks. Use them to create a nature-inspired art piece. Arrange them in a pattern or paint them with vibrant colors.

Shadow Shapes:
Task: Choose a sunny day. Find a flat surface and observe the shadows cast by different objects. Try to make shapes or animals using the shadows.

Budding Botanist Challenge:
Task: Identify and collect parts of plants. Find a flower, a leaf, a stem, and a seed. Examine each part closely and learn about its function.

Prototyping

Cloud Watcher's Diary:
Task: Lie on your back and look up at the sky. Identify and sketch three different cloud shapes. Write a short story about what each cloud shape reminds you of.

Nature's Perfume Maker:
Task: Find three different flowers. Smell each one and describe the scent. Pretend to be a perfume maker and name your floral creations.
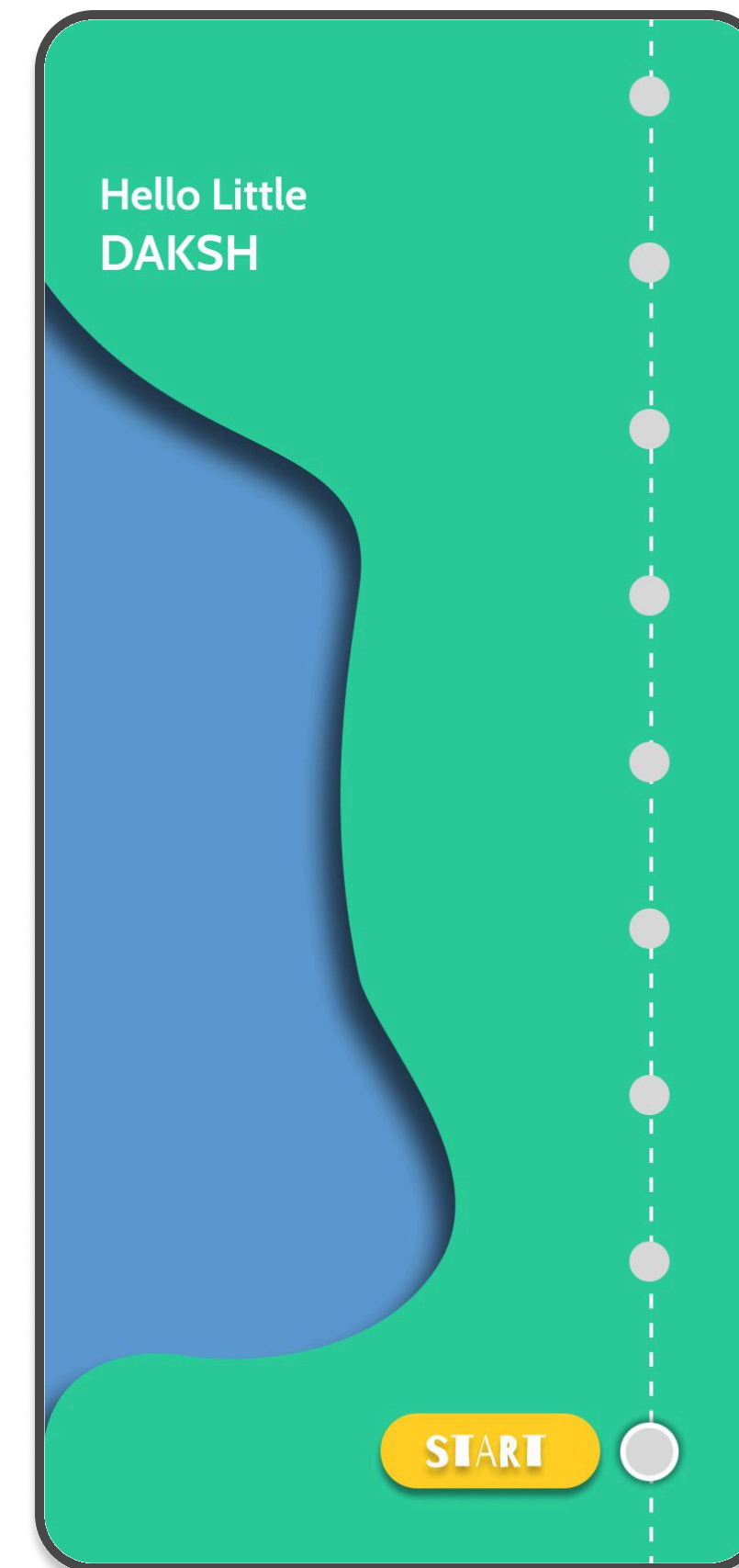
Prototyping
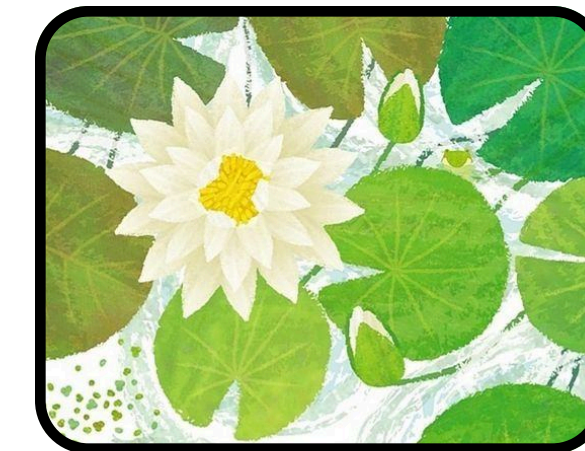
First overlay

Design considerations:
- Personalised profile of the child giving the impression of talking with them.
- Poppy playful color scheme.
- With each task completion, interesting elements added into the screen to spike curiosity and keep engagement. Eg: Leaves added to the pond after completion of the first task. Fishes added after the second task.

Link to working prototype:

https://www.figma.com/proto/oQHY9dH5TIExr6ezoKiORW/P2?
type=design&node-id=131-186&t=MNtA1Ymxrf3RdI3j-1&scaling=contain&page-
id=112%3A2&starting-point-node-id=131%3A186&mode=design

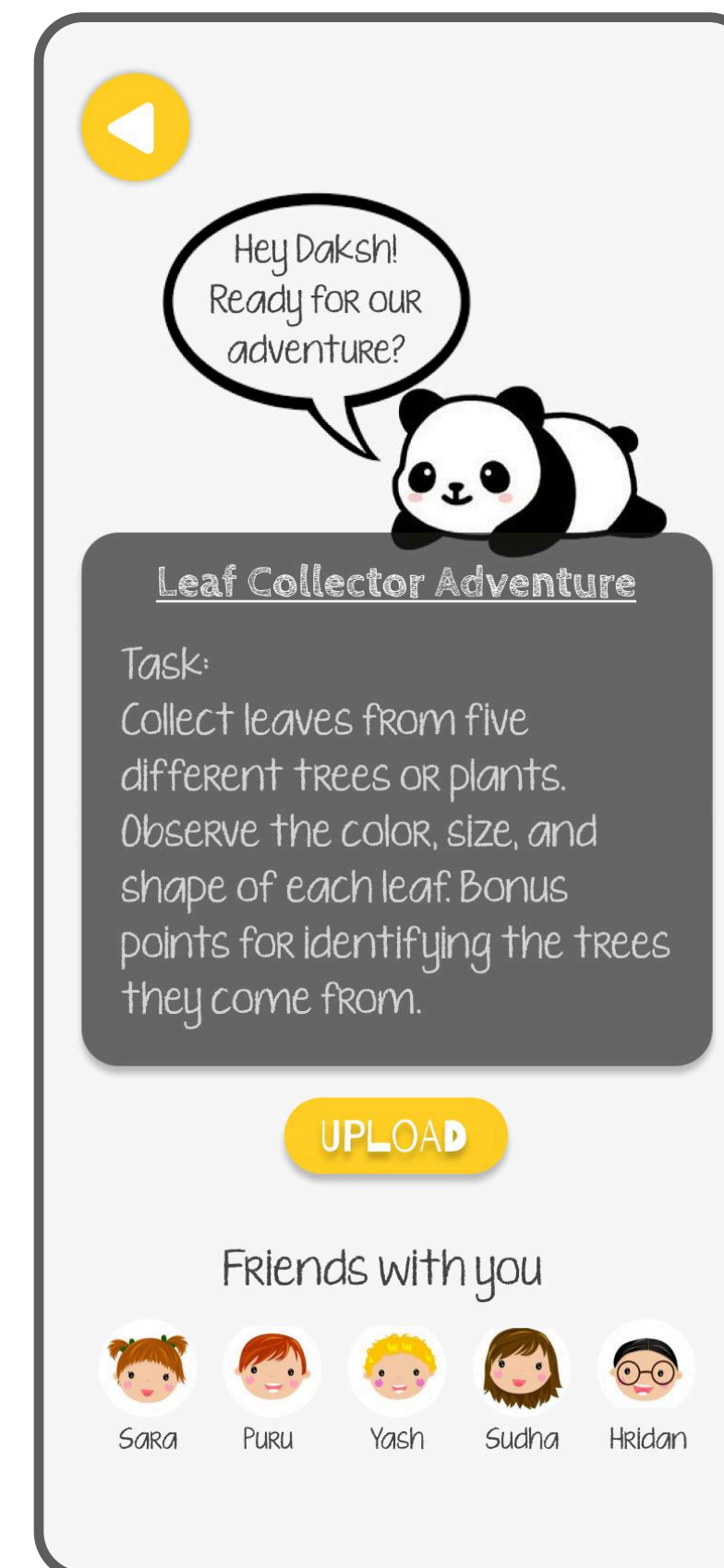**Addition of elements on completion of tasks**

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Prototyping

Task reveal
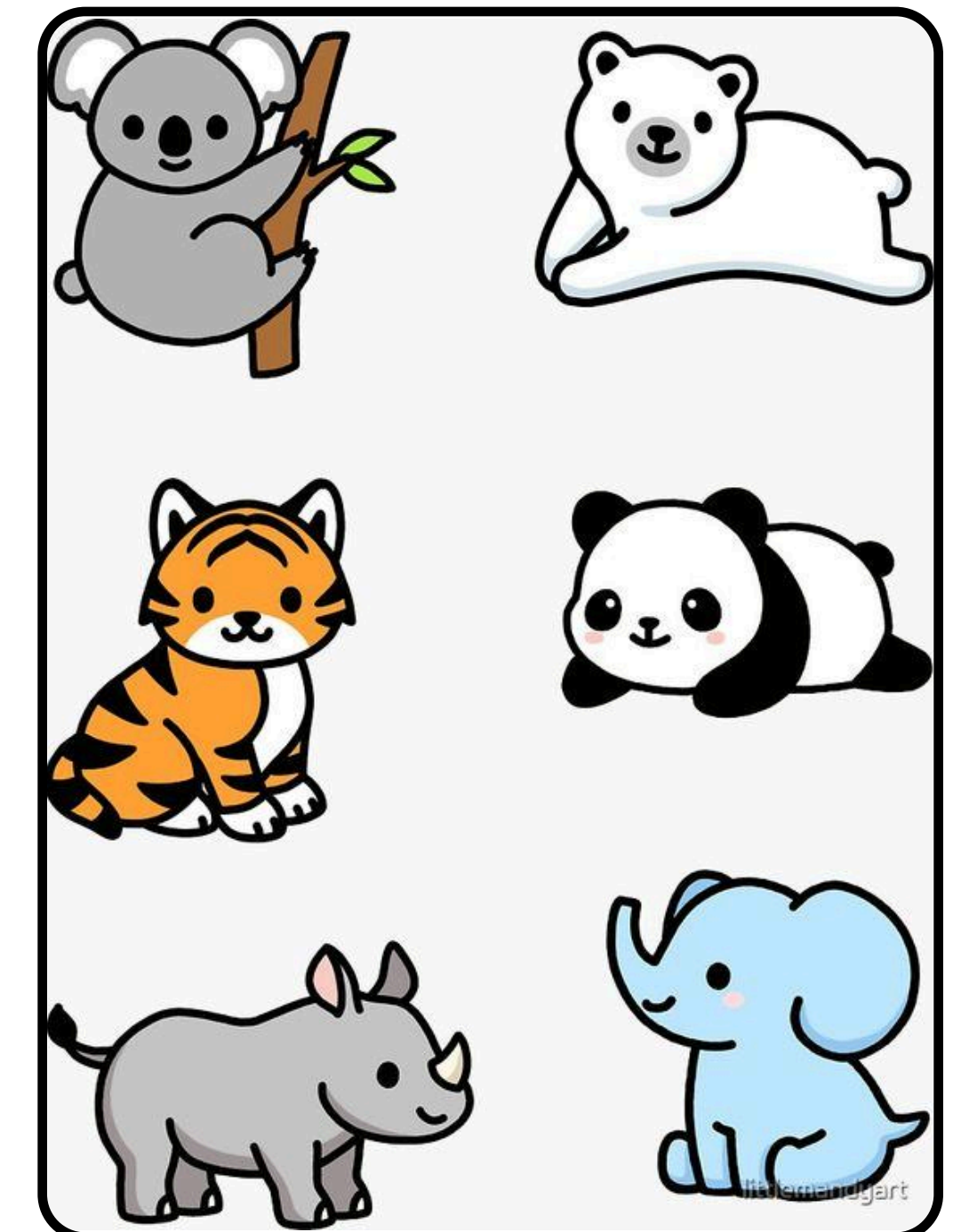
Design considerations
- Changing mascot for interaction with personalised messages
- Fun fonts to maintain engagement and interest
- Peer for motivation and healthy competition
- Minimal content to avoid distraction
- Game like word play

Link to working prototype:

https://www.figma.com/proto/oQHY9dH5TIExr6ezoKiORW/P2?
type=design&node-id=131-186&t=MNtA1Ymxrf3RdI3j-1&scaling=contain&page-
id=112%3A2&starting-point-node-id=131%3A186&mode=design

Changing mascots

Insights

Behavioural Changes:
Increased Curiosity:
The project observed a notable increase in children's curiosity as they engaged in nature exploration tasks. The hands-on experiences triggered a desire to learn more about the environment, fostering a sense of wonder and inquisitiveness.

Improved Observation Skills:
Children exhibited enhanced observation skills, paying attention to details in leaves, textures, and sounds. This development in observational abilities is crucial for cognitive growth.

Importance of Nature in Child Growth:
Holistic Development:
Engagement with nature positively correlated with holistic child development. The project highlighted that exposure to nature plays a vital role in fostering physical, cognitive, and emotional well-being.

Creativity and Imagination:
Nature exploration tasks stimulated creativity and imagination in children. Activities like rock art and cloud watching encouraged them to express themselves artistically and think imaginatively.

Insights

Parenting Awareness:
Increased Awareness of Child's Interests:
Parents became more aware of their child's interests and inclinations through the project. Understanding the activities that captivate their child's attention in nature facilitated better parent-child communication.

Importance of Outdoor Activities:
The project underscored the significance of outdoor activities in a child's routine. Parents became more conscious of incorporating nature-based tasks into their child's daily life.

Environmental Stewardship:
Early Environmental Awareness:
Children participating in the project showed signs of developing an early environmental awareness. Through tasks like plant part identification and bird watching, they began to understand the interconnectedness of living beings in the ecosystem.

Fostering a Sense of Responsibility:
The nature exploration tasks contributed to instilling a sense of responsibility towards the environment. Children expressed a desire to take care of plants and animals, showcasing early signs of environmental stewardship.

Insights

Positive Behavioral Outcomes:
Reduced Screen Time:
The project had a positive impact on reducing screen time. Children, engrossed in nature activities, naturally spent less time on electronic devices, contributing to a healthier balance between screen-based and outdoor activities.

Enhanced Social Skills:
Collaborative tasks, such as scavenger hunts, encouraged teamwork and social interaction among children. Improved social skills were observed as they engaged in discussions about their discoveries.

Emotional Well-being:
Increased Happiness and Satisfaction:
Children reported increased feelings of happiness and satisfaction after completing nature tasks. The connection with nature positively influenced their emotional well-being.

In conclusion, the Project demonstrated that fostering a connection with nature contributes significantly to behavioural changes, holistic child development, and heightened parenting awareness. The insights emphasise the importance of integrating nature-based activities into a child's routine to nurture their curiosity, creativity, and environmental consciousness from an early age.