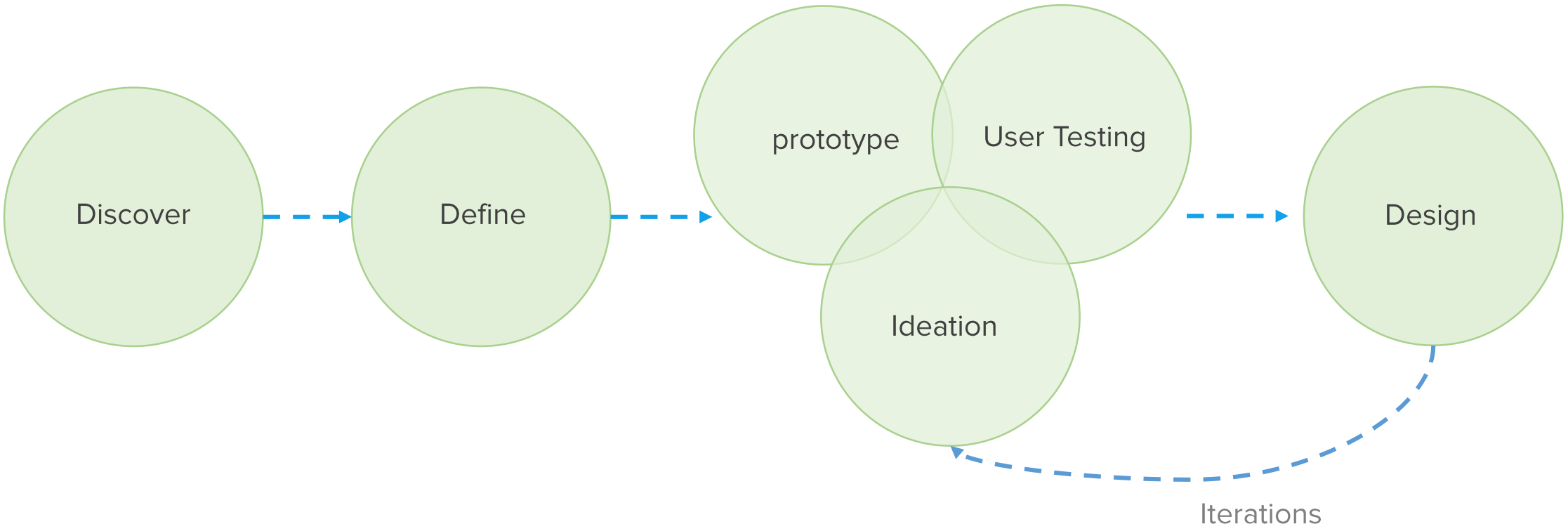
Learning aid for dyslexic children

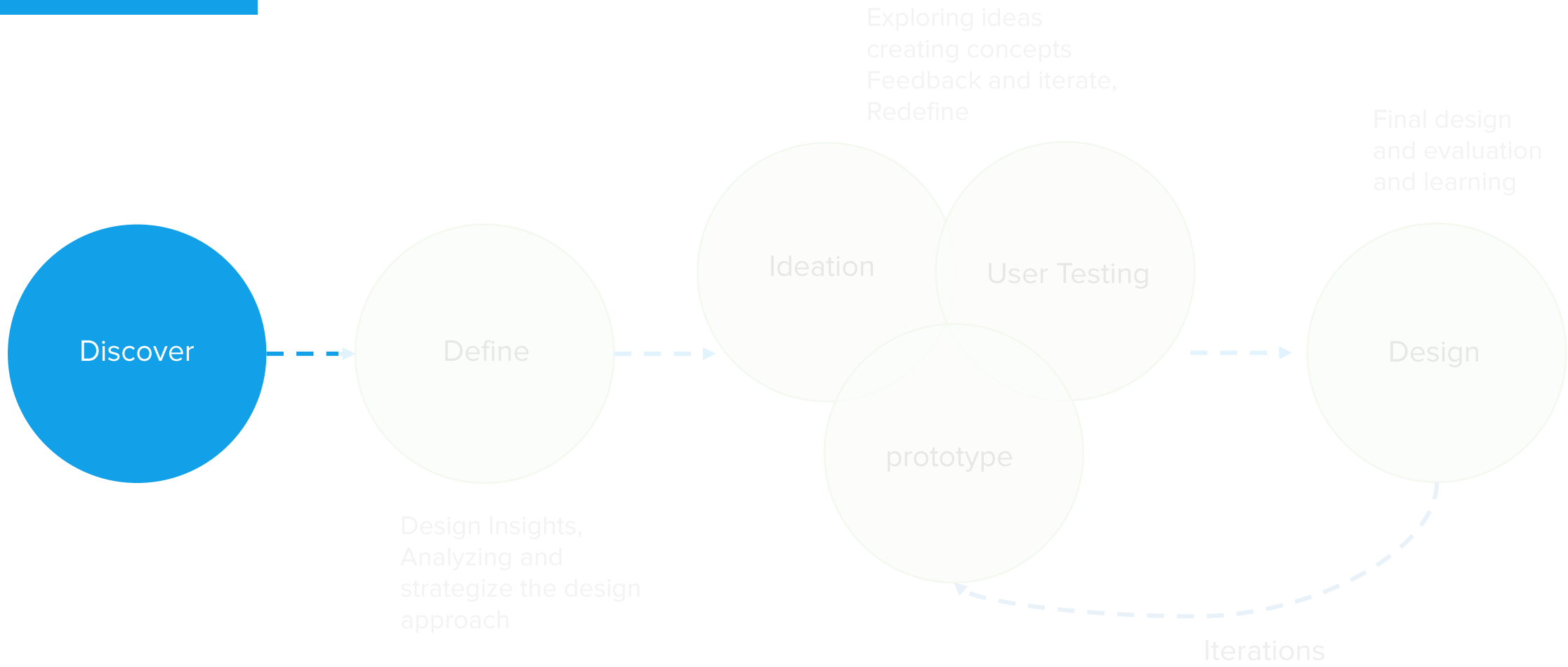
Guided By : Prof. Ravi Poovaiah

Naveen Singh Rawat
146330011 | Sr. Interaction

Design Process



Design Process



Discover

Understanding dyslexia, the dyslexic, perceptions and user research

Studies

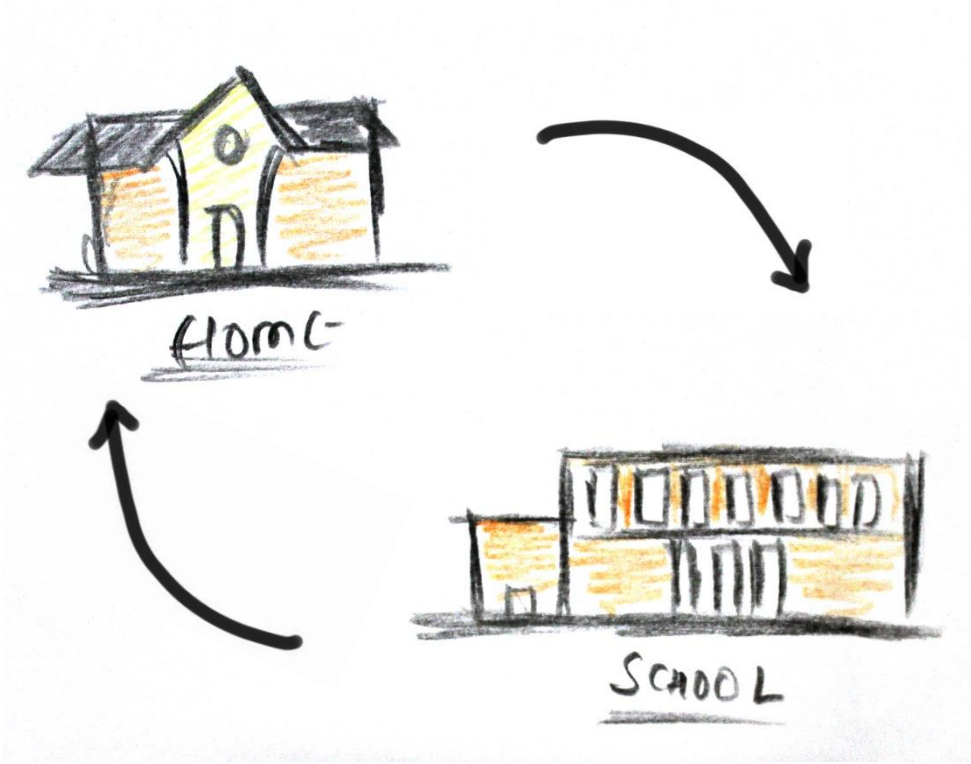
Observation

User Interviews

- **Acute difficulty in decoding/reading** the written word. People suffering from dyslexia are also often unable to comprehend what they just read.
- Language based (no problem with vision)- Difficulty in understanding and processing letter patterns and make words with them.
- Dyslexia is a neurological disorder, often with genetic origins.
- **Its common, 10% to 15%** of the world population is dyslexic. Of people with poor reading skills 70-80% are dyslexic

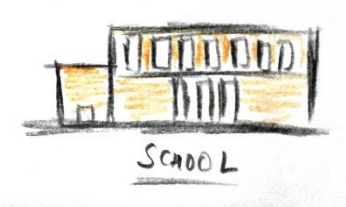
- Several success stories.
- Visually strong , primary thinking is visual.
- Good experiential memory.
- More curious then average
- Holistic thinking, sees the big picture.

One Day in the life of a dyslexic kid


HOME
SCHOOL

- It is hard for many parents to realize or consider dyslexia as a simple learning disability.
- The kids start feeling insecure about their own ability and loose further interest in studies.

Complaints | Discouragements | Compared with others | Parents not able to teach



- They find it very hard to keep up with other kids. Feels secluded.
- Teachers won't be able to give individual attention and also they are not keen on listening.

Secluded | Lags academically | Instructions not clear | Complaints to parents | Doesn't speaks up | Performance gap

Psychological

Academic

Psychological

Academic

- Lack of confidence & self-esteem.
- Anxiety
- Feeling that they will be ‘found out’ and not considered good enough.

Psychological

Academic

- **Reading/Decoding**
- **Comprehension**
- Spelling / Encoding
- **Retention**
- Slow, untidy writing , taking note while instruction
- Organizational problem

Decoding

Comprehension

Retention

Decoding | Comprehension | Retention

- Difficulties with new words/word finding/ pronunciation. Transitioning sounds into words.
- Difficulty in manipulating letters.
- Reading fluently

Decoding | **Comprehension** | Retention

- Difficulties processing text and deriving meaning from words.
- Confusion about the meaning of words and sentences.
- Lack of concentration during reading

Decoding | Comprehension | **Retention**

- Quickly forgetting how to spell what was learnt.
- Trouble remembering or summarizing what is read

Hypothesis

- Dyslexics will learn better if the instructions are tailored for their key issues.
- Dyslexics tend to be good in experiential memory, focusing on reinforcing what was learnt might lead to better retention.
- Technology can provide necessary multi sensorial environment to dyslexics that may lead to better learning outcomes.

- Multiple professional interviewed across private and government organization.
- Teaching sessions were attended and observed.
- Three separate stages were executed.
- Goals : To get deeper first hand understanding of teaching methods, ways of instruction and problems.

- Follow a structured approach in learning instruction
- Approach to reduce time taken to bring child to grade level reading level.
- Focus on primary learning grades as they are the right time to intervene.
- Avenue to motivate and encourage and get feedback.
- An environment which is interactive and engaging.
- Repeat and review information.

Intervention opportunities

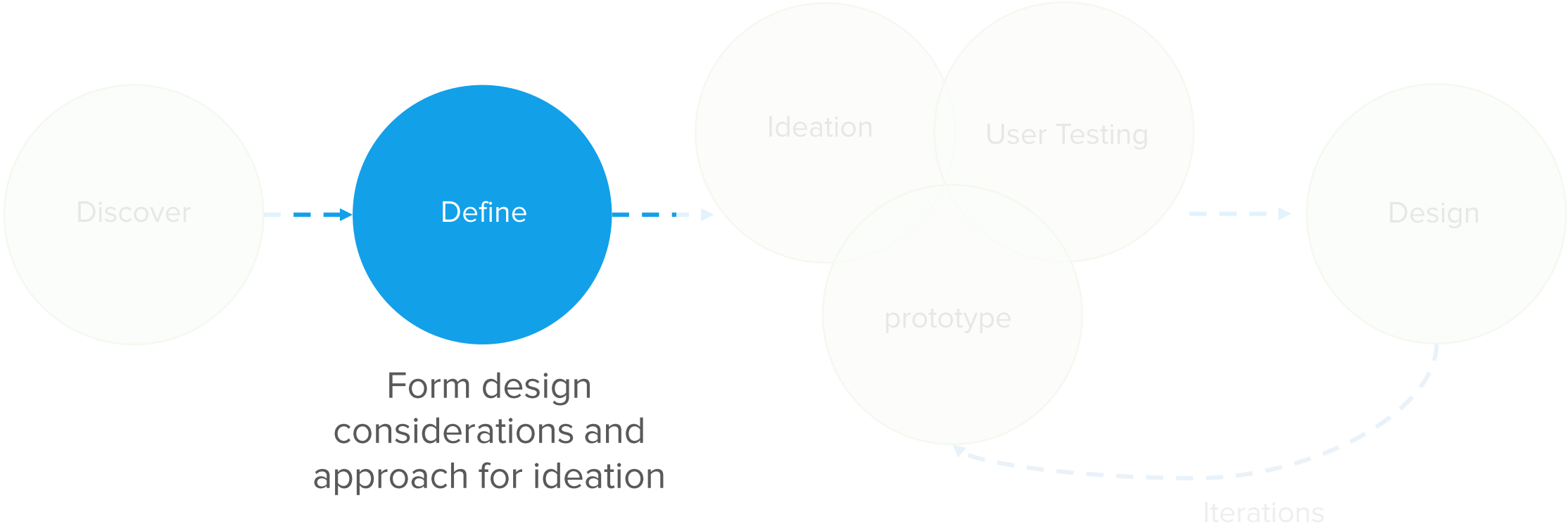
- A digital aid/technology can seamlessly integrate in the learning environment.
- It can provide necessary risk taking, Active learning, and multi-sensory environment many dyslexic learners need.
- Early intervention post assessment will prove most impactful as focusing very early in scholastic life will make dyslexics well equipped with essential tools to make way through academics.
- Wider access. As only few get remedial education , digital aid can help bring more children get dyslexic help.

Intervention opportunities

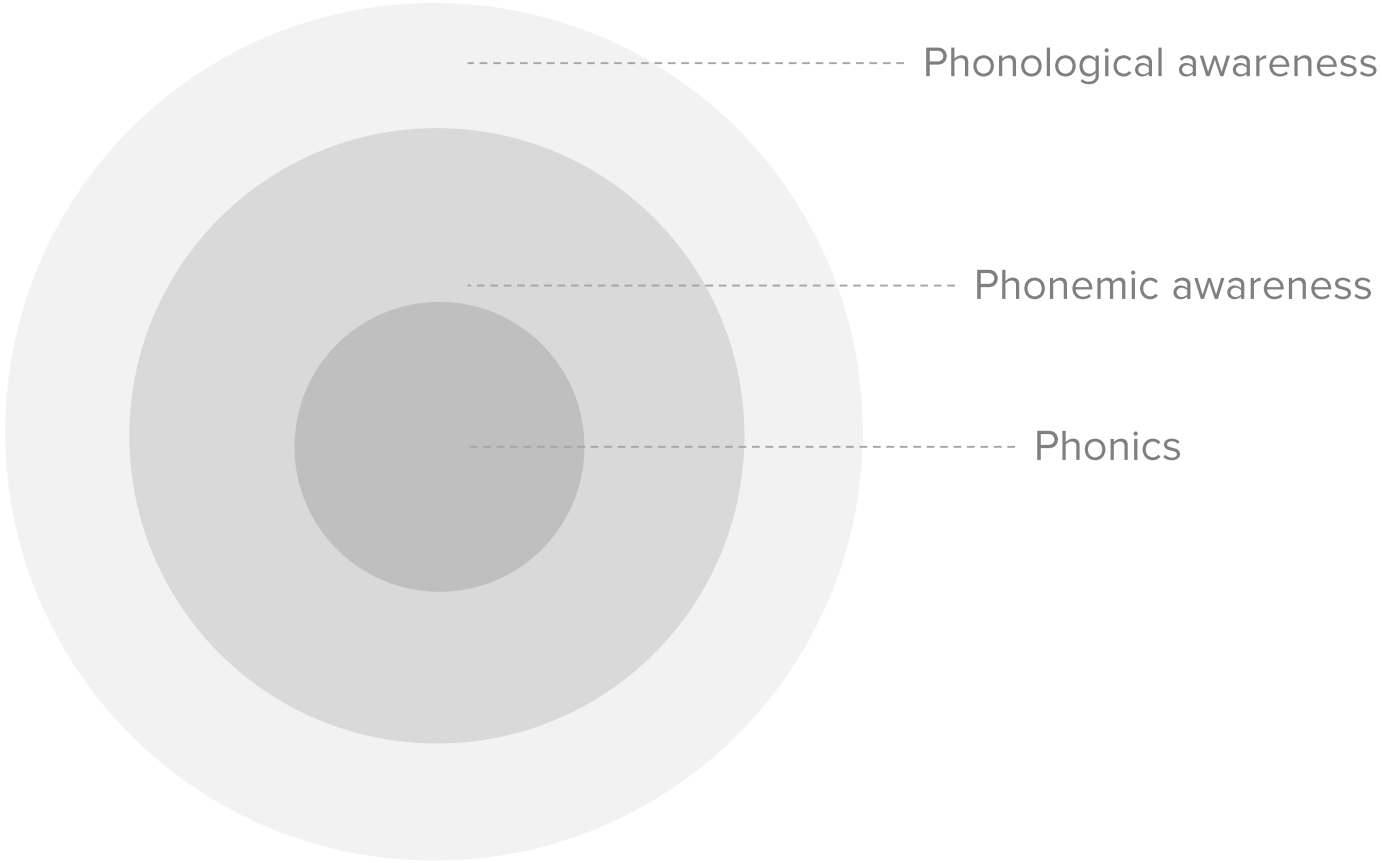
- Rather than just the teacher relaying information while the student absorbs and regurgitates, the teacher will become more of a facilitator as the child will become more active and engaged.

- As dyslexia is spectrum disorder and each one learns differently, lessons can be customized to fit each student's progress and learning style. Such learning tool can provide opportunities to be able to learn at own level and pace.

Design Process



Form design considerations and approach for ideation

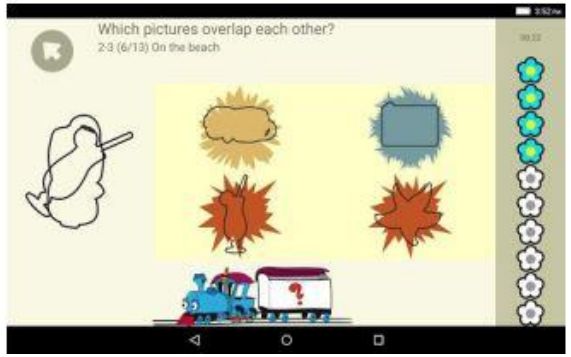

Phonological awareness
Phonemic awareness
Phonics

- Remember – Recognize the sounds and recall.
- Clarifying concept with examples..
- Apply, illustrate information by showing examples.
- Analyze by deconstructing whole in parts.
- Assemble, combine or organize.

	Product	Description
1.	Picture it	Displays words with images.
2.	Tactile letters	Tactile and interactive tool for learning letter sounds
3.	Eyegames	Interactive tool for learning letters sounds by matching same sound or shape.

1

3



2

- Interactive aids in the case studies revealed that technology has had a very strong impact in the way education is consumed and it opens many new dimensions and ways of imparting instructions that were earlier not possible

- Follow a structured approach in learning instruction
- Approach to reduce time taken to bring child to grade level reading level.
- Focus on primary learning grades as they are the right time to intervene.
- Avenue to motivate and encourage and get feedback.
- An environment which is interactive and engaging.
- Repeat and review information.

- Help in Understanding - To better help retain concepts first establish rules
- Room for error – let children commit mistakes and learn from them.
- Reinforcement – Organize content to reinforce learning.
- Provide more help in system which aids in current task.
- Reward and create challenges to provide motivation.

Define

Design Brief and Goals

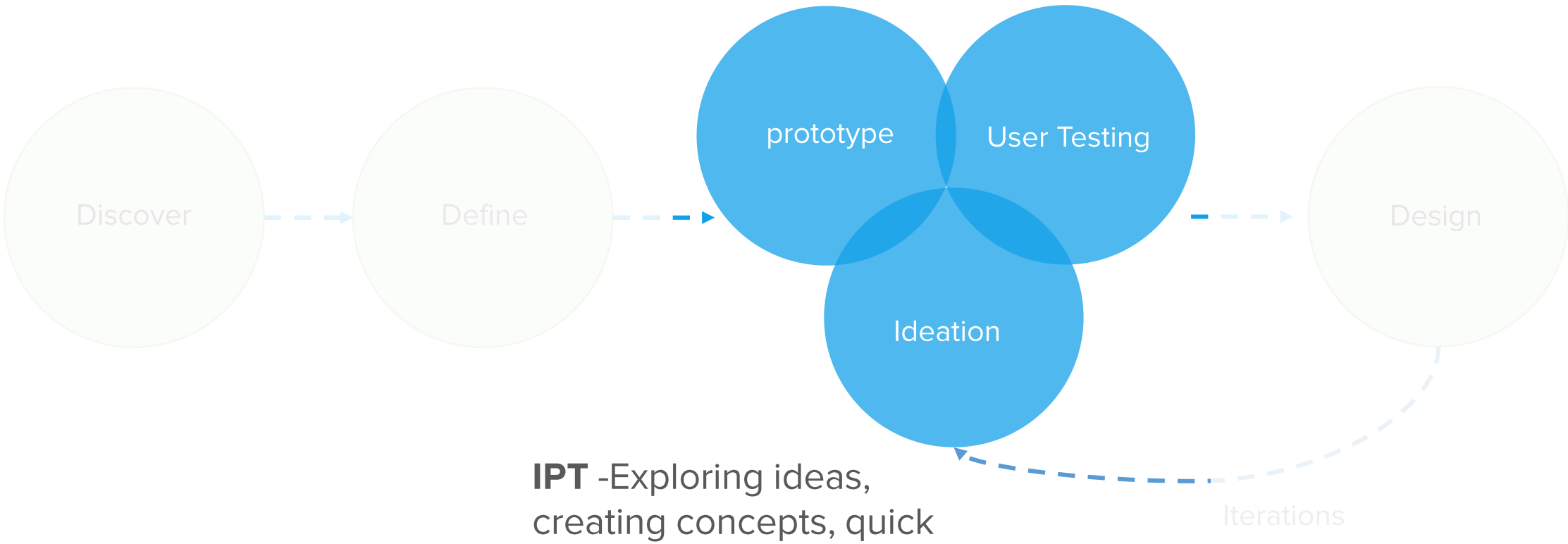
- The main goal is to help dyslexics take initiatives in reading and improve their involvement. The solution will create a play and learn environment that makes children feel comfortable in learning and makes sessions more productive.

- The goal is not to create an alternative to the current teaching method, rather a learning tool as an additional aid to be played around with for conceptual clarity and application in reading.

- Learning goal for target audience age 5-7 years dyslexics to improve their understanding of the alphabetic principle.

Teacher uses song, story and movement to teach sounds of word ‘scarecrow’.

Design Process



IPT -Exploring ideas, creating concepts, quick prototyping, feedback and iterate.

Ideate

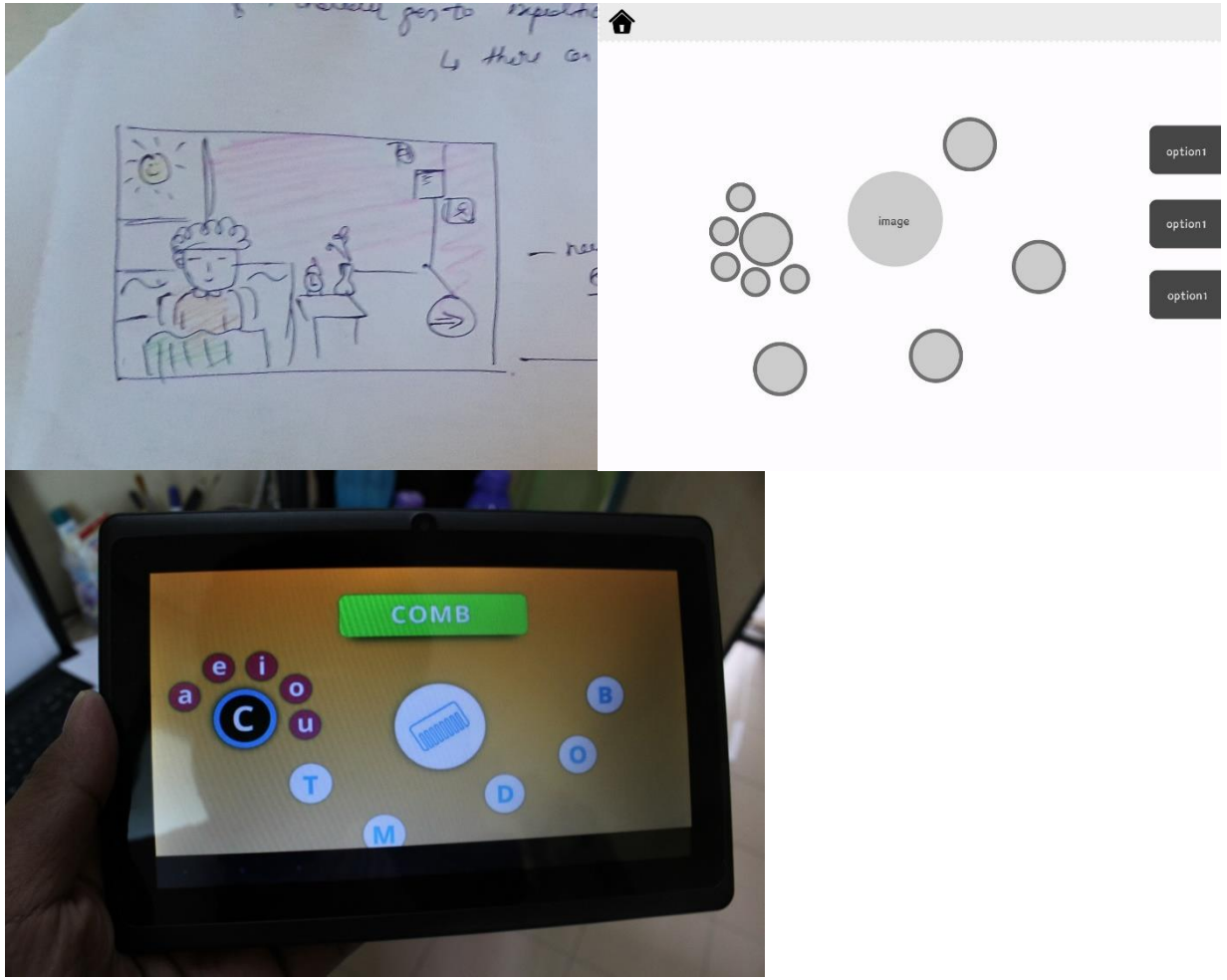
Exploring idea and concepts

- Based on revised design implications I brainstormed ideas in three ways-
  - Exploring without constraints.
  - Refining to suit brief
  - Rapid prototyping (paper, digital) to test concepts with users.
  - Input feedback to produce final design outlines with concept.

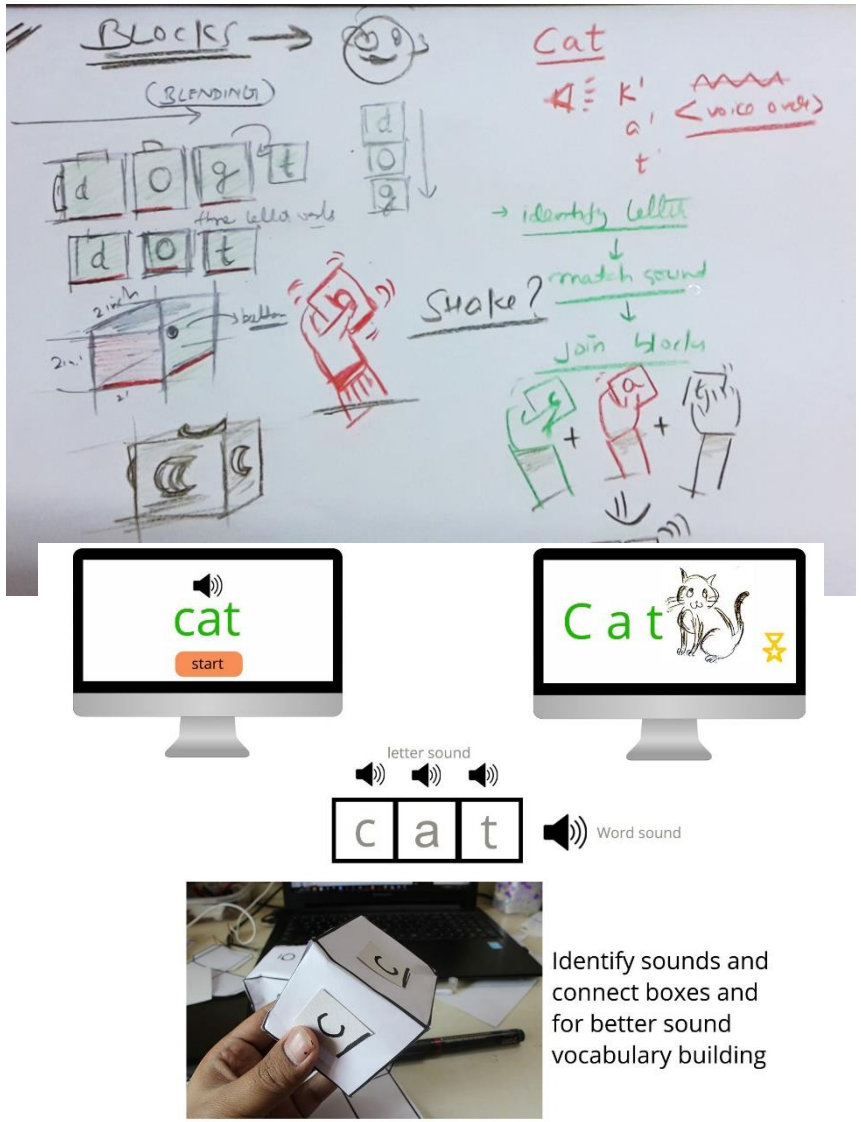
Ideate

Exploring idea and concepts

- Tommy's Day - Learning in kids' environment



- Sound blocks – tactile blocks to be played with an joined to sound out

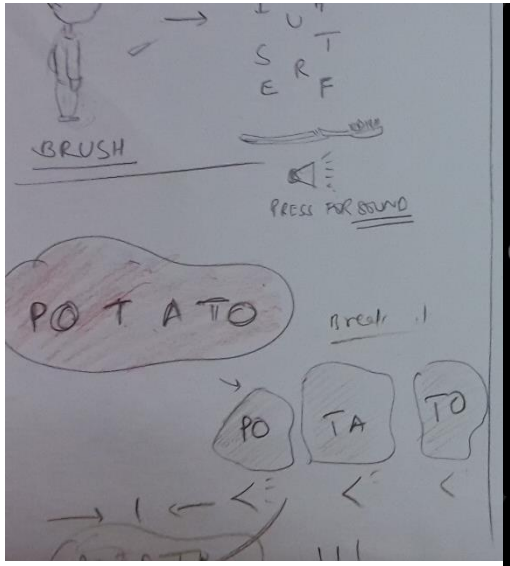


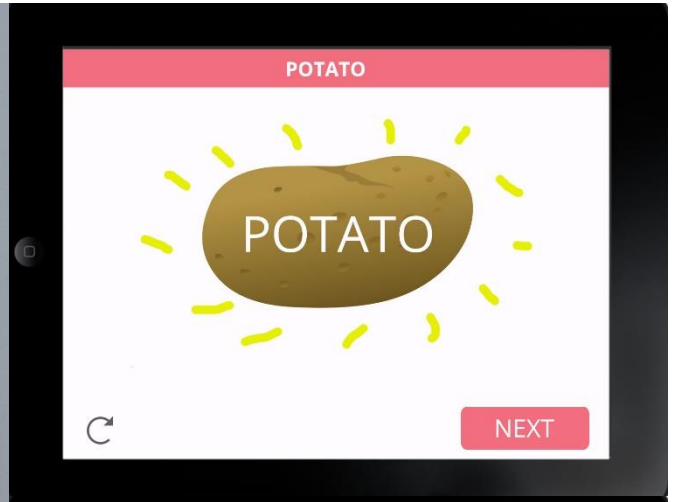
Identify sounds and connect boxes and for better sound vocabulary building

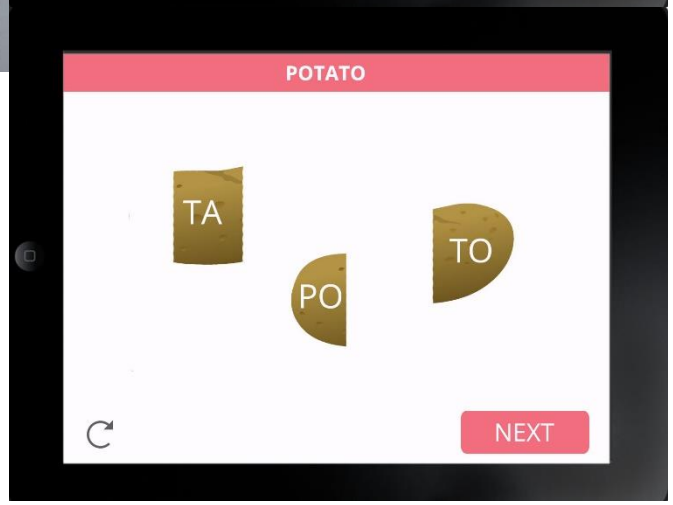
Ideate

Exploring idea and concepts

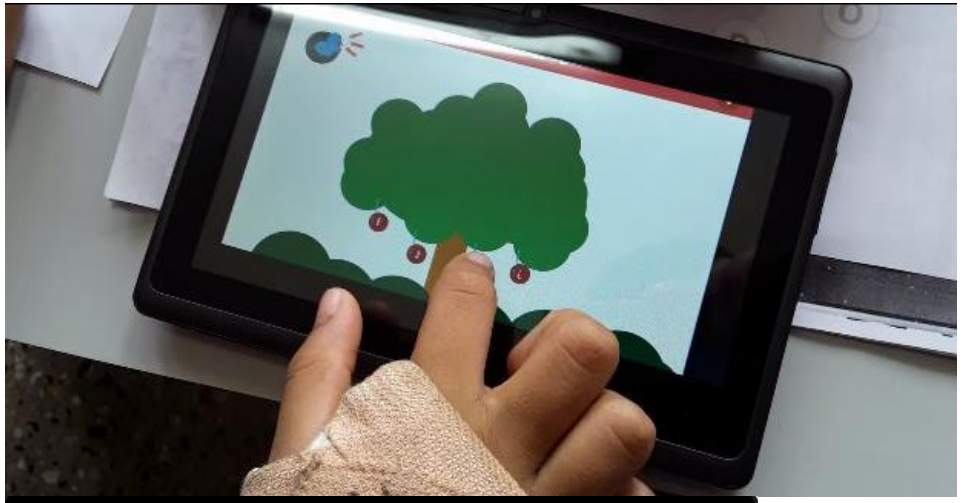
- Triggering Memory with images to learn syllables

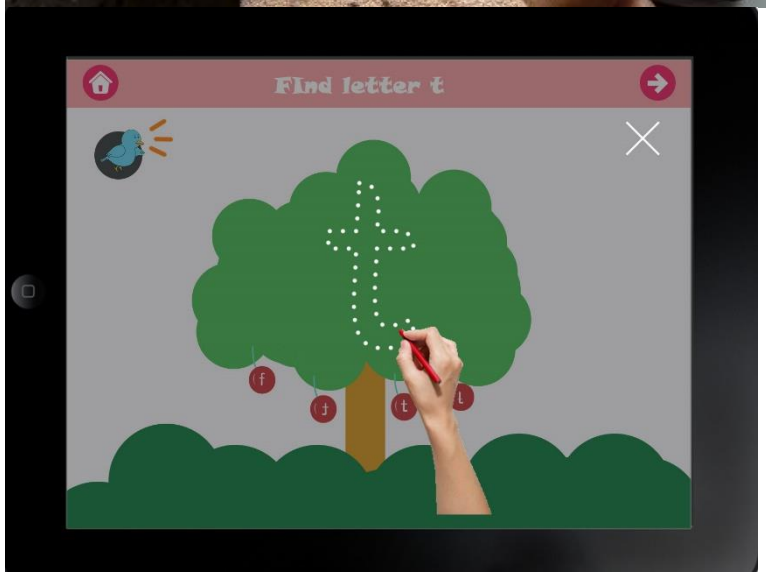






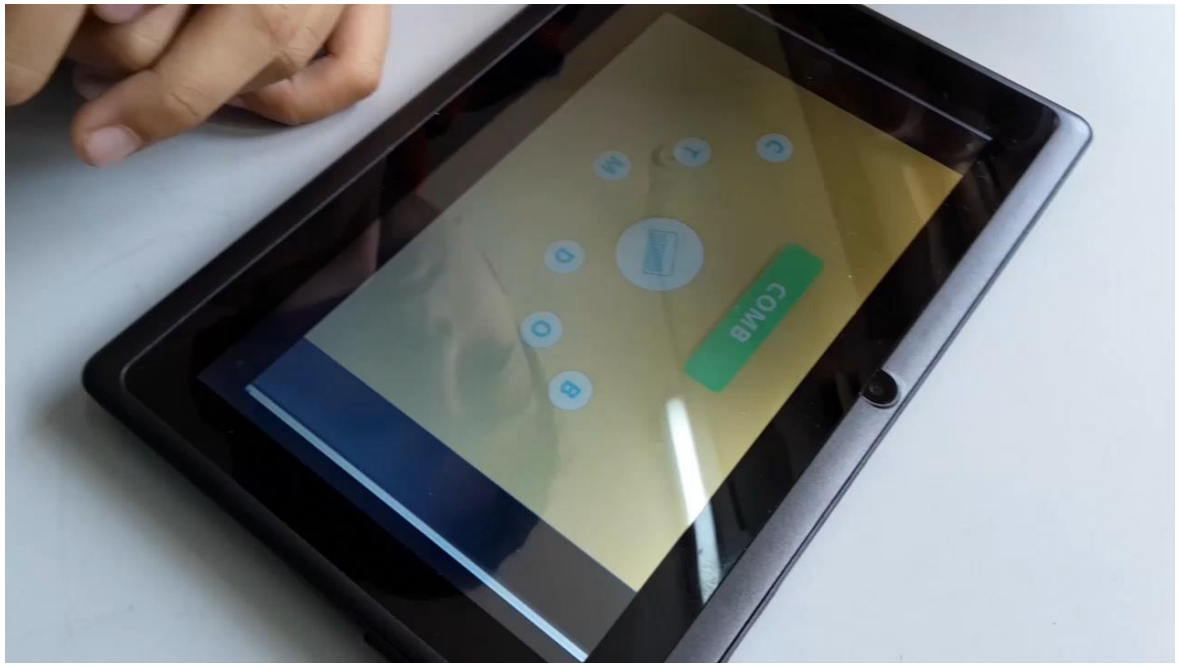
- Introducing interactivity with characters and game play





Ideate

Rapid prototyping to test

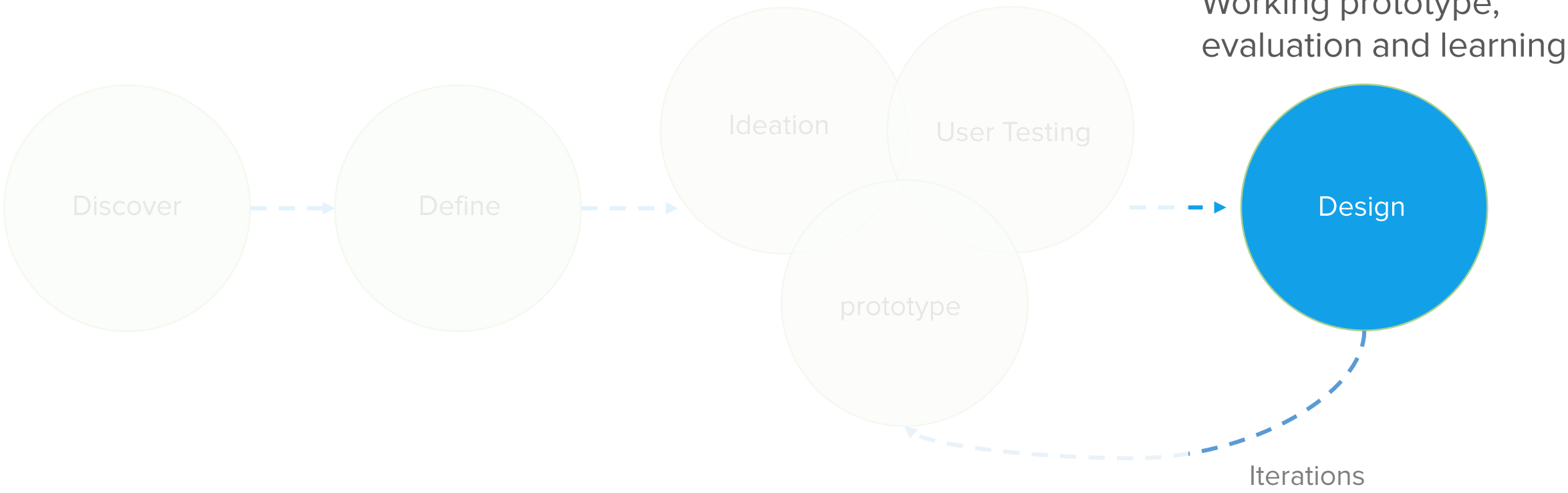


Ideate

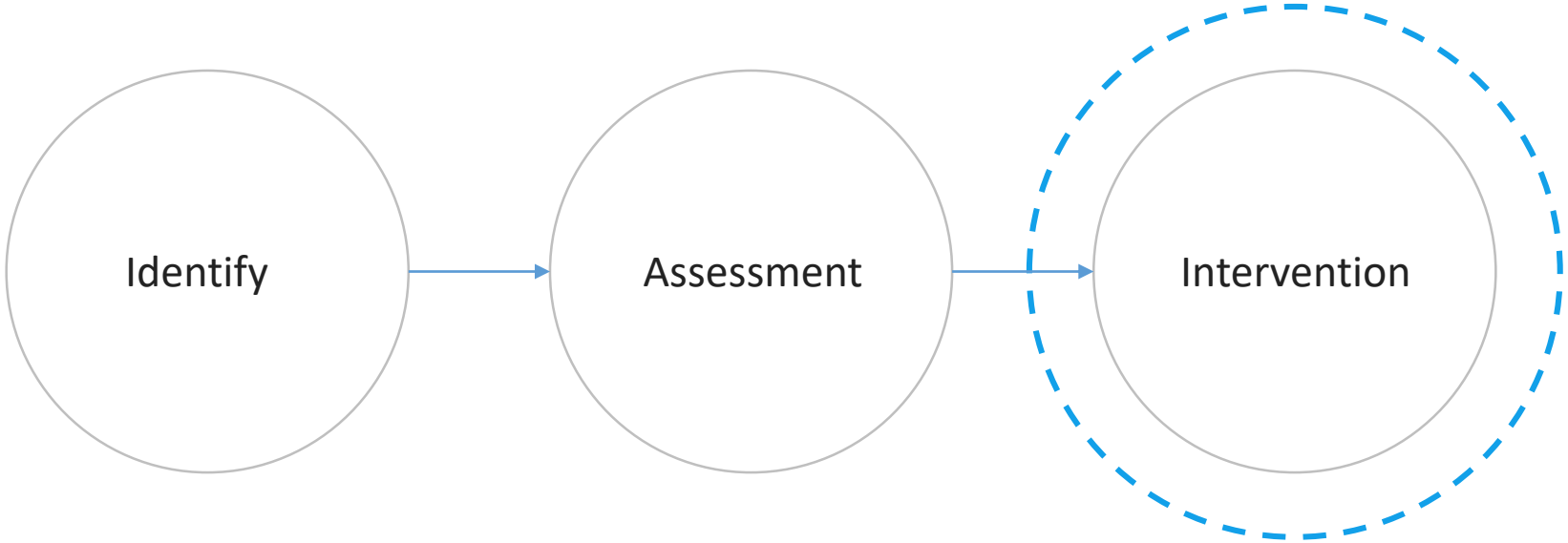
Rapid prototyping to test

Design Process

Final design concept, output, design details, Working prototype, evaluation and learning

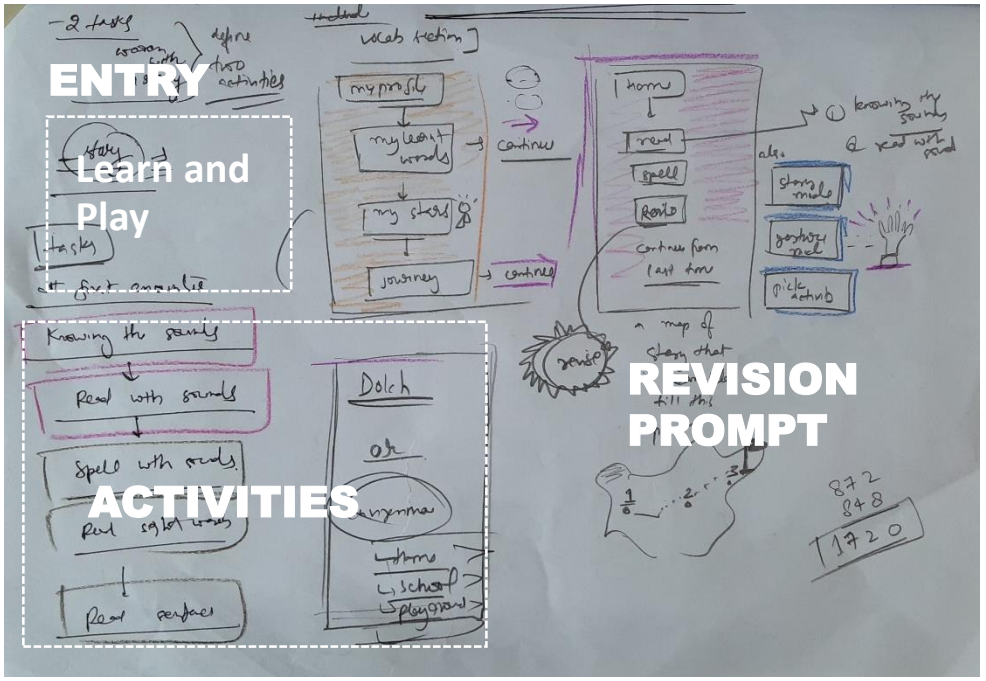


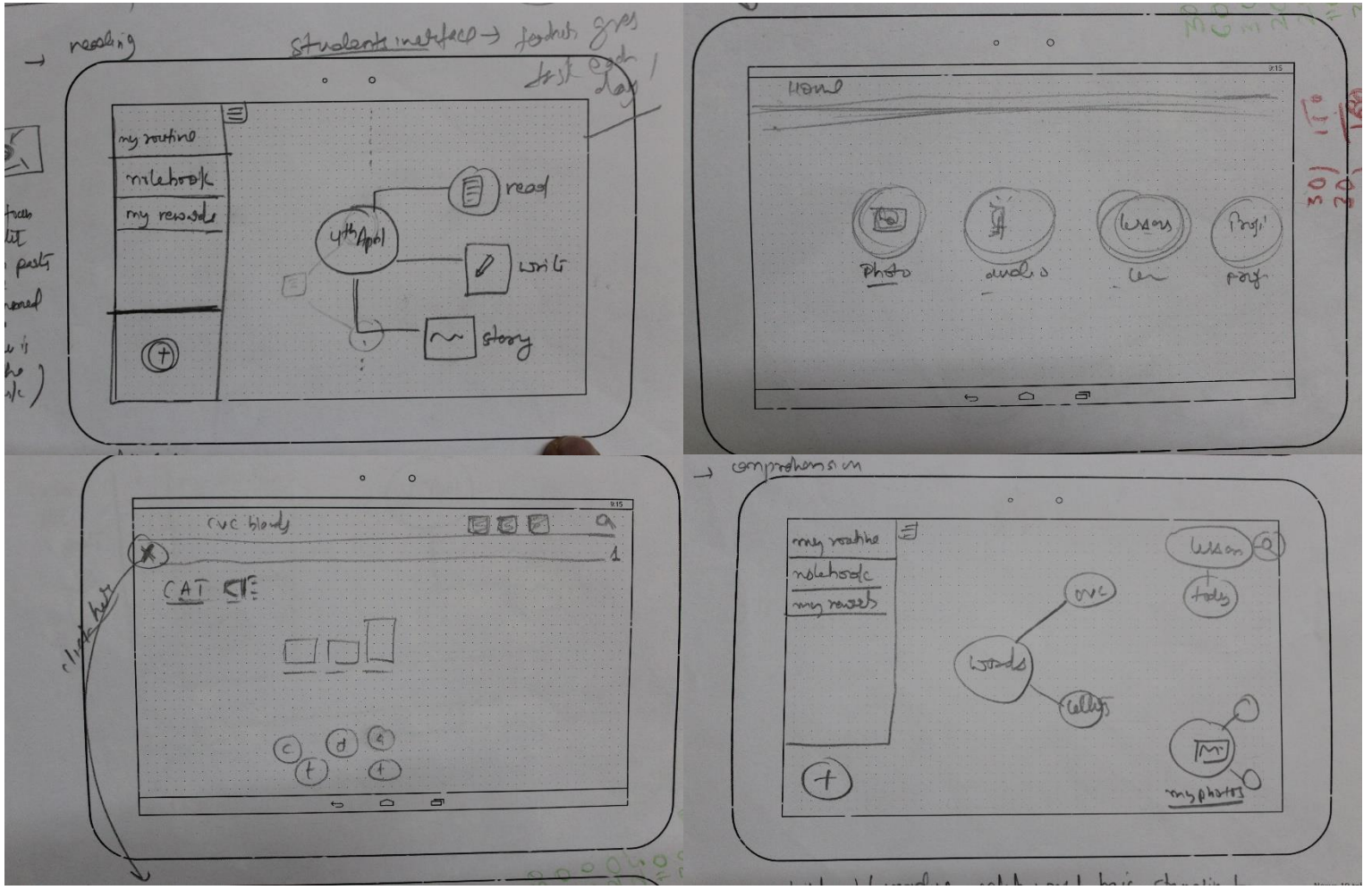
Targeted during early intervention



Design

Final Concept and output





Lexo – learning aid for dyslexics

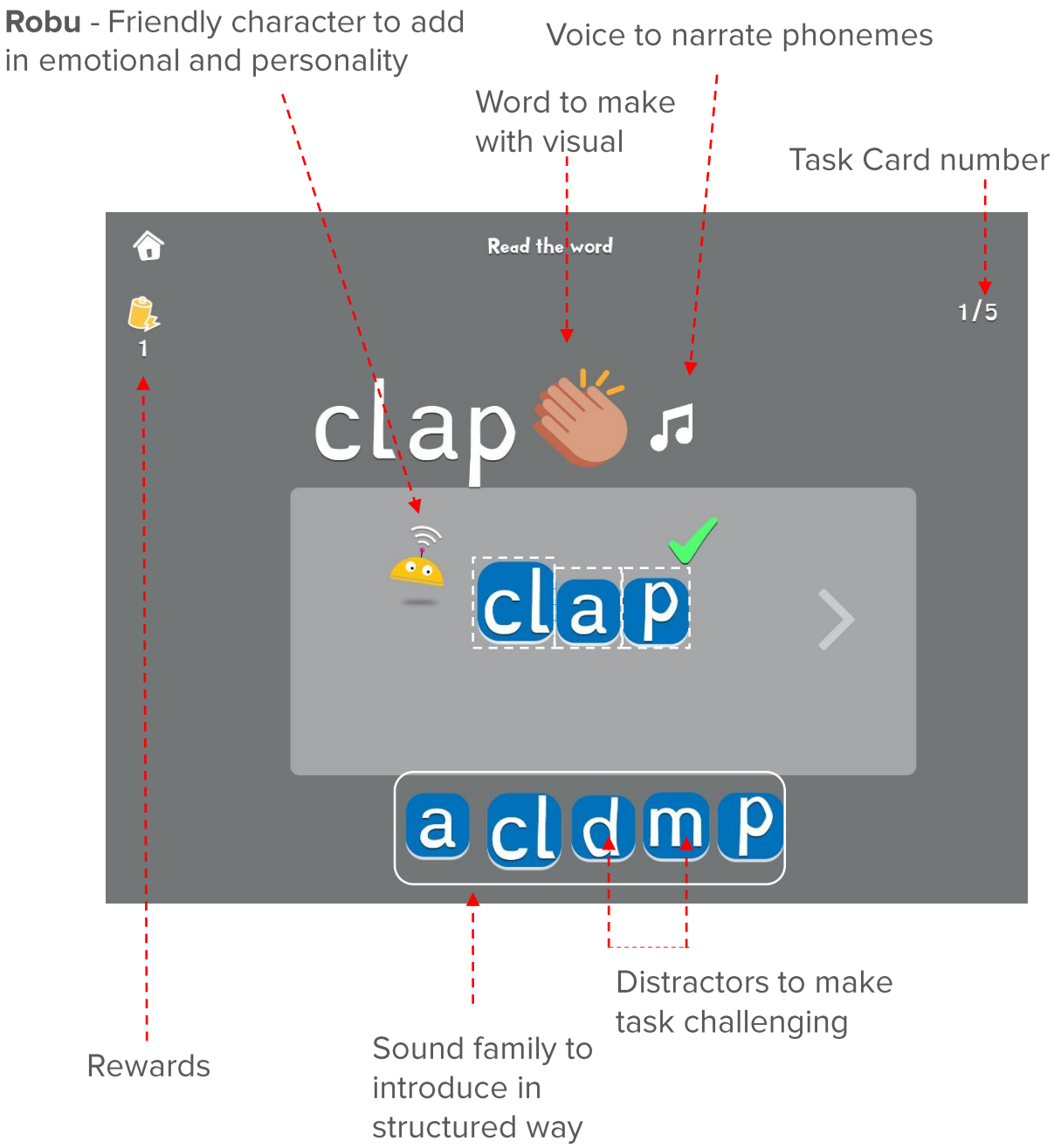
Properties -

- It is a learning application for dyslexic children focusing specifically on learning alphabet rules or principle and lets children explore different possibilities based on structured tasks that are interactive and multisensorial.
- The application involves gamification and rewards and challenges the user.
- Inspired from the Phonic approach of teaching the application builds a layers of interactivity with concept building tasks with audio feedback during interaction.
- Tasks are based on systematic inclusion of alphabets with vowel an consonant families, one vowel and few consonants.
- The application pursues a framework approach with more concepts getting added with grammar rules.

Design

Final Concept and output

- Similar sounding words are introduced earlier to reinforce segmentation and phonological skills to aid in learning by trial and error.
- Each task is started by a audio help of what to be done and the correct sound to identify and encode into the boxes.
- Educator involvement is approached via customizing ability. Educator can add new words for child tasks to suit learning based on what is being remedied during intervention.
- Each word formation reinforces concept learning through the shape of the outcome word. Eg. In this case.

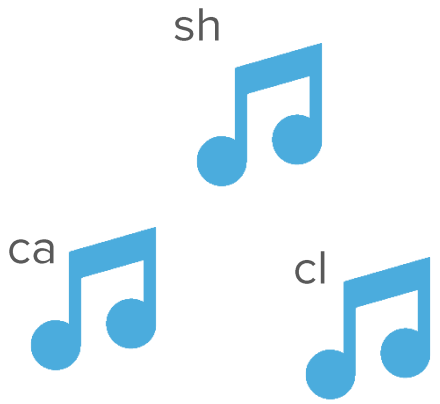


Design

Final Concept and output

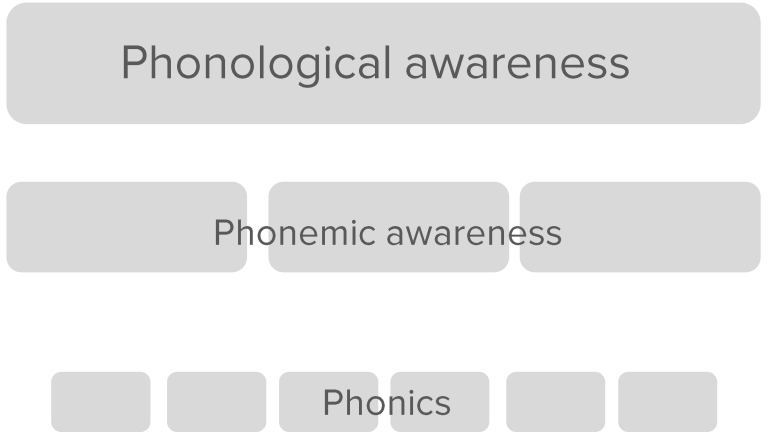
- Instructions are imparted via activity of identifying and then dragging the correct sounds to their correct places.
- Navigation in the application is driven by audio feedback as user interacts.
- The concept was further extended and it was realized that to test and evaluate for the scope of the project, the focus should be on how letter-sound concept would be imparted to children effectively and customizability option to be explored after the main task is achieved.
- This encourages helps to slow down and focus and full engaged in teaching. It puts u incharge in self chaeking and helo in pronounciation and helps people who do not have English as fiest language

Introduced to units of sound and practice words formed by them. As user interacts with the application , the sound help in identifying and organizing



I devised the requirement for such a concept to be developed and designed -

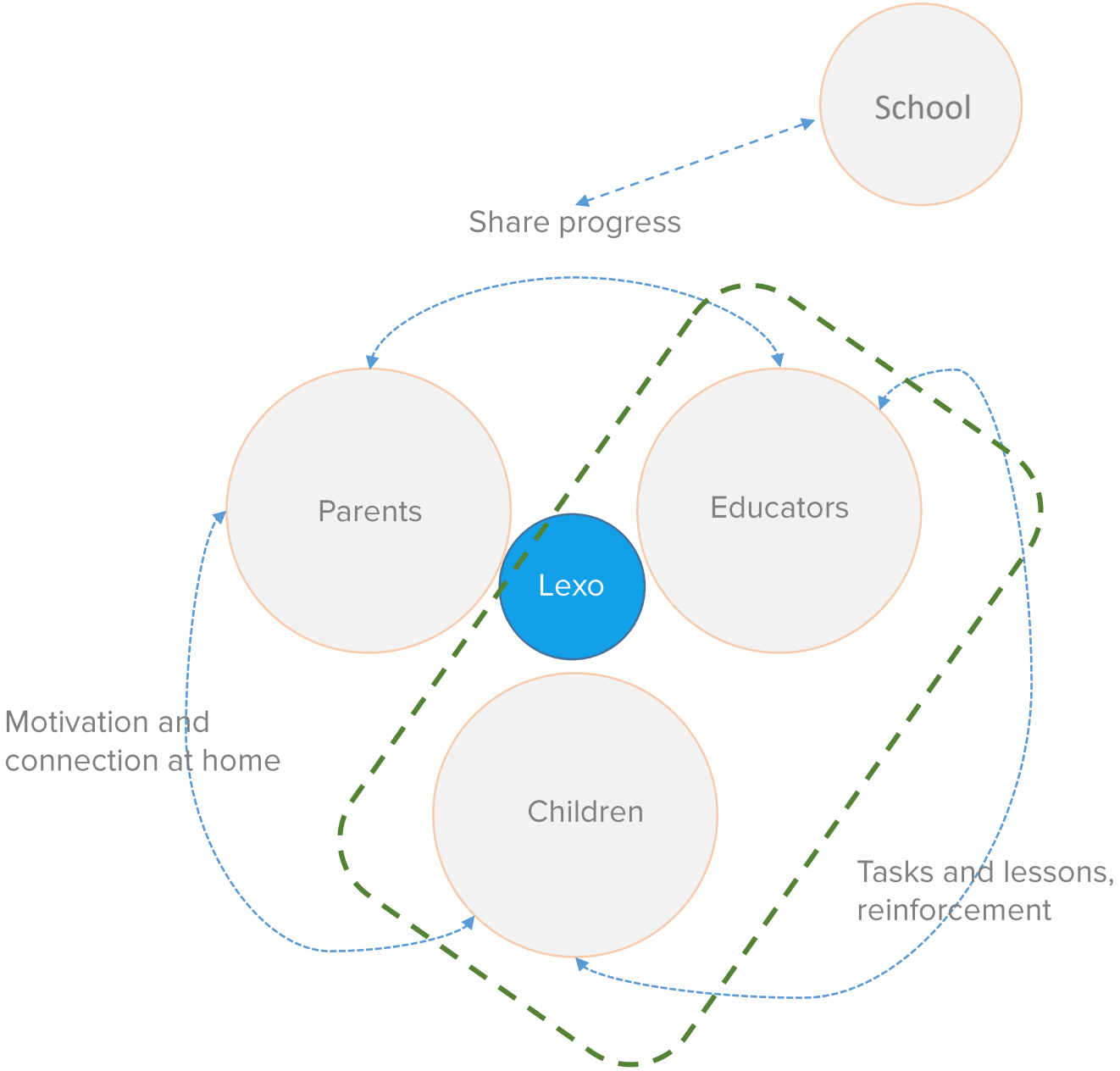
- To grasp literacy concept easily
- Get encouraging environment
- Build better memory and retain what was learnt through repetition and practice.
- Easy Interaction with the content.

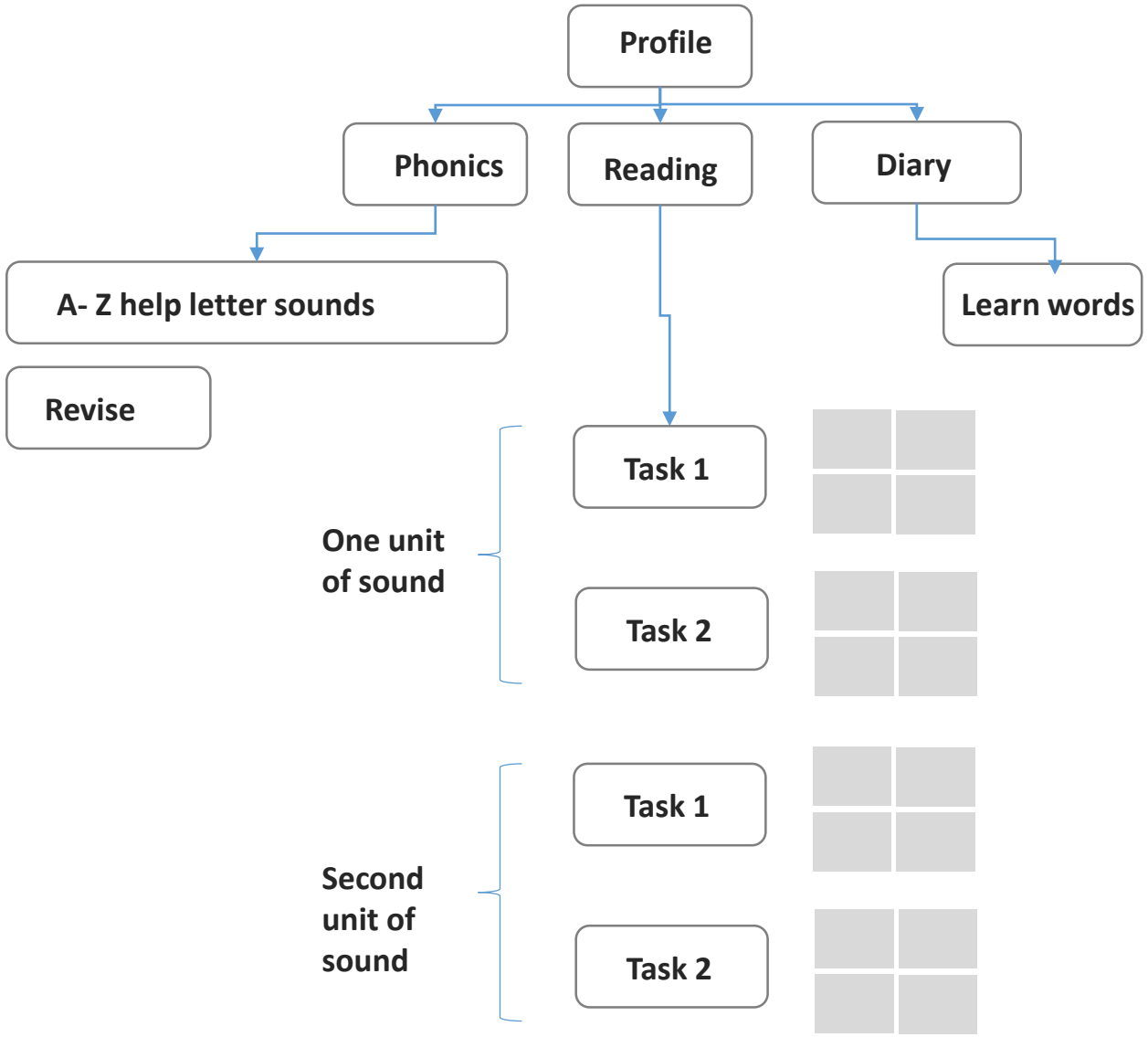


- Key steps –
  - Break down the concept into the very basics. Use lesson plans to establish tasks and structured progress.
  - Create quick consumables/exercises for revision and memory building
  - Chunk the exercises into further consumables. Like train the children on a single vowel first.

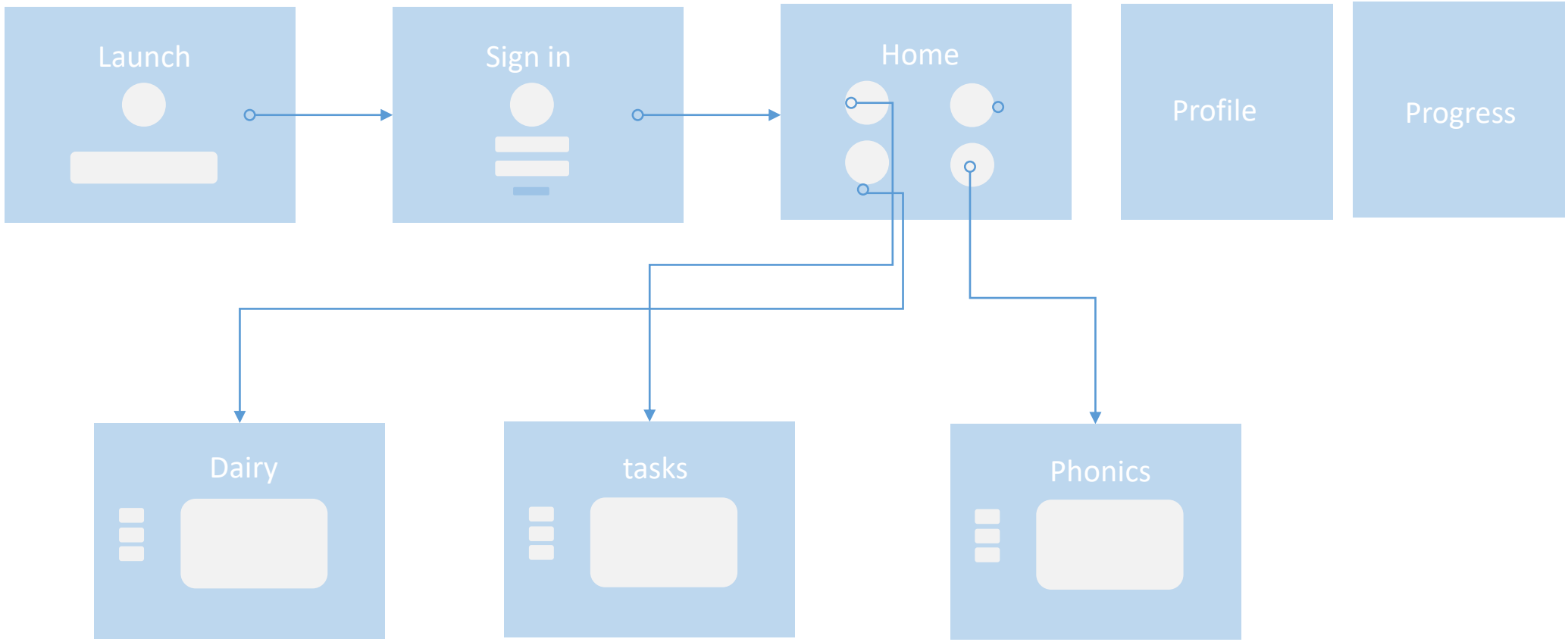
Ecosystem - extended

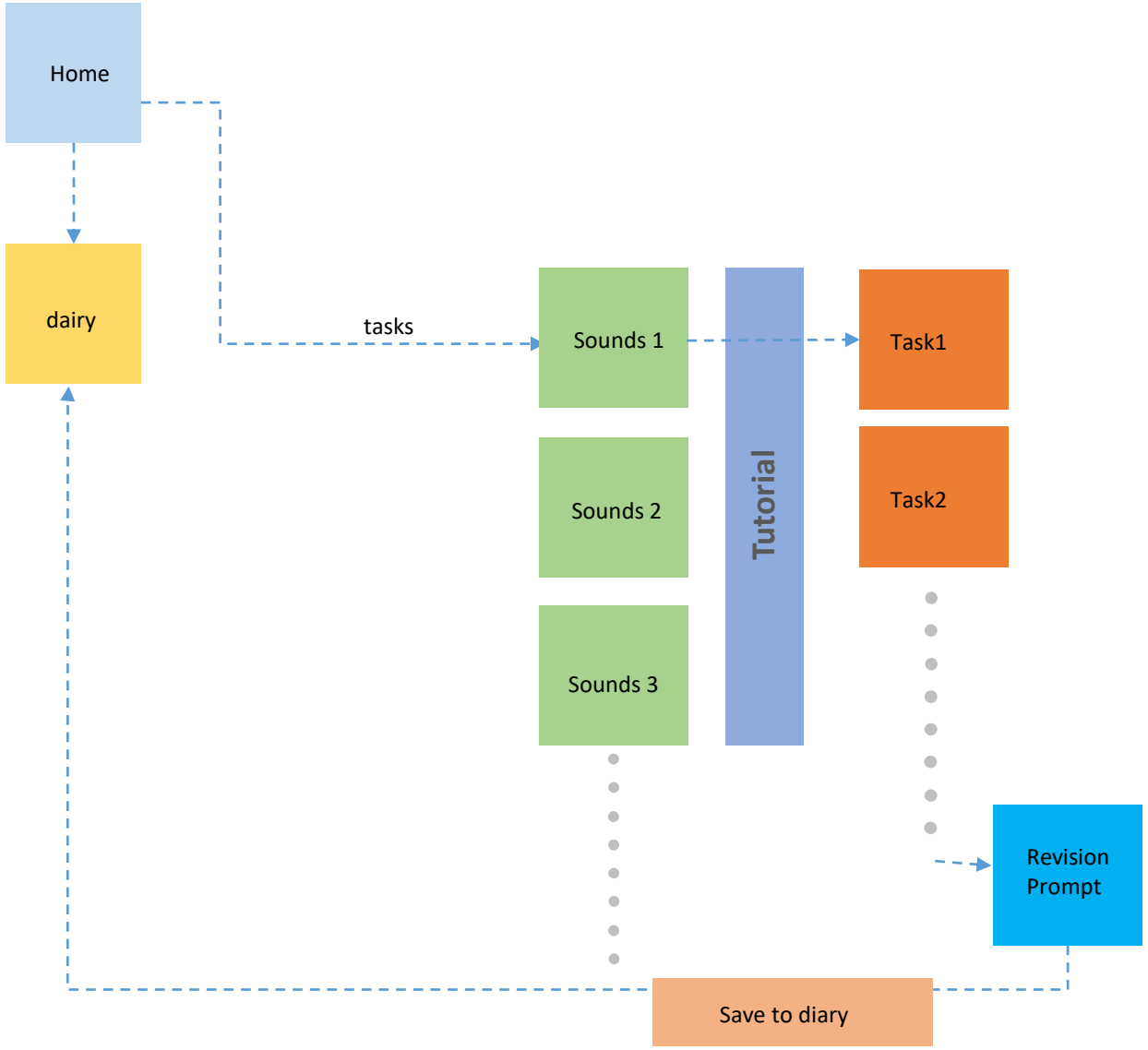
- The ecosystem will be contain children and educator .
- Teacher will keep track of child’s progress at center and parents at home, they will share child's progress with each other and the assessment will also help in keeping child’s progress in check with school also.
- The child will feel more in control of his learning and will grow with the lessons.




Profile
Phonics
Reading
Diary
A- Z help letter sounds
Revise
Learn words
One unit of sound
Task 1
Task 2
Second unit of sound
Task 1
Task 2


Info
Student bio
Progress
Rewards
Sign out

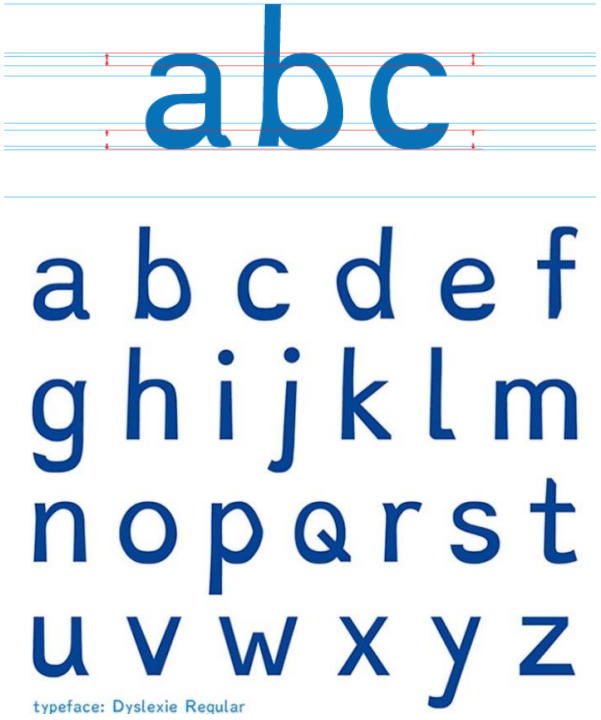

Launch
Sign in
Home
Profile
Progress
Dairy
tasks
Phonics


Home
dairy
tasks
Sounds 1
Sounds 2
Sounds 3
Tutorial
Task1
Task2
Revision Prompt
Save to diary

- My approach from the start of wireframe was to tackle interface design for dyslexic users.
- I replaced the words with understandable icons where it was possible. Using metaphors to create icons.
- Tried to make them simple and clear, not overloaded with unnecessary graphic elements.
- Keep the color scheme soft and easily readable fonts.

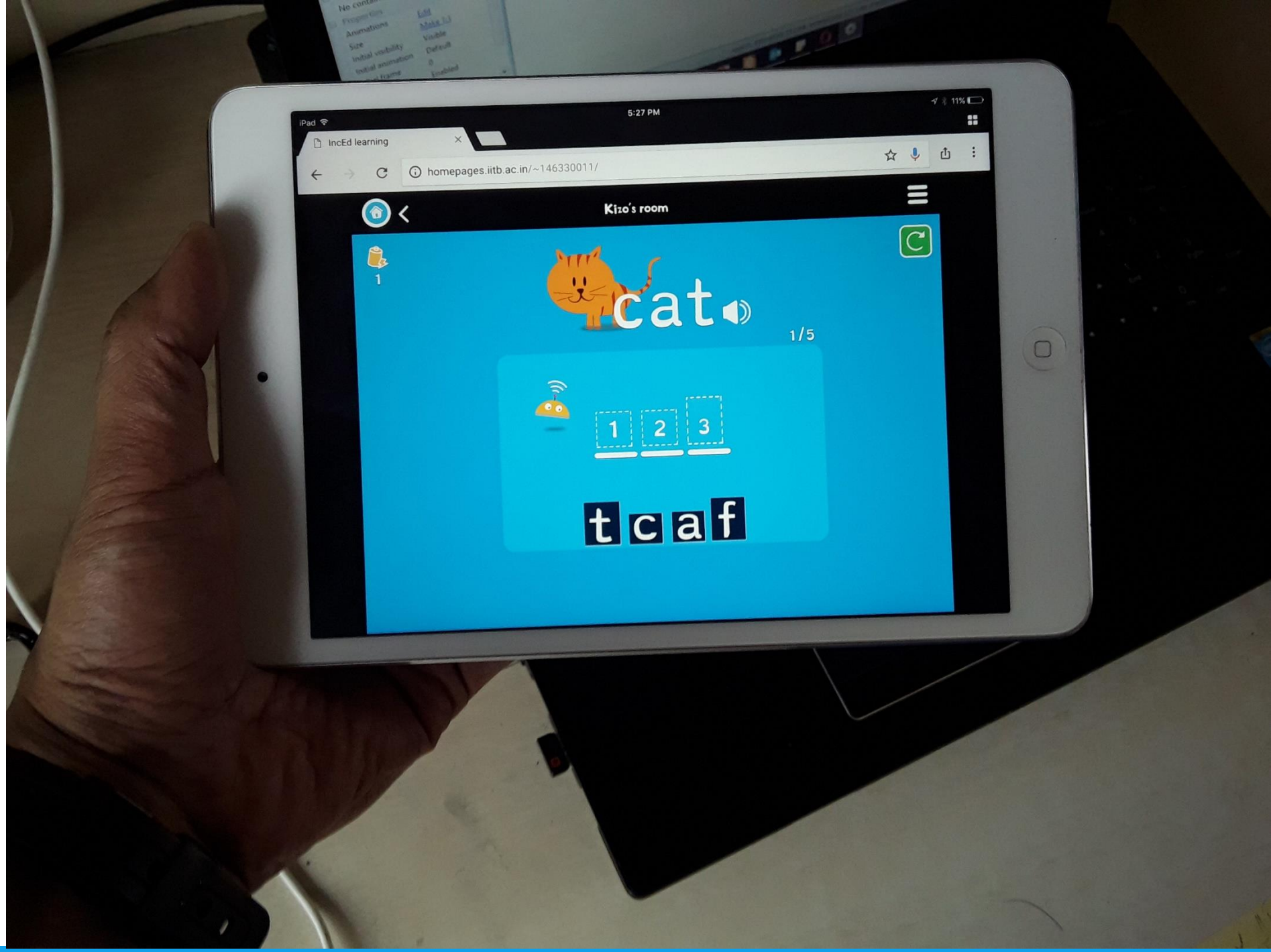
Dyslexie font

Specially designed for dyslexic people to read easier and understand the letter easier. The font has various thickness in its lines making it more distinguished from the other letters and also they are made bold at the bottom.




Lexo

Prototyping



Evaluation

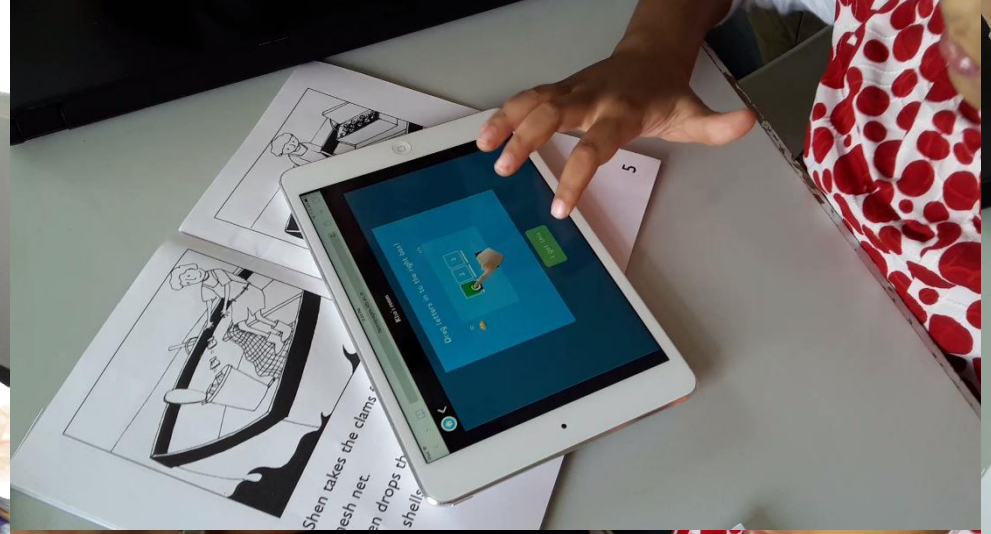
Learning goals

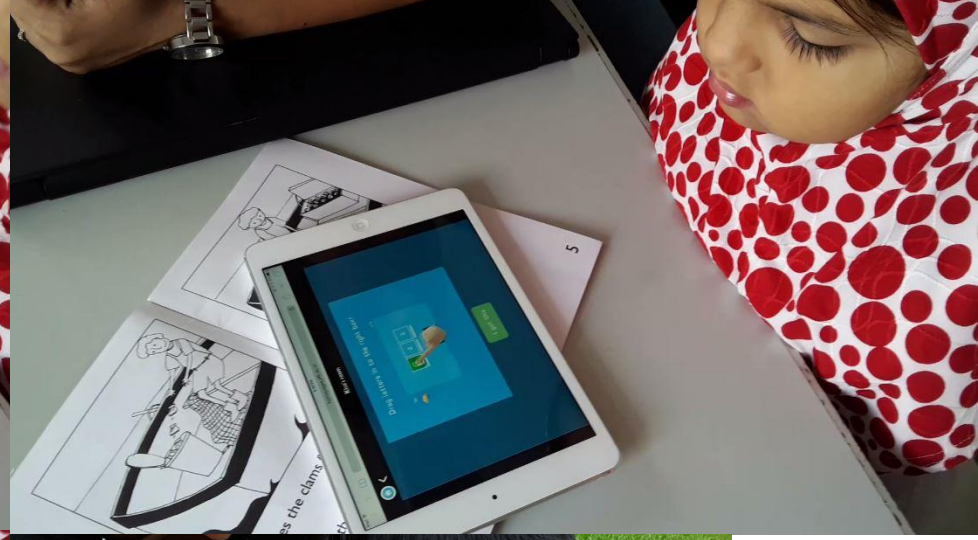
- Know about how words are made up of individual sounds.
- Understand the sequence of letters in word and their order.
- Understand correct placement of tiles.
- Recognize and identify similar looking letters and filter them out.

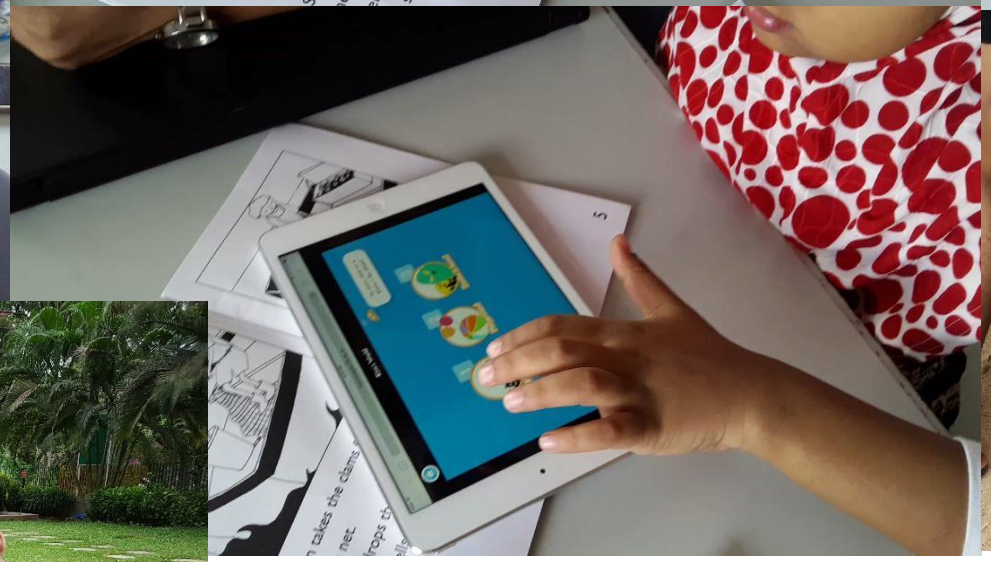
Usability goals

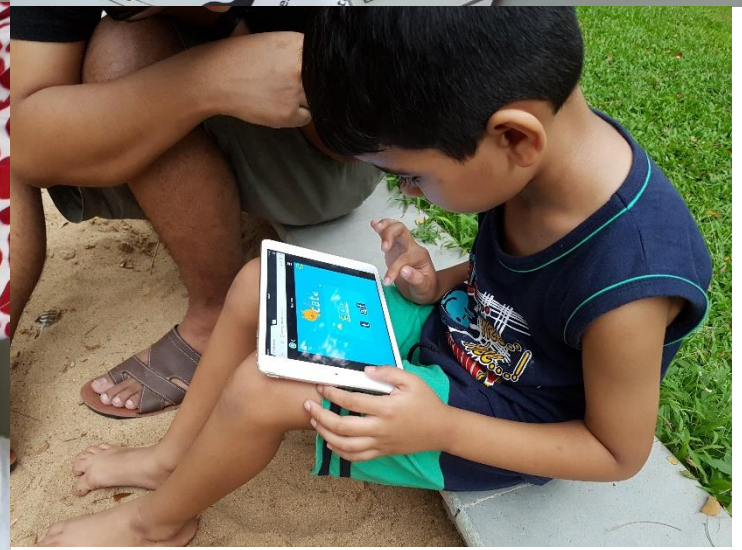
- Ease of navigation
- Identification of icons and buttons with ease.
- Audio cues for identifying what to do.
- Ease of repeating the task.
- Error prevention when incorrect choice is made.
- Participants were asked to think aloud and verbalize their thoughts while doing the task, the educators were also asked for the same, as the child looks for cues from educator.

- Participant completing a lesson sample - Students starts with daily revision and new words and saves what is learnt.
- Participant completing a task and access diary to revise the word
- Going back to task and navigating to the next task.
- Use audio instructions for navigation in the interface.
- Write a word on notebook after using the learning aid.









UT with 4 children.

1. Delight
2. Sense of completion
3. Wonder

1. Sensorial
2. Audio is welcomed
3. Wants more tasks
4. UI changes such as PLAY button

1. Focus is formed and eager ness to learn
2. Acitve participation from educator.
3. Looking forward for more

Evaluation

Observations

- After the session, the participants were asked questions based on observations from the tasks.
- Engagement was successful as the user wanted to perform more tasks on the device. Gamification ensured that user has incentive to go further .
- Users were able to arrange the letter tiles in the correct sequence with the help of all the audio and visual feedbacks.
- More varied distractors can make the learning goals more effective.

Task1 . . . . . .

	Card 1	Card 2 . . . . . Card n
Understanding of tasks	✓	✓
Understanding of audio cues	✓	✓
Phonics/word retention	✓	✓
Participant corrected errors	✓	No
Responded to visual feedback	✓	✓
Learning curve was short	✓	✓
listened to audio instruction before starting the task	✓	No *User become used to the task flow after watching hearing the tutorial*

Evaluation

Observations

- After the session, the participants were asked questions based on observations from the tasks.
- Engagement was successful as the user wanted to perform more tasks on the device. Gamification ensured that user has incentive to go further .
- Users were able to arrange the letter tiles in the correct sequence with the help of all the audio and visual feedbacks.
- More varied distractors can make the learning goals more effective.
- Users was able to understand sequencing faster when the simple rules of the task were established through visual and audio cues.
- The interactive letter tiles were the key engaging content in the interface and more possibilities open in making them more customizable.
- Shortcomings - The tasks had similar interaction styles without much variation except from the learning concept.

Conclusion

- After the session, the participants were asked questions based on observations from the tasks.
- Engagement was successful as the user wanted to perform more tasks on the device. Gamification ensured that user has incentive to go further .
- Users were able to arrange the letter tiles in the correct sequence with the help of all the audio and visual feedbacks.
- More varied distractors can make the learning goals more effective.
- For future scope I think of possibilities with tactile user interfaces that are not constrained by the interface or screen size.
- This project can be further developed to be part of a full scaled application that can be installed in schools computes to assist teacher in helping children that are struggling.

References

- http://www.shiningstars.co.id/Articles/Dyslexia
- http://www.wicd.org/famous-dyslexics/
- http://www.nwlink.com/~donclark/hrd/bloom.html