P1 PROJECT REPORT

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DECLARATION

I declare that this written submission represents my ideas in my own words. This project based on a workshop that I attended at IDC encouraged self learning and hence no external resources including the internet have been used anywhere. The entire project is a representation of my own ideas and experience. Wherever other's ideas or words have been included, I have adequately cited and referenced the original sources.

I also declare that I have strictly adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/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 been properly cited or from whom proper permission has not been taken when needed.

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ACKNOWLEDGEMENT

First and foremost, I would like to thank Prof. Uday Athvankar for being a mentor and guide to helping me not only to understand the rather complicated and intricate world of game design, but also helping me realise my potential. I can't thank him enough for providing his support in all my endeavours and providing the right exposure full of great people working towards betterment of education in the country.

I want to thank Sharmila Ma'am and Bhavana Ma'am for providing me with all the resources to explore my ideas. I want to thank my batchmates (Vasundhara and Ravi) for never turning me down for help and my colleagues (Sonali and Gagan) I had the pleasure of meeting during the workshop for their feedback and assistance that constantly helped me improve my work.

I want to thank the kids (too many of them to name) who let us test these games, for their enthusiasm, cheerfulness, creativity, ingenuity and amazingly good manners. For never giving up on me even when I was constantly trying to educate them that too during their summer holidays, for their assistance with making the games, for their spirit and for teaching me how to find back FUN.

I am deeply grateful to each and everyone for their time, for their patience and their precious feedback.

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ABSTRACT

We are all well aware of the condition of education in rural India. Poor living conditions, children supporting in running the household, preference to male child for promoting education, unavailability of good schools within reach are just a few problems to begin with. To combat this situation many government schools have been started in the country in the past along with various new rules and policies to facilitate learning in rural areas.

But the government schools, even with their free learning resources are failing to provide a more nurturing environment for the students or let's say volunteer students to learn or further grow. Lack of dedicated teachers who are willing to reach out are making matters worse. Identifying and rectifying the problems in learning through games was the core learning in this project.

TOPIC

Process of developing board games and digital gamification to aid primary school learning.

INTRODUCTION

To create a better method of educating the kids of rural and tribal backgrounds, ministry of education of the Madhya Pradesh government decided to take a new approach to education by incorporating gamification and extending the same using digital medium.

Under the guidance of prof uday Athvankar at IDC and with a lot of help from the RSK members , I worked on the project of gamification of education, a joint venture with other design school interns from different fields of expertise.

INTRODUCTION

OBJECTIVE

The purpose of the project was to discover the various possibilities in learning through games by Converting the maths and language syllabus of class 1 to 5 into games that help aid the understanding of concepts by engaging one in alternative thinking.

Duration : 4 weeks

TIMELINE

I have presented a detailed description of the events, tasks and activities that took place during the entire module which helped us prepare, test and finalise the games, understand game design and get the in depth knowledge of the processes involved.

TIMELINE OF THE PROJECT

DAY 1

Introduction of game design to all the interns by Prof Athvankar.
Task: Re-inventing an existing game-Mastermind
The workshop began with prof Athvankar introducing us to game and its definition. Comparison of various game and game-like activities gave a clearer picture of the different applications of the two processes. To fully understand this we had to take an old existing popular game and understand its mechanics.

Gameplay:
The game I analysed for this purpose is the popular game of 'mastermind'. A two player game, its objective is to decode a code of four different color with the same placement as the one created by the code maker, without looking at the original code. The player does so by placing coloured pegs in the corresponding rows of the code pegs without looking. The code maker then reveals whether the coloured pegs are kept in the right position by using two code pegs of red and white color. White code pegs denote right color right position. Red code peg denotes wrong color wrong position. No peg means wrong color wrong position. The codebreaker analysis this code and makes the next move till he finds the right code in less than 10 moves.

Observation and modification:
To begin with it took us a lot of time to understand the game ourself. Once we got a hang of it we wrote down the things in the game that were causing us not to be able to understand the game properly. We decided to give the game different levels in order to make it more suitable for even younger audience and difficult levels that could even put adults in a fix.

TIMELINE OF THE PROJECT

DAY 2

Warm up session.

Task:
Developing a physical game based on any given concept.

Gameplay:
The concept we took this time was teaching the metric table. The game we developed was called " meter-meter". It helped people get better at understanding the metric conversion from centimeter to kilometer. The game consisted of a circular playing board drawn on the floor on which different conversions were written. The aim of each team of two people is to make a kilometer by adding those numbers by jumping on the numbers on one leg. This was a turn based game. While one team tried to derive the kilometer, the other team tried to create obstructions in order to confuse them.

Playtesting and observation:
While the game had limited learning, there were some added learning that happened while the player learned the game. By the end of one round each player became better at addition and more physically active. We didn't get to test the game with children but we as adults enjoyed the game. the task helped us understand the mechanics and requirements of a physical game and how to incorporate learning with fun.

TIMELINE OF THE PROJECT

DAY 3

Meeting with Rajya Siksha Kendra members

We were introduced to the dedicated teachers from Rajya Siksha Kendra who gave a presentation of the kind of problems that the schools in madhya pradesh are facing and what efforts have already been put into place to combat these problems. They gave us a clearer idea of what was expected out of the workshop in terms of what should be the output of the game. They also walked us through understanding the background of the targeted kids so we can understand our users better. After the meeting we were given our topics from the mathematics syllabus for primary school to work on.

TIMELINE OF THE PROJECT

DAY 4-5

Understanding the syllabus

In order to be able to create the game we had to thoroughly understand the scope of syllabus for our topic. What concepts were covered in the syllabus covered and what was parallely happening in other subjects to correspond to the learnings in one subject. we intensely went through all the mathematics books from class 1 to 5 and came up presented our observations to the team. After the presentation we discussed all the various topics with individual teachers in detail to further clarify our doubts.

Next we tried to understand the various problem areas in children's learning, which were the difficult to grasp concepts and what were the existing methods to make those concepts easier to understand..

TIMELINE OF THE PROJECT

WEEK 2

Game development begins.

We took one problem area and started to develop concepts for developing game strategies. Each concept was analysed critically within the group to make sure the format of a game was followed. Player interaction, challenging, strategy based, luck based or skill based games were analysed and intensely discussed with Prof. Athvankar and other participants. Prototypes were made and tested amongst each other. A few days later kids joined in. We got the opportunity to extensively test our games, gather feedback and further modify our games. By the end of week two we have some solid prototypes ready to be presented to the RSK team.

TIMELINE OF THE PROJECT

WEEK 3

Playtesting, iterations and finalisations.

Further work on the games, refining them, playtesting and changes implemented. We got the opportunity to meet kids from underprivileged households. It gave us a very good idea of what exactly our games have to aim at achieving. The kids with their vigor, enthusiasm and ingenuity encaptured us and we ended up having a rather transformative experience. It was time to further refine our games and make them more relevant to them.

These are the problem areas we tried to combat:

1. Place value and expanded form:
According to the RSK Team , children have trouble recalling, understanding and properly apply the concept of place values. The problem arises with them being able to understand the concept of four digit numbers and how to define the value of a digit by placing them in the right order.

2. Less than '<', equal '>' to and greater than '=' values and symbol recognition:
The teachers realise that it is difficult for kids to understand the symbols associated with value of the digits. Not only are they unable to understand which symbol stands for what but also its application in other units of measurement like height, weight and so on.

TIMELINE OF THE PROJECT

WEEK 3

These are the problem areas we tried to combat: (... cont.)

3. Number Sequence:
Little kids from grade 1 often face difficulty when they are asked to start counting from a random number onwards instead of from 1 to 10. A child may be able to say the whole sequence from 1 to 9 but when asked to tell the number between 4 and 6, would have trouble remembering. This makes understanding of concepts further than counting difficult to grasp. So we had to develop the game that helps them practice how to count from between the sequence.

4. Concept of ones, tens and zero:
The concept of zero is a rather difficult one to understand but it has significant importance hence it's better to make the concept clear at early age. How a value turns from single digit number to double digit number and why a zero is introduced in the house of ones is also too complex for kids to understand. So we aimed at making a game that physically lets the kid understand why exactly this system has been derived.

TIMELINE OF THE PROJECT

WEEK 3

And these are the games we presented to the RSK team by the end of three weeks:

1. Digit monster - Place value

2. Kam Jyada Kam - (<,> and = symbols)

3. Order Order - number sequences and between numbers

4. Dassi - concept of ones , tens and zero

Once the games were done we picked up the most applicable game and started thinking about its production.

TIMELINE OF THE PROJECT

WEEK 4

To help us understand how to digitise and what things to keep in mind while designing a digital game we had talks from several people with expertise on the subject. Edu is fun, Puzzle desh, The yellow monkey were some of the people who came and shared with us their experience in designing digital games aimed at educating.

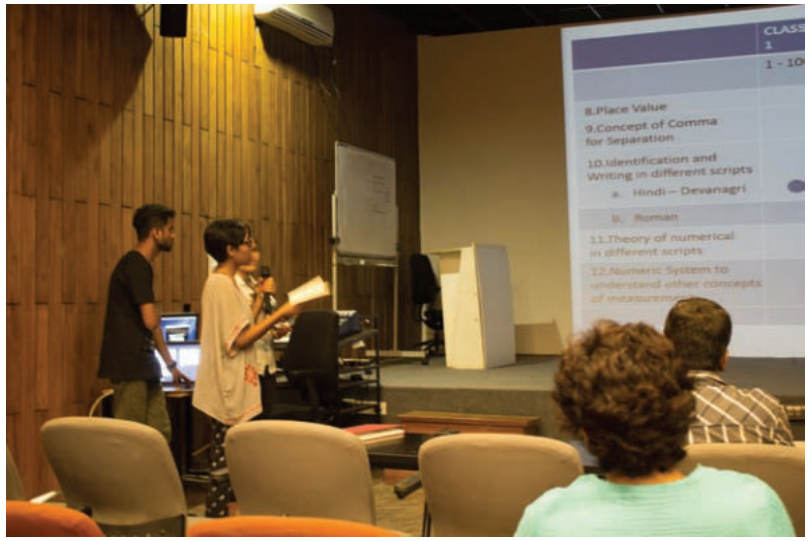
The week began us continuing to work on our digital games. apart from this we attended a talk by IDC Phd. students working on understanding game psychology who exposed us to the difference between gamification and game. They conducted a workshop where each of us did activities of gamification and clarified our doubts. This helped us in making further refinements to our digital game.

FINAL DAY

The workshop ended with a final presentation made to several people interested in knowing the outcomes of our endeavours/explorations and a brief talk to summarise the workshop by Prof. Athvankar.

TIMELINE OF THE PROJECT

PROCESS IN DETAIL



NUMBER SYSTEM CLASS 1-5

Number system a study of syllabus.
Following are the topics covered in mathematics

1. Digit identification
2. Writing Practice (Pre Activity)
3. Count and Write
    a. Number
    b. Words (verbal)
4. Knowing the value
5. Write and speak in Hindi
6. Sequence and Order
    a. Increasing and Decreasing
    b. Even and Odd
    c. Relative Order
7. Greater than and Lesser than
8. Place Value
9. Concept of Comma for Separation
10. Identification and Writing in different scripts
    a. Hindi – Devanagri
    b. Roman
11. Theory of numerical in different scripts
12. Numeric System to understand other concepts of measurements
13. Number Lines

PROCESS IN DETAIL

PROBLEM AREAS

Problem area in learning

1. Place Value

2. Understanding expanded form of Place value

3. Greater than and Lesser than values and use of the symbols <,>,=

4. Number sequence.Adjacent numbers, increasing and decreasing values.

5. Factor and multiples L.C.M. and H. C. F.

PROCESS IN DETAIL

GAMES DEVELOPED

1. We picked up particular problem areas and started working on the games.
2. Had several discussions about game play, format , concepts, learning and understanding a child's mind.
3. We designed some rough drafts and started experimenting

Kam-Jyada-Kam

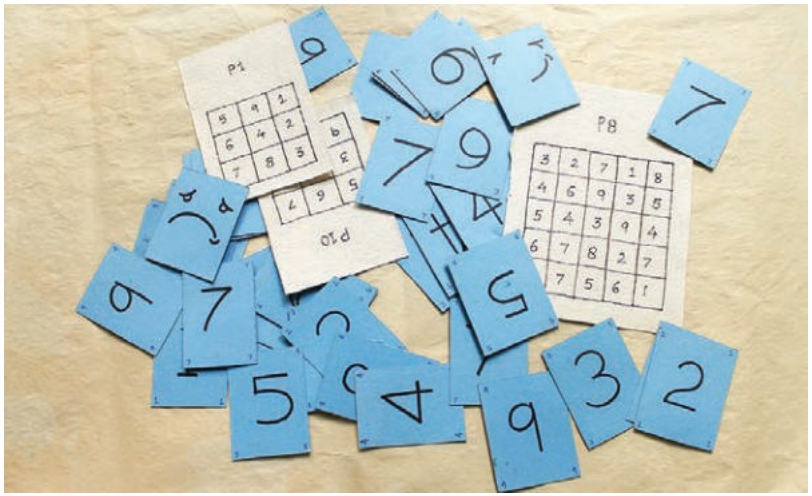
Conflict and resolution:
1. The game was designed to solve the problem of understanding corresponding signs for lesser, greater and equal values.

2. The kids wear a number and align themselves with the signs on the floor to dodge elimination. We introduced singing in the game to liven the task and add interest.

3. It's an outdoor game that requires minimum 10 people. Kids from class 3rd and 4th can play this game.

4. It worked really well in terms of understanding the concept and group interaction.

PROCESS IN DETAIL



GAMES DEVELOPED

Order Order!

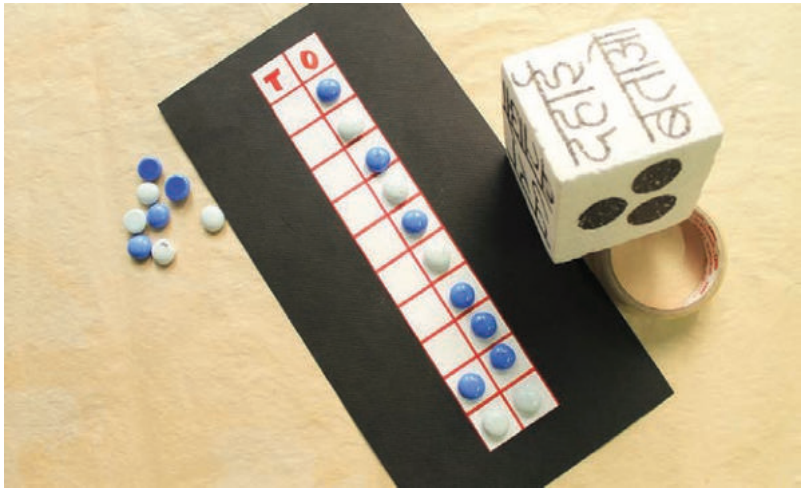
Conflict and resolution:
1. The game was designed to solve the problem faced while understanding of number sequences.

2. For level one, a max, four player game, puzzles are given and kids need to find the hidden puzzle in it and make that puzzle using cards.

3. Once done, they need to show and shout out loud, “Order Order!!” and display the cards.

4. The game did well in terms of recognizing sequences. Increasing and decreasing order, counting from between and between numbers.

PROCESS IN DETAIL



GAMES DEVELOPED

Dassi

Conflict and resolution:
1. The game was designed to make the kids understand the concept of tens.

2. It's a 2 player game where aach player is assigned 12 pegs of each two colors.

3. The kids start playing if 1, 2 or 3 number comes on the dice . If the other sides of the dice come, they are told to say it out loud the number on the board.

4. Whoever has the maximum number of pegs in the ones row puts places his peg on the tens row indicating his tens. Eventually, the one with maximum number of tens on the tens row wins.

5. The game did well in terms of understanding the concept but needs more 'FUN'.

PROCESS IN DETAIL

GAMES DEVELOPED

Digit-Monster

Conflict and resolution

1. The problem area we picked up was teaching place value and expanded word form for kids of third and fourth standard.

2. Gameplay based on recognising four digit number system and using cards to form a number with four numbers used in different place value positions.

3. Helps kids understand the concept of ones, tens, hundereds and thousands.

4. The first few prototypes of the game were lenghty and uninteresting but as we continued playtesting, the game evolved and became popular. The next few pages are dedicated to understanding the evolution of 'Digit monster' into 'Ankasur'.

PROCESS IN DETAIL

OBSERVATIONS

The four games we prototyped and playtested opened several new insights into the mind of children.

1. The intricate structure and strategy making let's kids understand the applications of their learnings.

2. Player interactions with each other and co-piloting audience creates a more supportive environment rather than having only sport related activities or toys for kids to apply group mechanics.

3. Kids don't hold back with clarifying doubts unlike classrooms.

4. Importance of storytelling while developing games for children and how it can amplify the effect of learning.

ITERATIONS

1. Several playtests were conducted to understand what to introduce to make the game more fun.

2. Changes were actively made, we listened to the kids.

3. Game design is a dynamic process. being able to identify gliches and constantly making required changes enhances the game experience for children.

PROCESS IN DETAIL

DIGIT MONSTER

Conception:
1. We first came up with couple of ideas which revolved around having cards that add up to a specific value of four digit counting

2. Our first prototype was a 52 card game that had many different cards labelled 100's, 1000's, 10's and ones.

3. The objective was to make a given four digit number by winning the right amount of cards.

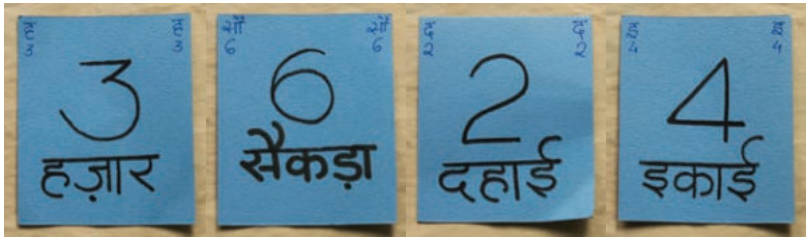
Obstacles:
1. The game was not only lengthy, consisted lots of hardware, and the gameplay was getting too crowded with number of moves per player.

2. limited possibilities with giving a four digit number to begin with.

3. (it was tedious)….

4. We were not sure if any learning is happening.

PROCESS IN DETAIL



DIGIT MONSTER

Gameplay evolved:
1. Increase uncertainty by using a two by two grid to write the numbers in.

2. To ensure understanding of the concept we introduced that the player who wins has to announce the number they made in expanded form.

Obstacles:
1. Learning was too obvious.

2. Kids weren't dynamically changing their number sequences and were playing safe.

3. Game becomes predictable very early and completely luck based.

4. Kids started losing patience waiting for the card they wanted.

PROCESS IN DETAIL

ANKASUR - CONCEPTION

Based on more playtest results we carried on some changes in the game and interesting observations came up.
1. We derived the story of a monster who eats digits as the main villain of the game.

2. The name “Ank” - Digits, “asur” - Monster = Ankasur/ Digit-monster

3. Using the ankasur card alters the progress of the game. We gave it power.

4. The gameplay involves minimum 2 to maximum 4 players. First player writes down four numbers in a two by two grid and distributes 5 cards to each player. The task of each player is to use the cards to make any four digit number from the digits written in the grid.

5. The four action cards dynamically alter the game and each player can use the card when their turn comes.

6. First player to make a number quickly shouts out the entire number with the correct place value and wins.

PROCESS IN DETAIL

ANKASUR - OBSERVATIONS

1. The game caught up pace and kids started looking forward to pick up the next card to find ankasur.

2. Uncertainty increased and so did the interaction amongst players. Kids forgot they were actually learning math.

3. Since action cards encouraged kids to control the progress of the game they started making dynamic decisions.

4. Even the losing kid wasn't too disappointed because they had fun using the monster cards to mess with their opponent's move.

5. Most importantly, the game became FUN.

PROCESS IN DETAIL

GAME PRODUCTION

1. Graphics introduced to the packaging describing the story of ankasur.

2. Box was simple and resembled the shape of a matchbox.

3. Game was made completely in hindi with instruction manual too.

4. Created illustrations in manual for better understanding.

5. The game is quite low cost since printed paper is the only hardware.

PROCESS IN DETAIL

GAME PRODUCTION

1. Ergonomically the size of the cards are comfortable for kids to hold them and reduce paper consumption.

2. Action cards showed the actions to be conducted along with written instructions.

3. Color coding the four houses cards apart from adding text helps kids interpret and play with ease.

4. We also made a tutorial video explaining the gameplay and progress of the game and how to use various cards in collaboration with kids.

PROCESS IN DETAIL

DIGITISATION

Digitisation: making learning without teacher possible.

In order to combat the problem of missing or un-enthusiastic teachers in government schools we worked on developing a digital version of the games.

Discussions on the various aspects of a game like its name, its limitation, its social relevance, its software and hardware implication were the major points we kept in mind while designing. Furthermore, we developed initial graphics and game flow of the game in terms of screen content and layout and conceptualised different levels. Side by side we worked on the production of our board games. Making them as visually, economically and ergonomically friendly as possible.

PROCESS IN DETAIL

TEES MAAR KHAN

Conceptulisation:
1. For developing the digital game, the problem are we focused on was greater than, lesser than and equal to value recognisation and symbol usage which kids found confusing.

2. Several ideas were thrwon around including a prototype of a car game which we later realised had several drawbacks.

3. We had to decide a gameplay that was multiplayer so that more than one kid can learn while playing the game and player interaction amongst each other is not hampered because of the digital enviorment.

4. As the discussions progressed we were able to come up with a simple concept based on relevance to the children's enviorment so that they are not baffled with sudden introduction of technology.

5. The game's software and hardware possiblities were discussed and finally a game flow was derived.

6. We made rough visuals for the progress of the game to help the developers understand how the game mechanics worked.

PROCESS IN DETAIL

TEES MAAR KHAN

Gameplay

1. The player has to place the corresponding sign on the back of a creature on which two numbers are displayed on either sides of it.

2. Both players have to put the sign between the numbers to capture it. Tapping on the moving flies, will add as an element of fun.

3. The first player to grab thirty such creatures wins the game and becomes 'tees maar khaan'.

4. The player is repeatedly made to look for the correct sign and place it on the correct fly in order to kill it. This will help in registering the sign in child's brain.

5. The challenge factor in the game as in who kills 30 flies first wins, keeps the kid motivated.

6. If the order is correct the creature glows green and pops. If the sign in wrong, the creature glows red and multiplies in two creatures.

PROCESS IN DETAIL

GAME FLOW

START

↓

PLAYERS CHOOSE THEIR COLOR

↓

GAME STARTS : TUTORIAL TIPS

↓

GAME PLAYS

↓

SCORE SCREEN

↓

CONGRATULATION SCREEN

↓

RESTART OR QUIT

PROCESS IN DETAIL

GAME PRODUCTION

1. Two player game, can be increased by introducing bluetooth connected devices.

2. Different levels are introduced so the learning becomes thorough.

3. Levels are based on different creatures.:
earthworm < crab < turtle < bee < bird < fly

4. Software Possibilities – adobe flash, Photoshop

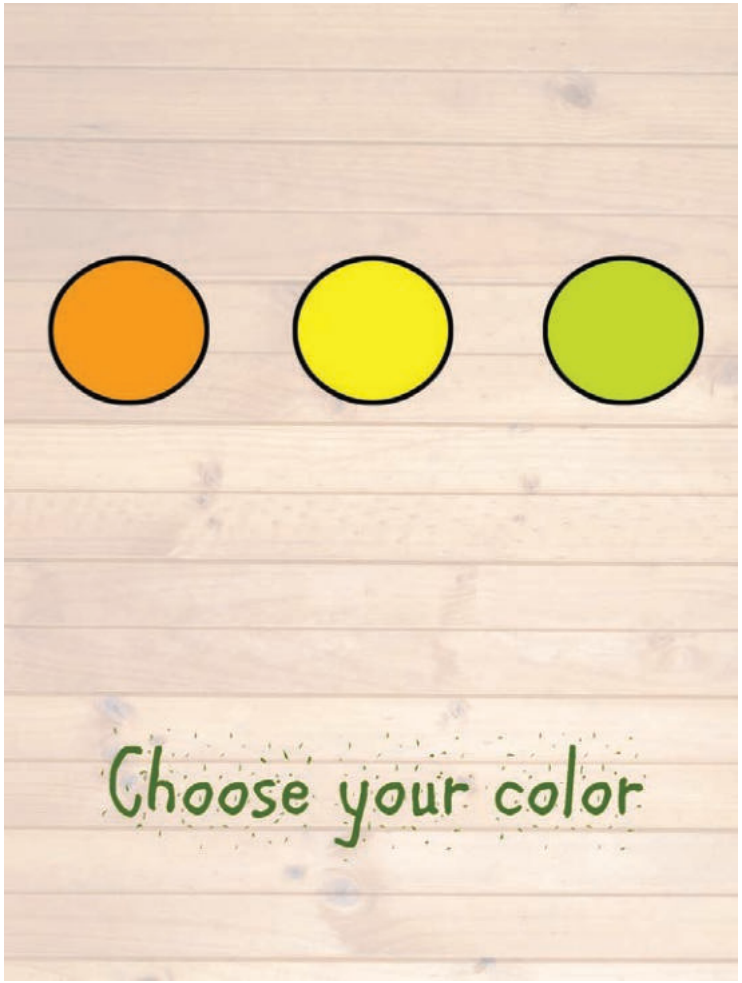
5. The game area comprises of a background image of any item that the creature wants to eat. Example: let's say the creature is a house fly, flying over food kept uncovered.

6. Bottom of the screen has three selection buttons with <, > and = signs on them.

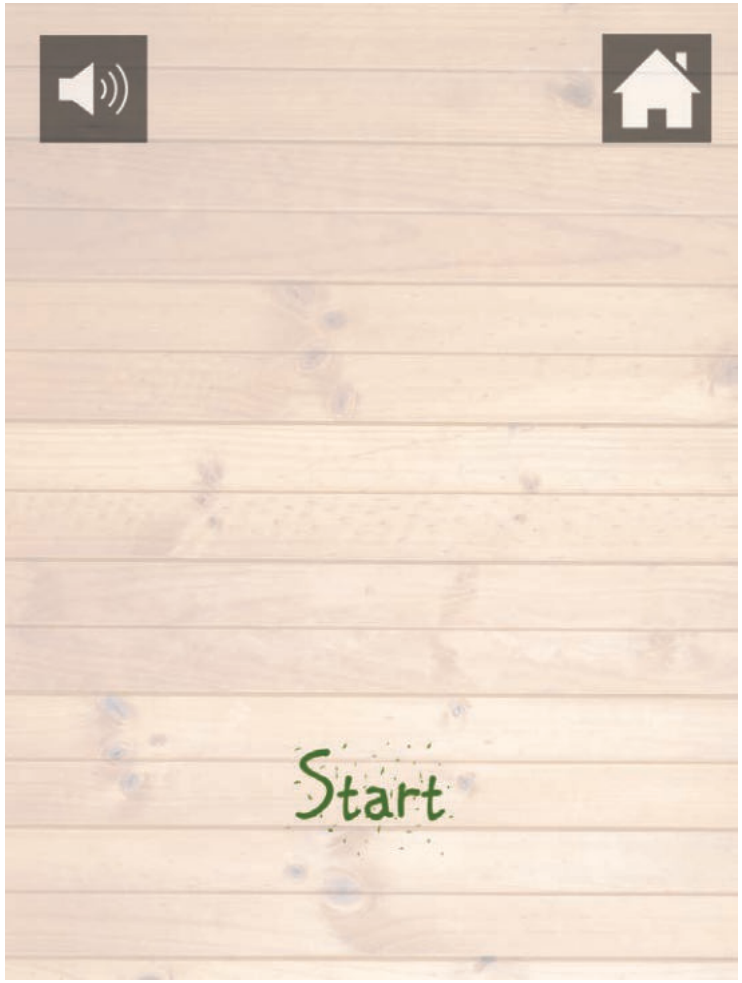
7. The corners of the screen has home and settings button.

8. Based on each creature's environment we decided to have different backgrounds. This adds a story to the game and game play.

GAME LAYOUTS



GAME LAYOUTS



GAME LAYOUTS

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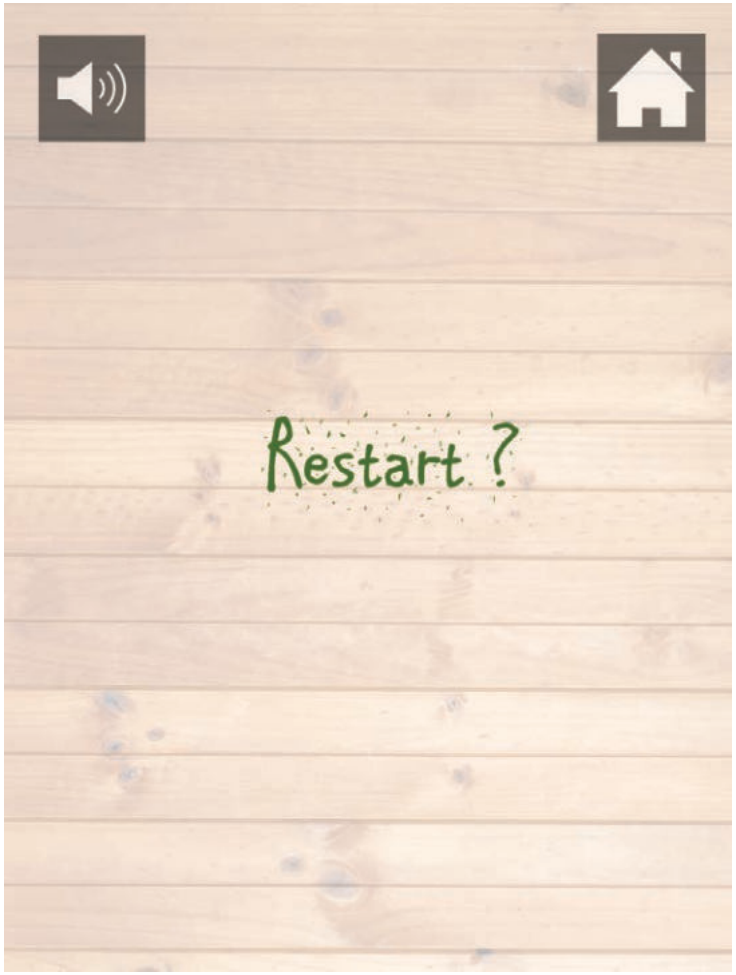

FINAL OBSERVATIONS

The bigger picture:
Schools could focus on teaching the kids things which are relevant to the lives around them. Today we follow the same way of teaching kids in rural areas that we do to kids in urban areas who have educated parents and different resources. If we can make curriculum changes in the language in which children study for relevance in understanding , why not make proper changes based on the social structures and background of the targeted kids and help them learn things they can apply in life around them.

In terms of education and learning:
Changing the method of formal book instruction and teachers guidance to a self learning and exploratory method of learning enabled the kids to think alternatively .

Player interactions with each other and co-piloting audience creates a more supportive environment rather than having only sport related activities or toys for kids to apply group mechanics.

By using elements from their own surrounding to play, we can create more relevance for kids to develop an interest in trying to understand even difficult concepts.

The teacher can understand more clearly and accurately if the kids are able to understand the concept in the right way.

CONCLUSION

The entire experience in terms of my understanding of design taught me the following:

1. Team work
2. Time management
3. Work management
4. Self initiated learning
5. Idea generation, conceptualization and execution till finalisation
6. Context and relevance
7. Most importantly the sense of achievement in making something without the help of internet.

In a world of strangeness I seek familiarity,
In a world of familiarity I seek strangeness,
The truth is one can never settle. And hence,
To move forward, regardless the outcome,
To seek challenges, to take risks, to overcome defeat
and to submit to the process of learning
that's what a game teaches us.

REFERENCES

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MP GOVERNMENT Education Portal

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