GAMIFICATION OF EDUCATION

Khel
IDC, IIT Bombay
June - July'15

Gamification of Education

8th May - 8th June 2015
IDC, IIT Bomay

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Certificate of Participation

Workshop on
GAMIFICATION OF EDUCATION

This is to certify that

Ms. Suruchi Sati

has participated in the workshop on
Gamification of Education
conducted by *Industrial Design Centre, IIT Bombay*
from *8th May 2015 to 8th June 2015*

Prof. B. K. Chakravarthy
Workshop Co-ordinator
IDC, IIT Bombay

Prof. U. A. Athavankar
Workshop Faculty
IDC, IIT Bombay

Declaration

I hereby declare that this project work entitled "GAMIFICATION OF EDUCATION" submitted to IDC, IIT Bombay, is a record of an original work. This work was done as a part of a workshop "GAMIFICATION OF EDUCATION" guided by Prof. Uday Athavankar, Professor, IDC, IIT Bombay. I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any 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 not been properly cited or from whom proper permission has not been taken when needed.

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Acknowledgement

I would like to express my deepest appreciation to all those who provided me the guidance this project. A special gratitude I give to our project coordinator Prof. Uday Athavankar , whose contribution in stimulating suggestions and encouragement, helped me to coordinate my project.

Furthermore I would also like to acknowledge with much appreciation the crucial role of Rajya Shiksha Kendra, Madhya Pradesh and IDC, IIT Bombay, for conducting this workshop and helping it shape into the project of 'KHEL' ; and to Mrs. Bhavana, Mrs. Sharmila and all visiting coordinators, who provided us all required equipments and the necessary materiasl to complete the task.

A special thanks goes to my team mates, Mr. Swoyanshu Barik and Ms. Namrata Primalani, who put in their sincere efforts to execute this project together.

Abstract

Indian education system has been lacking many appropriate and necessary resources and therefore, has failed to be effective, for a very long time. It has often been criticized for being too rigid and based on rote learning rather than problem solving. There is also an acute shortage of qualified Indians in Indian education system. Apart from the obvious issues, there are also many deeply embedded problems that need to be studied and worked upon, in order to improve the quality of education.

'KHEL' is an ambitious project aimed at improving the quality of education in the schools of Madhya Pradesh, and hence make a contribution to the betterment of the Indian education scenario, by generating supplementary material based on game-plays and activities.

The opportunity to be a part of this project offered to encompassed many of aspects of quality education and learning based on thorough research and interactions, and resultantly provide us, participants, with an opportunity to contribute to the possibility of a better future for the underprivileged kids in Madhya Pradesh.

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Khel

Gamification of Education

Introduction

KHEL 'The Gamification of Education' a project by **IDC** in collaboration with **RSK (Rajya Shiksha Kendra)** for government schools of Madhya Pradesh, and **MHRD (Ministry of Human Resource Development)** focused on exploring and creating supplementary material that is game based and interactive in order to enhance the quality of learning in primary schools across the state of Madhya Pradesh.

The project is ongoing, the initial phase of which was completed over a span of one month.
(8th May - 10th June'15).

The first phase of the project, which included basic ideation and production of games for trial, recruited around 20 students and practising designers from different design schools and workspaces in India.

Project contributors were all divided into a total of 8 groups. Every group was allotted a topic each, from the curriculum of 1st to 5th standard, ranging from Maths to Language Studies.

'KHEL', apart from time slots utilised on creating games, featured a wide variety of workshops, activities, interactions, presentations and field trips to facilitate and promote a multidimensional approach to making engaging learning games. Some of the prominent ones are listed in the following pages.

The workshop-cum-project culminated in production of a set of games by each group, consisting of the final draft of a Board Game and a Digital version largely based on the board game.

Game design workshops

Workshop conducted by Prof. Uday Athavankar featured many interactive sessions and indoor and outdoor activities focused on helping students understand the basics of game design.

Workshops that were held towards the end, focused on adapting the game designs for a tablet, exploring numerous possibilities that come with a digital platform.
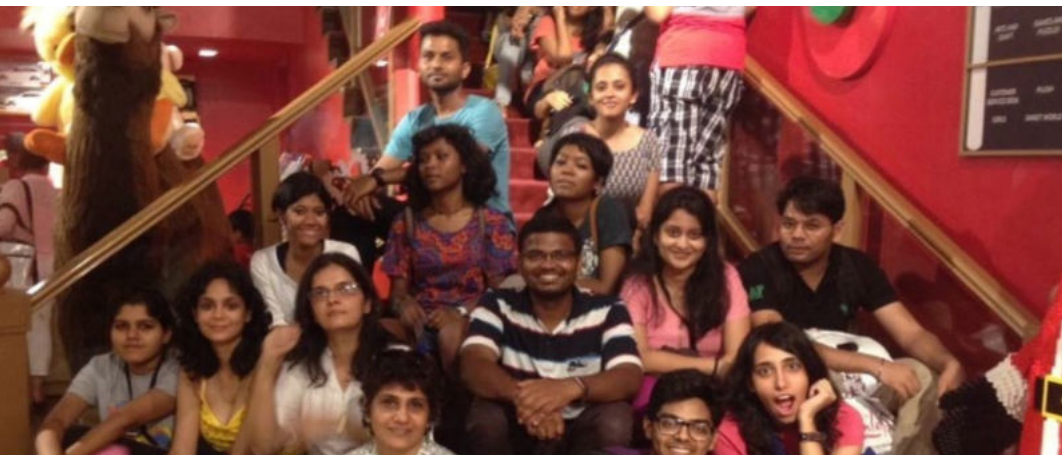
Field Trips

A fun outing to the Bhau Daji Lad Museum holding the exhibit 'Games People Play' followed by exploring the toy store Hamleys' at Phoenix Mall.

Interactions

Presentation by RSK team on their own learnings and attempts at gamification of education from relevant curriculum, exposed students to a more precise and focused look at the problem areas in learning through gamification.

Brainstorm sessions were held between 'Paper Boat' team and the student groups on taking their game designs forward and translating them into digital games.

Consistent interactive trial sessions with kids of relevant age groups were held at regular intervals, to ensure that the games were efficient at teaching the subject matter, while being sufficiently engaging.

Project objective

To create supplementary material to improve the quality of learning.

To improve the level of engagement of students.

To simply introduction of complex ideas and concepts.

To reinforce and ensure retainment of material studied earlier.

Target group & Syllabus

The target group of the project is underprivileged kids, specifically studying in schools in Madhya Pradesh, belonging to the age group of 5-10 years (Class 1st to 5th).

The syllabus for kids of this age group has been specified below :

Class 1 :

• Visual introduction of coins and notes.
• Understanding basic of the Indian Currency,   and their segregation into coins and notes (From 1 to 100).
• Segregation of value of money
  (10 Rs. = 5 + 2 + 2 + 1 Rs.).

Class 2 :

• Basic chunking in Coins & Notes of higher values (Rs. 1 - 10)
• Components & segregation in the value of 1 Rupee.

Class 3 :

• Basic operations in money without conversions. (Addition, subtract, multiplication, division) (Example : 75 p = ?   x   25p).
• Understanding segregation of rupee up till 100 (Eg : 5 Rs. x 8 = ?)

Class 4 :

• Ability to recognise notes up till 1000.

• Operations in money (Addition, Subtraction, Multiplication, Division) (with conversions).

Class 5 :

• Making bills.
• Addition of larger amounts on money.

Objective

To design a game that would :

Make kids acquainted with Indian notes and coins
currently in circulation + the outdated ones
(through picture based activities.)
(PRE GAME - Preliminary Activity)

↓

Make them understand the basic difference between
coins and notes (Difference between the physical
properties of notes and coins.)
(PRACTISE - Board game 1 : Basic Level)

↓

Basic operations in value of money - Paisa and Rupees
(Addition and subtraction)
(POST GAME - Revised game 1 : Complex Levels)

Process

- Understanding the syllabus.
- Analysing kids' understanding on the subject through their response on an outdoor activity (Basic version of Board Game)

Activity 1

(Outdoor / Indoor Activity)

↓

- Spotting problem areas.
- Planning out a board game based on the previous activity.
- Reviewing rules & adding new/modified fun elements to the game, based on kids' response.
- Introducing theme based which improves the interest of the kids to play the game.

Board Game

(Level 1)

First Draft

↓ ↑

Reviewed Version

↓

- Levelling the game up to include operations in bigger values and ability to recognise notes up to 100.

Board Game ┄┄► **Digital Version**

(Multiple levels)   **(Multiple levels)**

Modified for digital platform.

Preliminary activity

'Chori Chori'

A basic board activity, introducing kids to the visual specifications of coins and notes, and the difference between the two, by focusing on their physical properties.

Activity Board

Playing Pins

Dice

Note and coin tokens

Elements

The activity consists of an Activity Board, maximum four playing pins, tokens of Notes & Coins, and a Dice.

The activity required kids to identify and differentiate between coins & notes based on their physical properties and values, hence introducing kids to the idea and concept of money.

Problem Areas

Video documentation showed that kids had just a **basic idea of the concept of money**, but weren't well versed with details such as, the value of money, or the hierarchy of values in money.

They also found it **hard to draw parallels between coins and notes.**

Adding, subtracting or segregating money (generating change) was an unknown territory to the younger ones.

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Key-points

The game had to be **simple to understand** as the target group had no prior knowledge of the functioning of money.

The **difference as well as, similarity in the values of notes and coins** had to be emphasised upon.

Basic **adding and subtracting of money** was to be included in the gameplay to understand basic operations on value of money.
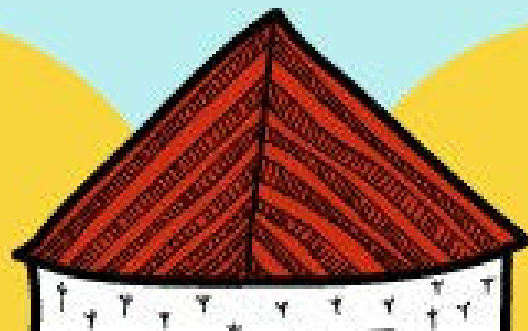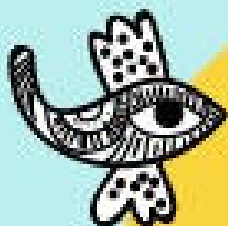
जेबखर्च

" कमाओ और लुटाओ "

**A board game
on money**

Introduction & theme

The Board Game **"जेबखर्च"** imitates real-life situations in which people interact with money, hence giving kids an opportunity to gain practical knowledge on the subject of money. The game is meant to be played between **two to four players**.

Storyline :
The board represents a village and the circles represent houses in it. A vender sells different objects with different price value in the centre of the village. The players are supposed to land on different houses to help the people with their work and resultantly earn enough pocket money to buy the items on sale by the vendors.

Theme :
Considering the target audience that mostly belong to the villages in MP, '**Gond' Art style**, the folk art widely practised in Madhya Pradesh, was chosen for execution.
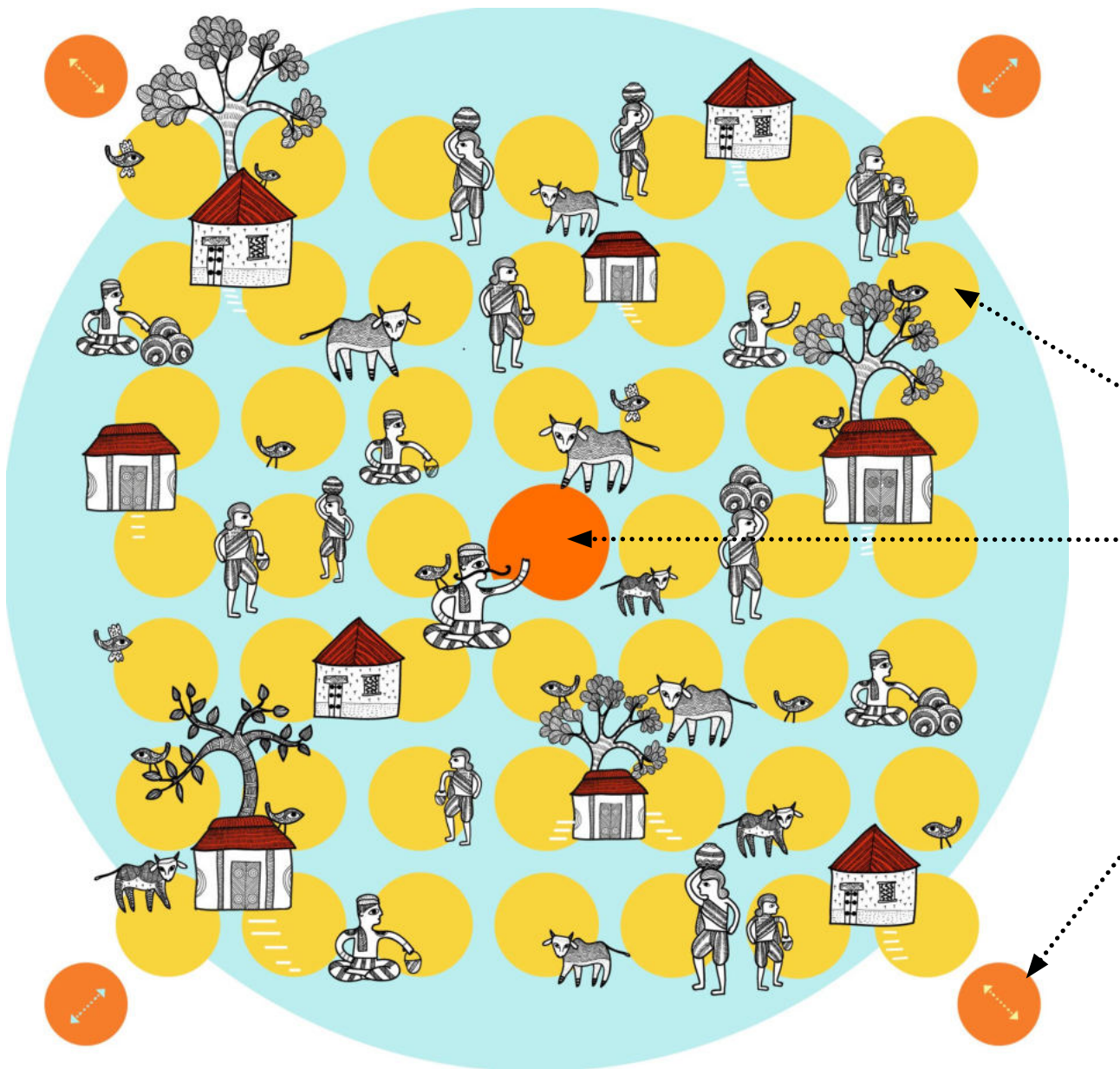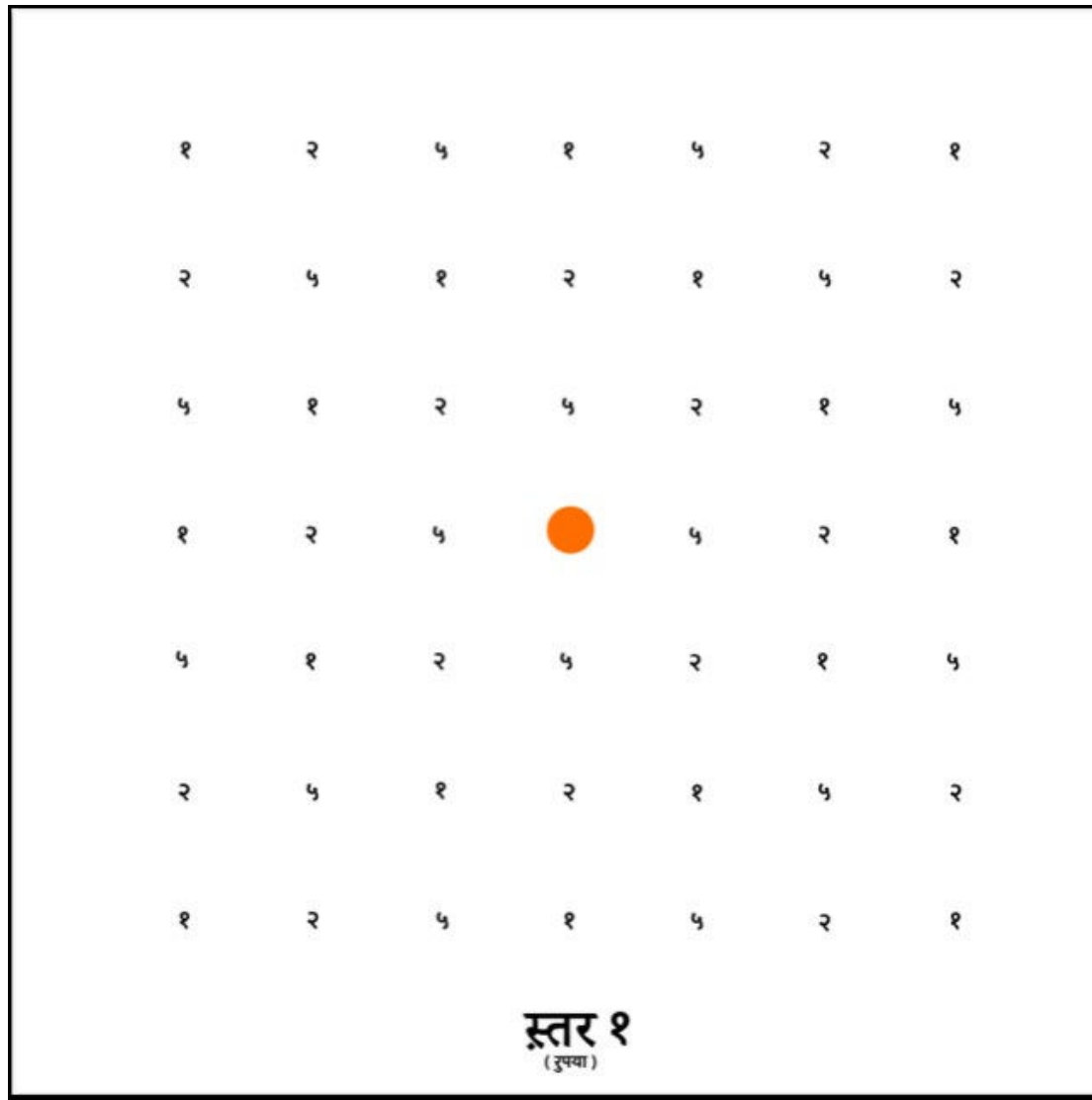
Elements

Game Board

Scoring Tiles - These yellow tiles contain notes and coins of varying values that can be earned by the players upon landing on one.

Vendor's Tiles - The vendor's tiles contains items on sale which are to be bought by the player once any of the players accumulate enough money precisely equal to the value of the item on sale. Each time an item is bought by one of the player, another item is put up for sale on the vendor's tile. Each round allows the sale of maximum five items, until the money on the board is exhausted.

Teleportation Tiles - Any of these orange tiles enable the player to teleport to the other orange tile diagonally facing it in the other end, allowing players to cover the entire board with lesser efforts.

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स्तर १
(रुप्या)

Elements

Level Sheets

These transparent sheets that are to be placed on top of the game board before starting the game, **specify the value of money tokens** that will be placed in each tile. Apart from specifying the values for addition, the sheet also specifies money values for subtraction as it displays the amount of money in each tile, once it has been taken away by any of the players.

There are total **7 level sheets,** each sheet representing a certain ocmbination of coins and notes, determining it's level of difficulty.

Elements

Players' tokens

The game allows maximum four player to play against each other.

Each player is to be assigned one of these coloured tokens in the beginning of the game.

Each token has two faces, the upper face with the '+' is used for addition and the lower face with the '-' sign is used for subtraction of values.

₹ १२५
बैट (Bat)

₹ ६२
बॉल (Ball)

₹ १०२
विकेट (Wicket)
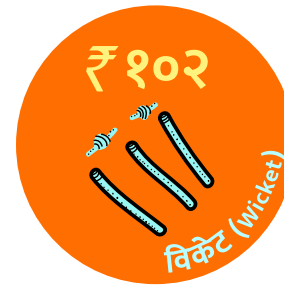
Elements

Vendor's token

Token that display the value of items on sale (To be placed in the vendor's tile in the center).

Money token

Token that the players are supposed to earn in oder to buy any item on the vendor's token. (To be placed on the play yellow tiles)

Dice

The dice determines the number of steps that will be taken by each player on the board upon their turn.

Gameplay

Four players start the game from four corners of the board.

An object with a price tag is placed on the board.

The first player rolls the dice to begin the game and according to the number on dice the player moves his color token that many steps on the board such that he is able to get more money. Wherever he keeps his token the player collects that amount of money (notes,coins,paisa) and keep it with themselves (like an account).

The players can move only horizontally or vertically. Diagonal move is prohibited.

The players have the choice to move either horizontally or vertically on the grids such that their move will fetch them more money.
If one of the players land on the same grid as the other player who was previously standing on the grid, he can claim the money from the player who was on the grid earlier.

When a player lands on one of the corners on the board, he has the choice to teleport to the corner which placed diagonally opposite on the board.

If the players exceed the target value then they can subtract a certain amount from their account in order to achieve the target.

The player who exceeds from the target has to try to land on the empty grid which was containing the amount that he wants to subtract from his account. He takes out that amount of money from his account and keeps on the empty grid.

The player also has the option to exchange a bigger value with small denomination of same value.

The player sitting diagonally to each other can make a team. So the two teams will play against each other.

Two players of the same team can add whatever they earn and try to achieve the target value first.

The team members won't claim money from each other when they lands on same grid.
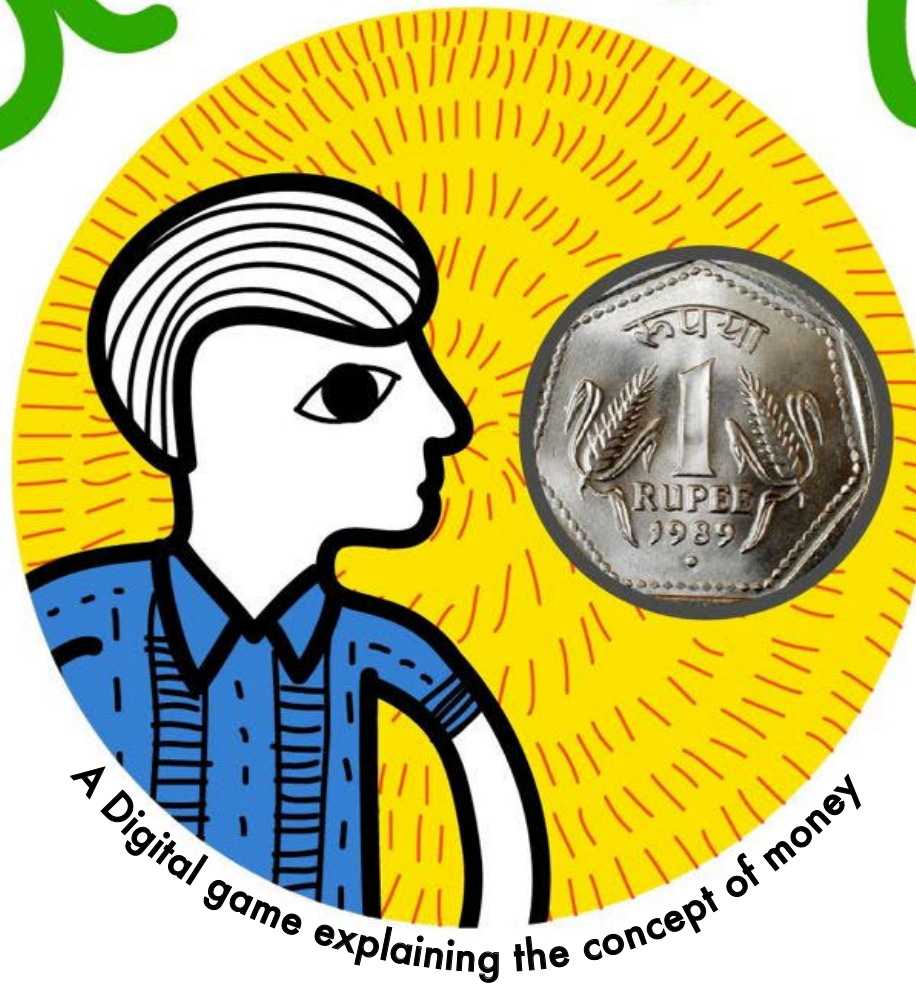
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(रुपया)
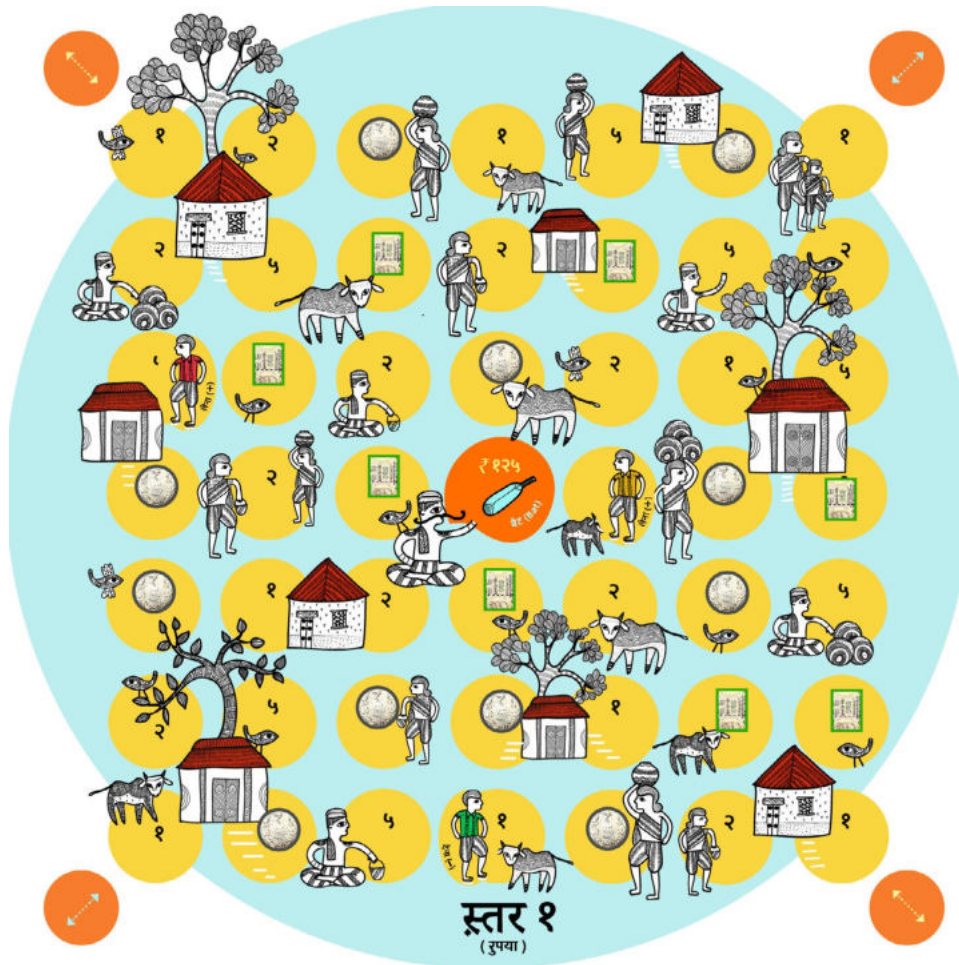
Winning

The player or team that is able to **generate the money of the target** value first wins the sale round.
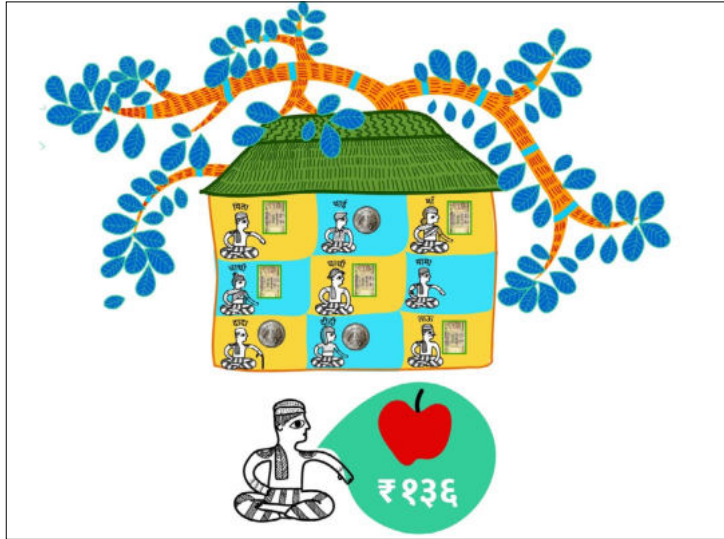
The player or team that is **able to buy items of the most accumulated value**, wins the game.

उधारवर्षे

A Digital game explaining the concept of money

Opening screen for each round.

Screenshots
of the proposed
design

Game Board Screen.

Personal account / earnings screen.

Digital Iteration

The **digital version of the board game** is, more or less, based on the mechanics of the same game, was introduced, along with a few modifications making it more suitable for a digital platform.

Following are the specifications that were considered while recreating the board game for a digital platform :

- Tablets (800x480 px / 7" inch tablets, Android)

- Interactive / Encouraging interaction based learning.

- Could be played by more than one player. (2-4 Players).

Setting :
The digital version of the game **"जेबखर्च"** has the same gameplay and follows the same theme and storyline.

It can be played by 2 - 4 players who can also together as teams to play against each other.

The digital version requires a common tablet which will display the gameboard, while separate tablets can be used to keep account of one's earnings.

It also has may interactive elements
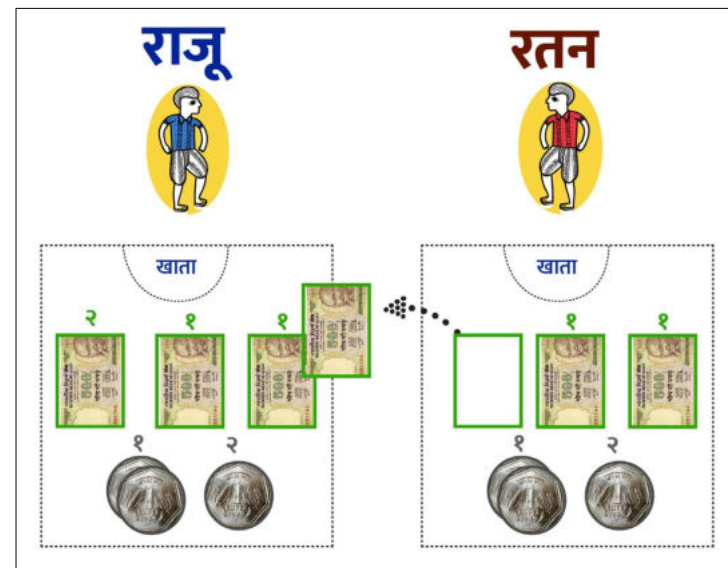(attack and counter-attack, blocking and unblocking).

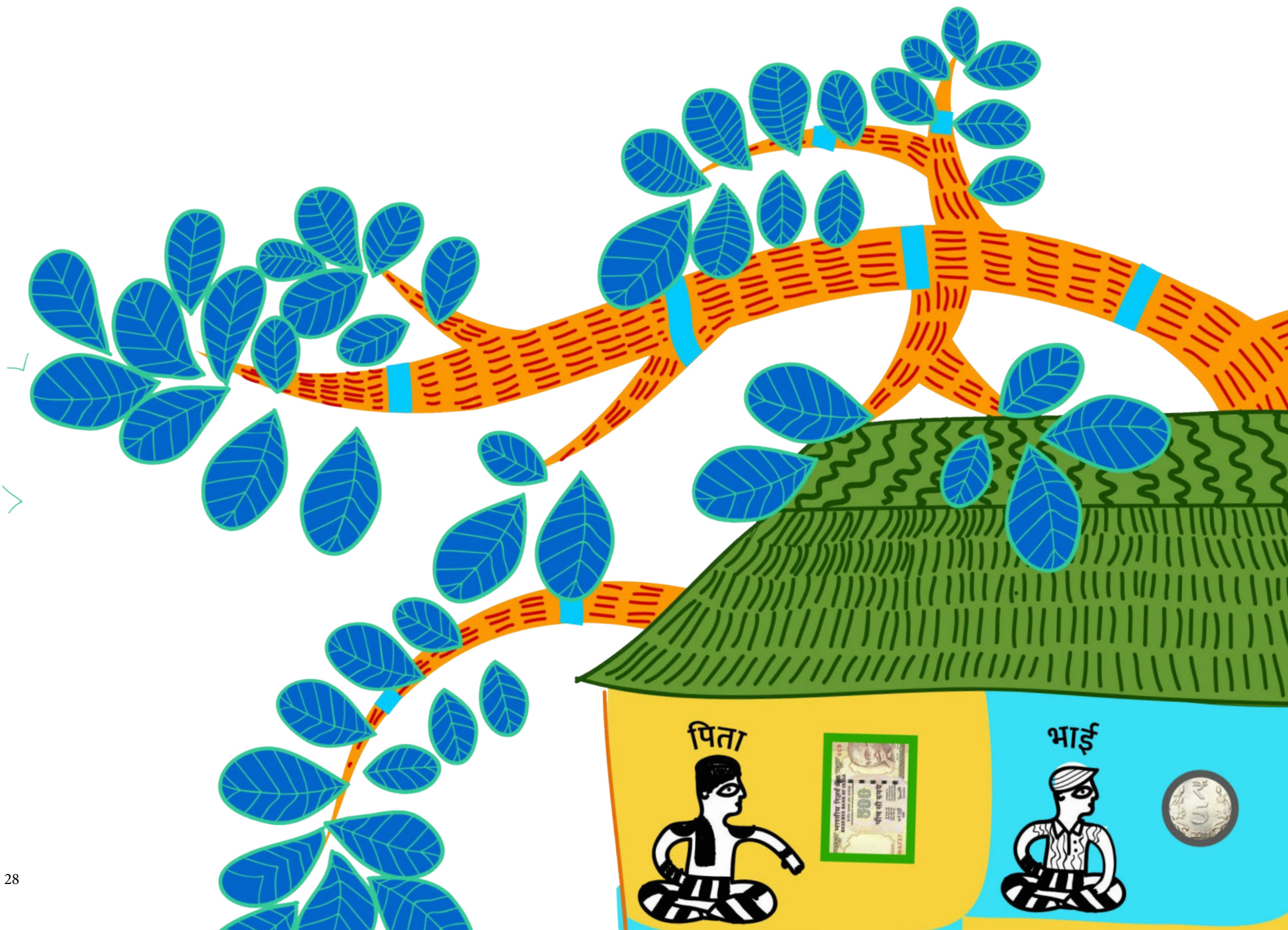Player introduction / Number of players display.

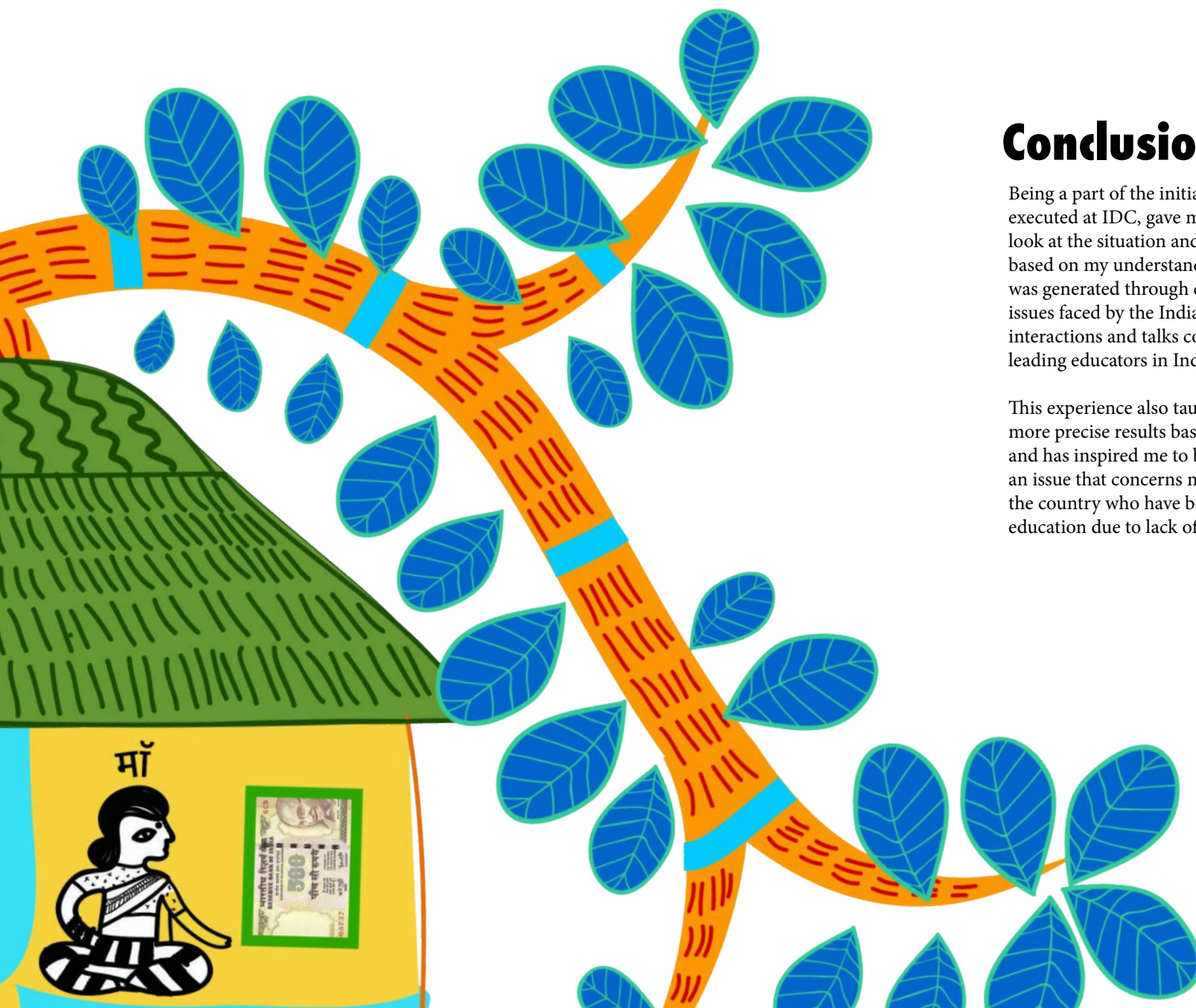Stealing onset screen.

Stealing defense.

Stealing commencement screen.

Conclusion

Being a part of the initial phase of the project, executed at IDC, gave me an opportunity to closely look at the situation and offer my own solutions based on my understanding on the matter which was generated through consistent exposure to the issues faced by the Indian education system via, interactions and talks conducted by some of the leading educators in India.

This experience also taught me to come up with more precise results based on thorough research and has inspired me to be more sensitive to an issue that concerns millions of children in the country who have been deprived of quality education due to lack of resources and efforts.

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