

Project-1, Boski Jain, 146250006

Gamification of Education

8th May - 8th June 2015

About the Project

This project is a collaboration between IDC, IIT B along with RSK (Rajya Shiksha Kendra) for creating game based supplementary material for the government schools of Madhya Pradesh.

Project objective

Exploring online and offline game design solutions to enhance the quality of learning in primary schools across the state.
(class 1 -5, particularly in subjects like Mathematics and language)

Observations

- **The quality of learning**—as measured by reading, writing, and arithmetic has either shown no improvement or actually worsened in the last few years.



Class 5 level students who can read a text of class 2 level

61.3%	47%
2005	2013

Class 8 level students who can do division

69.8%	46%
2005	2013

Class 3 level students who can read class 1 texts

40.4%

2011

40.2%

2013

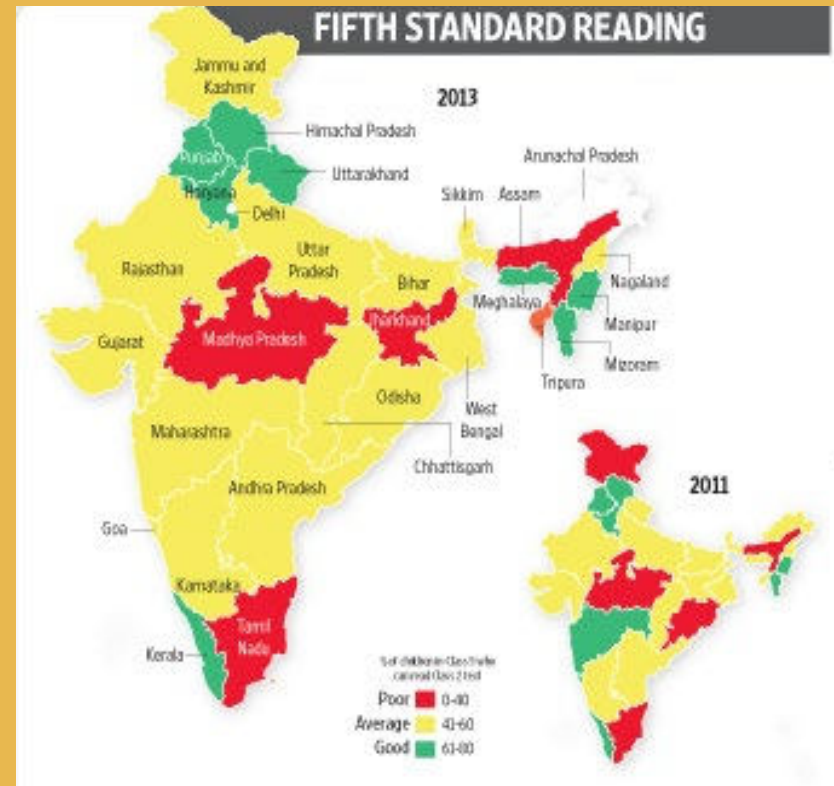
Class 3 level students who can do simple subtraction

30%

2011

26.1%

2013



Observations

- Enrollment in private schools.

Student enrolment in private schools

2005 16.3%
2013 29%

Table A2: NUMBER OF INSTITUTIONS BY MANAGEMENT

Sl. No.	States/ Union Territories	Primary Schools								Total
		Government		Local Bodies		Private Aided		Private Unaided		
		Number	%age	Number	%age	Number	%age	Number	%age	
1	2	30	31	32	33	34	35	36	37	38
1	Andhra Pradesh	5074	7.6048	51303	76.89	2091	3.134	8253	12.37	66721
2	Arunachal Pradesh	1911	91.087			10	0.477	177	177	2098
3	Assam	30054	96.3	580	1.9			568	1.8	31202
4	Bihar	42050	99.853			18	0.043	44	0.104	42112
5	Chhattisgarh	32929	93.146			278	0.786	2145	6.068	35352
6	Goa	899	73.089			178	14.47	153	12.44	1230
7	Gujarat									
8	Haryana	9343	66.798			171	1.223	4473	31.98	13987
9	Himachal Pradesh	10577	94.32	0	0	3	0.027	634	5.654	11214
10	Jammu & Kashmir	13825	89.505	1	0.006			1620	10.49	15446
11	Jharkhand									26731
12	Karnataka	22766	87.734	4	0.015	228	0.879	2951	11.37	25949
13	Kerala	2607	38.417			3911	57.63	268	3.949	6786
14	Madhya Pradesh	28479	65.226			410	0.939	14773	33.83	43662
15	Maharashtra	526	1.0538	43204	86.56	2588	5.185	3597	7.206	49915
16	Manipur	1875	77.479			405	16.74	140	5.785	2420

Observations

- **Student - teacher ratio:**

Right to education act (RTI) mandates an optimal student teacher ratio of 30:1 for all Indian Schools.

No. of schools: 28,479

No. of teachers: 1,91,705

No. of students: > 1 crore

Student- teacher ratio in schools:

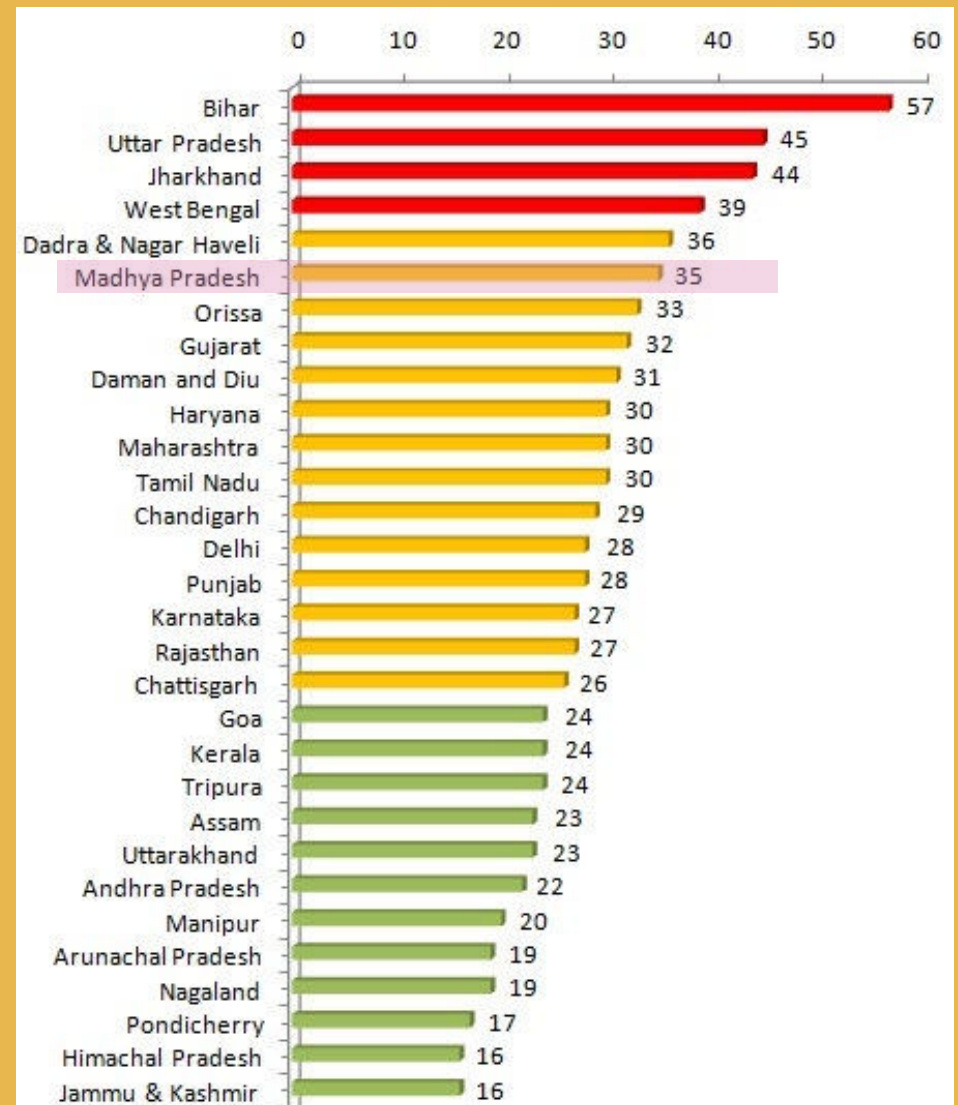
primary schools: 38.26

middle school: 35.79

Single teacher schools:

primary schools: 14510

middle school: 3431



Need for better material

The RSK team was eager to include designers to see what more inputs could be brought in.



Gamification

Is the concept of applying game-design thinking to non-game applications to make them more fun and engaging.

Why apply it here

- To create aids for teachers and text books
- To help generate more interest in subjects
- To create activities which can be passed from one generation to another

Learning areas

(class 1-5 curriculum: Mathematics, Hindi, English)

- Number system
 - Operations
 - Measurements
 - Geometry
 - Fraction/ Decimal system
 - Commercial Mathematics
-
- English- basics
 - Hindi- basics

Learning areas

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- Number system
 - Operations
 - Measurements
 - **Geometry**
 - Fraction/ Decimal system
 - Commercial Mathematics
-
- English- basics
 - Hindi- basics

Group:

Shubit Sagar- NID (Exhibition and Space design)

Saloni Dandavate- NID (Animation Design)

Boski Jain- IDC VC

Curriculum

	Class 1	Class 2	Class 3	Class 4	Class 5
Shapes	Triangle, circle, square	3D: Sphere, cube, cylinder, cone	Closed and open shapes	-	types of triangle- sides and angles, sum of angles is 180
Surfaces	-	Curved and Plane, Counting the no. of surfaces	-	-	-
Lines	-	Horizontal, Vertical, Slant	Straight, curved	-	Lines, line- segment and rays, parallel and perpendicular
Vertices and sides	-	-	No. of vertices: square, triangle, circle	-	-
Construction of circle	-	-	-	Using thread, radius, diameter, circumference, chords	Circle with a given radius
Angle	-	-	-	Types without measurement	Vertices, arms, measurements, classification
Symmetry	-	-	-	Identifying symmetrical and asymmetrical objects	Axis of symmetry
Perimeter	-	-	-	Concept of circumference	Formula for square and rectangle
Area	-	-	Understanding $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{3}{4}$	-	Concept of area

Curriculum | Problem Areas

	Class 1	Class 2	Class 3	Class 4	Class 5
Shapes	Triangle, circle, square	3D: Sphere, cube, cylinder, cone	Closed and open shapes	-	types of triangle- sides and angles, sum of angles is 180
Surfaces	-	Curved and Plane, Counting the no. of surfaces	-	-	-
Lines	-	Horizontal, Vertical, Slant	Straight, curved	-	Lines, line- segment and rays, parallel and perpendicular
Vertices and sides	-	-	No. of vertices: square, triangle, circle	-	-
Construction of circle	-	-	-	Using thread, radius, diameter, circumference, chords	Circle with a given radius
Angle	-	-	-	What are angles. Their types without measurement	Vertices, arms, measurements, classification
Symmetry	-	-	-	Identifying symmetrical and asymmetrical objects	Axis of symmetry
Perimeter	-	-	-	Concept of circumference	Formula for square and rectangle
Area	-	-	Understanding $1/2$, $1/4$ and $3/4$	-	Concept of area

Physical Games

indoor and outdoor activities

8th May - 20th May

Game 1



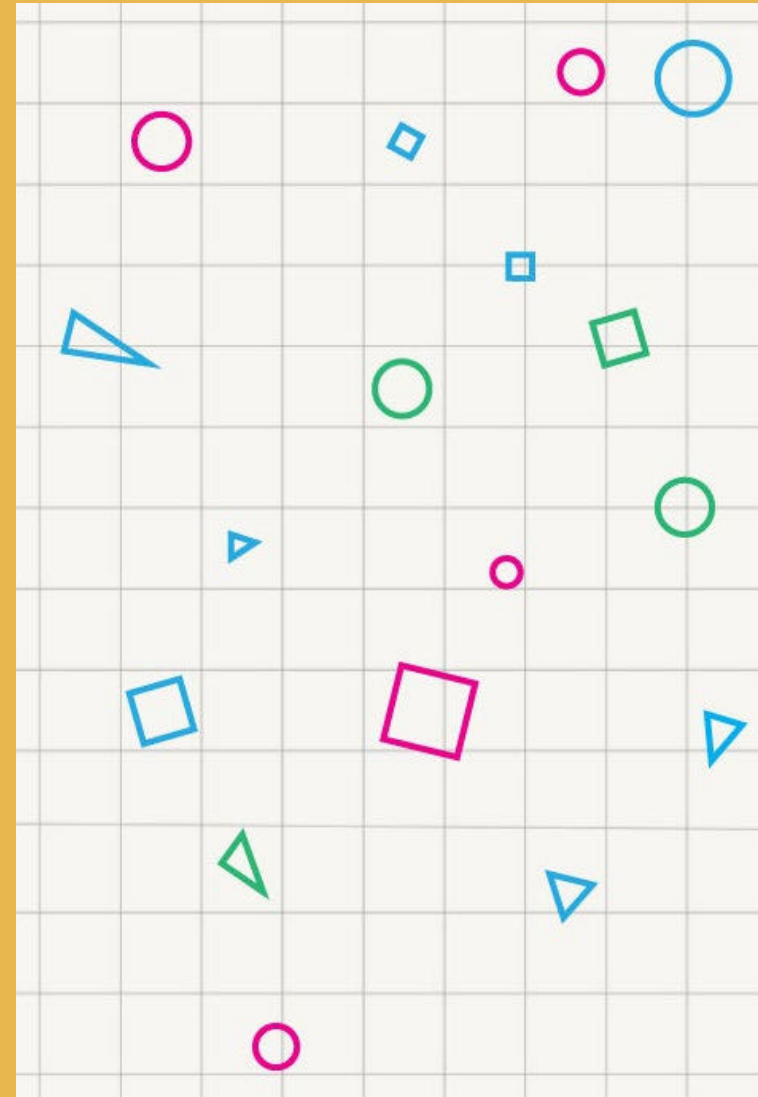
Educational objective:
Introducing shape. Application of gained
knowledge of shapes

Age group:
4-6 years of age

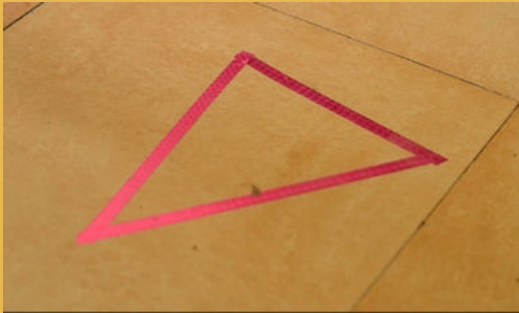
Mode of Play:
Can be played outdoor and indoor

Gameplay

- Basic shapes are drawn randomly around the floor.
- Line by line a rhyme is recited that the kids repeat as they run around in circles.
- At the end of the rhyme, the conductor announces the name of a shape.
- The kids have to identify the announced shape from the drawings on the floor and stand on them.
- Once a kid reaches and stands on the shape he has to shout out the name of the shape.
- One who is left out or stands on the wrong shape loses.
- One who reaches the shape last loses.
- The one who survives the longest wins.



User Test

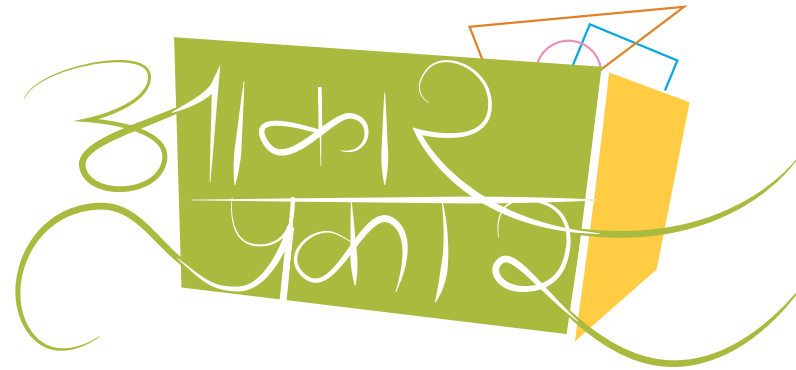


The kids have to identify the announced shape from the drawings on the floor and stand on them.

Scope

- Introduce images of 3D shapes (cube, sphere, cuboide and cone)
- Introduce images of everyday objects
- Incase of no instructor, children can alternatively take responsibility.

Game 2- Akaar Prakaar



Educational objective:

Understanding the concept of the shape
(number of corners and sides).
Recognizing the shape and naming it.

Age group:

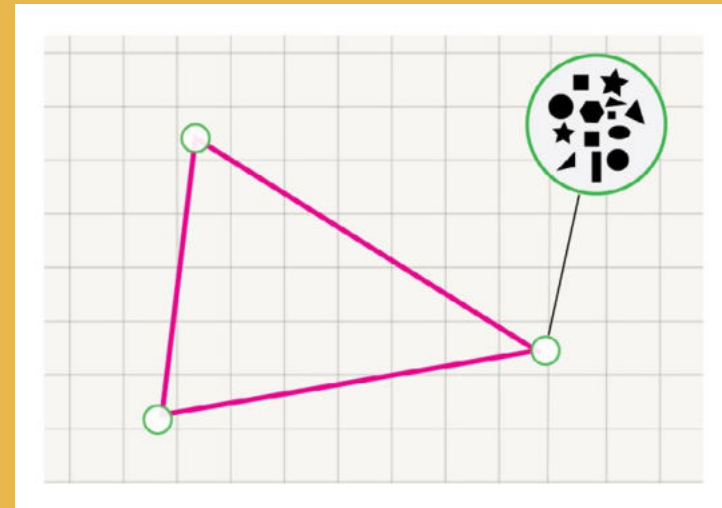
4-8 years of age

Mode of Play:

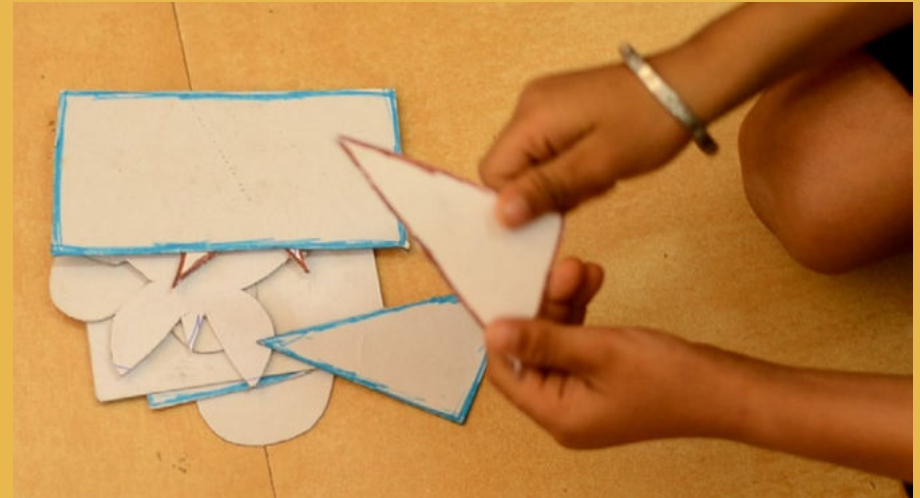
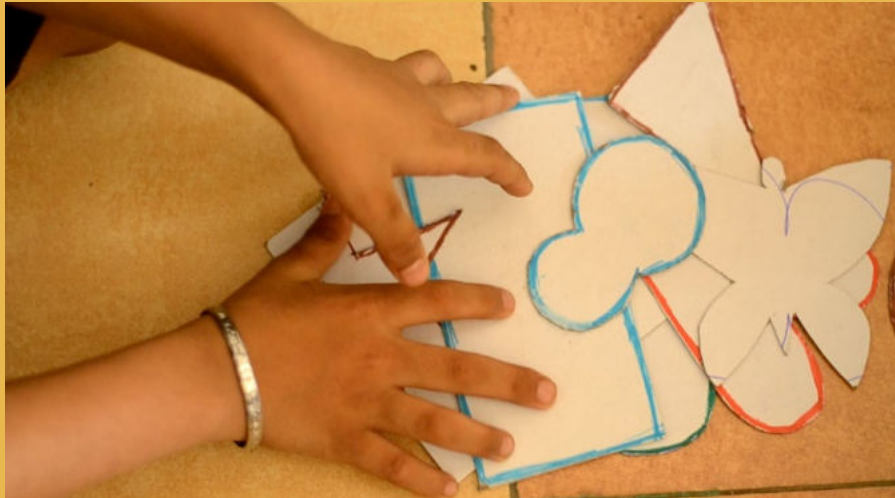
Indoor activity

Gameplay

- 2 teams with minimum 2 people in each.
- There is a set of 2D and 3D shapes kept in between the 2 teams.
- These shapes include basic as well as random shapes.
- One team plays at a time.
- The team that plays has one person blind folded while the other stands outside helping the player.
- The blind folded player has to pick out the given shape from the pile of shapes .
- The opposite team players are allowed to distract by prompting the wrong answers while the partner prompts the correct one.
- The team to collect the maximum number of correct shapes in the minimum amount of time in one round, wins.



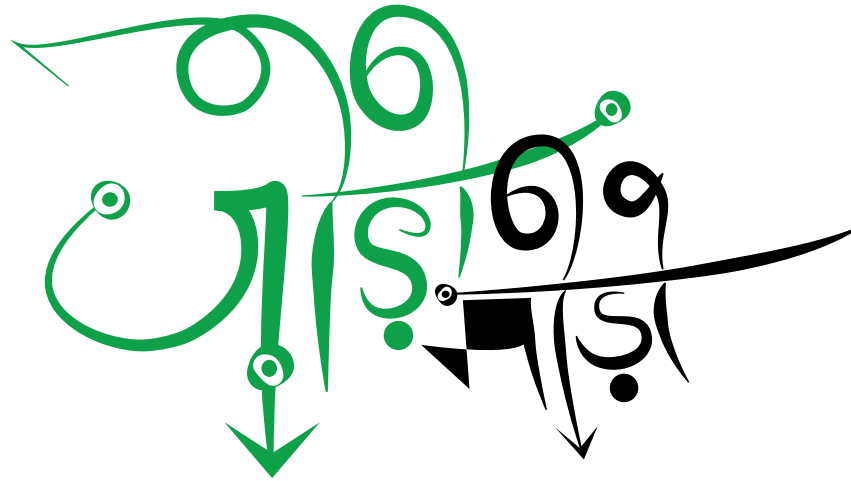
User Test



Scope

- Introduce actual 3D forms while the player is blind folded.
- Introduce shapes from everyday objects
- Kids can also sit blind folded with a pile of shapes and guess them
- Learning angles

Game 3



Educational objective:

Introducing point, line, segment and ray.
Understanding their properties. Application
of the gained knowledge

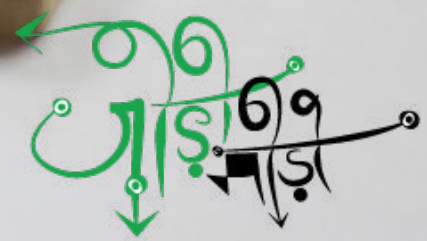
Age group:

8 years and above

Mode of Play:

Can be played outdoor or indoor

Game 3- final prototype

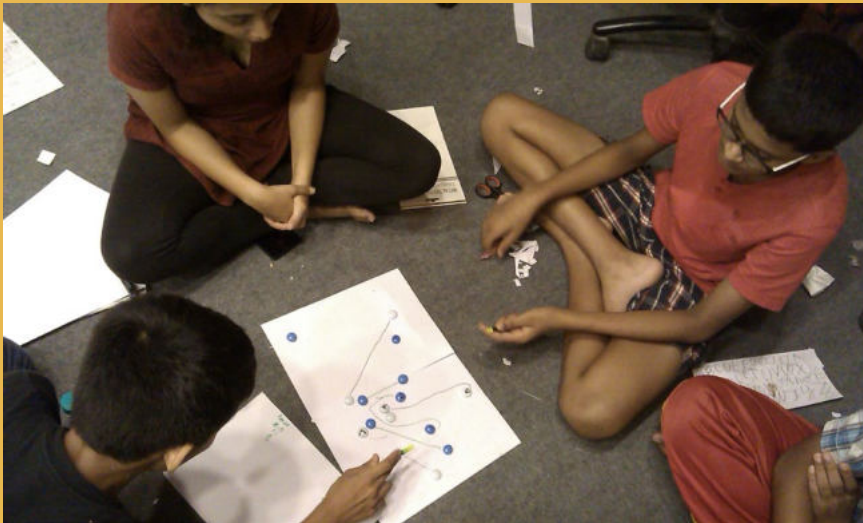


Game 3- final prototype



Scope

- More levels can be created that angles, closed shapes.
- An explanatory video to teach the concepts can overcome the problem of absence of a teacher.
- Similar rules but played as a board game by two players.



Observations

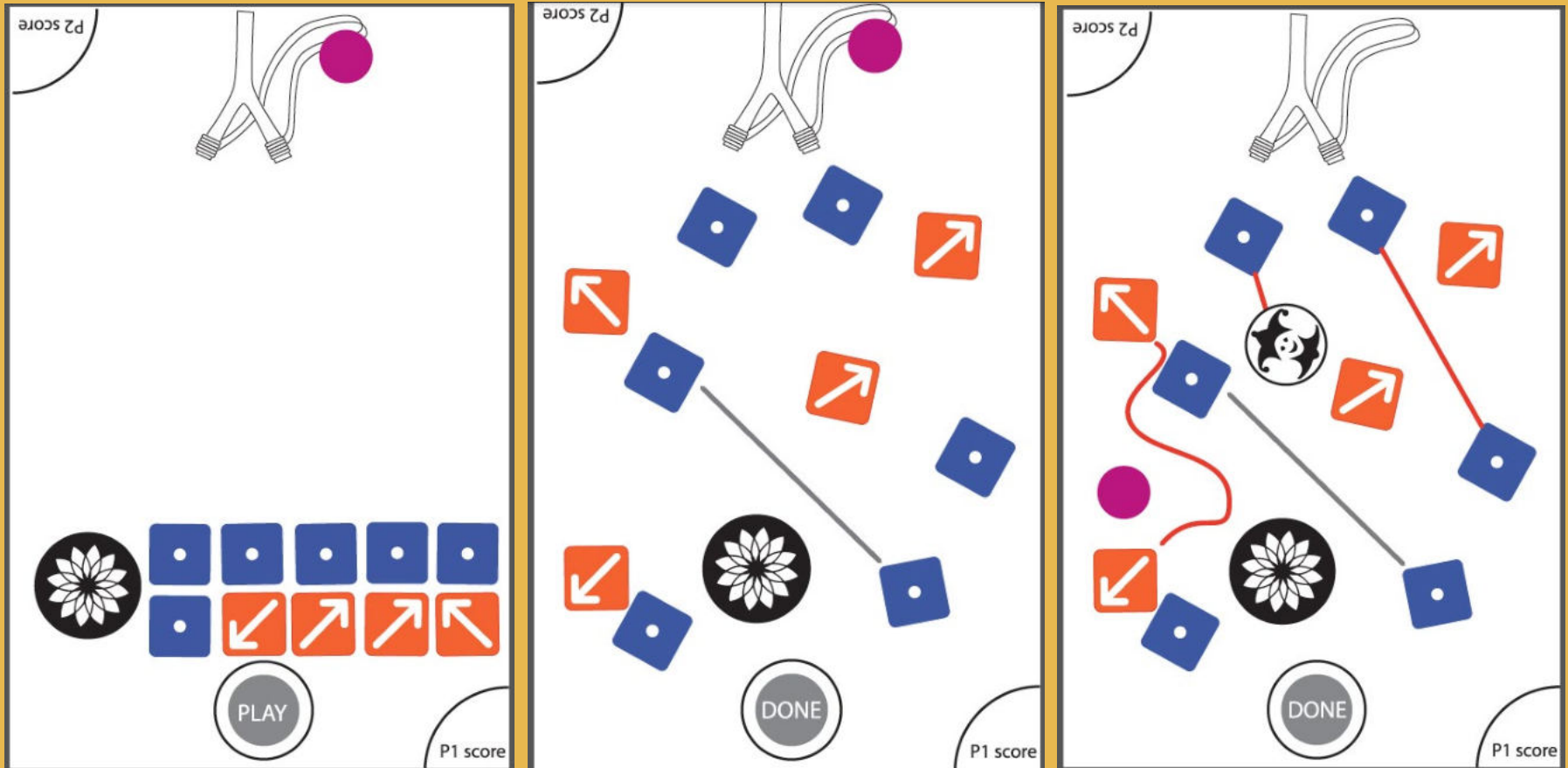
- Why did the games work?
 - Running
 - Singing
 - Prompting
 - Blind folding
- Older kids can teach younger kids
- Always requires an instructor
- Power to strategize in Game 3
- The unpredictability of the direction of arrows often lead to many being left out.

Digital Game (8th May - 20th May)

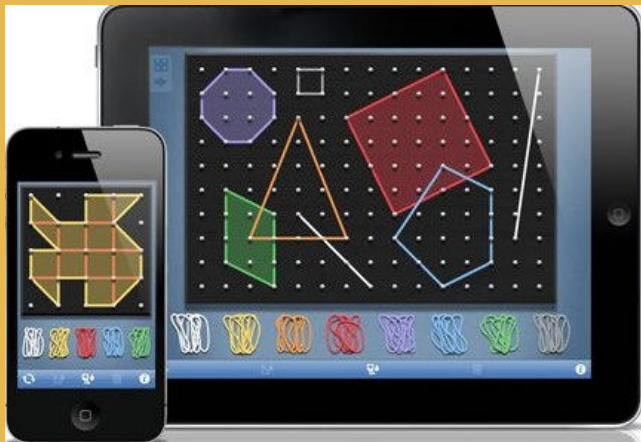
- For Aakash tablets (800x480 px, android)
- 2 or more players

First Attempt

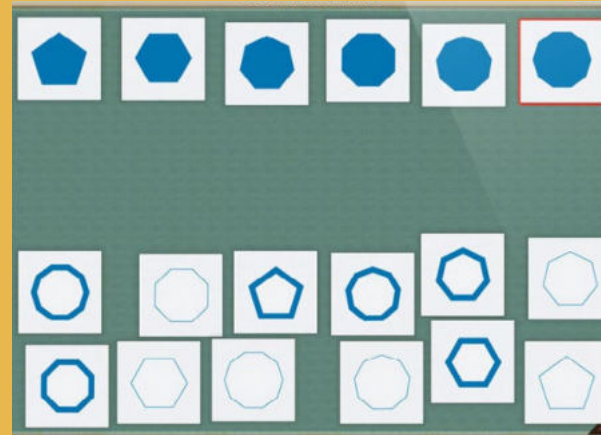
2 player game with rules similar to the physical game.



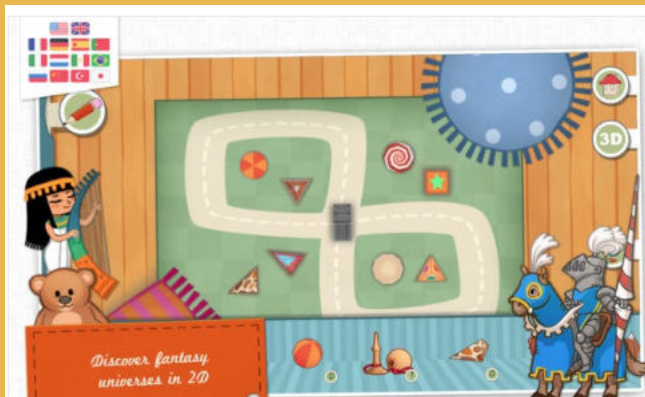
Similar Apps



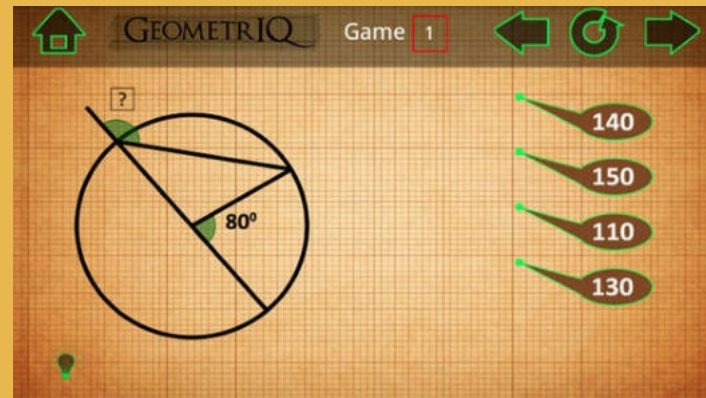
Geoboard



Geometric cabinet



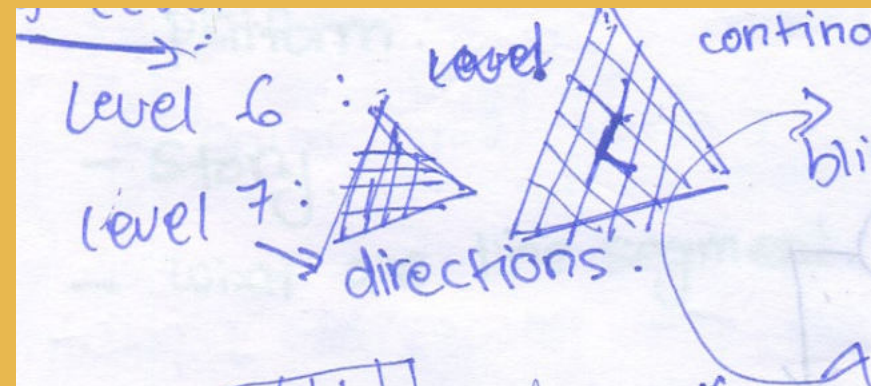
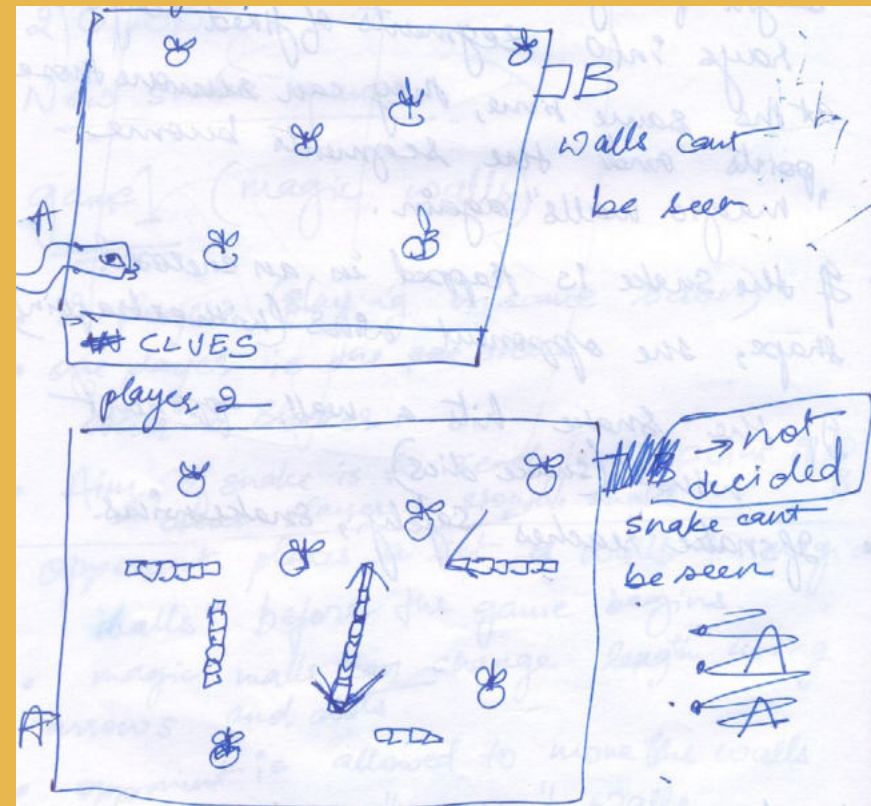
Geometric universe



GeometryQ

More Inputs

- Creating a maze with lines, line segments and rays
- Using some element like 'snakes' game: movement on a grid, getting trapped etc.
- Put a story around the task (theme).
- Should give equal opportunities for strategies to all players.
- Should keep them involved.
- Should be fun.



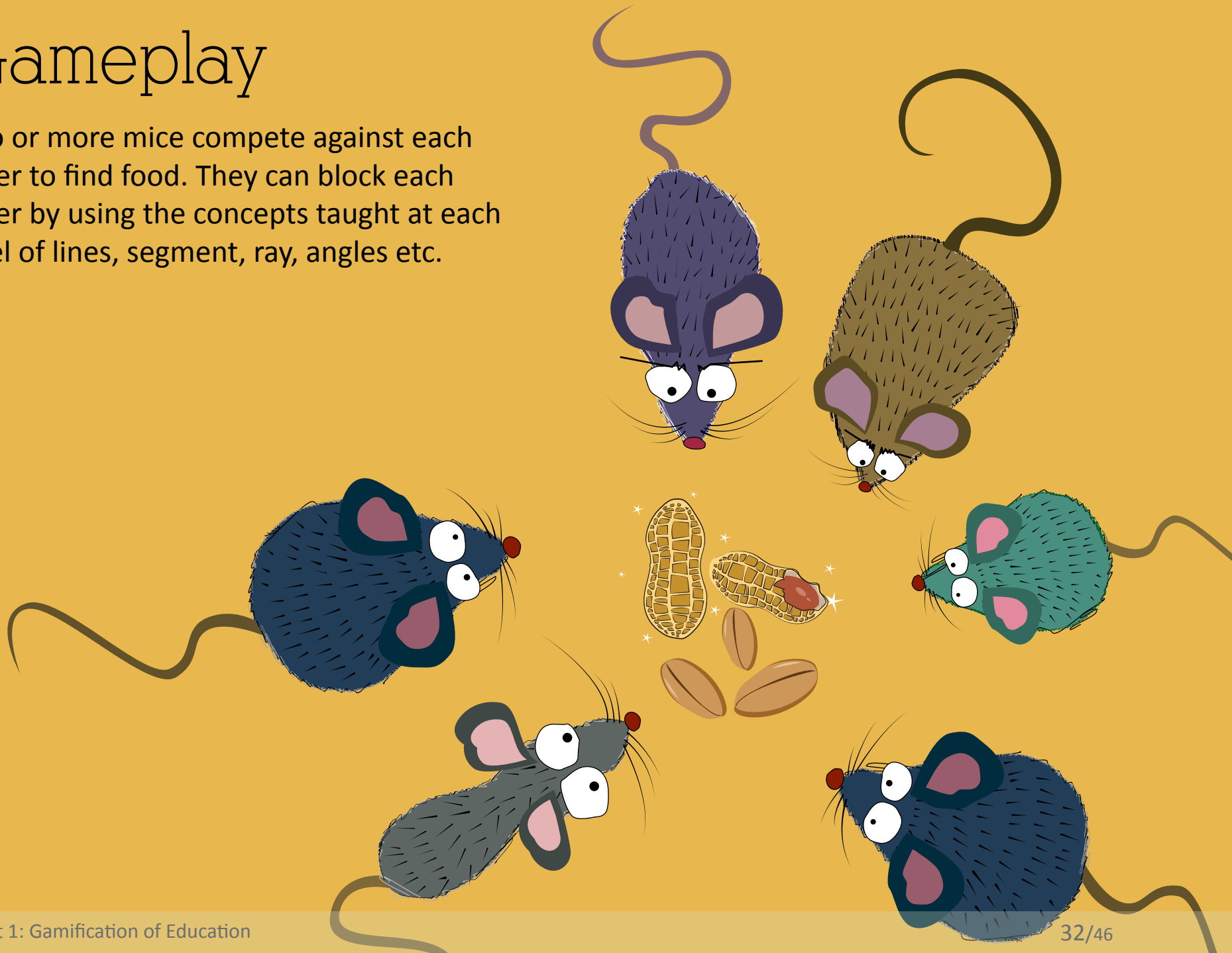
Final game



Adaangi (literary meaning- to block somebody's way) is a digital game for kids of 8 years and above. This game uses the basic concepts of Geometry like lines, segment, ray, angles etc.

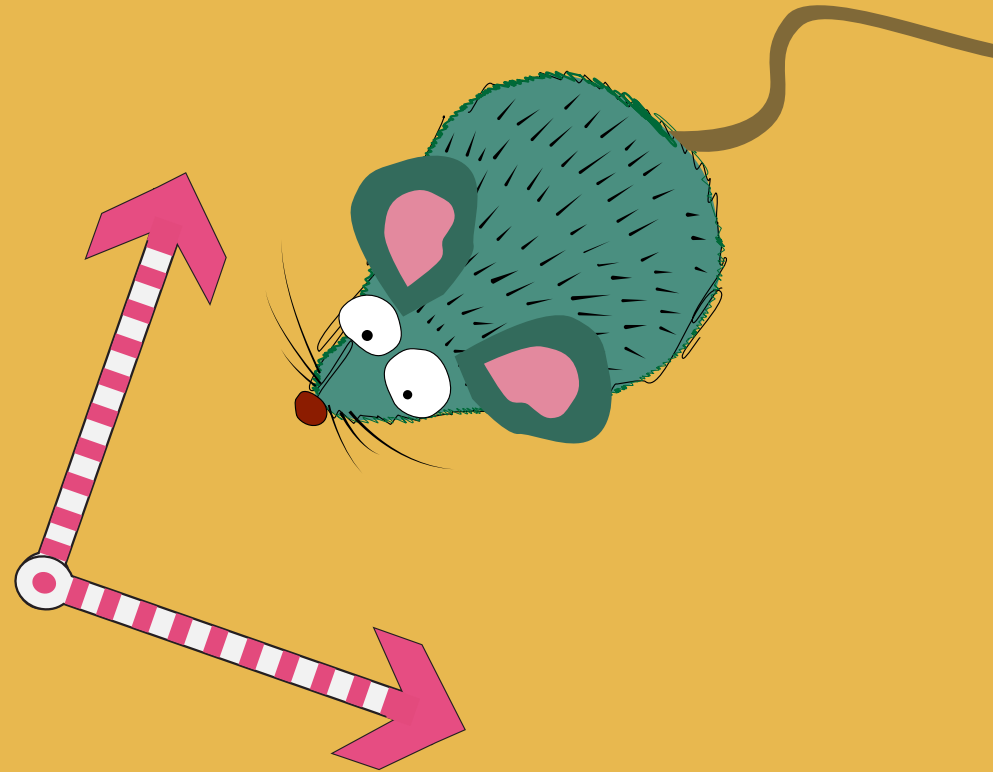
Gameplay

Two or more mice compete against each other to find food. They can block each other by using the concepts taught at each level of lines, segment, ray, angles etc.



Gameplay

- The player is a part of the game as a mouse trying
- To compete for his food.
- He has to direct and guide the mouse to the food.
- He can drag arrows to extend lines and rays thus
- Creating obstructions for the opponent.
- The game is played turn by turn during which the player can either move his mouse or extend any one of the used lines, rays etc. to block his opponent from reaching the food before he does.



Levels

Level 1: Straight lines and Curved lines

Level 2: Straight and curved Line, Segment and Ray

Level 3: Parallel and perpendicular lines

Level 4: Right angle.

Level 5: Acute and obtuse angle on a triangular grid

Level 6: Symmetry (provide few lines, once they are placed, more lines are generated by the computer in a symmetry)

Level 7: Same as level 6, but play area is bigger than the screen.

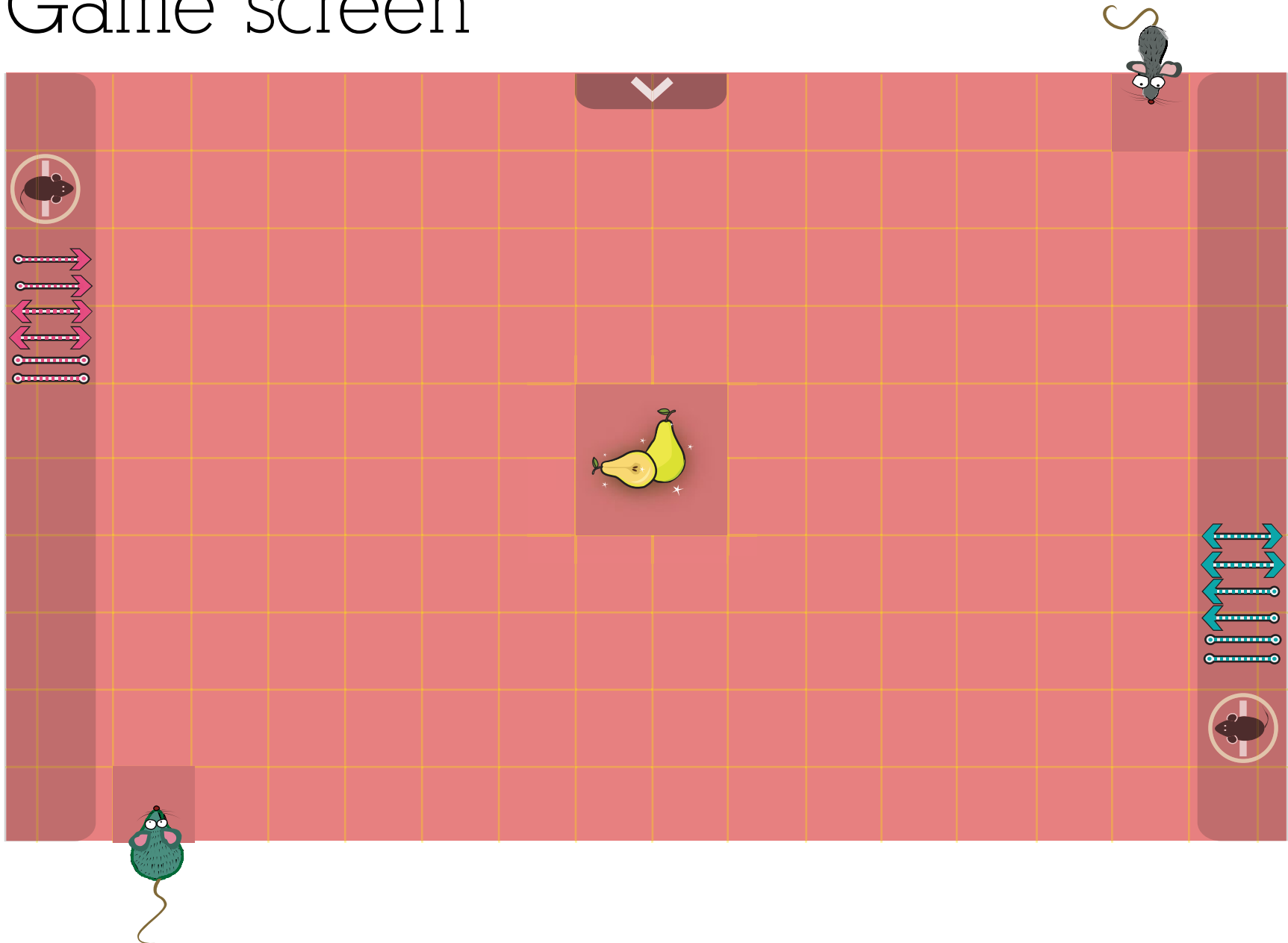
Level 8: Continuous moving mice. Limited time.

Level 9: Directions. Played on two screens. Players cant see each other's screens.

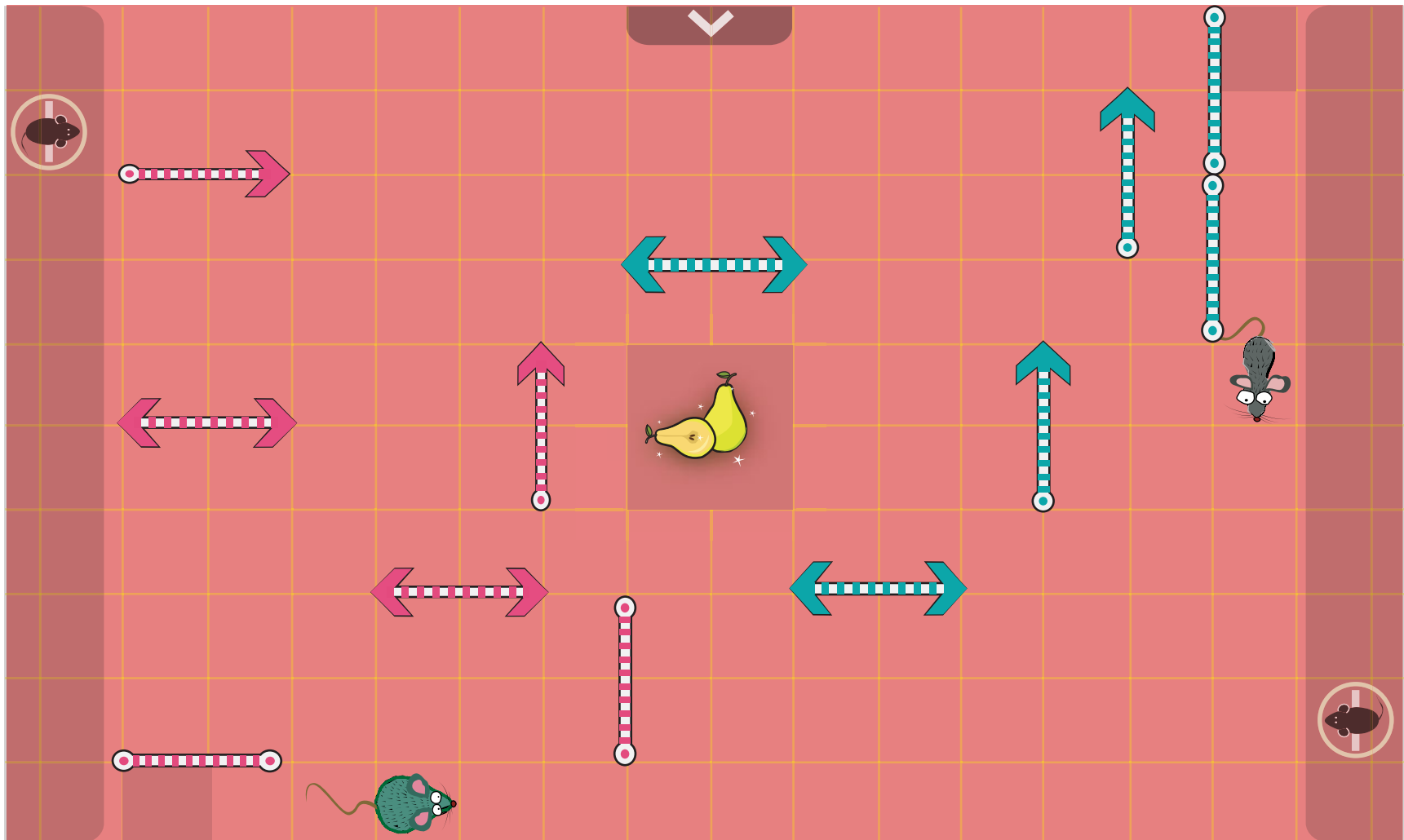
Learning

Levels	Topic	Curriculum
1	Straight lines, curved lines	3 rd standard
2	Lines, line-segments, rays	5 th standard
3	Parallel lines, perpendicular lines	5 th standard
4	Right angles	4 th standard
5	Acute angles, obtuse angles on triangular grid	4 th , 5 th standard
6	Symmetry	4 th , 5 th standard
7		
8		
9	Directions	4 th , 5 th standard

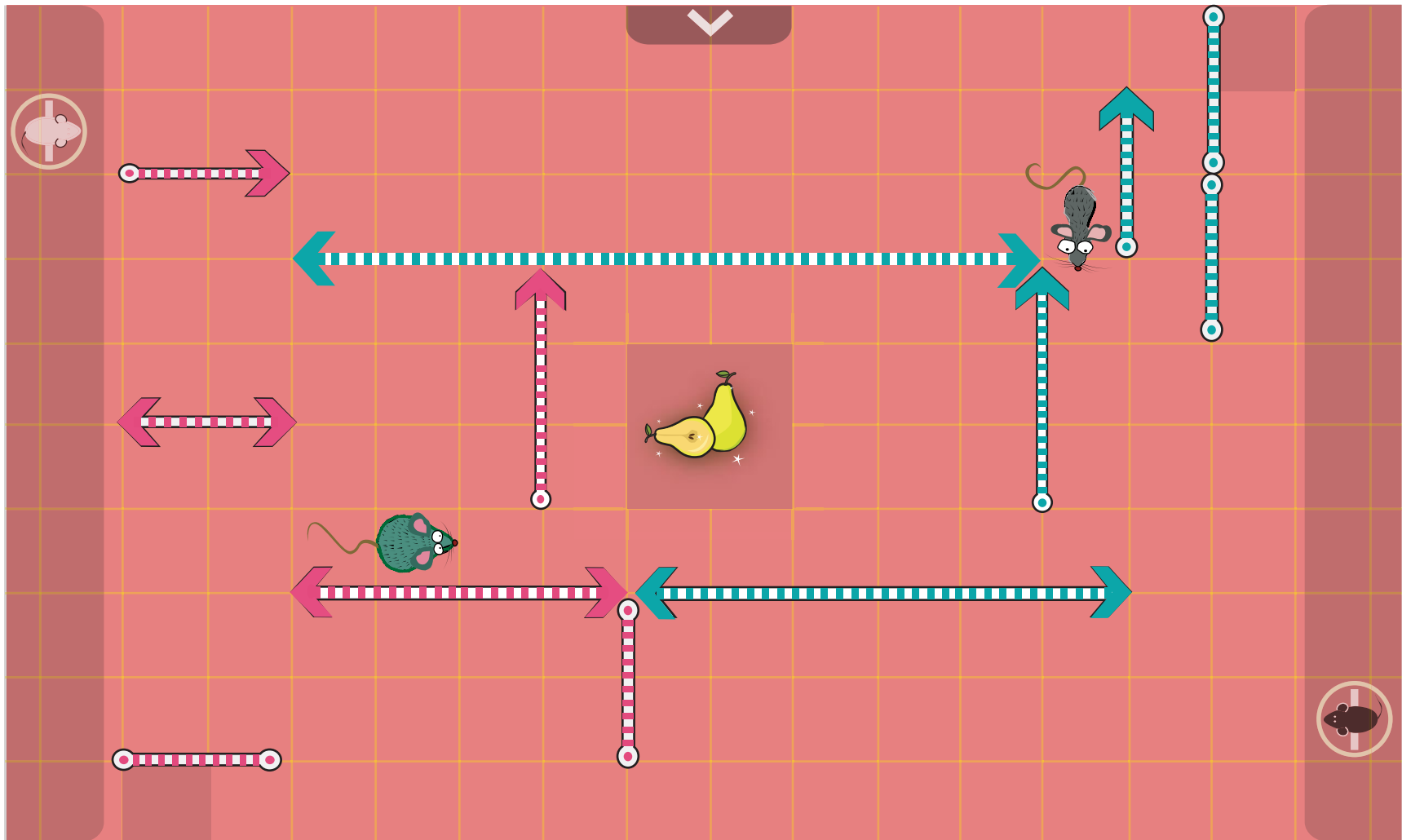
Game screen



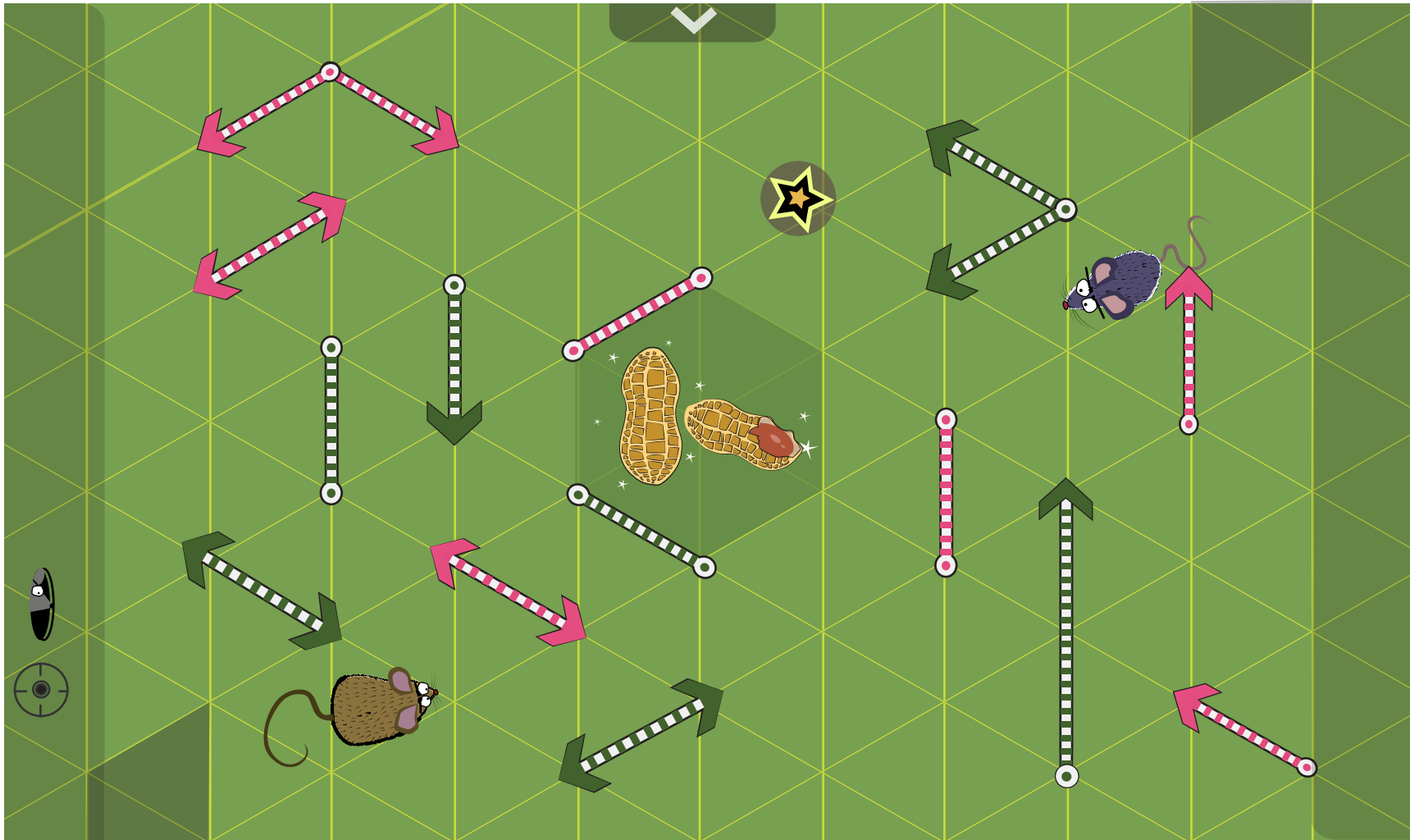
Game screen



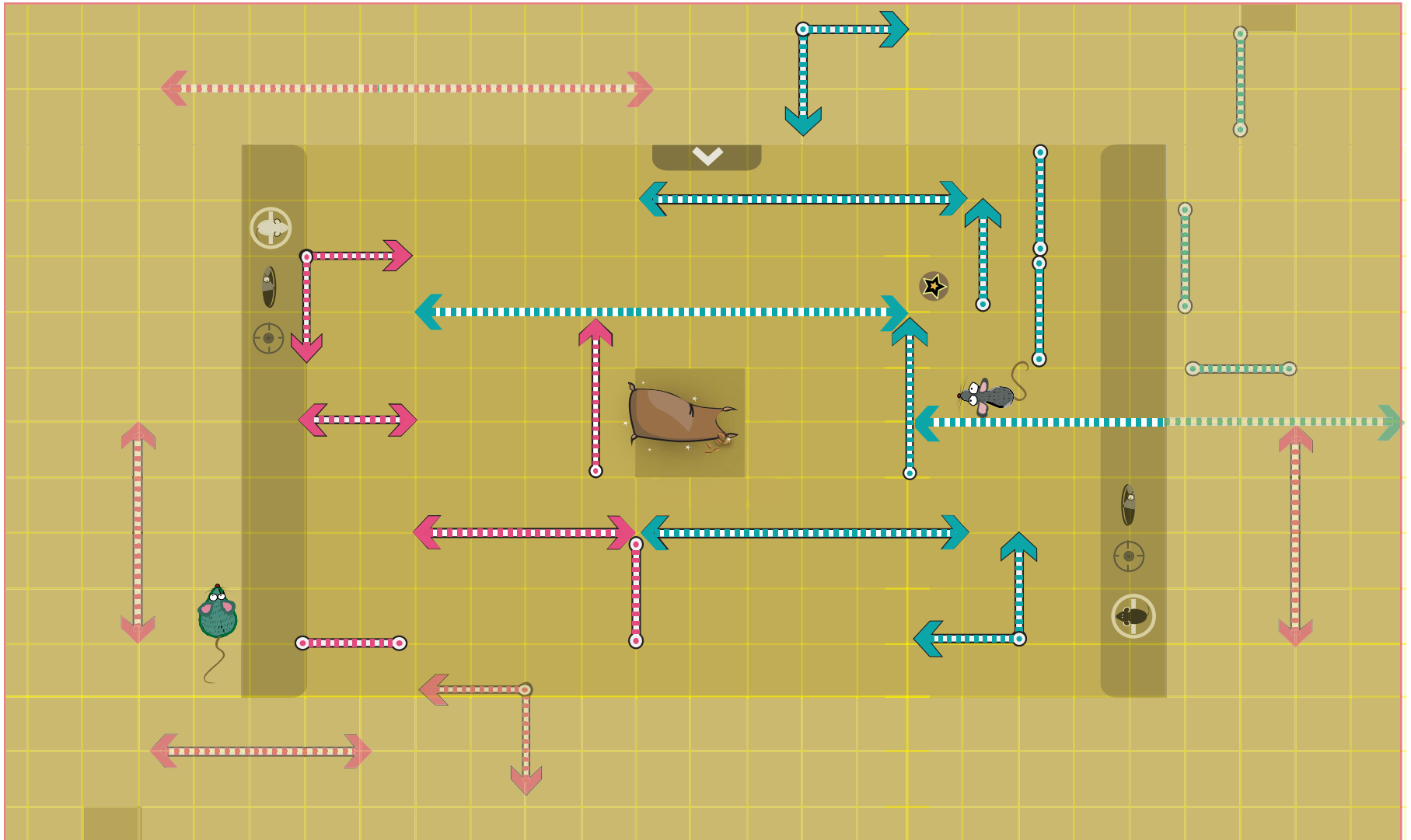
Game screen



Game screen

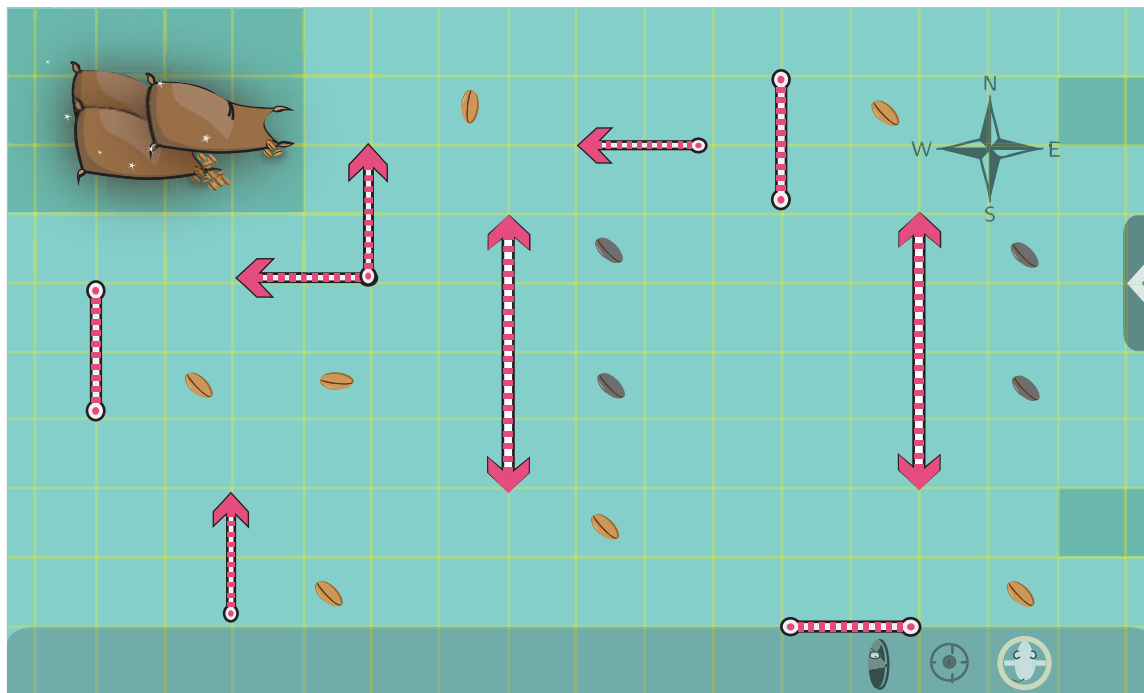
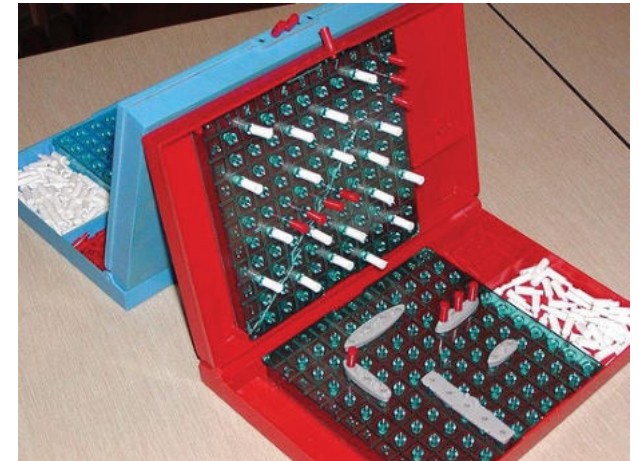


Game screen



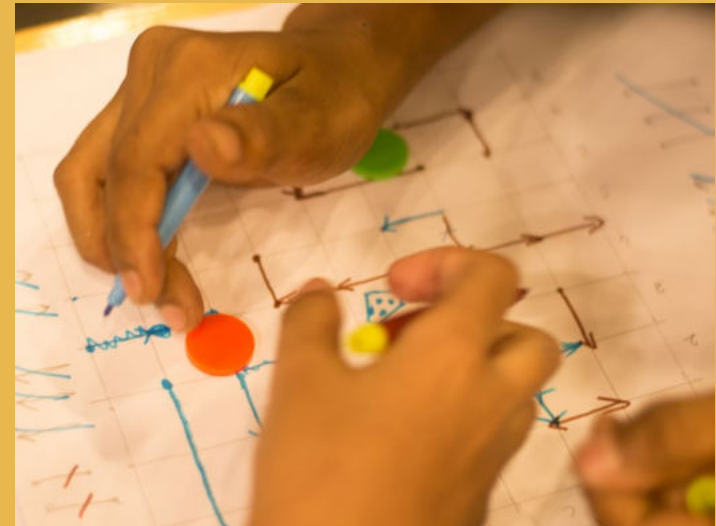


INSPIRED FROM BATTLESHIP



Testing

- Rules for blocking food and entrance while placing the obstructions
- Give lines, segment and ray to make the maze
- Replacing one's obstruction with the opponents
- Power to stop extension
- Place new obstructions after the game has begun
- Changing directions of the obstructions
- Confusion regarding my obstructions with the opponent's and
- Wanting to the power to extend those.
- Correction every time you make wrong move e.g. trying to extend segments.
- Power of the escape whole.



Experience

- Fun and personal
- Ten minutes of glory for the winner.
- Application of the learnt concepts
- Race to reach the food first invokes competitiveness which is exciting.
- The feeling of being able to strategically control the opponent's game makes one feel powerful.
- Various helplines and powers bring excitement to the game.



Conclusion

- Collaboratively working with the children to understand their psychology was a good learning experience.
- The concepts were constantly refined based on the feedback.
- This can develop an interesting culture of learning in schools.
- There is already availability of such material for children (activity based learning material).
- There are government and non-government agencies working on these.
- Accessibility to such material is difficult for the people these were designed for.

References

Slide 3

<http://www.livemint.com/rf/Image-621x414/LiveMint/Period1/2014/01/16/Photos/School%20Kids1--621x414.jpg>
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Slide 4

<http://www.livemint.com/Politics/db5Bfb8qSTFhO70WEafBpJ/Indias-education-quality-has-failed-to-improve-finds-ASER.html>
30.6.2015

Slide 5

<http://www.livemint.com/Politics/db5Bfb8qSTFhO70WEafBpJ/Indias-education-quality-has-failed-to-improve-finds-ASER.html>
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Statistics of School Education 2011-12

http://mhrd.gov.in/sites/upload_files/mhrd/files/statistics/SSE1112.pdf
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Slide 6

Source: Statistics of School Education 2011-12

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1.7.2015

Slide 7

<http://www.livemint.com/rf/Image-621x414/LiveMint/Period1/2013/02/26/Photos/Sharp%20Imagemint--621x414.jpg>

Thank You