

Final Project

Mathematical Shape Learning Game

Submitted By

Name:Shahin Kadir

ID:22103096

Organizer University: Jagannath University

Venue: International University of Business, Agriculture and Technology
(IUBAT)

Dept./Institute/Centre: Computer Science and Engineering (CSE)

Unique Batch Number: 03

Training Track/Course Name: Front-End Development (ReactJS)

Project Description: Mathematical Shape Learning

1. Project Overview

Mathematical Shape Learning is an interactive browser-based mini-game designed for primary-level students to help them recognize and learn fundamental geometric shapes. The goal of the game is to identify the correct shape when prompted with a question such as “Which one is a rectangle?” Users are presented with multiple colorful shapes rendered using HTML and styled with CSS, and must click on the correct one to receive positive feedback. The game uses visual appeal, interactivity, and audio effects to make learning more engaging and enjoyable for students. It serves as an excellent tool for early education, combining play with purpose.

The application promotes active participation and continuous learning by offering new questions with each round. It is lightweight, fully functional offline, and accessible on a wide range of devices including desktops, tablets, and mobile phones.

2. Project Objective

The objective of this project is to develop a creative and engaging learning tool that enables children and young learners to visually identify and differentiate between common geometric shapes. It aims to:

- Simplify the learning process through interactive elements.
- Use multimedia (visuals and sound) to enhance memory retention.
- Provide a fun environment where students are motivated to learn through trial and error.
- Demonstrate the use of core front-end development skills in building educational applications.
- Create a foundation for future educational apps with similar interactive features.

3. Features

- **Shape Identification Quiz:**
The application randomly generates a shape-related question (e.g., "Which one is a circle?") to challenge the user.
- **Multiple Visual Options:**
A set of four different shapes appears as clickable buttons. These shapes include rectangles, squares, circles, triangles, trapeziums, and angles, styled entirely using CSS.
- **Interactive User Interface:**
Each shape highlights when hovered over, giving users tactile feedback. Clicking a shape provides instant feedback on the user's choice.
- **Audio Feedback System:**
The game plays a cheerful sound when the correct shape is selected and a different sound for wrong answers, reinforcing the learning experience.

ENHANCING DIGITAL GOVERNMENT AND ECONOMY

Digital Skills for Students

- **Correct Shape Highlight:**
If a user selects the wrong answer, the correct shape is displayed visually so they can learn from their mistake.
- **Next Question Mechanism:**
A simple “Next Question” button allows the game to reset and provide a new challenge each time, keeping the experience dynamic.
- **Randomization:**
Both the questions and the order of the shapes are randomized to prevent memorization based on position and ensure ongoing engagement.
- **Responsive Design:**
The application is responsive and works across different screen sizes and devices, making it accessible for students with tablets, laptops, or desktops.

4. Technical Details

Frontend Development:

□ **HTML5:**

Used to structure the layout of the game including the question prompt, shape options, result feedback, and control buttons.

□ **CSS3:**

Employed extensively to create and style the shapes (rectangle, triangle, square, circle, trapezium, and angle) using only pure CSS. Animations and transitions add to the user experience.

□ **JavaScript (ES6):**

Used to handle game logic, including:

- Generating random questions.
- Shuffling and displaying shape options.
- Checking user answers.
- Playing audio files.
- Updating UI elements dynamically based on user input.

Game Logic:

- **Random Shape Selection:**
A shape is chosen at random from the list and displayed in the question.
- **Shape Shuffling:**
The array of available shapes is shuffled and four options are displayed, ensuring that the correct shape is always included.

ENHANCING DIGITAL GOVERNMENT AND ECONOMY

Digital Skills for Students

- **Event Handling:**
Each shape has a click event listener that evaluates the user's selection and provides real-time feedback.
- **Audio Control:**
To comply with browser policies, audio is allowed only after the user interacts with the page.

UI/UX Components:

- **Question Panel:** Displays the name of the shape to be identified.
- **Option Panel:** Shows shape options with consistent sizing and styling.
- **Result Section:** Displays whether the answer is correct or incorrect with visual and auditory feedback.
- **Correct Shape Reveal:** Highlights the correct shape when a wrong answer is selected to support reinforcement learning.

5. Future Improvements

- **Timed Mode:**
Add a countdown timer to increase the challenge and test quick recognition skills.
- **Difficulty Levels:**
Introduce basic, intermediate, and advanced levels where complex shapes like parallelograms or 3D shapes (e.g., spheres, cubes) are added.
- **Text-to-Speech Support:**
Implement audio narration for shape names and feedback to assist children with reading difficulties.
- **Multilingual Interface:**
Allow language selection (e.g., Bangla, English, Hindi) for wider accessibility.

6. Conclusion

The **Mathematical Shape Learning** game combines entertainment and education into a seamless interactive web-based tool. By using fundamental web development technologies—HTML, CSS, and JavaScript—it delivers an engaging experience for young students learning geometric shapes. The game not only supports academic learning but also encourages visual recognition, decision-making, and digital interaction skills.

Its modular and extensible design ensures that it can be upgraded in the future with minimal changes. With its user-friendly interface, accessibility, and visual appeal, this game is a valuable addition to any early education platform or learning environment. Moreover, the project effectively showcases practical front-end development skills suitable for real-world educational software.