Department of Computer Science & Engineering

University of Rajshahi

Project Title: KidZone — A Safe, Engaging Online Learning Platform for Children

A project submitted in partial fulfillment of the requirements for the degree of Bachelor of Computer Science and Engineering. **Course code: CSE4292.** Project (Part II)

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Session: 2018-19

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Session: 2018-19

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Abstract

KidZone is an online learning platform designed for children to study in a safe and enjoyable environment. The system connects admins, creators, parents, and kids through a web application.

Creators can upload educational videos and images, and the admin reviews these uploads to ensure they follow rules suitable for children. If content violates the guidelines, the admin can reject it. Parents can create accounts, subscribe to creators, and use a secret key to allow their children to enter Kid Mode, where only approved and subscribed content is shown.

The platform is built using the MERN stack—MongoDB for database management, Express.js and Node.js for backend APIs, and React.js for frontend development. For secure storage of uploaded media, Cloudinary is used.

Overall, KidZone ensures a fun, safe, and controlled online learning experience for children under proper parental supervision.

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Team Contribution

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Frontend Components: Navbar.jsx, VideoCard.jsx, VideoPlayer.jsx	Frontend Components: KidModePinModal.jsx, SubscriptionCard.jsx
Frontend Services	Frontend Services
CSS	Context
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Chapter 1: Introduction

1.1 Overview

KidZone is a web-based educational platform that creates a safe and engaging environment for children to learn. It integrates **role-based access** for admins, creators, parents, and kids, ensuring that all content is child-friendly and approved before being viewed.

1.2 Problem Statement

Children often face exposure to unsafe online materials. Many educational platforms do not provide sufficient content filtering or parental control. KidZone addresses these issues through admin moderation, parental supervision, and secure access.

1.3 Objectives

- To design a **child-safe online learning system**.
- To enable creators to upload educational videos and images.
- To allow admins to approve or reject content.
- To give parents control via subscriptions and secret keys.
- To provide kids access only to approved and subscribed content.

1.4 Scope

The project includes admin, creator, parent, and kid roles, secure authentication, cloud-based media storage, and a responsive frontend interface.

1.5 Motivation

Our motivation was to develop a system that blends online learning with safety, ensuring that children access only verified, age-appropriate educational content.

Chapter 2: Literature Review

Online learning platforms have seen significant growth in recent years, driven by the increasing demand for digital education tools and remote learning. Popular platforms like **YouTube Kids** and **Khan Academy** provide children with access to a variety of educational content. YouTube Kids offers videos filtered for children, while Khan Academy provides structured lessons and exercises. However, both platforms have limitations:

- **YouTube Kids:** Though content is filtered for children, it lacks personalized parental control and a subscription mechanism for specific creators. Content moderation is primarily automated, which can result in inappropriate videos slipping through the filter.
- **Khan Academy:** Focused on structured learning, but it does not provide a social or creator-driven environment, nor does it allow parents to control what content their children access beyond general courses.

Other educational platforms like **Udemy** and **Coursera** cater to broad audiences but are primarily aimed at adults or older students, lacking specialized child-friendly interfaces, real-time parental control, and content approval mechanisms suitable for young children.

KidZone addresses these gaps by combining several key features:

1. **Multi-role Architecture:** KidZone separates users into four distinct roles — Admin, Creator, Parent, and Kid. This ensures that each user has a tailored experience and clear access permissions.
2. **Admin Moderation:** Unlike automated filtering used in most platforms, KidZone employs an admin approval system for all uploaded videos and images. This guarantees that content adheres to child safety guidelines and educational standards.
3. **Parent-Controlled Access:** Parents can subscribe to specific creators and generate a secret key to allow their children to enter Kid Mode. This mechanism ensures that children can only access approved content, giving parents full control over their learning environment.

Technical Considerations:

- **Frontend Technologies:** React.js [2] allows developers to create dynamic, interactive, and responsive user interfaces suitable for both parents and children. Component-based architecture simplifies development and ensures consistency across the application.

- **Backend Technologies:** Node.js [3] and Express.js [4] provide a scalable and efficient server environment for handling multiple concurrent users, API requests, and role-based authentication.
- **Database Management:** MongoDB [1], a NoSQL database, is ideal for managing heterogeneous and hierarchical data, such as users, subscriptions, and media files. Its flexible schema supports future expansion and complex queries.
- **Cloud-based Media Storage:** Cloudinary [5] ensures that videos and images are stored securely and can be delivered efficiently to users across different devices. It also provides built-in transformations and optimizations for media files.

Comparative Advantage:

- KidZone combines features seen individually in existing platforms, such as parental control (YouTube Kids), structured content (Khan Academy), and media-rich environments (Udemy), into a **single, secure, and child-centric platform**.
- The secret key mechanism is a novel approach to enforce parental supervision while giving children a seamless learning experience.
- Role-based access ensures that creators can focus on content creation, admins maintain quality and safety, parents manage access, and kids enjoy a distraction-free environment.

Chapter 3: System Analysis

3.1 Functional Requirements

- **Admin:** Approves/rejects uploaded content, manages users.
- **Creator:** Uploads educational media for review.
- **Parent:** Registers, subscribes to creators, manages child's access.
- **Kid:** Views approved content using the secret key.

3.2 Non-Functional Requirements

- Secure login and authentication (JWT).
- Responsive UI for all devices.
- Cloud-based storage for videos/images.
- Fast API response time.

3.3 Feasibility Study

- **Technical Feasibility:** Built with the MERN stack [1–4].
- **Operational Feasibility:** Simple and user-friendly.
- **Economic Feasibility:** Low-cost due to open-source technologies.

Chapter 4: System Design

4.1 Architecture

Three-tier architecture:
Frontend (React.js) ↔ Backend (Express.js + Node.js) ↔ Database (MongoDB)

4.2 Modules

- **Admin Panel:** Approves/rejects content uploads.
- **Creator Dashboard:** Uploads videos/images.
- **Parent Dashboard:** Subscribes to creators and manages secret key.
- **Kid Mode:** Displays only approved content.

4.3 Database Design

The KidZone platform uses MongoDB with Mongoose to manage data for multiple user roles — Admin, Creator, Parent, and Child [1]. The database has three main collections:

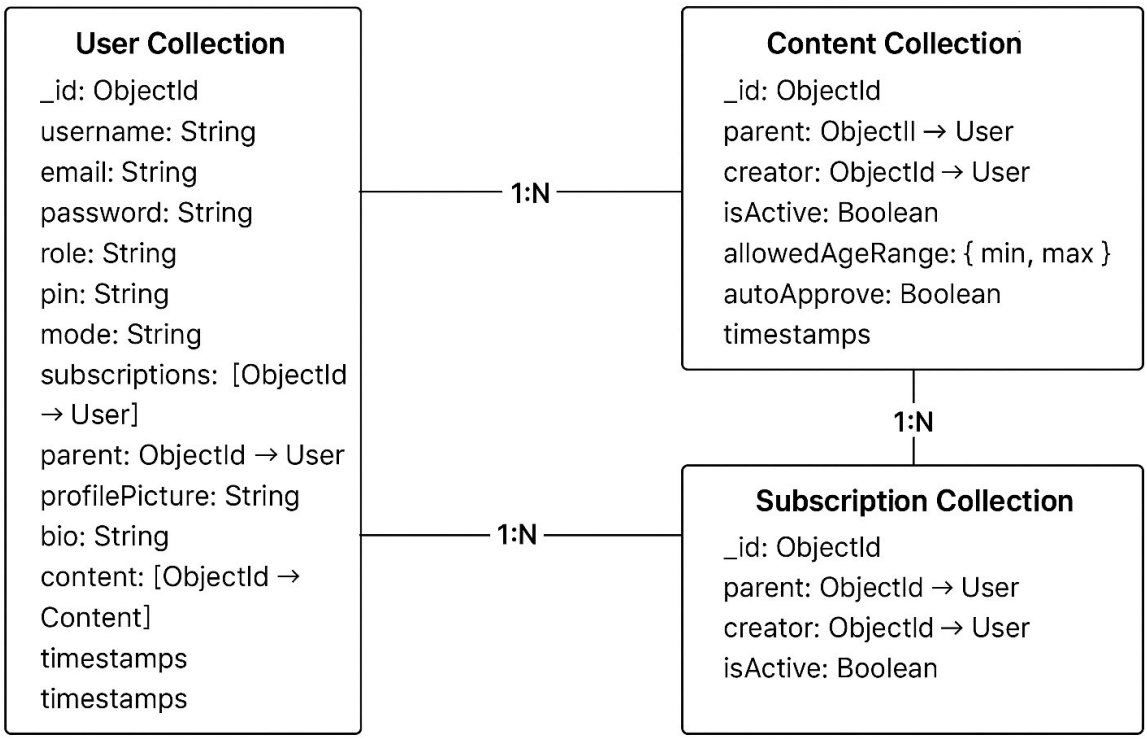
- **Users:** Stores all user information including role, email, password, and role-specific details like profile information for creators, subscribed creators for parents, and secret keys for children [2].
- **Content:** Stores videos and images uploaded by creators, with fields for title, description, file type, URL, category, age group, and approval status [3].
- **Subscriptions:** Tracks which creators a parent subscribes to, maintaining subscription status and timestamps [4].

Relationships:

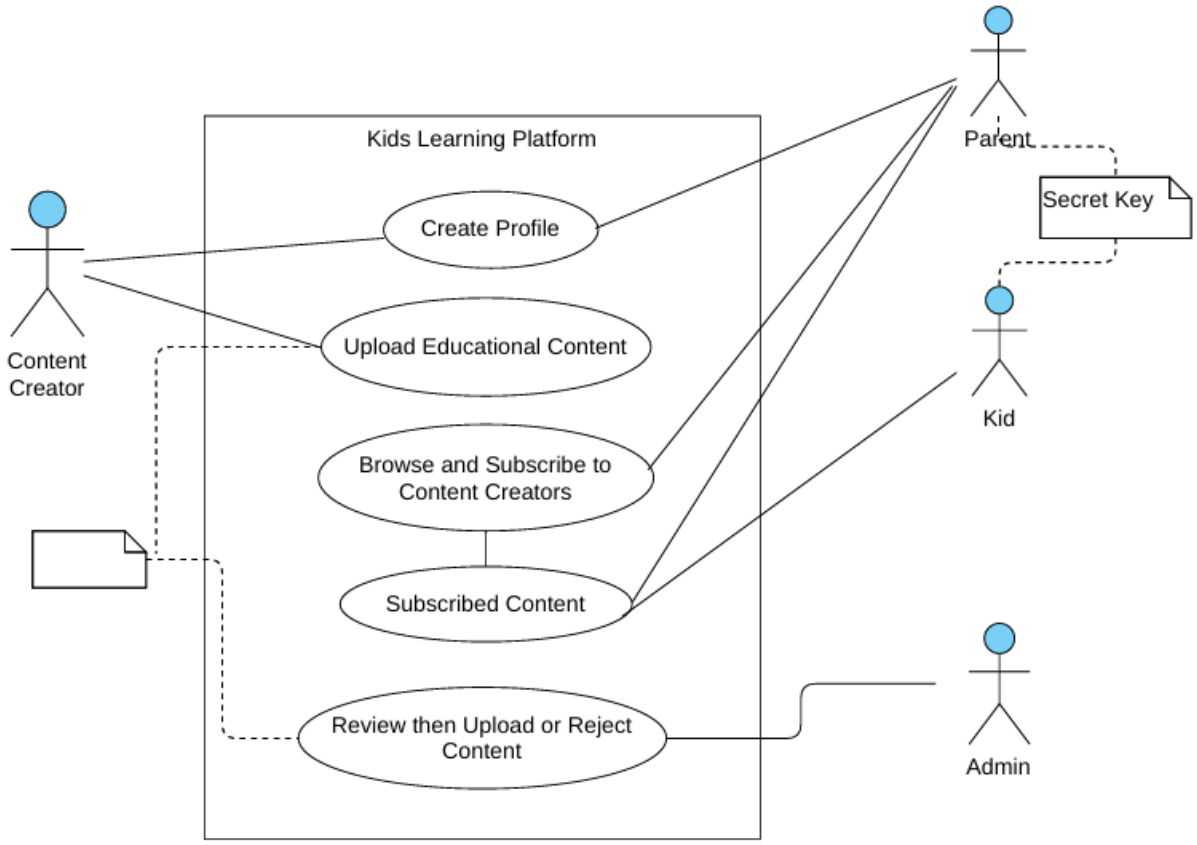
- Creators → Content: one-to-many
- Parents → Subscriptions: one-to-many

This design ensures secure, role-based access and moderated content delivery for children through proper data relationships and validation mechanisms.

ER Diagram:


User Collection
_id: ObjectId
username: String
email: String
password: String
role: String
pin: String
mode: String
subscriptions: [ObjectId → User]
parent: ObjectId → User
profilePicture: String
bio: String
content: [ObjectId → Content]
timestamps
timestamps
1:N
1:N
Content Collection
_id: ObjectId
parent: ObjectIl → User
creator: ObjectId → User
isActive: Boolean
allowedAgeRange: { min, max }
autoApprove: Boolean
timestamps
1:N
Subscription Collection
_id: ObjectId
parent: ObjectId → User
creator: ObjectId → User
isActive: Boolean

4.4 Use case Diagram



4.5 Functional diagram

Diagram 1: Administrator Focus:

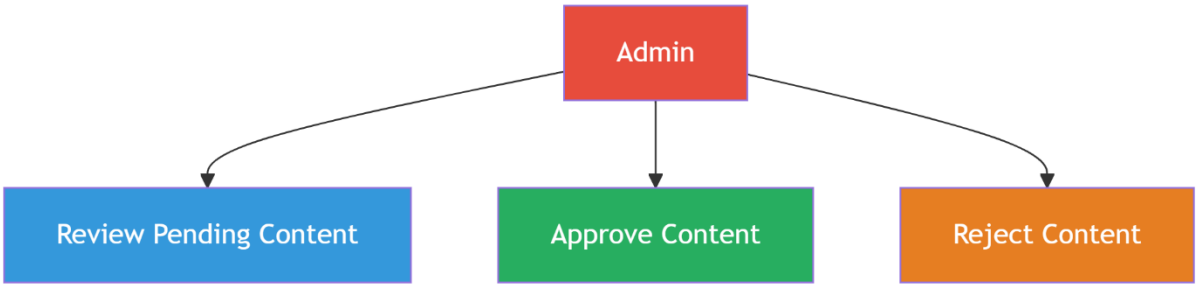


Diagram 2: Content Creator Focus

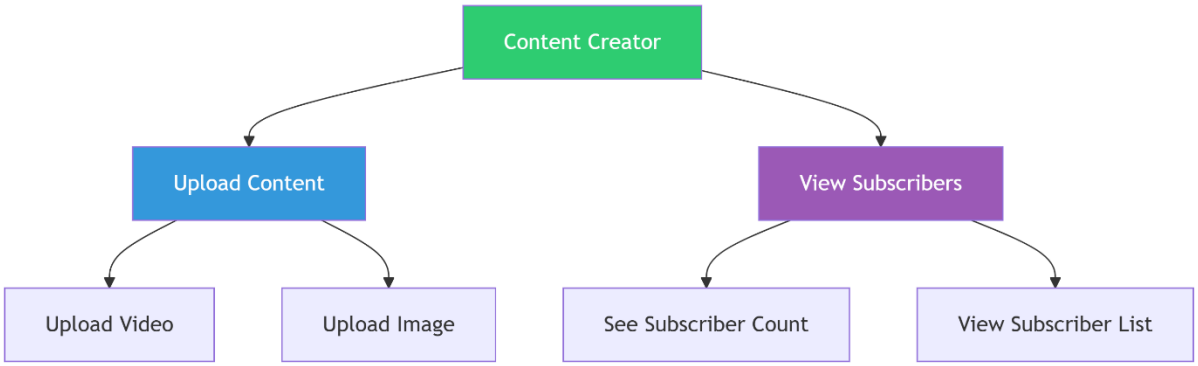


Diagram 3: Parent Focus

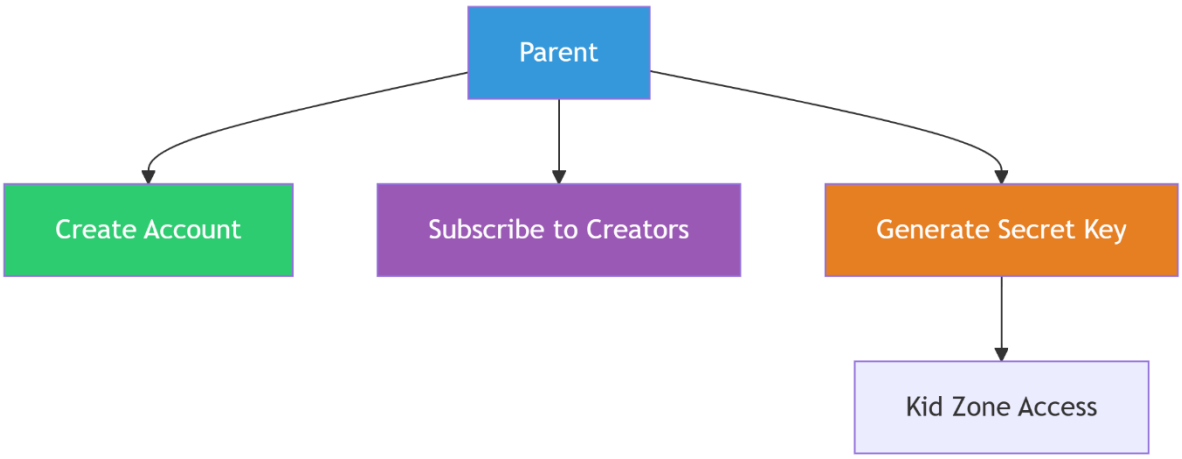
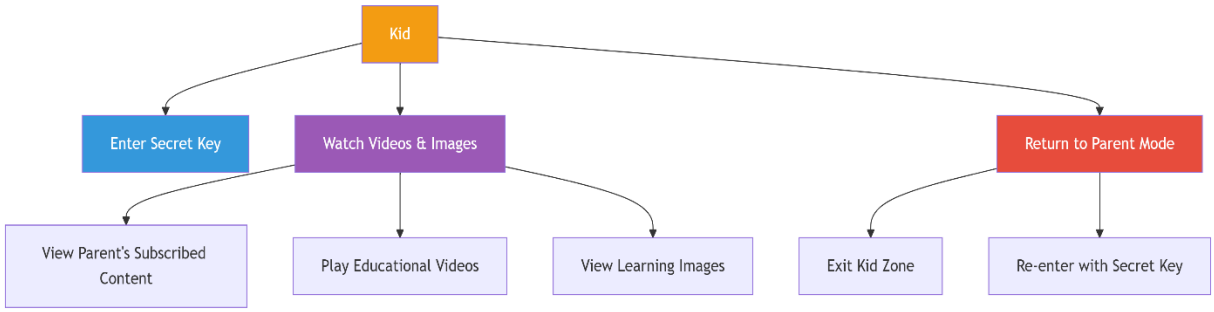


Diagram 4: Kid/Child Focus



Chapter 5: Implementation

5.1 Frontend and Backend Implementation

The frontend of KidZone is built using **React.js** [2], with **Tailwind CSS** for styling and **Redux/Context API** for state management. The interface is designed for **different user roles**: Admin, Creator, Parent, and Kid.

The backend is developed using **Node.js** and **Express.js** [3][4]. It handles all **RESTful APIs**, **authentication**, and **content moderation logic**.

5.2 Screenshots and Features

Home Page:

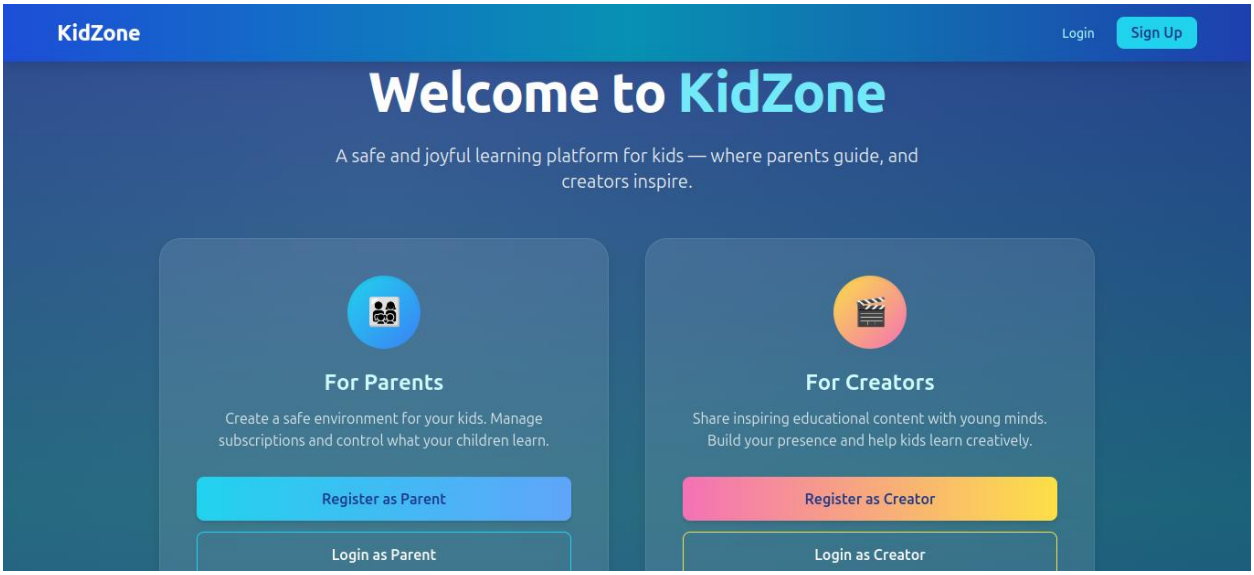


Fig 1: Home Page

Creator:

Creator Registration:

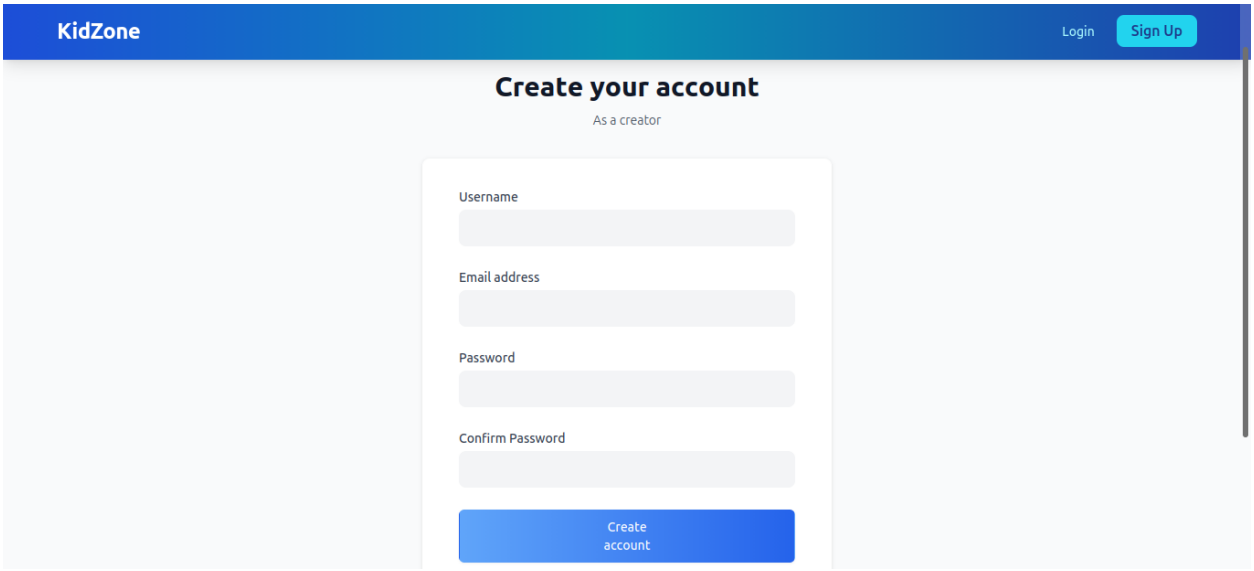


Fig 2: Creator Registration

Creator Upload

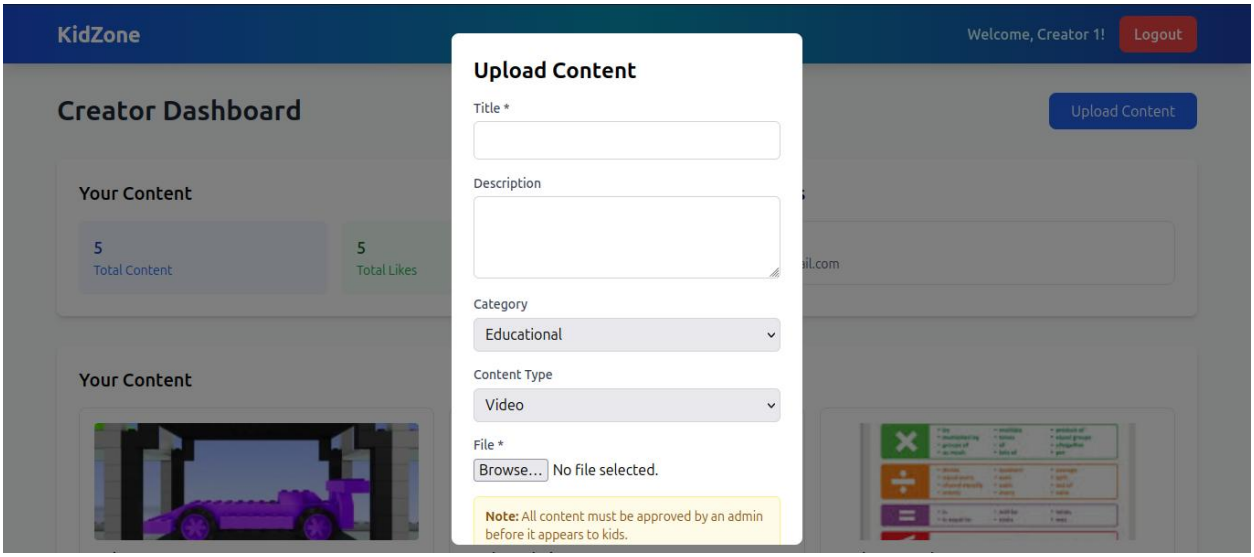


Fig 3: Creator Upload

Creator Dashboard

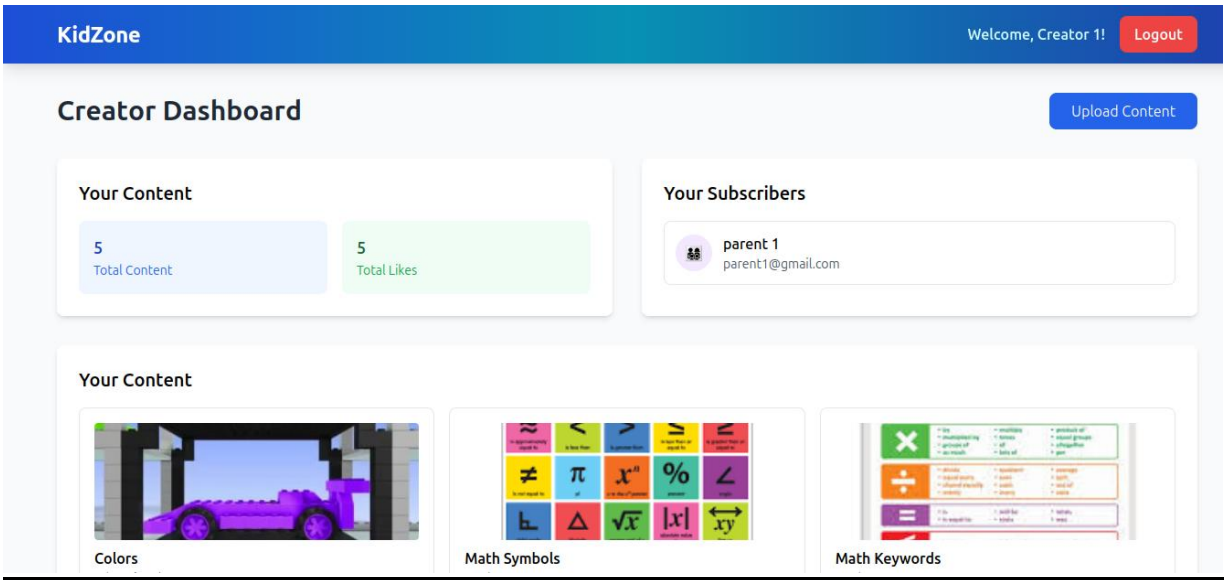


Fig 4: Creator Dashboard

Admin:

Admin Dashboard

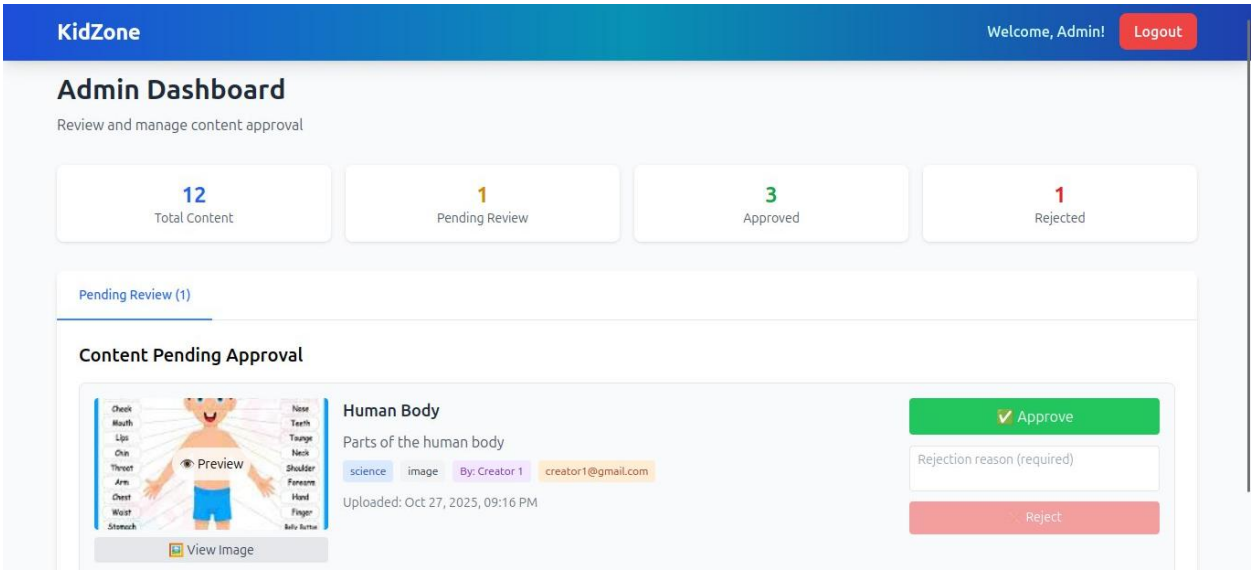


Fig 5: Admin Dashboard

Admin Approval

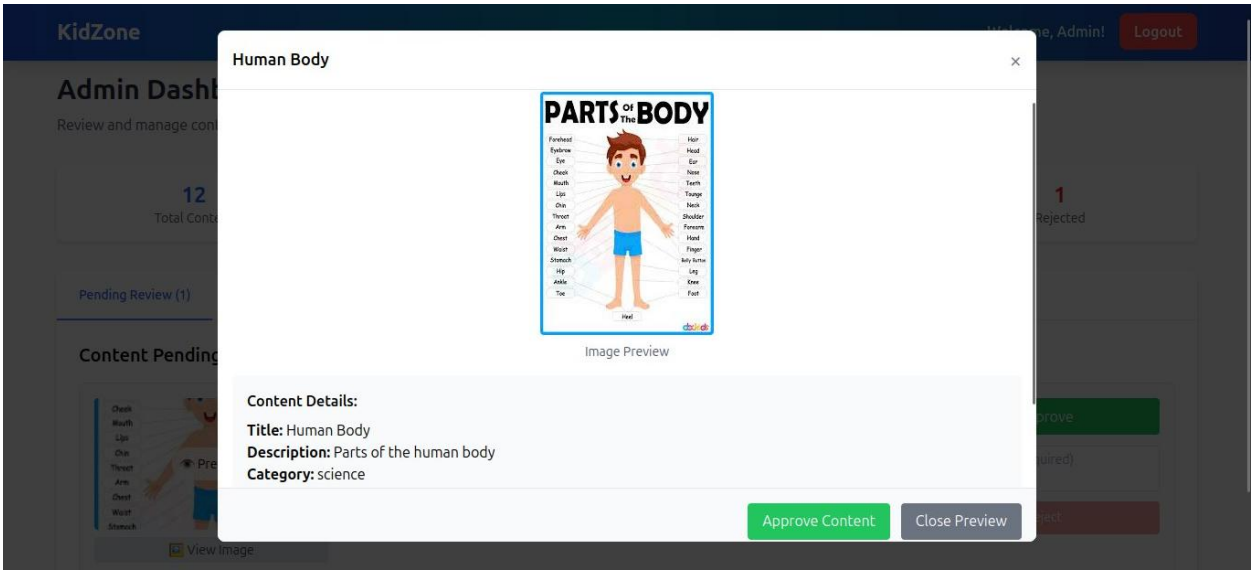


Fig 6: Admin Approval

Parent:

Parent Registration

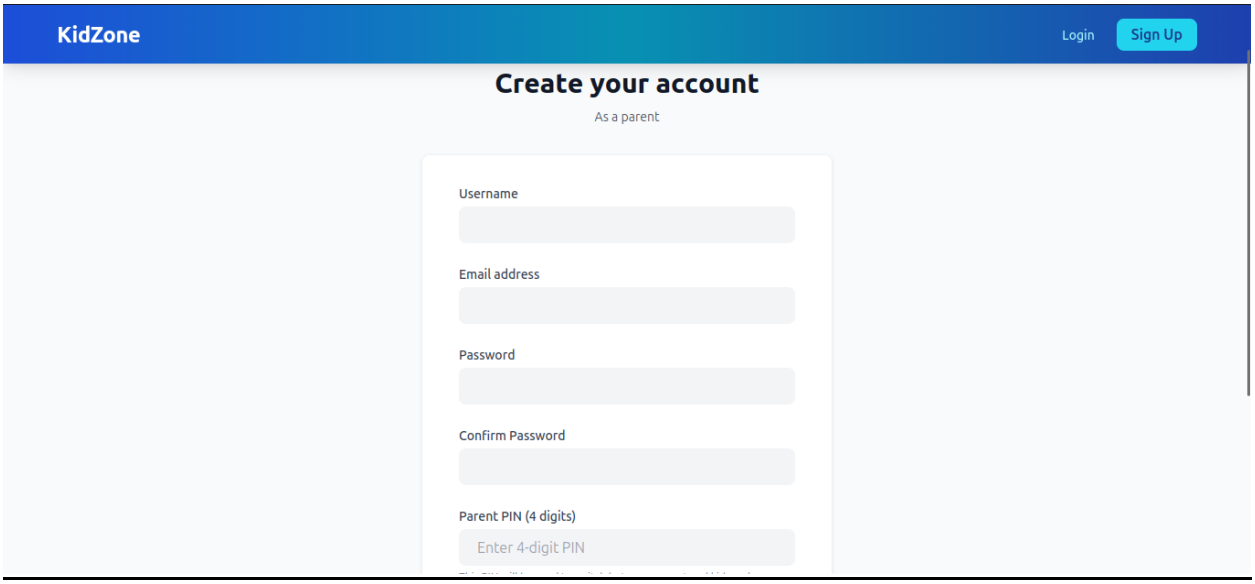


Fig 7: Parent Registration

Parent Sign in

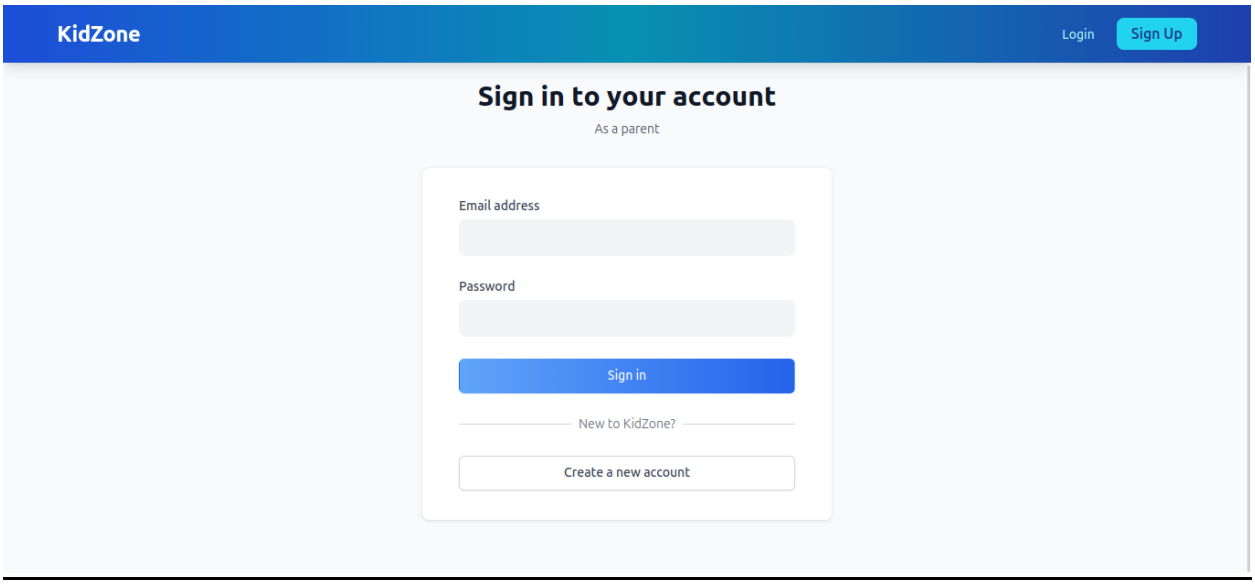


Fig 8: Parent Sign In

Parent dashboard

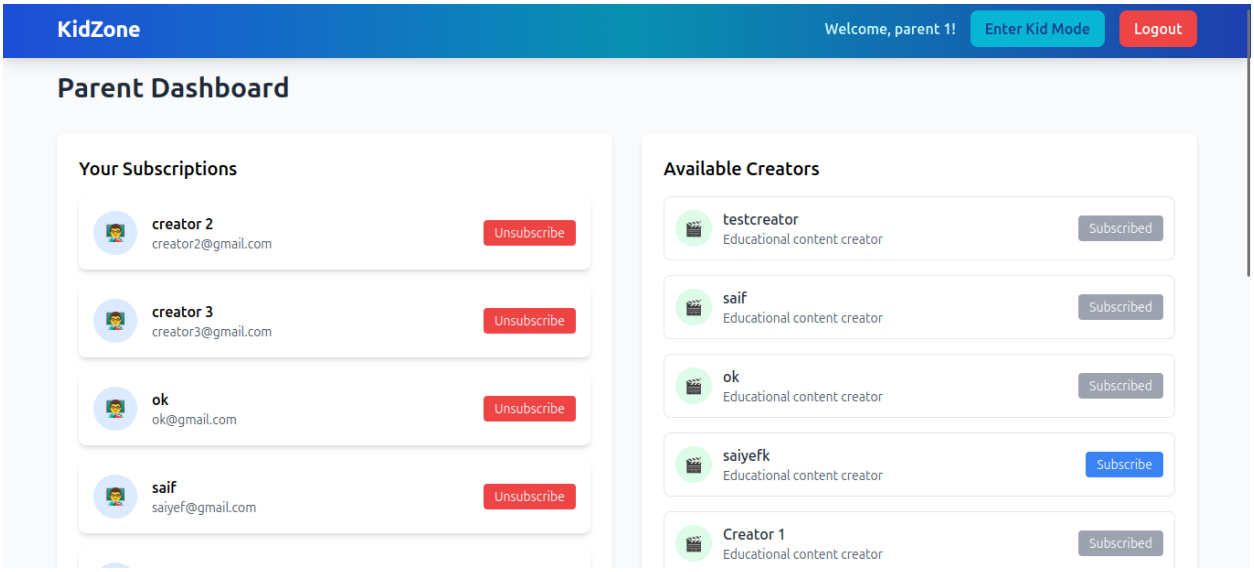


Fig 9: Parent Dashboard

Parent visiting a creator's profile

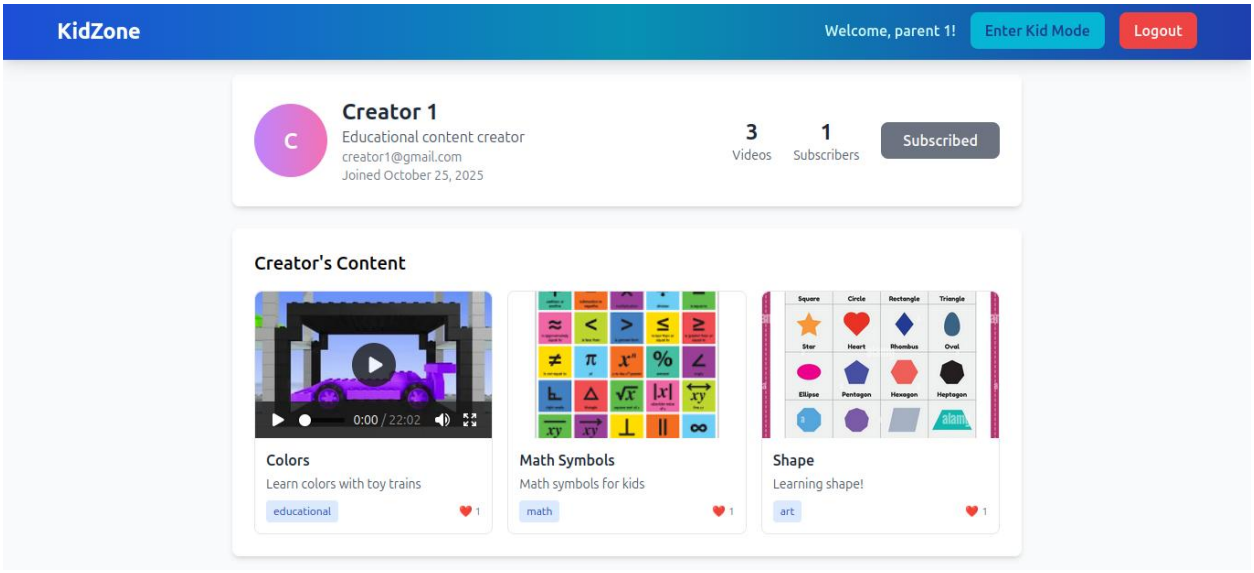


Fig 10: Parent visiting a creator's profile

Kid:

Enter Kid mode

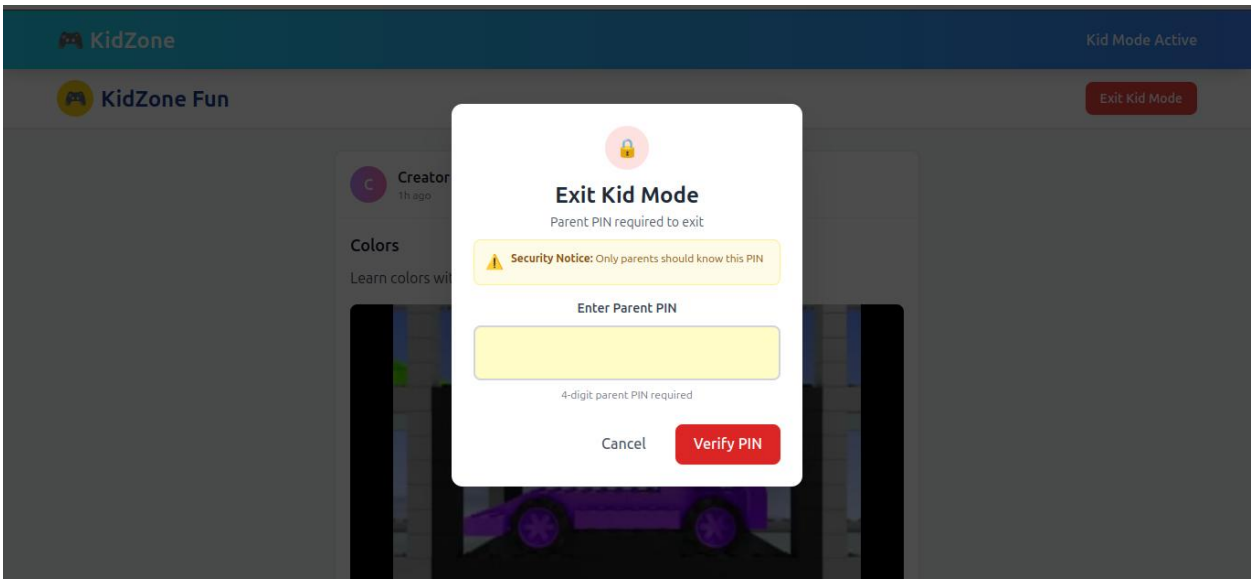


Fig 11: Enter Kid Mode

Kids newsfeed

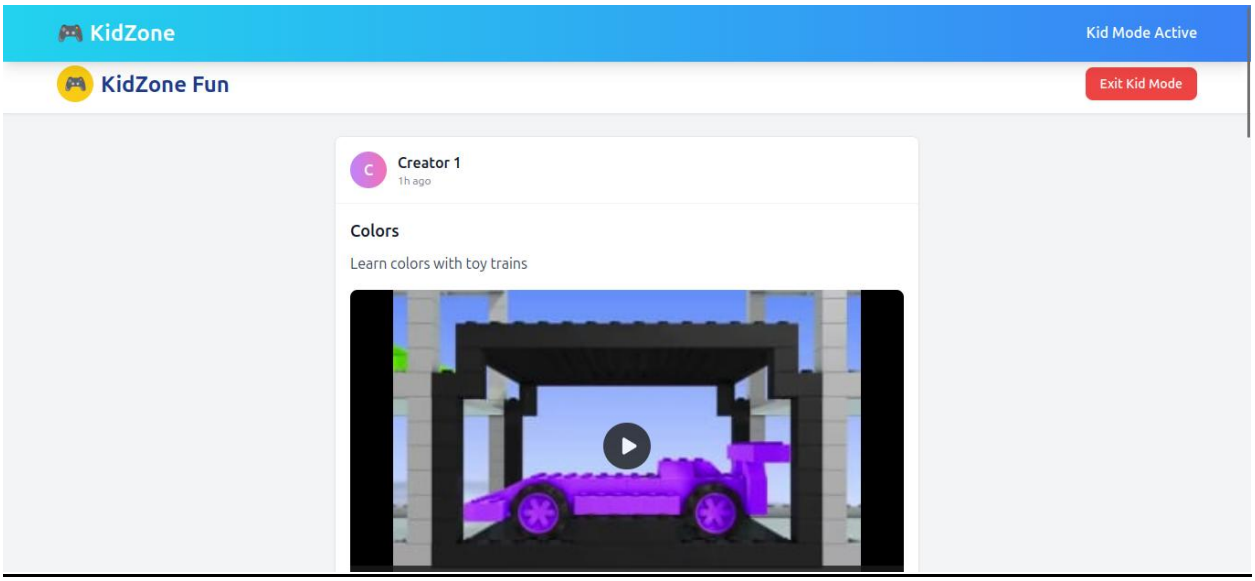


Fig 12: Kid Newsfeed

Chapter 6: Testing

Testing Types:

- **Unit Testing:** Checked individual backend functions.
- **Integration Testing:** Ensured frontend-backend interaction works correctly.
- **System Testing:** Verified workflows for all roles.
- **User Acceptance Testing:** Parents and kids tested usability.

Results:

- Admin can approve/reject content.
- Parents can subscribe and generate secret keys.
- Kids can only view approved content.

All tests confirm that the system meets functional and non-functional requirements.

Chapter 7: Results and Discussion

- KidZone provides a safe learning environment with role-based access and admin moderation.
- Parents control what children can access using secret keys.
- The MERN stack [1–4] ensures a scalable, responsive, and secure system.
- Cloudinary [5] efficiently stores and delivers media content.

Chapter 8: Advantages, Limitations, and Future Scope

Advantages:

- Safe and moderated content for children.
- Parental control via secret key.
- Role-based access and secure media storage.

Limitations:

- Requires stable internet.
- Web-based only (no mobile app yet).
- Manual admin approval may take time.

Future Scope:

- Mobile apps for Android and iOS.
- AI-assisted content moderation.
- Payment gateway integration.
- Quizzes, live classes, and interactive learning features.

Chapter 9: Conclusion

Conclusion

KidZone successfully demonstrates a **safe, engaging, and controlled learning platform** for children.

- Admin moderation and parental subscription ensure **child safety**.
- The MERN stack [1–4] and Cloudinary [5] provide **scalable, fast, and secure media management**.
- KidZone combines **learning, entertainment, and parental control** in a single platform.

Chapter 10: References

References

[1] MongoDB Documentation, “Introduction to MongoDB,” Available: https://www.mongodb.com/docs

[2] React.js Documentation, “React Overview,” Available: https://react.dev

[3] Node.js Documentation, “Node.js Overview,” Available: https://nodejs.org/en/docs

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[5] Cloudinary Documentation, “Media Management API,” Available: [https://cloudinary.com/documentation]