



KAI KONANE: MOBILE LEARNING FOR PRESCHOOL LEARNERS

The user manual for Kai Konane Application



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Introduction

In South Africa, the education system is facing a challenge as young children struggle with basic literacy skills like reading comprehension due to factors like a shortage of qualified teachers and lack of quality learning materials according to the recent Progress in International Reading Literacy Study (PIRLS 2021). This situation highlights issues affecting academic success for Grade 4 students by the age of 10, in the country. In addition to these difficulties, the safety of children has emerged as an issue as the number of reported incidents of children being abducted has risen, causing anxiety for parents who enroll their children in traditional preschool settings, in crime ridden neighborhoods.

Project Foundation

About Kai Konane

Kai Konane is an online learning tool for preschool learners. It was designed to tackle the educational issues we face in South Africa head on by offering a fun and secure space for children to enhance their early reading and understanding abilities in an interactive way through various activities and stories available on the platform. It aims to narrow the literacy divide by creating an easily accessible educational environment beyond the confines of typical classrooms while reducing the necessity for children to be present in physical school settings, for safety reasons and providing parents with reassurance.

Key Solutions Provided by Kai Konane

Interactive Literacy Development

- Engaging storytelling system with voice narration
- Progressive reading exercises
- Age-appropriate content delivery
- Real-time progress tracking

Safe Learning Environment

- Secure digital platform accessible from home
- Monitored user interactions
- Protected communication channels
- Controlled access for different user types

Quality Education Support

- Structured learning content
- Professional teacher oversight
- Personalized learning paths
- Regular progress assessments

Stakeholder Collaboration

- Parent-Teacher communication
- Progress monitoring tools
- Shared learning objectives

By implementing these solutions, Kai Konane directly addresses the educational gaps while ensuring child safety and maintaining high educational standards. The platform empowers parents, teachers, and children to participate in a collaborative learning journey, fostering literacy development and educational growth in a secure digital environment.

Technical Implementation

The technical implementation of Kai Konane app incorporates contemporary development methods and technologies to establish a thorough and efficient educational solution. This section covers the User Interface and User Experience (UI/UX) design, database setup, deployment on cloud platforms, integration of AI and Machine Learning, utilization of microservices, data analytics, development practices and platform implementation. Below, lies a breakdown of these elements.

UI and UX of Kai Konane

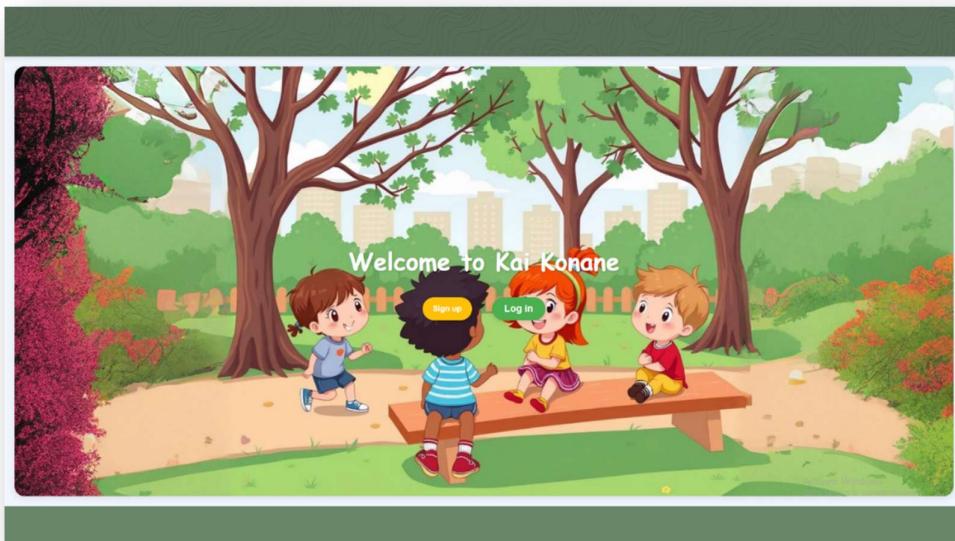


Figure 1: User Interface of Kai Konane

The Kai Konane app offers a User Interface that caters to the needs of different users: children, parents and teachers. It focuses on navigation and accessibility so that users can easily engage with the system. The app's interfaces were created following web standards and utilize HTML, CSS and Flask for dynamic content display.

Key UI and UX elements

- Kai Konane uses bright colors to appeal to young learners.
- It also emphasizes the use of sound to appeal to the young learners. For example, on the child home page, background music is played and the buttons start moving in sync with song's tempo, encouraging children to want to return and use the app frequently.
- Every time you press a button, you'll hear a sound to let you know if your action was successful or if there was an error and as you type each letter, the system will play a sound to confirm that your input has been received instantly.

Database implementation

The app's data management is supported by a strong database configuration assisted by SQLAlchemy ORM. Within the database structure are tables dedicated to users profiles and roles like children and parents along with sections for activities loggings, feedbacks received, results achieved and stories shared, all hosted securely on Render's cloud platform ensuring data protection and accessibility.

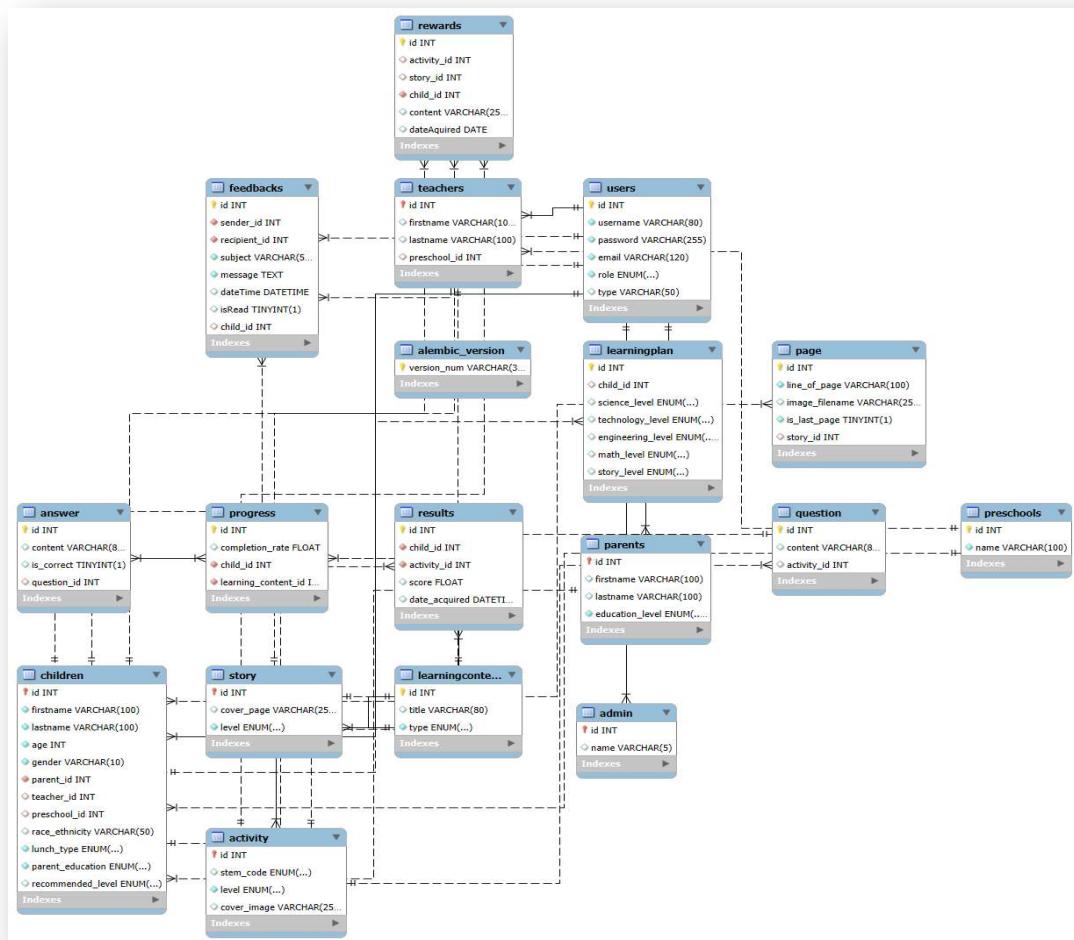


Figure 2: Database Schema of Kai Konane

Newer Technologies and Trends

The app uses modern technologies and trends to enhance its capabilities. One standout aspect is its use of cloud computing and machine learning for advanced functionalities.

- Cloud Computing
 - The app is hosted on Render, providing scalable and managed hosting services for both the application and database. This ensures high availability and performance while reducing maintenance overhead.

The screenshot shows the Render Dashboard interface. At the top, there are tabs for 'Render', 'Dashboard' (which is selected), 'Blueprints', and 'Env Groups'. On the right side of the header, there are buttons for '+ New', a user profile icon, and 'Nolan Temp's Workspace'. Below the header, the project name 'kai-konane' is displayed. A button '+ Add environment' and a gear icon are also present. The main area is titled 'Production' and shows a table with two service entries:

Service Name	Status	Type	Runtime	Region	Last Deployed
kai-konane	Deployed	Web Service	Python 3	Oregon	6 days ago
kai-konane	Available	PostgreSQL	PostgreSQL 16	Oregon	20 days ago

Figure 3: Kai Konane app in Render Hosting Services

- AI and Machine Learning
 - A custom machine learning model (level predictor) was developed and integrated to automatically recommend learning levels for children. This model predicts the learning level based on the child's age, gender, race, lunch type, parent educational level, and completed activities.
 - The model was created using joblib for model serialization and pandas for data handling. It was trained to predict whether a child should be classified as BEGINNER, INTERMEDIATE, or ADVANCED.

Web-based API/Microservice/Serverless Technology

The app architecture is set up to use RESTful services, which help with transferring data and communication between the front end and back end parts of the system. The system also uses Flask to build RESTful API points and a microservice oriented architecture for developing modules in a scalable and maintainable manner.

Data Analytics

The app incorporates data analytics features to track user progress and provide insights for parents and teachers. This includes monitoring activity completion rates and analyzing the feedback provided.

- Tools and libraries
 - Pandas for data manipulation
 - Matplotlib for creating simple visual reports for children's results and progress.

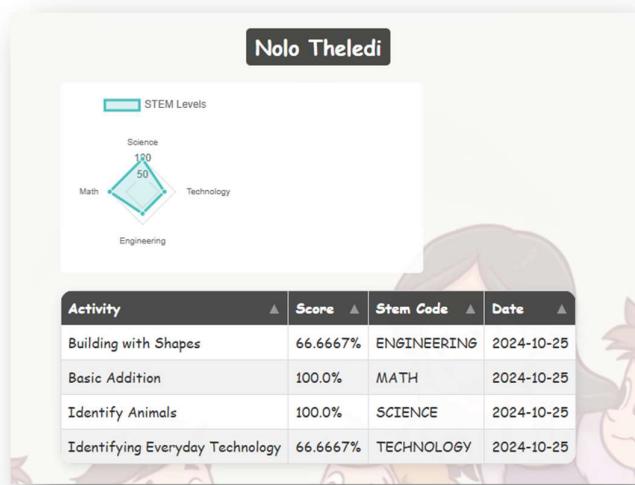


Figure 4: Results reporting section

The graph shows green line for each subject if the child is passing the subject overall and shows a red line if the child is failing.

DevOps Process (Git/Containers)

The project uses a Git based process for managing versions of the code during development with commits and careful branch management to maintain effective code organization throughout the development process.

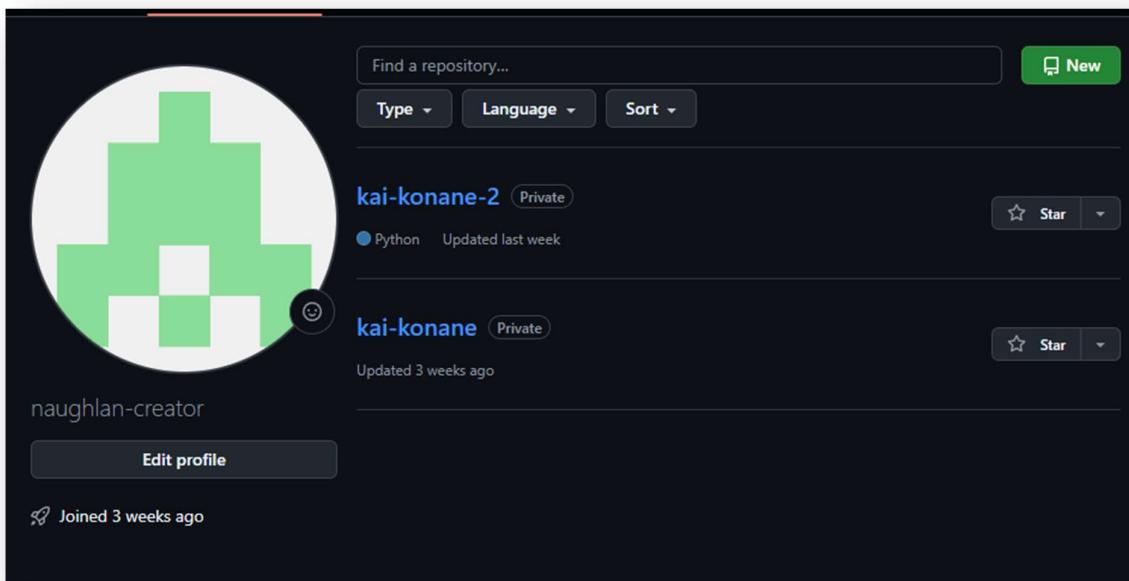


Figure 5: Git repositories of Kai Konane

Platform Implementation (Web/Desktop)

The app was implemented as a web based platform, ensuring cross-platform compatibility through responsive design. The front-end UI is accessible on various devices, including desktops, tablets, and smartphones, providing a seamless experience.

Technologies used

- HTML/CSS for structure and styling
- JavaScript for dynamic functionality
- Flask for server-side operations.

Public Availability

The app is publicly accessible through its deployment on Render, a cloud-based hosting provider. This is the link to the Kai Konane app: <https://kai-konane.onrender.com/>.

Getting Started

User Types and their Roles

Parents

- Create and manage family accounts
- Monitor children's learning progress
- Communicate with teachers
- Access learning reports
- Manage child profiles

Teachers

- Track student progress
- Update personalized learning plans
- Communicate with parents
- Access learning reports

Children

- Access age-appropriate learning content
- Engage with interactive stories
- Earn achievements and rewards

Administrators

- Manage all user accounts
- Create and control learning contents
- Monitor system performance
- Manage preschool registrations

Sounds and notifications

The Kai Konane app features music and sounds on each page to help users or parents identify the accessed page through the audio cues provided. Cheerful or happy sounds indicate success when the correct button is pressed while sad or negative tones are used for errors.

Account Setup

Users have options to setup accounts based on their roles (parent - child, teacher).

Follow these steps to create an account:

1. Make sure to open Kai Konane in your web browser.
2. Click on the 'sign up' button to access the registration page



Figure 6: index page

3. Select your role or choose whether you are a parent or teacher by clicking the respective button on the signup page.

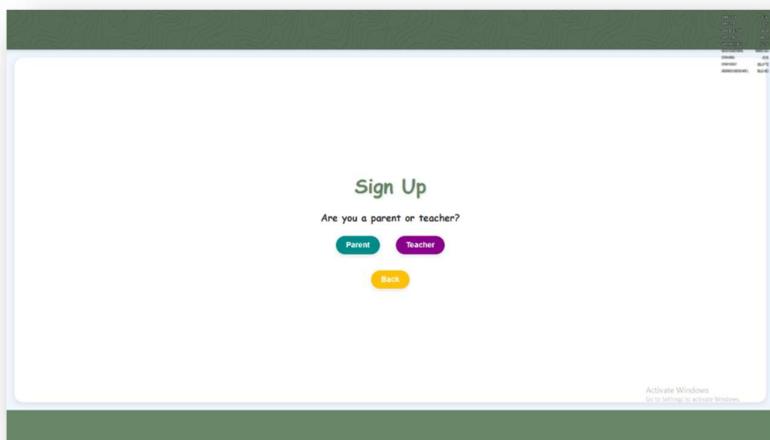


Figure 7: sign up page

3.1. Parent Signup

Only parents have the right to sign up their children for the Kai Konane app.

- Step 1: Enter the number of children you are enrolling.

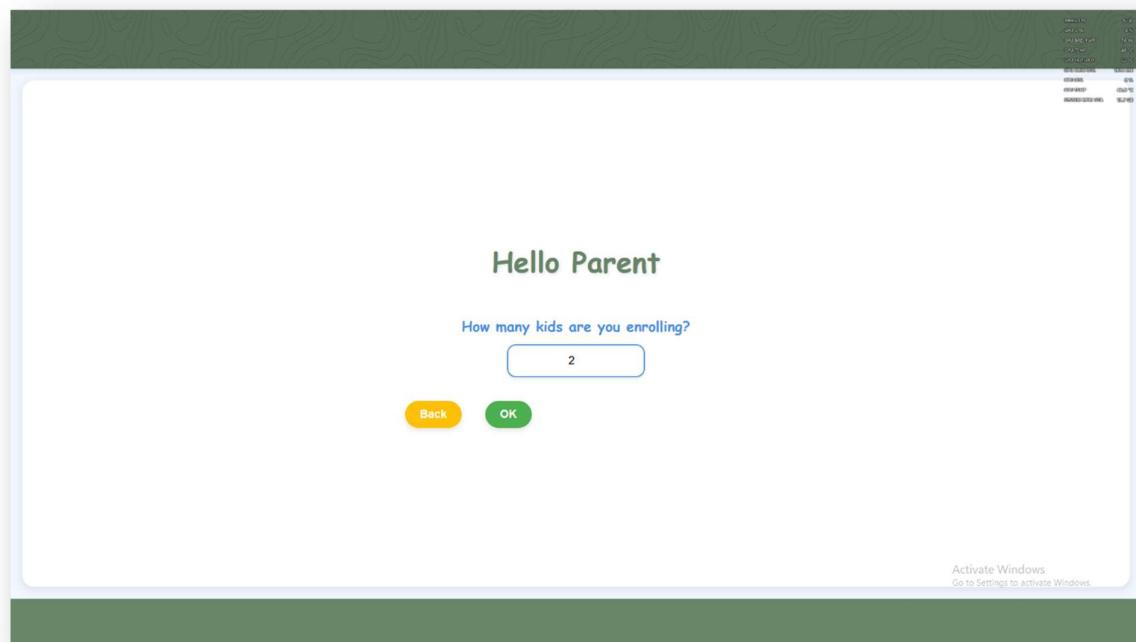


Figure 8: parent_signup_1 page

- Step 2: Create login details, including username, email, and password.

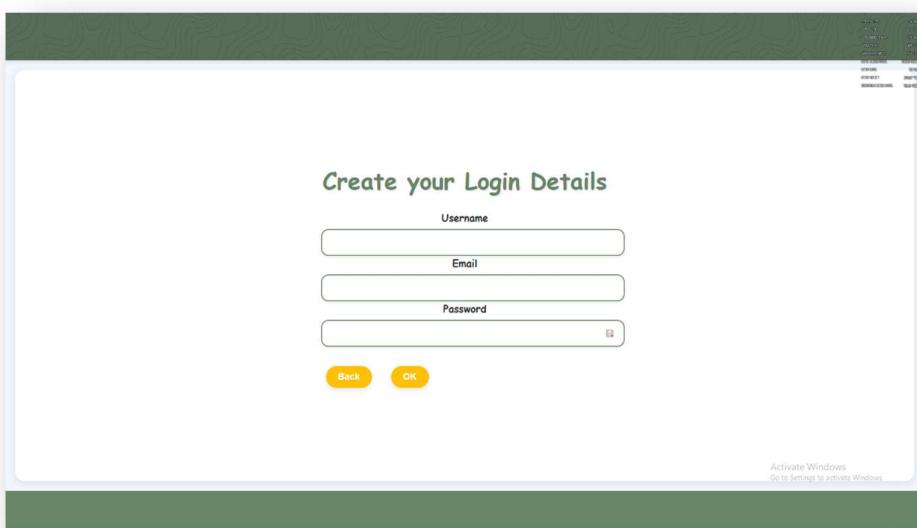


Figure 9: parent_signup_2 page

- Step 3: Complete the parent profile by entering your first name and last name and choosing your highest educational level and the preschool of your children.

Create your Profile

First name

Last name

Parent's Education Level:

Select Education Level

Select your Children's Preschool:

Choose a Preschool

Back OK

Activate Windows
Go to Settings to activate Windows.

Figure 10: parent_signup_3 page

- Step 4: Fill in your children's information such as their names and age along with selecting their gender and username and password details as well as their lunch preferences and the teacher they are assigned to. Your surname will automatically be applied to your children's names within the system.

Enter children's details

Child 1

First Name:

Age:

Gender:

Select Gender

Username:

Password:

Race/Ethnicity:

Lunch Type:

Select Lunch Type

Teacher:

Select Teacher

Child 2

First Name:

Activate Windows
Go to Settings to activate Windows.

Figure 11: parent_signup_4 page

3.2. Teacher Signup

- Step 1: Select the preschool you are associated with from the list of the registered preschools in the system.

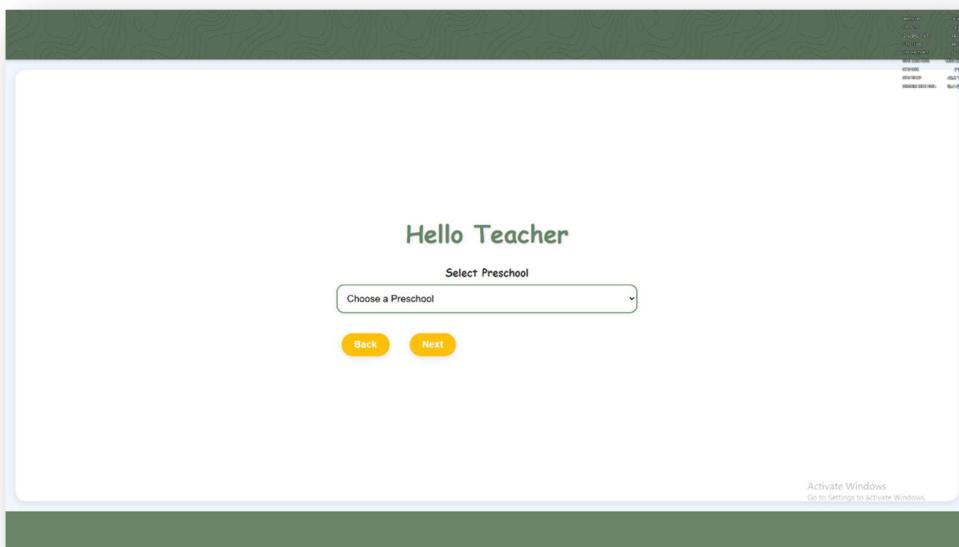


Figure 12: teacher_signup_1 page

- Step 2: Create your login details, including username, email, and password.

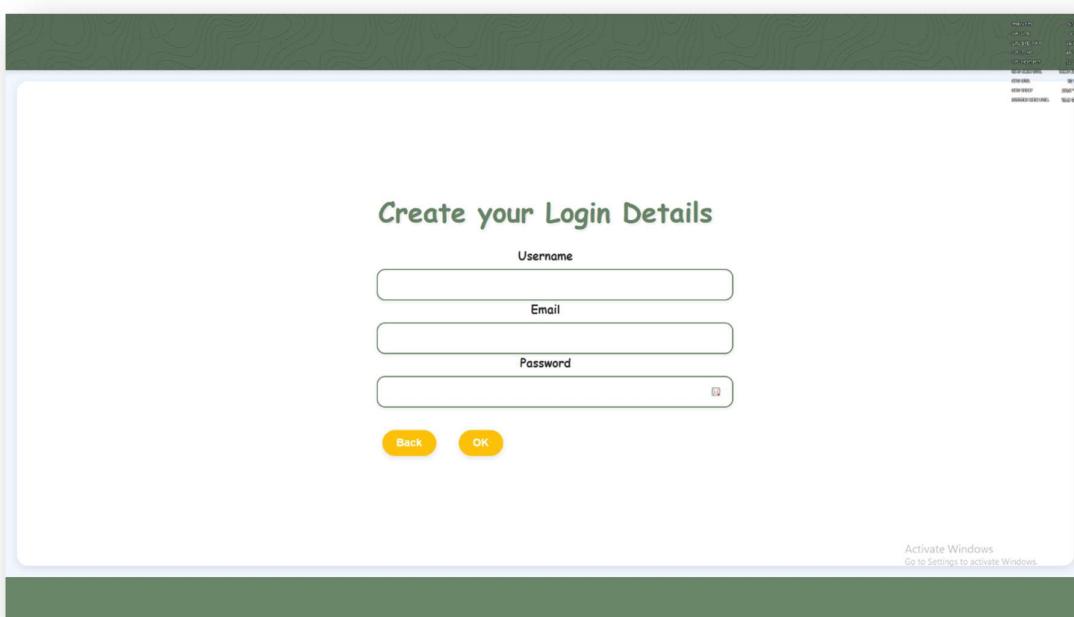


Figure 13: teacher_signup_2

- Step 3: Complete the profile by entering your first and last name.

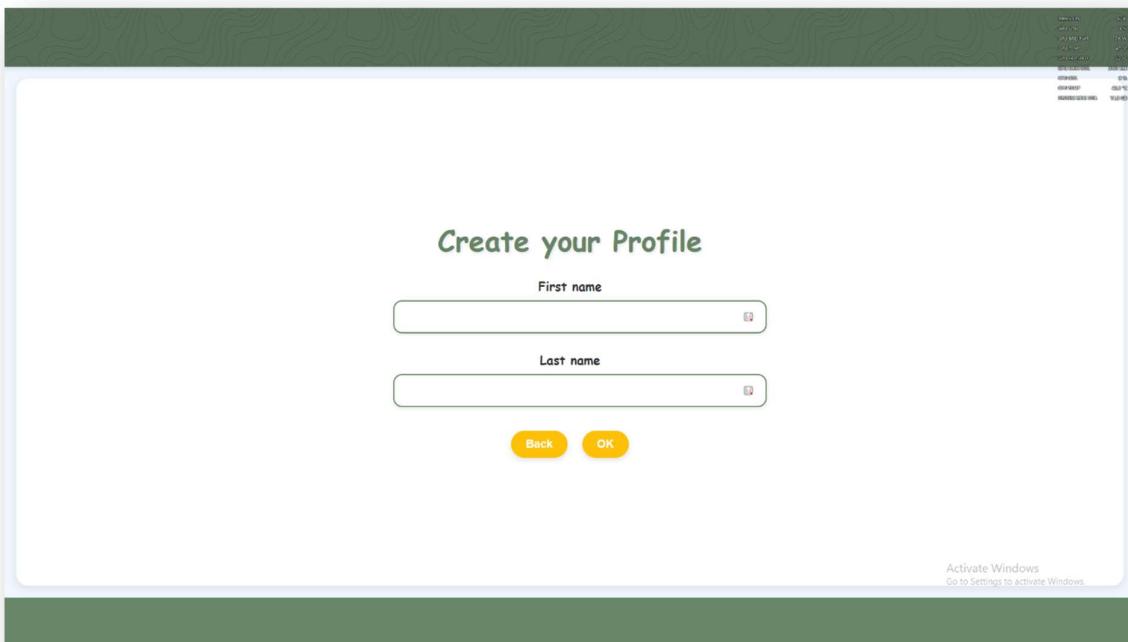


Figure 14: teacher_signup_3

3.3. Child Signup

Children are registered by their parents during the procedure, so please check out the **Parent Signup**.

3.4. Admin Signup

Admin account is already available in the system and can only be accessed using a specific DEV username and password.

Accessing Account

After you have signed up successfully, please proceed with these instructions to access your account:

1. Visit the Kai Konane website and click the login button.



Figure 15: Kai Konane Home Page

2. On the login page, please enter your username and password in the designated fields and click “Log in”.



Figure 16: login page

First time user walkthrough

Once you log in, you will be directed to the home page of your role.

- **Parent Home:** Access options like viewing your children, their progress and results, and sending messages to the teachers of your children.

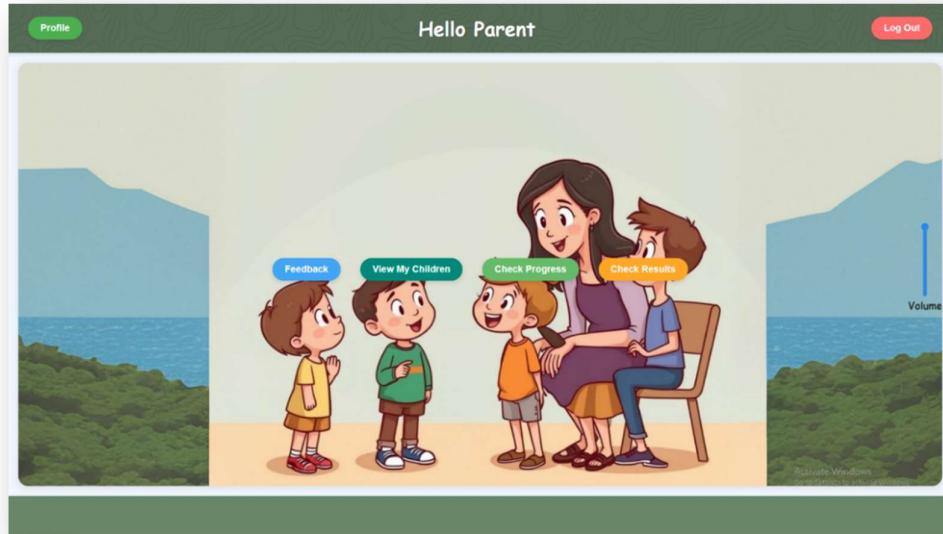


Figure 17: parent home page

- **Teacher Home:** View your learners, send messages to their parents, and manage their learning plans.



Figure 18: teacher home page

- **Child Home:** Start learning activities and access educational content.

Home page for **male** student

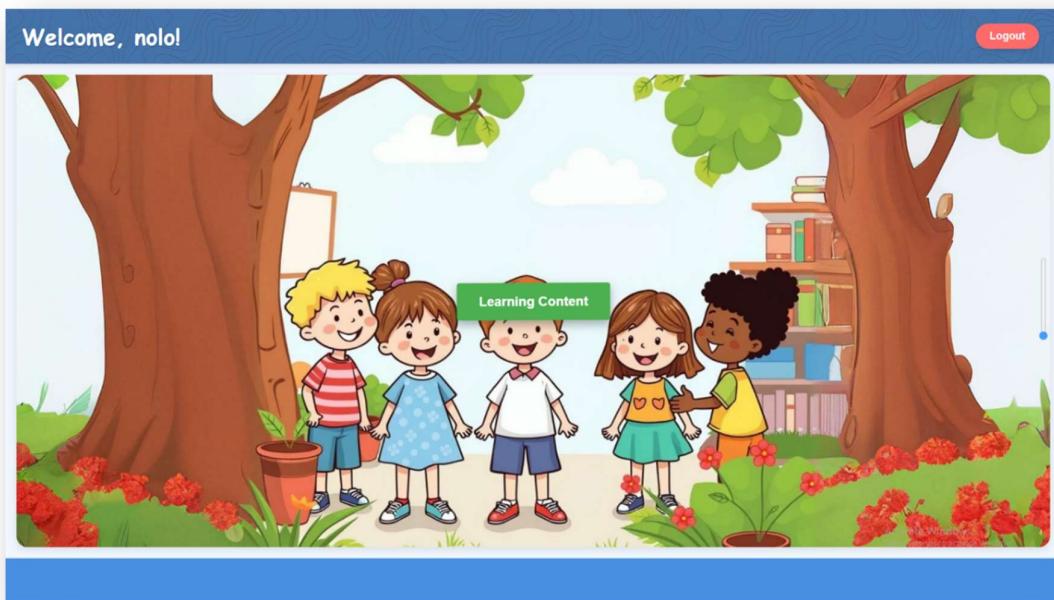


Figure 19: child home page (male)

Home page for **female** student:



Figure 20: child home page (female)

Functional Sections

This section provides an overview of all the main functionalities available in the Kai Konane application, organized by user role: Admin, Parent, Teacher, and Child. Each subsection describes the purpose of the feature and suggests relevant screenshots for better understanding.

Admin Role

The admin role has access to core management functionalities, including content and user management.

- **Admin Dashboard**
 - Access to all administrative functions, such as adding content, managing users, and handling preschools.

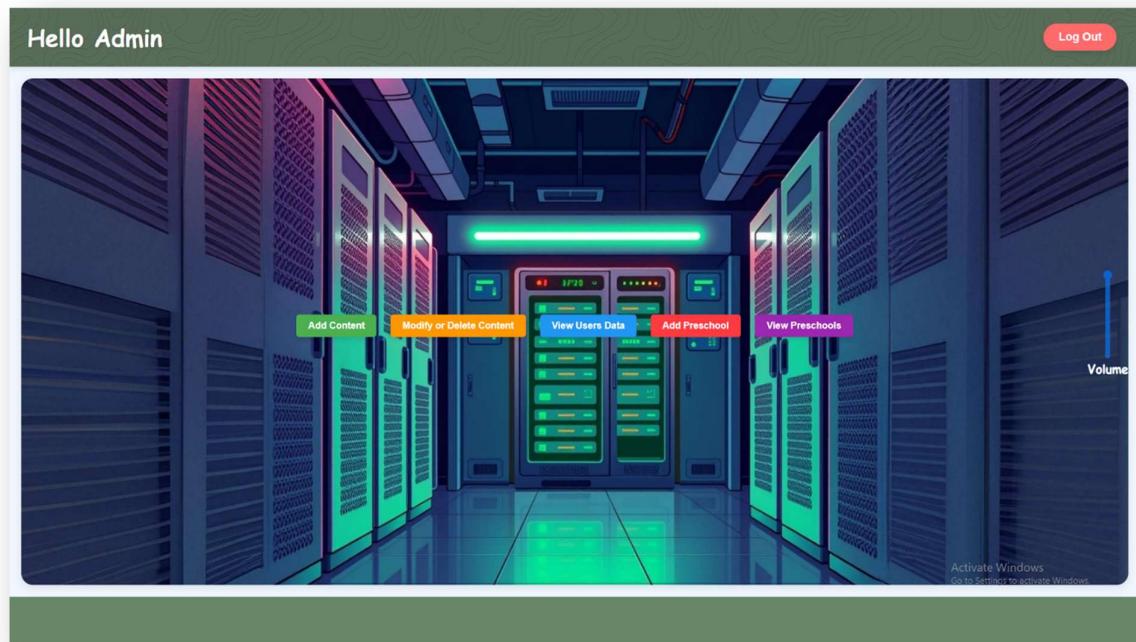


Figure 21: admin home page

- **Add Content**
 - Add new stories or activities to the app for children to use.

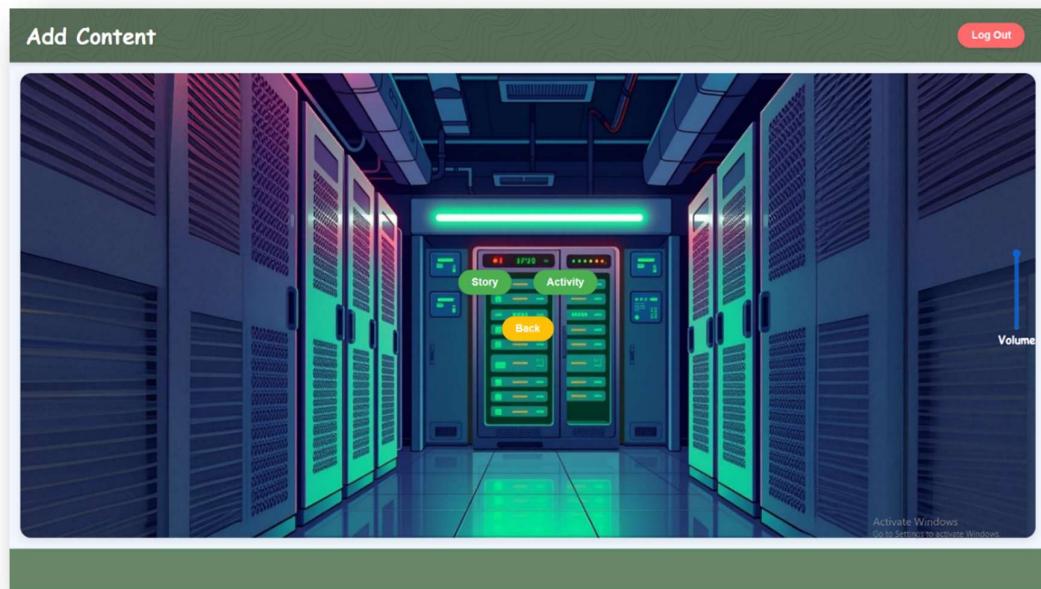


Figure 22: add content page

- **View and manage content**
 - View all available content and modify or delete specific items.

Name	Content Type	STEM Code	Modify	Delete
Basic Addition	ACTIVITY	MATH	Modify	Delete
Identify Animals	ACTIVITY	SCIENCE	Modify	Delete
Identifying Everyday Technology	ACTIVITY	TECHNOLOGY	Modify	Delete
Building with Shapes	ACTIVITY	ENGINEERING	Modify	Delete
Weather Matching	ACTIVITY	SCIENCE	Modify	Delete
Using Technology Safely	ACTIVITY	TECHNOLOGY	Modify	Delete
Building a Bridge	ACTIVITY	ENGINEERING	Modify	Delete
Simple Pattern	ACTIVITY	MATH	Modify	Delete
Animal Habitats	ACTIVITY	SCIENCE	Modify	Delete
Functions of Technology	ACTIVITY	TECHNOLOGY	Modify	Delete
Simple Machines	ACTIVITY	ENGINEERING	Modify	Delete

Figure 23: modify learning content page

- **Manage Users**
 - View, edit, or delete user data.

User Data

Search users:

ID	Username	Email	Role	Actions
1	admin	admin@example.com	ADMIN	<button>Edit</button>
6	teacher	tikkev29@gmail.com	TEACHER	<button>Edit</button> <button>Delete</button>
26	parent	naughtantmp@gmail.com	PARENT	<button>Edit</button> <button>Delete</button>
27	nolo	nolo@gmail.com	CHILD	<button>Edit</button> <button>Delete</button>
28	kale	kale@gmail.com	CHILD	<button>Edit</button> <button>Delete</button>

Figure 24: view user data page

- **Add and manage preschools**
 - Add, edit, or remove preschool entries.

Add a New Preschool

Preschool Name:

Add Back

Figure 25: add preschool page

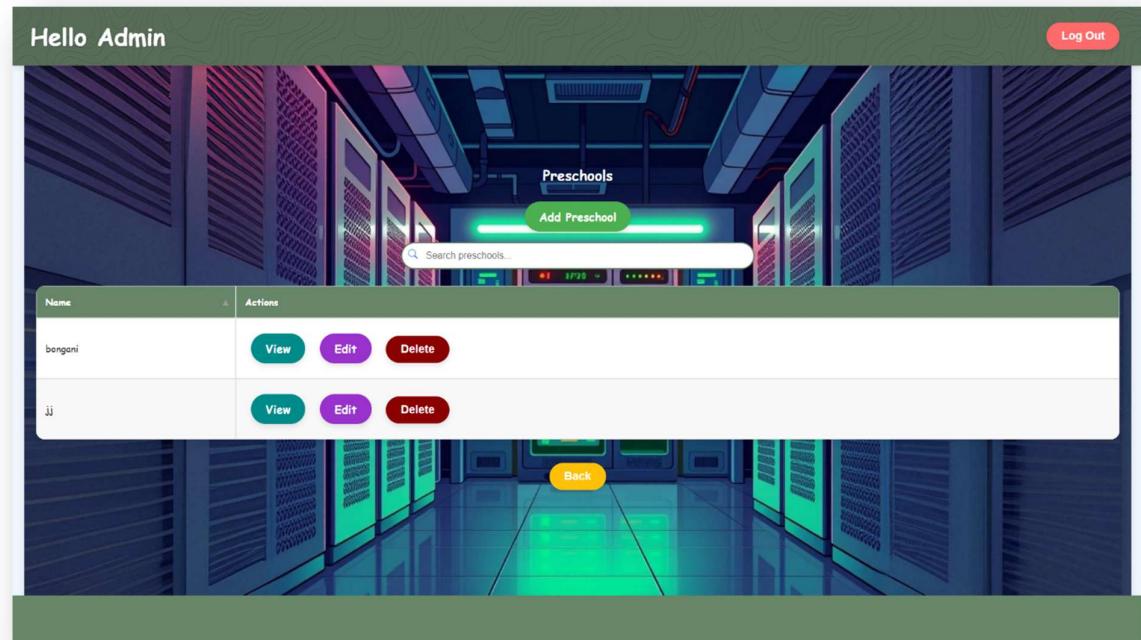


Figure 26: manage preschools page

Parent Role

Parent can track their children's progress, communicate with teachers, and manage child accounts.

- **Parent Dashboard**

- Central hub for parents to view progress, send messages, and manage profiles.



Figure 27: parent home page

- **View Child's Progress and Results**

- Monitor children's learning progress and completion rates.

A screenshot of a web-based application interface titled "Child Progress". At the top, there is a search bar with the placeholder "Search children or content..." and a "Home" button. The main area is a table titled "Child Progress" with columns: "Child", "Learning Content", "Type", "Completion Rate", and "Completed". The table lists various children's activities, such as "Building with Shapes", "Jack the Rabbit", and "Max the Dog", categorized by type (ACTIVITY or STORY) and completion rate (e.g., 66.6667%, 100.0%). A volume control slider is visible on the right side of the screen. A tooltip for the volume slider says "Activate Windows Go to Settings to activate Windows Yes".

Child	Learning Content	Type	Completion Rate	Completed
Nolo Thledi	Building with Shapes	ACTIVITY	66.6667%	No
Nolo Thledi	Jack the Rabbit	STORY	100.0%	Yes
Nolo Thledi	Max the Dog	STORY	100.0%	Yes
Nolo Thledi	Lily's Garden Adventure	STORY	100.0%	Yes
Nolo Thledi	Sam and the Missing Kite	STORY	0.0%	No
Nolo Thledi	Lucy the Butterfly	STORY	0.0%	No
Nolo Thledi	Ben's Big Adventure	STORY	0.0%	No
Nolo Thledi	Lily's Trip to the Moon	STORY	0.0%	No
Nolo Thledi	Basic Addition	ACTIVITY	100.0%	Yes
Nolo Thledi	Identify Animals	ACTIVITY	100.0%	Yes
Nolo Thledi	Identifying Everyday Technology	ACTIVITY	66.6667%	No
Kale Thledi	Building with Shapes	ACTIVITY	100.0%	Yes
Kale Thledi	Basic Addition	ACTIVITY	100.0%	Yes
Kale Thledi	Jack the Rabbit	STORY	100.0%	Yes

Figure 28: check children's progress page

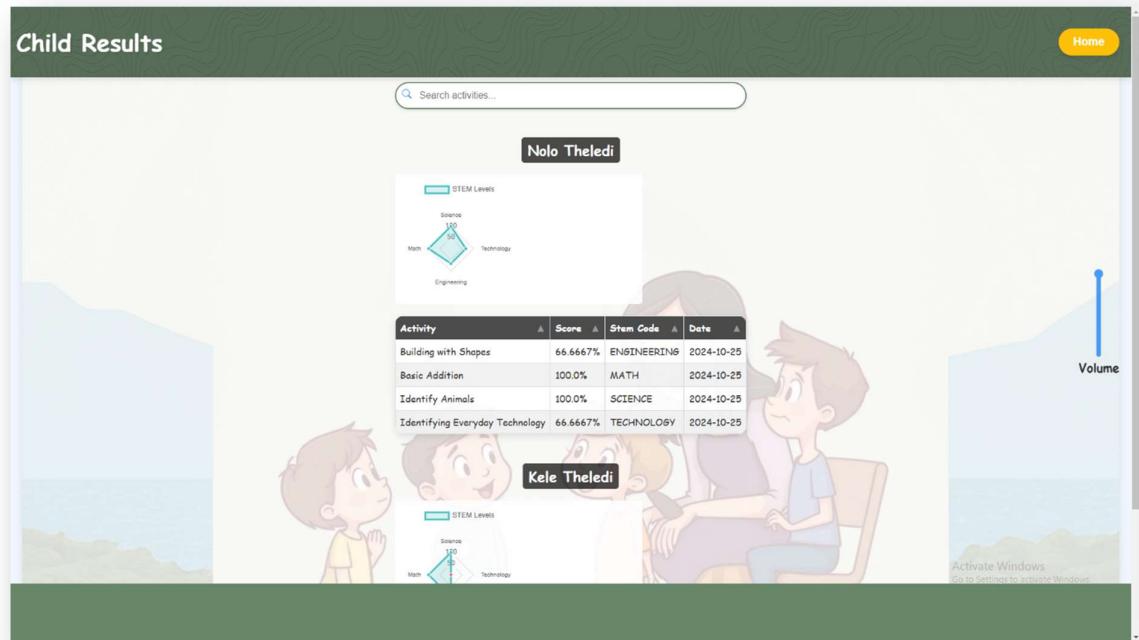


Figure 29: check children's results page

- **Send and Receive messages**
 - Communicate with teachers and receive updates. Please see the Feedback System section for more information.

Teacher Role

Teachers have functionalities for managing their learners and managing their learning plans.

- **Teacher Dashboard**

- Access to teacher tools for communication, managing students, and managing learning plans.



Figure 30: Teacher home page

- **Manage Learning Plans**

- The system creates learning plans for children based on their and their parents' personal details. The teacher only gets to update the learning plan of the children if they feel the need to do so.

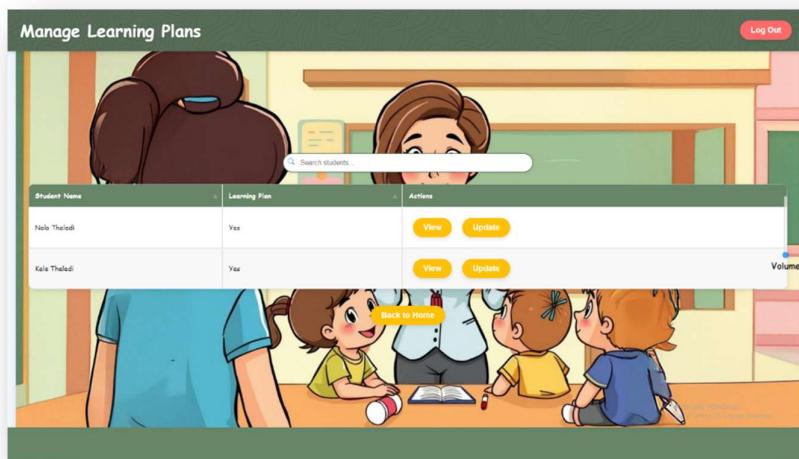


Figure 31: Manage learning plans page

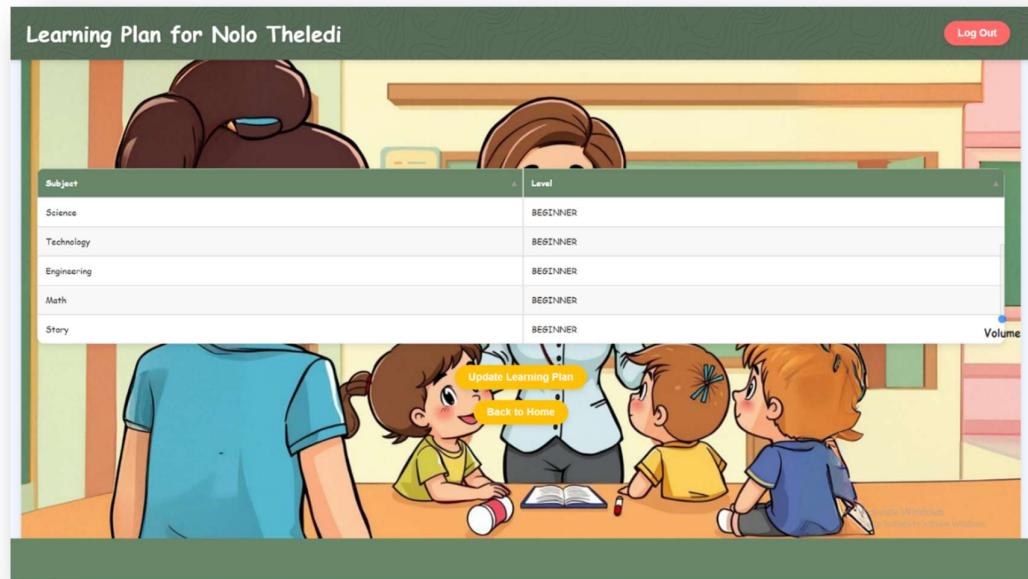


Figure 32: view child's learning plan page

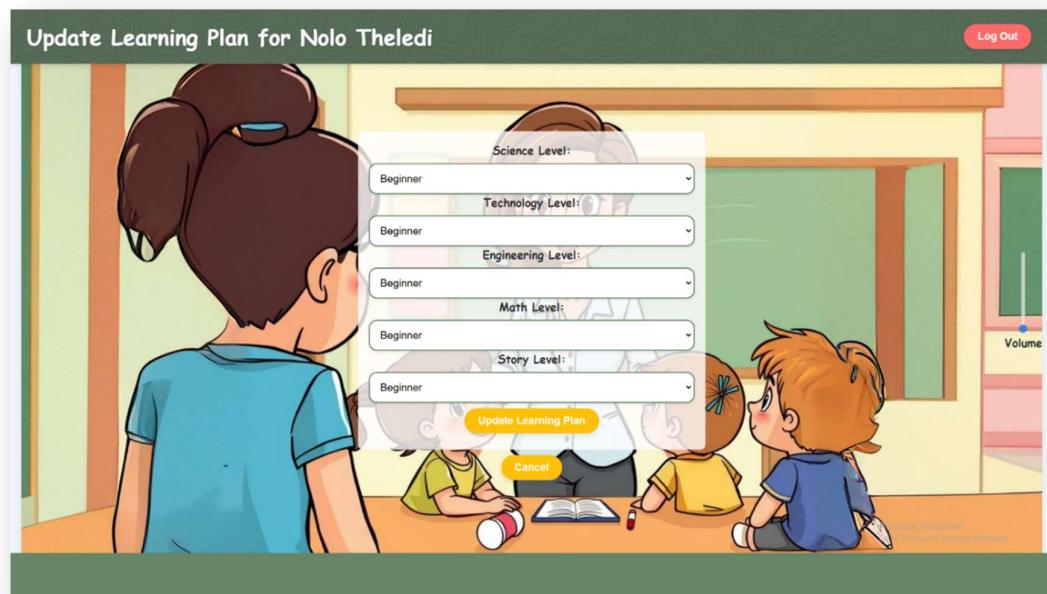


Figure 33: update learning plan page

- **Communicate with parents**
 - Send messages to the parents of their learners. Please see the Feedback System section for more information.

Child Role

The child role is focused on interactive learning and content engagement.

- **Child dashboard**

- Provide children with direct access to learning content like activities and stories.



Figure 34: child home page

- **Accessing Stories**

- Read educational stories and complete reading exercises. Please see the Storytelling System section for more information.



Figure 35: learning content home page

- **Activities**

- Engage in activities that test and develop knowledge across different subjects. Please see the Activity System section for more information.

Activity System

The Activity System can only be accessed through a child's login and it is designed to provide children with interactive learning experiences through various activities that cover four different subjects: **SCIENCE**, **TECHNOLOGY**, **ENGINEERING**, and **MATH**. It allows children to engage in questions and quizzes that reinforce their learning and helps parents and teachers monitor progress.

Key Features

- **Activity Home**
 - After clicking the Activities option on the learning content screen of the child's login, you will see the below page and it is the page where children can view available activities based on their current learning plan.

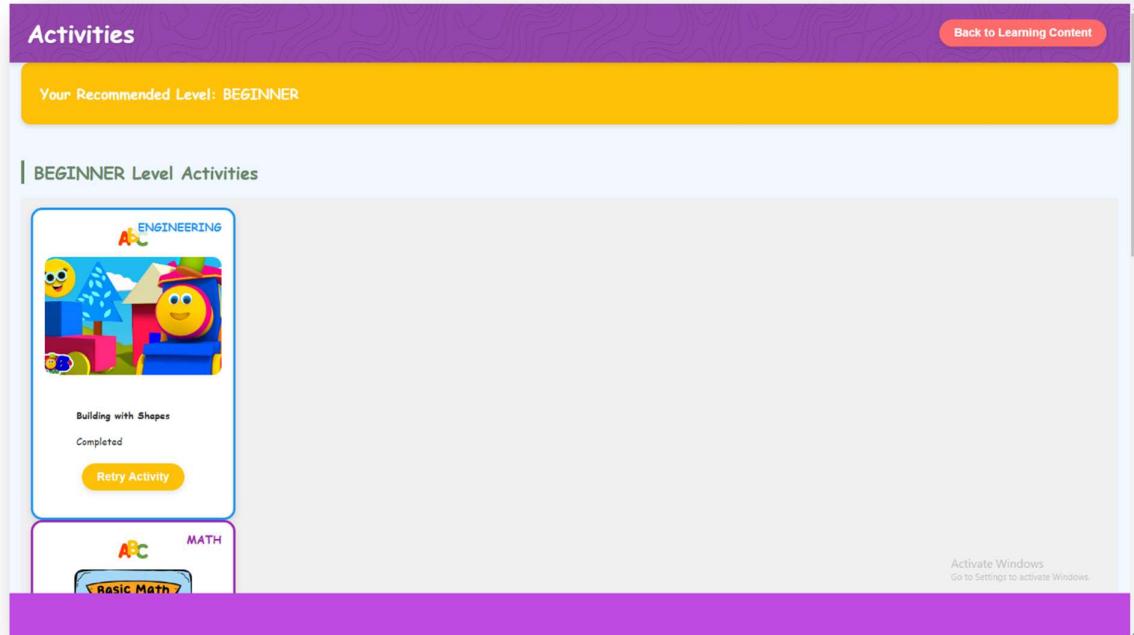


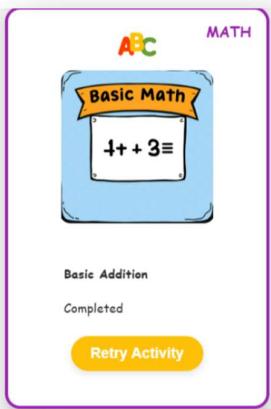
Figure 36: Activities page

The system adopts the tile approach to layer the activities and uses different colors to distinguish between different subjects.



Blue border for ENGINEERING activities.

Figure 37: ENGINEERING activity tile



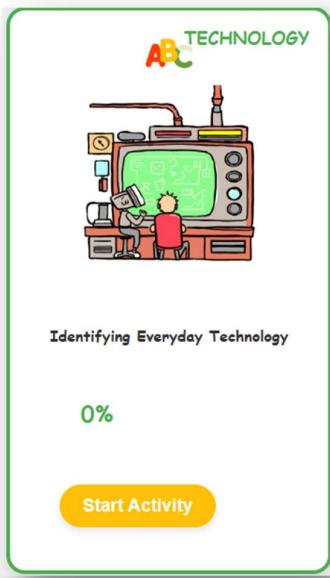
Purple border for MATH activities.

Figure 38: MATH activity tile



Yellow border for SCIENCE activities.

Figure 39: SCIENCE activity tile



Green border for TECHNOLOGY activities.

Figure 40: TECHNOLOGY activity tile

- **Activity Details and Participation**

- The page that hosts activities and allows children to answer questions.
- The page has the read functionality that reads the questions to the children and reads the answers as the children selects them and provide an incorrect sound if the answer is incorrect and the correct sound if the answer is correct.

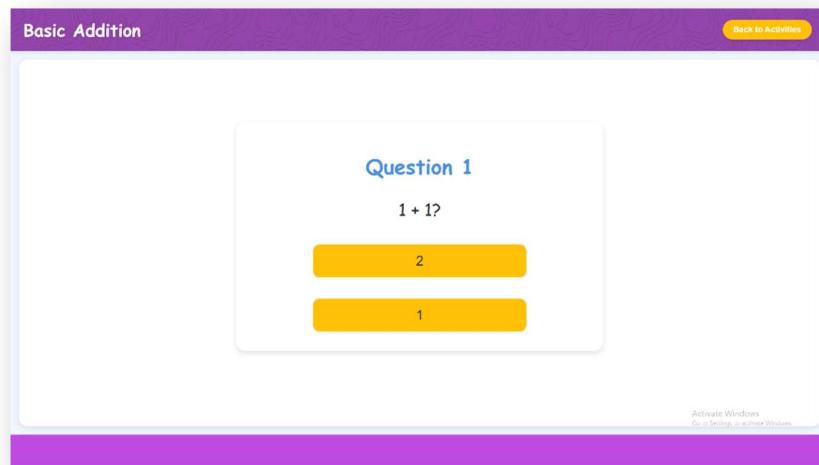


Figure 41: activity page

- After the activity has been completed, the system then updates the learning plan of the child based on their overall performance of the activities and after doing so, they will be greeted with the message box below showing that their learning plan has been updated to the suitable level.

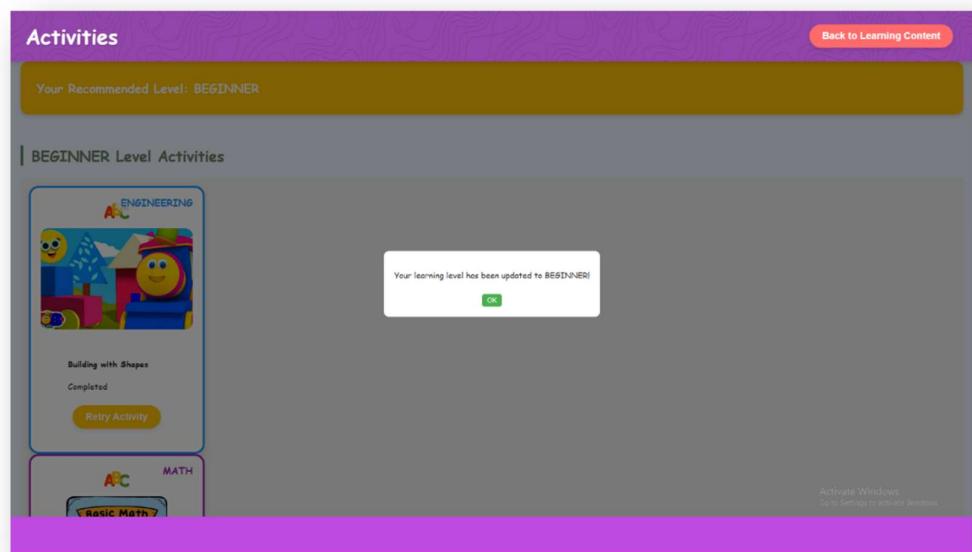


Figure 42: learning level update notification

Storytelling System

The Storytelling System is only accessible through the child's login and it focuses on providing an engaging way for children to read and learn through stories. It supports reading comprehension and makes the process interactive by including text, image and the read feature whereby the system turns hands free and reads the story back to the learners and highlight the word as it reads it.

Key features

- **Story list and selection**
 - Displays a collection of available stories based on the current learning plan of the children and in a tile format.

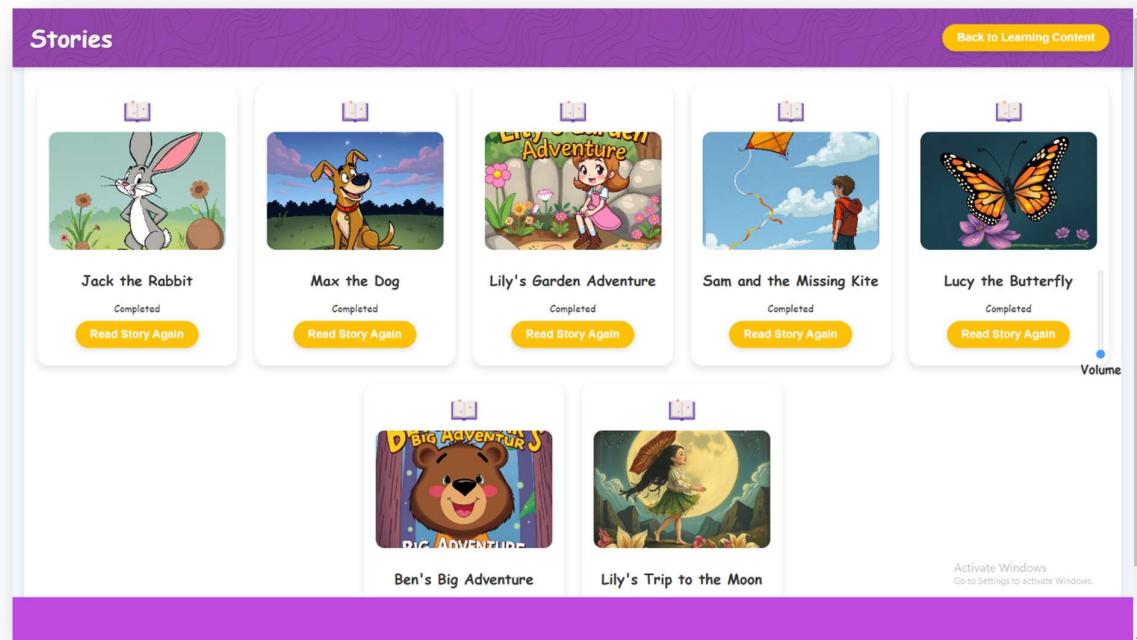


Figure 43: Stories page

- **Story details and reading**
 - Provides an immersive and hands free reading experience where children can listen to the stories.

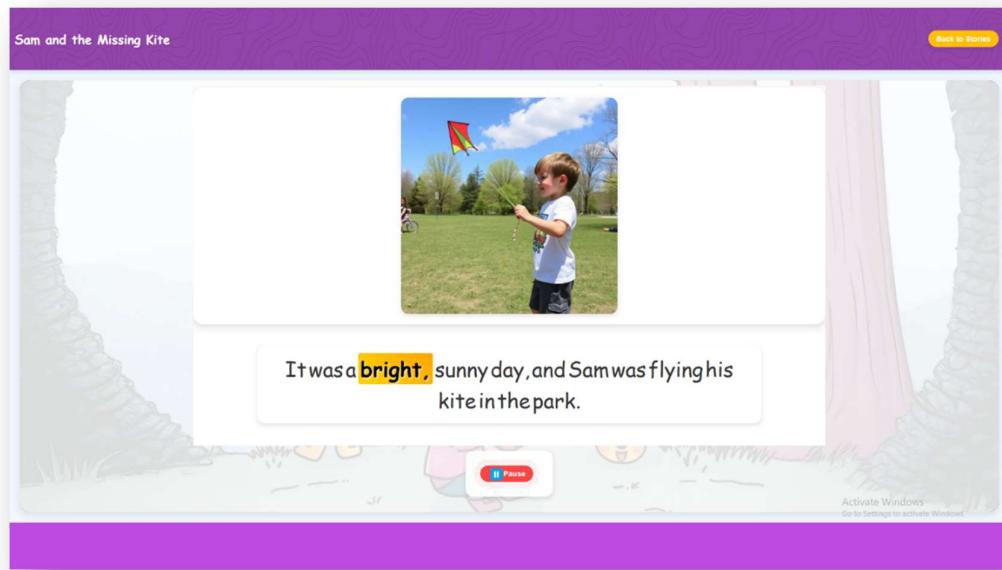


Figure 44: Story page

- When the system finishes reading the story, it plays a Story Complete sound and flashes the below screen before returning back to the stories home page.

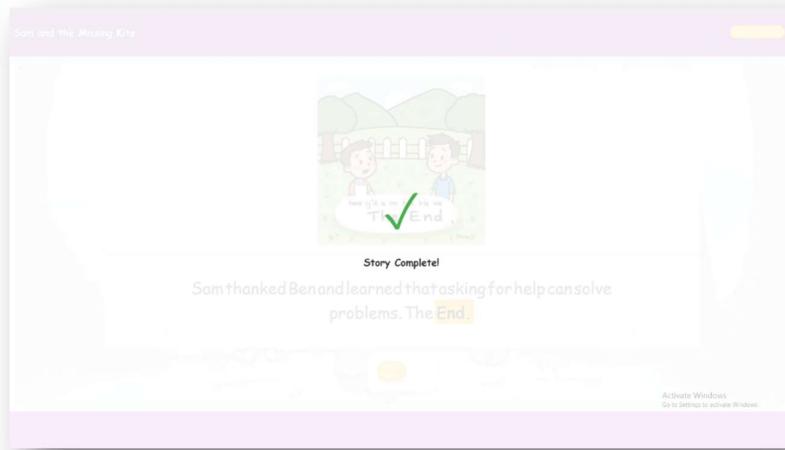


Figure 45: Story completed notification

- **Interactive reading and voice support**
 - Enhances the reading experience with the voice narration and page-turning futures.

Feedback System

The Feedback System enables users (primarily parents and teachers) to send and receive feedback, view past communications, and track status of the message. This system helps maintain transparent communication between teachers and parents and provides a platform for constructive feedback.

Key Features

- **Feedback Home**
 - The central hub for accessing feedback functionalities, including writing new feedback, viewing received feedback, and checking past communications.



Figure 46: Feedback home page

- **Writing Feedback**
 - Allows users to draft and send feedback messages to recipients.

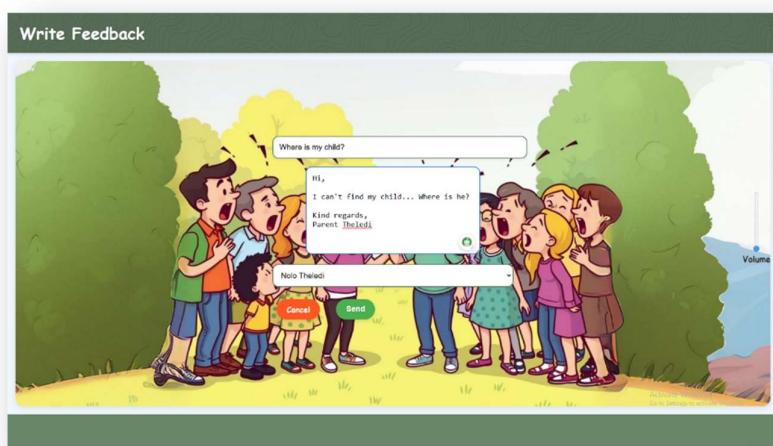


Figure 47: write feedback page

- **Viewing Feedback**

- Users can see new feedback they have received and respond if needed.



Figure 48: read feedback page

- **Past Feedback**

- Allows users to review their past feedback, aiding in record-keeping and follow-up actions.

Subject	Sender	Date	Status
Where_is_my_child2	Parent Thleledi	2024-11-07 10:02	Read
Where_is_my_child2	Parent Thleledi	2024-11-01 14:56	Read
Where_is_my_child2	Teacher Thleledi	2024-10-26 05:06	Unread
Where_is_my_child2	Teacher Thleledi	2024-10-25 11:38	Unread

Figure 49: past feedback page

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