WOLKITE UNIVERSITY

COLLEGE OF COMPUTING AND INFORMATICS

DEPARTMENT OF SOFTWARE ENGINEERING

COURSE TITLE:- Human Computer Interaction

TITLE:- KIDS TUTORIAL MOBILE APP

GROUP - 5

Student Name	ID NO
1. Dirsan Antehun	NSR/0798/14
2. Abate Agegnehu	NSR/0004/14
3. Abey Ashebire	NSR/0093/14
4. Wakisa Birhanu	NSR/2450/14

Instructor Name:

Mr. Hailemichael K.

Table of Contents

Abstract

To advance educational accessibility and promote a secure learning environment for children, we introduce the "Kids App," a mobile application developed using Android (Java) with XML for the frontend and Firebase for the backend. Our platform ensures secure content sharing by providing a dual-login system for teachers and evaluators. Teachers can upload educational videos, which are reviewed by evaluators before being made available for children. Approved content is accessible for children's learning, while declined videos are deleted for security purposes. The app simplifies interaction through Human-Computer Interaction (HCI) principles and heuristic usability, ensuring a child-friendly experience. Parents can view and share approved educational content via social media platforms. The app is designed to support a responsive and secure educational ecosystem while promoting effective learning and parental involvement.

Key Words: Android, Java, XML, Firebase, Human-Computer Interaction (HCI), Usability, Child Education, Secure Video Sharing, Frontend Development , Backend Development.

Chapter One

1. Introduction

1.1 Introduction

In developing countries like **Ethiopia**, access to quality educational resources for children remains limited due to economic challenges and technological gaps. To address this, we have developed the **Kids App**, a mobile application designed to provide both **entertainment and educational value** for children. The app focuses on ensuring children can learn while being entertained, reducing excessive screen time spent on non-educational activities.

The **Kids App** offers a secure, interactive educational platform where **teachers** upload educational videos, and **evaluators** review the content to ensure it aligns with the **curriculum** before approval. If the content meets educational standards, it becomes available for children. If it fails to meet the curriculum requirements, the content is deleted for security and quality control.

The app encourages **parental involvement** by allowing parents to view and share approved educational videos on various social media platforms, promoting broader educational access.

Built using **Android (Java)** with **XML** for the frontend and **Firebase** for secure data management, the app ensures a smooth and user-friendly experience. It incorporates **Human-Computer Interaction (HCI)** and **heuristic usability principles** to create a child-friendly and engaging interface suitable for early learners.

By leveraging **modern technologies** and focusing on Ethiopia's educational needs, the **Kids App** aims to promote **early learning, curriculum alignment, positive screen time habits, and secure content sharing** for children in a developing country.

1.2 Statement of Problem

In Ethiopia, a developing country, children often lack access to engaging and high-quality educational resources. Traditional learning methods may not effectively capture their attention, leading to unproductive use of time, such as excessive playing or screen time spent on non-educational activities. Furthermore, ensuring that educational content aligns with the curriculum is challenging, as there are limited platforms that allow for secure and organized sharing of curriculum-based materials.

There is a need for a mobile application that combines **entertainment and education**, providing children with access to secure, curriculum-aligned video content while ensuring simplicity and usability. Teachers require a platform to share educational resources, and evaluators must have the ability to review and approve these materials for curriculum alignment. Parents also need the ability to view and share approved content while monitoring their child's engagement.

The **Kids App** addresses these challenges by providing a secure, interactive platform designed for Ethiopia's educational context. It fosters a child-friendly learning experience, promotes positive screen time, and ensures the educational content adheres to the curriculum, enhancing engagement and productivity among children.

1.3 Objective

1.3.1 General Objective

The general objective of the project is to revolutionize the way children in Ethiopia engage with educational content by providing a secure and interactive mobile application. The Kids App aims to deliver a seamless learning experience that combines both education and entertainment, offering curriculum-aligned video content across various subject types such as Maths, English, Entertainment, and Amharic. The application enables teachers to upload educational videos, evaluators to review and ensure curriculum compliance, and parents to monitor and share approved content. By emphasizing usability and child-friendly design, the Kids App seeks to enhance children's learning while promoting positive screen time habits and educational involvement from parents.

1.3.2 Specific Objective

- ✧ To provide a secure and interactive educational platform that offers curriculum-aligned video content for children.
- ✧ To enable teachers to upload educational videos in subject areas such as Maths, English, Entertainment, and Amharic.
- ✧ To allow evaluators to review and approve video content for curriculum alignment, ensuring the educational value of the content.
- ✧ To support parents by enabling them to view and share approved educational videos through social media, promoting broader educational access.
- ✧ To design the app using Human-Computer Interaction (HCI) principles and heuristic usability, ensuring a child-friendly and engaging user experience.
- ✧ To promote positive screen time habits by balancing educational content with entertainment, fostering a fun and educational learning environment for children.
- ✧ To ensure security and content integrity by deleting videos that do not meet curriculum requirements, creating a safe platform for children.
- ✧ To align the app with Ethiopia's educational needs, offering tailored learning content in a contextually relevant manner.

1.4 Significance of the Project

The main purpose of the Kids App is to enhance educational accessibility for children in Ethiopia, particularly in areas where access to quality educational resources is limited. The application provides a secure, interactive platform that combines both entertainment and learning, offering curriculum-aligned video content in subjects such as Maths, English, Entertainment, and Amharic. By simplifying the learning process and ensuring content is accessible and aligned with the curriculum, the app promotes effective and engaging education for children. It also fosters positive screen time habits by providing children with an environment where learning is fun and engaging. Additionally, the app supports parental involvement by allowing parents to monitor their children's learning progress and share approved content, thereby promoting community engagement. The Kids App aims to address educational challenges in a developing country like Ethiopia, where resources and opportunities for learning may be scarce, and ensure that children have access to a safe and enriching educational experienc

1.5 Methodology

The methodology for developing the Kids App involves a systematic approach to ensure the application meets educational needs, security requirements, and usability standards. The following steps outline the process for selecting appropriate technologies, gathering, and managing educational content, and integrating the necessary features for effective learning.

1. **Evaluate and Select Appropriate Technologies:**
    - **Mobile Development Framework:** Choose **Android (Java)** for frontend development due to its scalability and compatibility with a wide range of devices. Use **XML** for designing a child-friendly interface, ensuring the app is visually engaging and intuitive.
    - **Backend and Data Management:** Select **Firebase** for secure data storage and real-time database management. Firebase offers scalability, security, and an easy way to manage user authentication, video uploads, and content review processes.
    - **Content Review System:** Implement a secure approval system for teachers and evaluators, ensuring that videos are reviewed according to curriculum requirements before becoming accessible to children.
2. **Gather Educational Content from Reliable Sources:**
    - Collaborate with teachers to upload educational videos on **Maths**, **English**, **Entertainment**, and **Amharic**. Ensure the videos are created in accordance with the curriculum for educational alignment.
    - Organize content into subject categories and ensure videos are appropriate for children's learning levels and interests. Implement guidelines for teachers to follow when uploading content.
3. **Preprocess and Clean Data:**
    - Clean and organize educational videos to ensure their quality and relevance. This includes reviewing the video content, checking the audio and visual quality, and verifying that the content aligns with the curriculum.
    - Use **Firebase** to store and manage data securely, ensuring that videos are easily accessible and protected from unauthorized access. Implement a system for categorizing and tagging videos based on their subject type.

4. **Integrate Secure Content Management System:**
    - Develop a video upload, review, and approval system where teachers can upload educational content, and evaluators review it based on curriculum alignment. If a video meets the required standards, it will be approved for children; if not, it will be deleted for security and quality assurance.
    - Continuously monitor the system to ensure efficient processing and secure content management, preventing unauthorized access to declined content.
5. **Test and Fine-Tune the System:**
    - Conduct usability testing based on **Human-Computer Interaction (HCI)** principles, ensuring the app's interface is child-friendly, intuitive, and easy to navigate.
    - Perform security testing to ensure all videos are appropriately reviewed, and the app protects user data.
    - Continuously gather feedback from parents, teachers, and evaluators to identify areas for improvement in the content upload and approval process.
6. **Ensure Educational Impact and User Engagement:**
    - Regularly assess the educational impact of the videos through user feedback, ensuring the content is both educational and entertaining. Encourage parental involvement by allowing parents to view and share approved videos.
    - Utilize **heuristic usability** to refine the app’s design and functionality, ensuring it promotes productive learning experiences for children while reducing time spent on non-educational activities.

By following this methodology, the Kids App will deliver a secure, engaging, and effective learning platform that aligns with Ethiopia's educational goals and promotes positive screen time habits for children.

1.6 Implementation

1.6.1 Frontend Technologies

For the frontend design of the Kids App, we will use Android (Java), XML, and Firebase to build an intuitive and engaging user interface. These technologies were chosen based on their compatibility with mobile development, scalability, and ease of use.

- ✧ **Android (Java)**
  - **Native development:** Java is widely used for Android app development, ensuring stability and performance. It allows us to create a fully functional and responsive mobile app that meets the specific requirements of the Kids App.
  - **Integration with Firebase:** Java integrates seamlessly with Firebase, which we will use for user authentication, data storage, and real-time updates. This ensures smooth handling of the video upload, review, and approval process.
- ✧ **XML (Frontend Design)**
  - **Child-Friendly Interface:** XML is used for designing a user interface that is visually engaging for children. With XML, we can structure layout elements like buttons, navigation bars, and media players to make the app easy to use for young users.
  - **Responsiveness:** XML ensures that the app layout is responsive, adjusting seamlessly to different screen sizes and orientations, which is important for accessibility across various Android devices.
- ✧ **Firebase**
  - **Real-Time Database:** Firebase will be used for managing video data, user interactions, and content approval workflows. It provides a secure, real-time database to store educational videos, track user activity, and ensure proper content moderation.
  - **Authentication & Security:** Firebase's authentication system ensures that teachers, evaluators, and parents can securely log into the app with separate roles and access permissions.

1.6.2 Backend Technologies

For the backend, we will rely on **Firebase** for backend services and storage. Firebase offers a powerful set of tools that complement the Android platform, ensuring smooth communication between the frontend and the server.

- ✧ **Firebase Realtime Database**
  - **Data Storage & Management:** Firebase Realtime Database will be used to store and manage educational content (videos, metadata) and user data (profiles, roles). It ensures real-time synchronization between different devices and users, providing up-to-date information across the app.
  - **Scalable Backend:** Firebase handles backend scaling automatically, ensuring that the app can grow as more videos and users are added.
- ✧ **Firebase Cloud Storage**
  - **Video Uploads & Storage:** Firebase Cloud Storage will be used for storing educational videos securely. It allows for fast uploads and downloads, ensuring smooth video streaming for users.
- ✧ **Firebase Authentication**
  - **User Management:** Firebase Authentication enables easy management of teacher, evaluator, and parent accounts. It supports email, social media logins, and other authentication methods to ensure a secure login process.
- ✧ **Security Rules & Data Validation**
  - **Content Moderation:** Firebase's security rules and custom logic will be used to validate and approve video content before it is accessible to children. This will be based on roles (evaluator, teacher) and ensure videos comply with curriculum requirements.

1.7 Scope of the Project

The scope of the **Kids App** includes the design and implementation of an educational platform tailored to children, with a strong emphasis on usability, accessibility, and content moderation. The project will focus on providing an engaging, child-friendly environment where children can access educational videos. The specific scope includes:

- **User Interface Design:** Creating a responsive and intuitive interface that is easy for children to navigate, using Android (Java) and XML to design a user-friendly experience. The interface will include simple navigation, colorful visuals, and engaging features that appeal to young users.
- **Content Management:** Enabling the uploading, reviewing, and approval of educational videos through different user roles (teachers and evaluators). The content will be categorized into subjects such as Maths, English, Entertainment, and Amharic, ensuring that it aligns with curriculum standards.
- **Role-Based Access:** Implementing separate logins for teachers, evaluators, and parents. Teachers will upload videos, evaluators will review and approve content, and parents can access and share approved videos with their children.
- **Real-Time Updates:** Using Firebase's real-time database to ensure that video content, user interactions, and content approvals are updated in real-time. This allows for smooth synchronization of data across different devices.
- **Educational Content Moderation:** Establishing a robust content moderation system that ensures uploaded videos meet curriculum standards before becoming available to children. This process will involve the approval of videos by evaluators and the deletion of non-compliant content.
- **Security and Data Privacy:** Implementing Firebase Authentication and security rules to manage user access and ensure data privacy, especially since the app is designed for children.
- **Multi-Platform Support:** Ensuring the app is compatible with different Android devices and screen sizes, providing a consistent user experience across smartphones and tablets.
- **User Engagement:** Encouraging positive educational engagement through features such as sharing approved videos via social media, allowing parents to play an active role in their children's learning process.

This project focuses on providing children with a safe and educational environment, fostering learning and development through engaging, interactive content

1.8 Limitation of the Project

- ✧ While the Kids App offers valuable educational content, there are some limitations that must be considered:
- ✧ Platform Limitation: The app is currently designed and optimized for Android devices only, which limits its accessibility for users with other mobile operating systems, such as iOS or Windows.
- ✧ Internet Connectivity: The app requires an active internet connection to function properly, as it relies on Firebase for real-time data synchronization, video streaming, and user interactions. This can pose a challenge in areas with limited or unreliable internet access.
- ✧ Limited Firebase Bandwidth: Since the app uses the free version of Firebase, there are restrictions on the bandwidth and storage capacity. This may affect the performance of the app, especially when handling large amounts of video content and a high number of users.
- ✧ Content Availability: The availability of educational videos is dependent on the content uploaded by teachers and approved by evaluators. Delays in content approval may impact the freshness of available educational material.

Chapter Two

2. Proposed System

2.1 Functional Requirements

The **Kids App** aims to provide an engaging and educational experience for children, using voice commands and multimedia content. The functional requirements for the system are as follows:

- **User Login and Registration:**
  - The application should allow evaluators and teachers to log in separately, ensuring that only authorized users can upload and approve videos.
  - Evaluators should be able to register new teachers, providing them access to the system.
- **Video Upload and Approval:**
  - Teachers should be able to upload educational videos through their login, which will be reviewed and approved by evaluators.
  - The application should notify users about the approval or rejection status of their uploaded content.
- **Content Categorization:**
  - The application should categorize educational videos based on subject types (Maths, English, Entertainment, and Amharic), allowing easy access and navigation.
- **Video Playback and Navigation:**
  - Users should be able to control video playback using voice commands, such as "pause," "resume," "next," or "previous."
  - The application should support continuous navigation across different video categories, allowing users to explore and play content seamlessly.
- **Real-Time Updates and Notifications:**
  - The application should provide real-time updates regarding video approvals or new content uploads, ensuring that parents and children are always informed of the latest educational material.
- **Parental Control and Access:**
  - Parents should be able to view and share approved educational videos through social media platforms.

- The application should include features to ensure that only approved content is accessible to children, promoting a safe and educational environment.

- **Accessibility Features:**
  - The application should adhere to accessibility standards, ensuring that users with disabilities can easily interact with the app using voice commands, screen readers, and other assistive technologies.

These functional requirements define the core features and interactions that will be available in the **Kids App**, ensuring that it offers an effective and engaging educational platform for children.

2.2 Non Functional Requirements

2.2.1 User Interface and Human Factors

- ✧ The **Kids App** should have an intuitive, child-friendly interface, easy to navigate and interact with via voice commands.
- ✧ It should provide quick feedback, ensuring smooth transitions and fast responses to user actions.
- ✧ Voice commands should be processed efficiently, offering a seamless, hands-free experience.
- ✧ The app should handle errors with simple, child-friendly messages when commands are not understood.
- ✧ It must be scalable to accommodate increasing users, ensuring smooth performance as the app grows.
- ✧ The app should be responsive and compatible across various devices and screen sizes, ensuring a consistent experience for all users.

2.2.2 Hardware Consideration

Users will interact with the **Kids App** primarily through touch and standard navigation, so it is important that the device has a responsive touchscreen for smooth interaction.
The app should be compatible with a wide range of Android devices to accommodate different user preferences and ensure broad accessibility.
Since the app fetches educational videos and content, a reliable internet connection is necessary to stream and download videos effectively

2.2.3 Security Issues

- ✧ Ensure secure coding practices are followed, especially when integrating with Firebase and other backend services.
- ✧ Use secure authentication mechanisms, such as Firebase Authentication, to authorize access to the app and ensure user privacy.
- ✧ Implement data encryption for sensitive user information (e.g., passwords, personal data) and ensure secure communication using HTTPS.
- ✧ Validate and sanitize user inputs to prevent malicious attacks, especially when uploading or interacting with videos.

2.2.4 Performance Considerations

- ✧ The app should provide fast and responsive user experiences, even with varying internet speeds and device capabilities.
- ✧ Optimizing video streaming and loading times is crucial to ensure smooth content delivery.
- ✧ The system should efficiently manage user requests and handle simultaneous user interactions without lag or crashes.
- ✧ Device capabilities, including RAM and processing power, should be considered to optimize app performance on different Android devices.

2.2.5 Error Handling and Validation

- ✧ Implement robust error handling mechanisms to manage runtime failures, such as network issues or content upload errors.
- ✧ Provide users with clear, understandable error messages when inputs are invalid or when the system encounters issues.
- ✧ Use proper validation techniques when users upload content or interact with the app to avoid unexpected crashes or data loss.

System must manage any run-time failures. Users may make errors, as well as the system itself. Users' errors that resulted in errors were handled by the proper exception handling methods.

Chapter Three

3 .Proposed System Architecture

3.1 Design Goals

When designing the **Kids App**, the following design goals are critical to ensure a positive user experience:

- ✧ **User-Friendly Interface:** The app should have an intuitive, easy-to-navigate interface that is appealing and accessible to children, allowing them to easily access and interact with educational videos and news content.
- ✧ **Content Accuracy and Relevance:** Ensure that videos and content are aligned with the curriculum, enhancing the learning experience for children. The app should provide accurate, up-to-date educational materials, tailored to the children's age and needs.
- ✧ **Seamless Interaction:** Focus on smooth interaction between the users and the app, ensuring that teachers, evaluators, and parents can easily upload, review, and share videos. Voice commands or gestures can be utilized for ease of navigation.
- ✧ **Performance Optimization:** The app should deliver a fast, responsive experience by optimizing Firebase backend operations, ensuring that content loading times, video streaming, and interactions are quick. Minimize any latency and ensure the app can handle a growing number of users effectively.

- ✧ **Robust Error Handling:** The system should be able to handle user errors efficiently, offering clear error messages and solutions when something goes wrong, such as invalid inputs or failed video uploads.

3.2 Proposed System Architecture

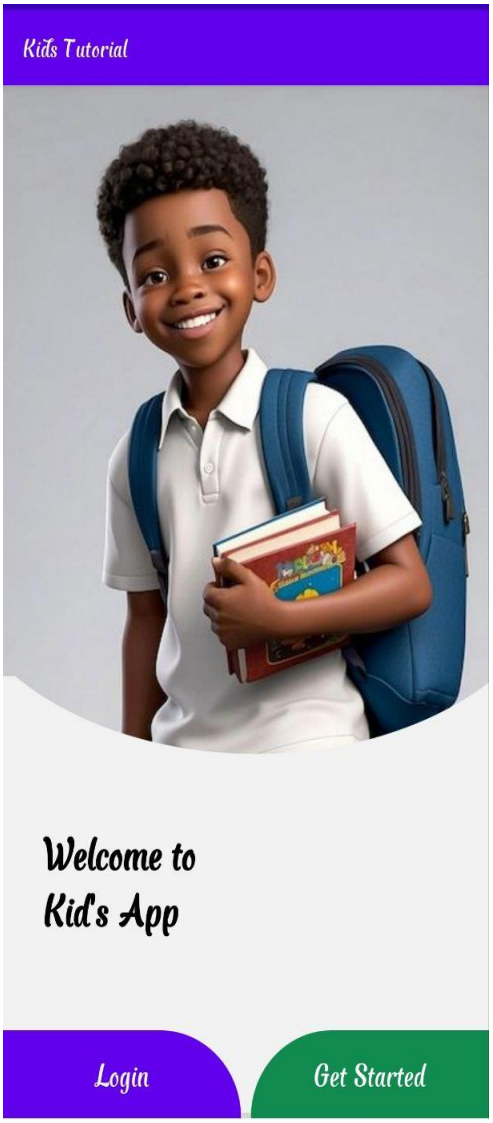
The architecture used for the Kids App follows a Client-Server Architecture, which is well-suited for mobile applications with a web-based component. Here's why this architecture is ideal for the app:

- **Client-Server Communication:** Since the app is designed to work across various devices, including mobile phones, the client-server model ensures that each device (client) communicates with the central server for data processing and storage. The server handles the data and content processing, providing the client with the required educational resources, including videos, news articles, and updates.
- **Centralized Content Management:** The server is responsible for integrating with various external sources (e.g., Firebase for data storage, video content, and metadata). It fetches educational videos, updates, and metadata, which are then processed and displayed to the users.
- **Scalability and Performance:** The client-server model allows the app to scale effectively as the number of users increases. The backend infrastructure can be enhanced to handle more traffic, video uploads, and real-time content updates without performance degradation. Firebase and other cloud-based services ensure scalability and efficient data retrieval.
- **Real-Time Content and Video Updates:** The server ensures that content such as educational videos and news updates is delivered to users in real-time, enabling smooth interaction and immediate access to approved materials.

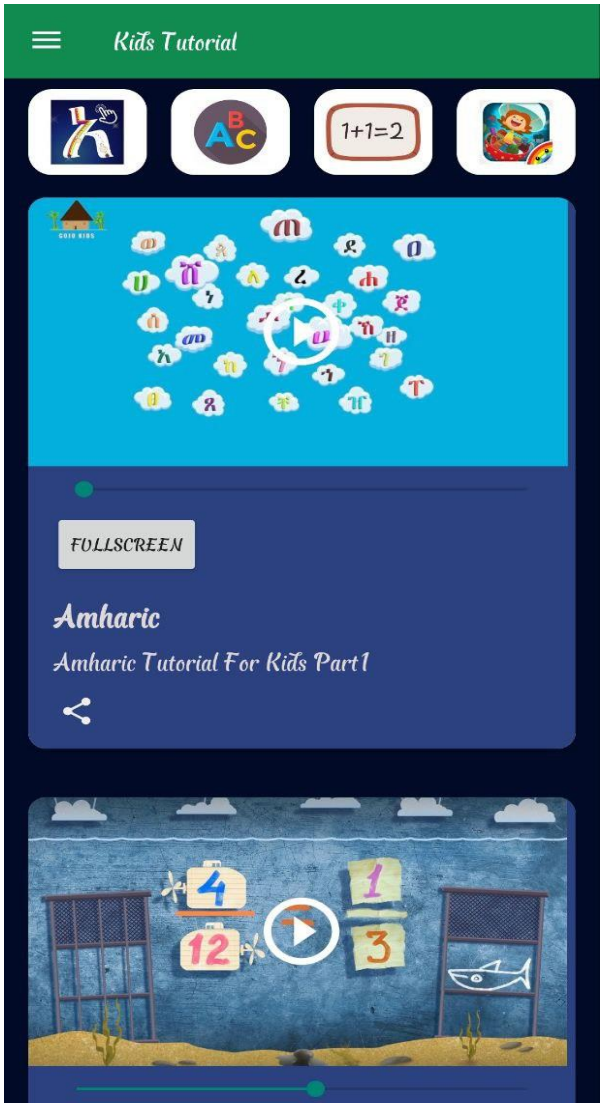
Chapter Four

4. *Kids App mobile App user Interface Overview*

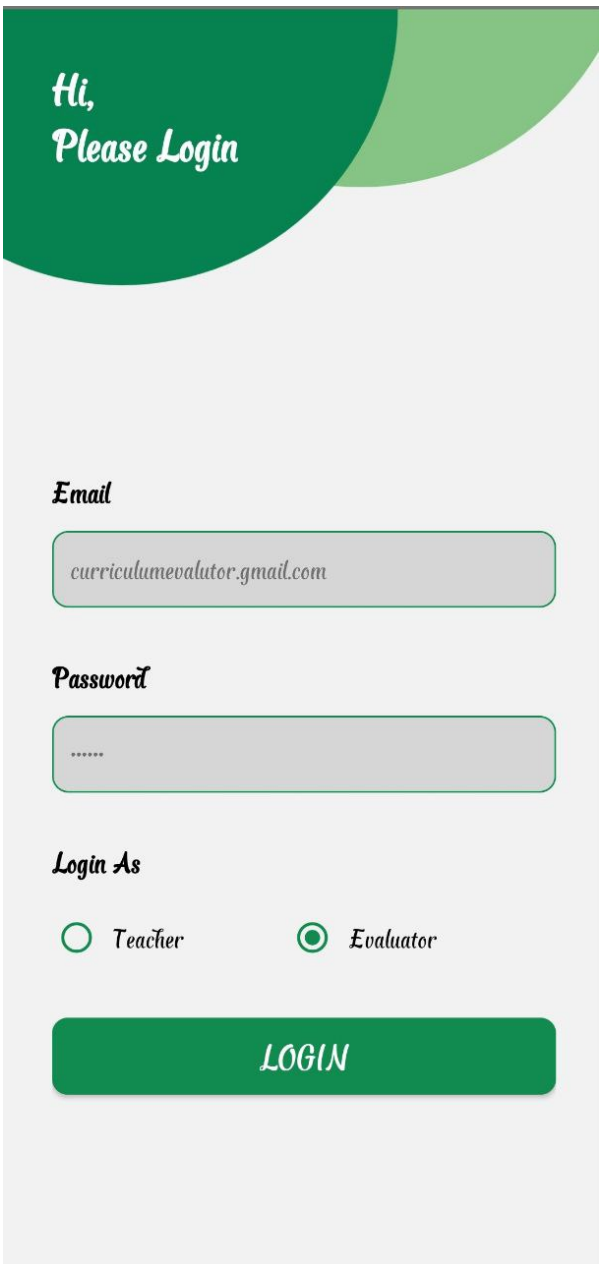
4.1. Get Started Screen



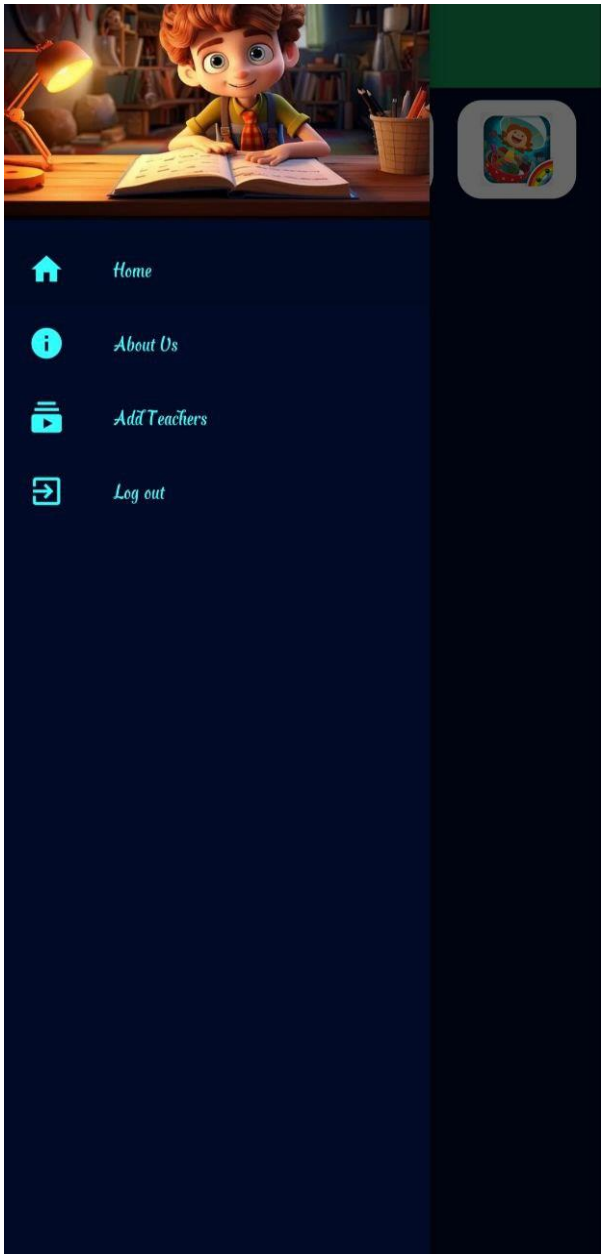
4.2 Home Screen when Get started Clicked for Kids



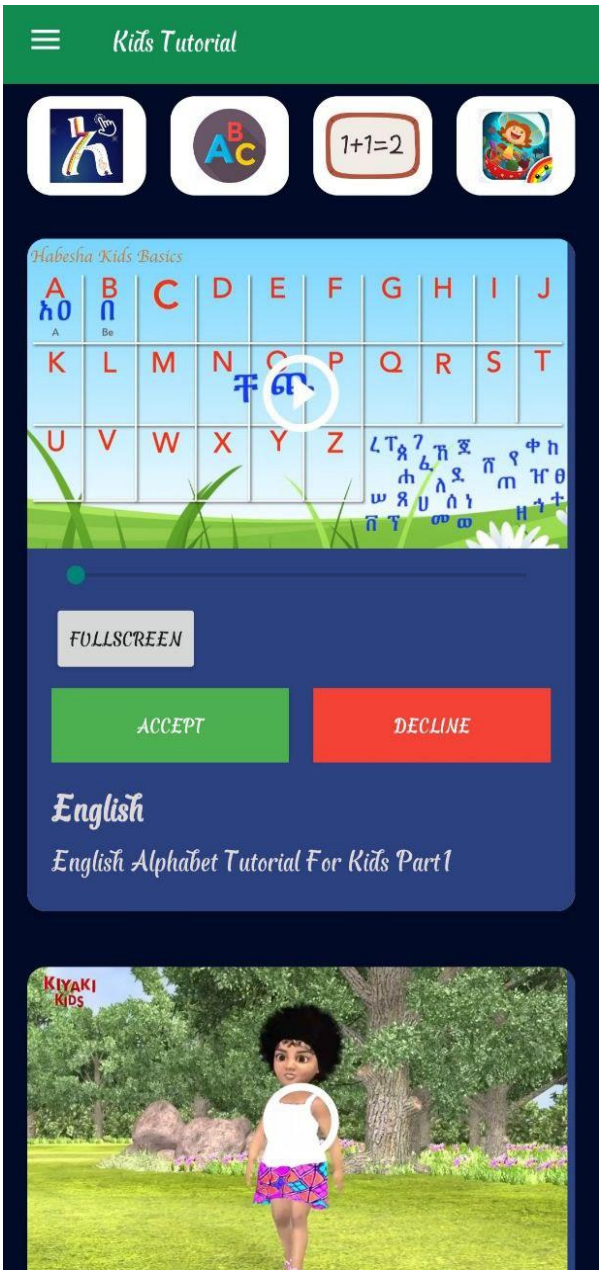
4.3. Login Screen



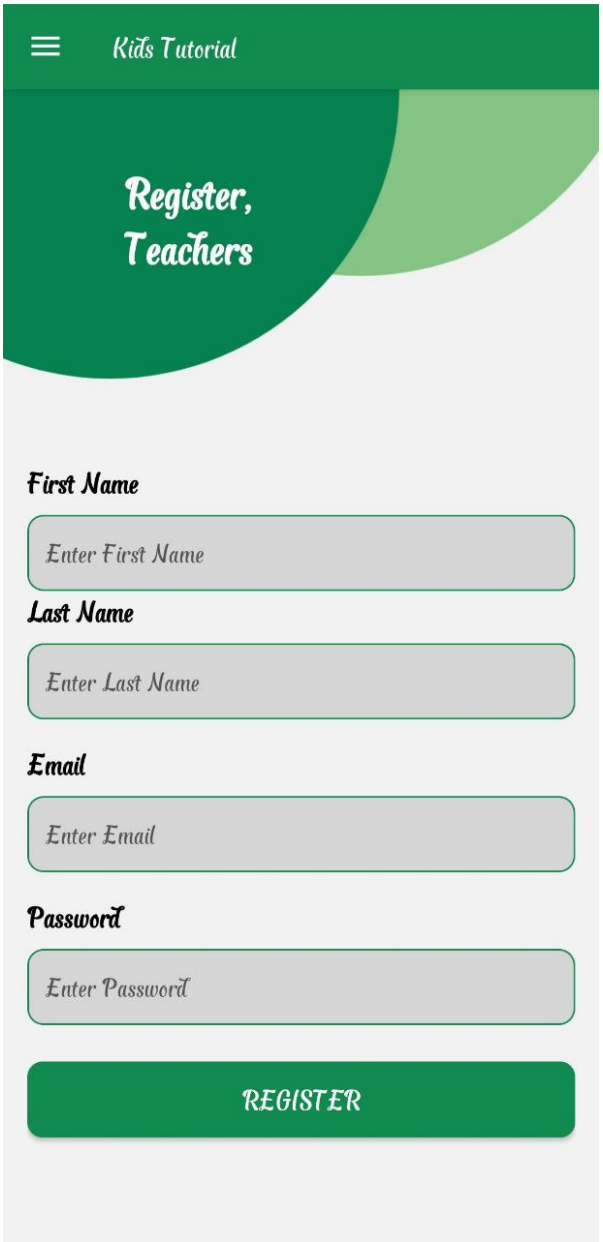
4.2 Navigation when evaluator login



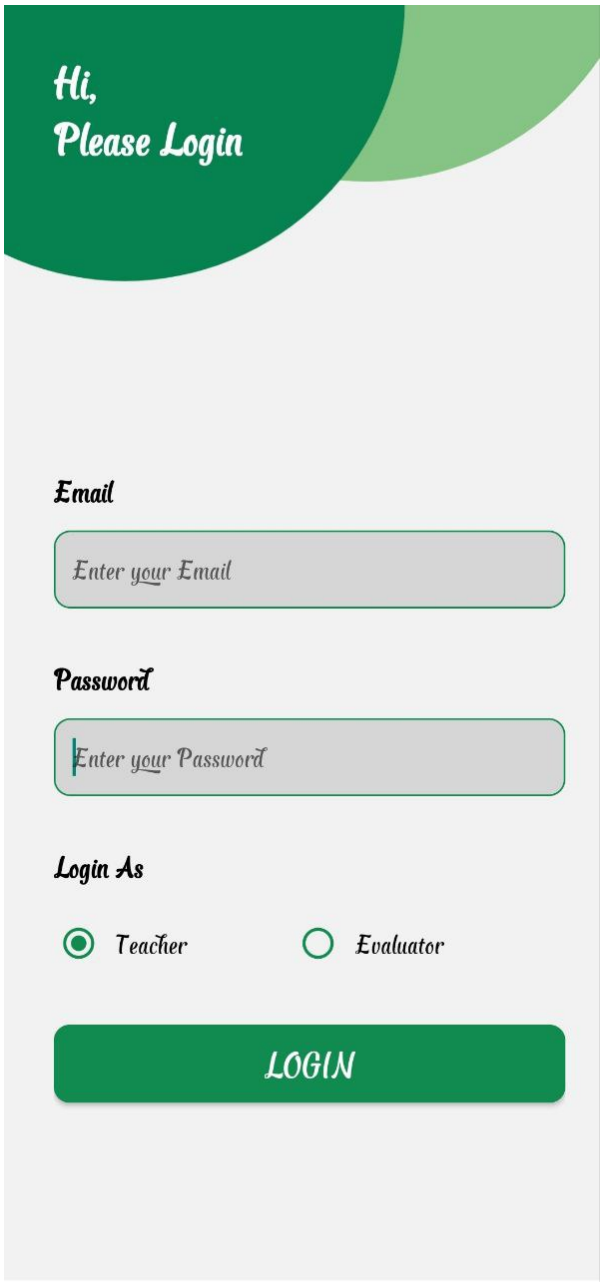
4.3Home page when evaluator login



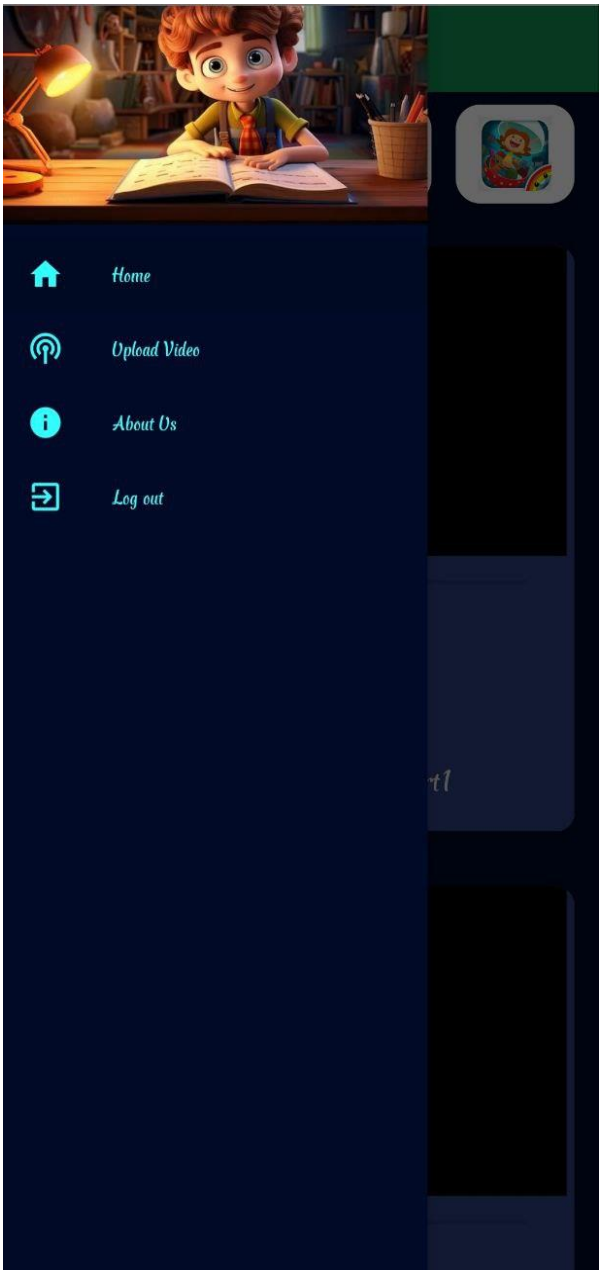
4.4 Register Teacher by evaluator



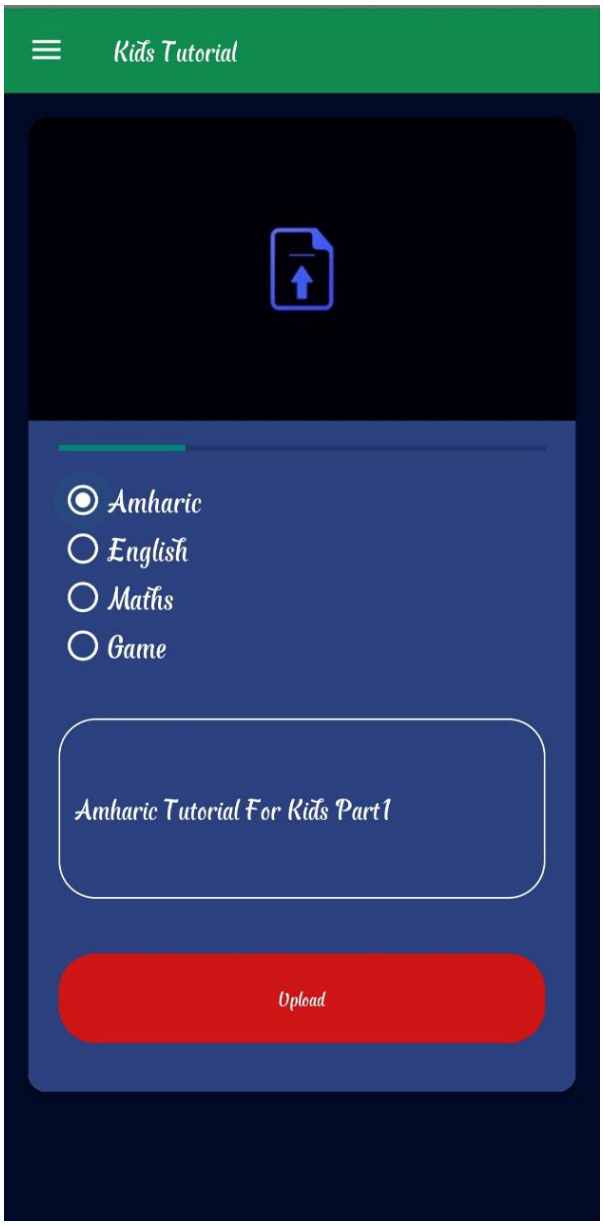
4.5 Login Screen



4.6 Navigation when Teacher login



4.7 Video Upload Form



4.8 Home page when teacher login

4.9 About Developers Page