B. V. V. Sangha's
Biluru GuruBasava Mahaswamiji Institute of Technology
Mudhol – 587313
[Recognized by Gov. of Karnataka & AICTE New Delhi and
Affiliated to Visvesvaraya Technological University, Belagavi]

Department of Computer Science & Engineering

E-Learning Using AI

PROJECT SYNOPSIS

of

Bachelor of Engineering

in

COMPUTER SCIENCE & ENGINEERING

Submitted by

Aman Inamdar	**Aishwarya Kangal**
2LB23CS400	**2LB22CS091**
Harshavardhan Bhuti	**Vijay Ganachari**
2LB23CS401	**2LB22CS086**

Under the Guidance of

Prof. Ramesh B. Kumbar
Assistant Professor,
Department of Computer Science and Engineering, BGMIT, Mudhol

Introduction

In the modern educational landscape, e-learning has emerged as a key component of teaching and learning. Digital platforms enable remote and flexible learning, connecting students and educators across geographical boundaries. According to UNESCO, "digital technologies have evolved from stand-alone projects to networks of tools and programs that connect people and things across the world" and these innovations "have the potential to speed up progress towards [education goals] … It can enhance the quality and relevance of learning, strengthen inclusion, and improve education administration and governance".

This underscores that online learning, when effectively implemented, can transform education by making it more accessible and adaptable. Modern e-learning systems are increasingly adopting intelligent features: for example, interactive modules, multimedia content, and automated assessments. However, the incorporation of Artificial Intelligence (AI) promises to take e-learning further. AI – defined as the ability of machines to process data through algorithms, learn from patterns, and apply knowledge much like humans – has shown significant advancements in recent years. With AI, e-learning can become personalized: resources and feedback can be automatically tailored to each student's profile and learning style.

In today's digital era, traditional classroom learning is being transformed through technology. *E-learning (Learn and Teach* is a user-friendly, AI-integrated web application designed to simplify the teaching and learning process for both educators and students. The platform enables teachers to upload lessons, post announcements, create custom quizzes, and track student performance. On the other side, students can view lessons, take AI-generated or teacher-created quizzes, and monitor their own progress.

Leveraging Python, Streamlit, and natural language processing (NLP), this system provides an interactive and dynamic learning experience with minimal technical setup. This project showcases how AI can enhance educational platforms by automating content understanding and personalized assessment generation.

Gap Identified

Despite the clear potential, significant gaps remain between current e-learning offerings and an AI-driven ideal. Many existing online education platforms deliver uniform content to all learners; they lack mechanisms to adapt to individual strengths, weaknesses, or preferences. Current systems often fall short of this: there is a gap in providing real-time personalization and analytics.

Moreover, while AI tools can process student data and adjust learning paths, most platforms do not yet integrate these features. Another gap is in feedback and assessment. AI can automate complex grading and offer detailed feedback instantly, but many courses still rely on manual grading or delayed feedback. Additionally, quality content generation is a challenge: without AI, creating diverse and engaging learning materials is labor-intensive. In short, the gap identified is a lack of AI integration in mainstream e-learning platforms. Our project will address this by developing AI-powered features to bridge the gap between conventional e-learning and the personalized, efficient learning environment that research shows is possible.

Objectives

- **To create an easy-to-use web-based platform:** for teachers and students to interact and manage academic content.
- **To allow teachers to**:
  - Upload lesson content in PDF or text format.
  - Post important announcements.
  - Create and assign custom quizzes to students.
  - View students' quiz performance and manage shared content.
- **To enable students to**:
  - View uploaded lessons.
  - Generate local quizzes from custom lesson text using AI.
  - Attempt quizzes assigned by teachers and get instant results.
  - Track lesson completion.
- **To integrate AI capabilities:** to generate quizzes automatically based on textual input.
- **To implement secure login systems:** for teachers and students, ensuring data separation role-based access

Methodology

The development of the *Learn & Teach* AI-based e-learning app follows a structured methodology to ensure clarity, modularity, and efficiency throughout the implementation. The key steps are as follows:

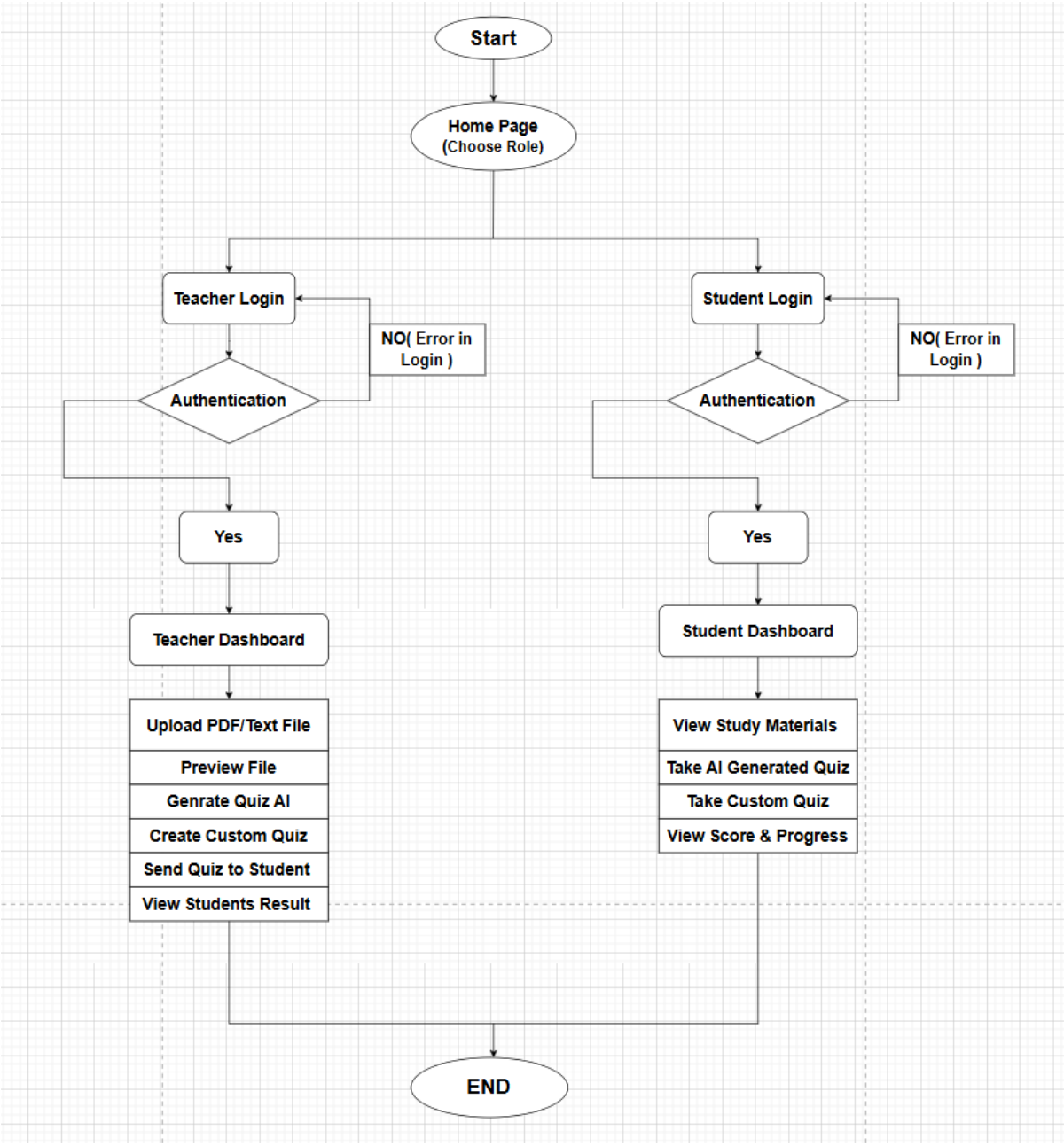

Figure: Flowchart of E-learning Using AI.

1. Requirement Analysis:

- Identified the needs of two user roles: **Teachers** and **Students**.
- Defined key functionalities such as:
  - Content upload
  - Announcements
  - Quiz creation and participation
  - User authentication
  - AI-based quiz generation from textual input

2. System design:

- Designed a role-based interface with separate dashboards for **Teachers** and **Students**.
- Created modular components:
  - **auth.py** – Handles user login and session management.
  - **quiz_generator.py** – AI-based quiz creation logic.
  - **utils.py** – Common utility functions (PDF parsing, quiz checking, etc.).
  - **data/ directory** – Stores uploaded files, user data, and results.

3. Frontend Development using Streamlit:

- Used **Streamlit** to design the UI due to its simplicity and quick deployment features.
- Created clean, sidebar-based navigation with a centered layout and interactive elements.
- Developed custom views:
  - **Teacher dashboard**: Upload files, view shared lessons, post announcements, create quizzes, view results.

- **Student dashboard**: View lessons, generate or take quizzes, track progress.

4. Backend Logic and File Handling:

- Handled lesson uploads in PDF/Text formats.
- Implemented secure file storage using custom directories for teachers and students.
- Used PyPDF2 and file reading logic to parse uploaded content for preview and quiz generation.

5. Quiz Generation & Management:

- **Teacher-created quizzes:** Interface for teachers to write and send multiple-choice questions.
- **AI-generated quizzes:** Used NLP techniques to automatically generate quizzes from uploaded text.
- Stored all quizzes and answers in a JSON format for easy rendering and scoring.

6. User Authentication:

- Created a simple authentication system using Python and Streamlit sessions.
- Ensured that teacher and student data are securely isolated.

7. Testing and Validation:

- Performed unit testing of individual components (auth, quiz logic, file parsing).
- Conducted user testing to ensure smooth navigation and correct role-based access.

Software/Hardware Requirements

The successful implementation of the AI-driven e-learning system requires the following resources:

Software Requirements:

- **Python 3.13.3**
- **Libraries/Modules:**
    - streamlit – for creating the web interface
    - pandas – for handling tabular data like quiz results
    - json – for storing announcements and quiz data
    - PyPDF2 – for reading PDF lesson content
    - shutil, os, datetime – for file and data management
    - base64 – for handling image and PDF encoding
    - custom quiz generation logic (e.g., quiz_generator.py)
    - user authentication logic (e.g., auth.py)
- **IDE/Text Editor:** VS Code / PyCharm / Jupyter Notebook
- **Browser:** Chrome/Firefox (to run the Streamlit app locally)

Hardware Requirements:

- **Processor:** Intel i3 or higher
- **RAM:** 4 GB minimum
- **Storage:** 500 MB or more
- **System:** Windows, macOS, or Linux (Any OS with Python support)

Benefits to Society

1. **Promotes Inclusive Education:**
    - Bridges gaps between urban and rural learners.
    - Enables access to quality learning materials for students with limited resources.
2. **Empowers Teachers:**
    - Gives teachers tools to create custom quizzes, share materials, and monitor student progress.
    - Reduces manual workload and boosts efficiency.
3. **Supports Parents and Guardians:**
    - Allows parents to track student progress and learning materials easily.
    - Encourages parental involvement in education.
4. **Fosters Innovation in learning:**
    - Uses AI for quiz generation and adaptive learning paths.
    - Stimulates interest in self-learning and research.
5. **Enhances Educational Institutions:**
    - Can be integrated into schools, colleges, and NGOs to supplement traditional learning.
    - Cost-effective and scalable learning solution.
6. **Encourages Eco-Friendly:**
    - Reduces paper usage by digitizing notes, quizzes, and teaching materials.

Conclusion

The **E-Learning Using AI** web application serves as a powerful educational platform designed to bridge the gap between teachers and students using AI-powered tools. By allowing teachers to upload educational content, generate quizzes automatically, and track student progress, the system enhances the teaching process and encourages interactive learning. Similarly, students benefit from easy access to materials, personalized assessments, and progress monitoring, making learning more engaging and effective.

This project not only promotes digital literacy but also supports inclusive education, especially for remote learners and under-resourced communities. With further enhancements, the Learn & Teach platform has the potential to be integrated with NGOs, schools, and learning centres, thereby contributing significantly to the advancement of accessible, quality education for all.

Bibliography

- United Nations Educational, Scientific and Cultural Organization (UNESCO). Digital Learning and Transformation of Education. Available online: https://www.unesco.org/en/digital-education (Accessed May 2025).

- Barrera Castro, G.P., Chiappe, A., Ramírez-Montoya, M.S., and Alcántar Nieblas, C. Key Barriers to Personalized Learning in Times of Artificial Intelligence: A Literature Review. Applied Sciences, 15(6), 3103, 2025. DOI: https://doi.org/10.3390/app15063103

- University of Iowa Online Programs. The Role of AI in Modern Education. UIowa Online Programs Blog, 2023. Available online: https://onlineprograms.education.uiowa.edu/blog/role-of-ai-in-modern-education

- Epoch AI. Large-Scale AI Models Dataset. Epoch AI, 2025. Available online: https://epoch.ai/data/large-scale-ai-models (Used for Figure 1.2 data visualization)

- Khan, Badrul. E-learning, Blended Learning Framework and Model. Image sourced from Wikimedia Commons. (Watermarked image not used in final content)

Team Members	**Signature**
Aman Inamdar (2LB23CS400)	
Harshavardhan Bhuti (2LB23CS401)	
Aishwarya Kangal (2LB22CS091)	
Vijay Ganachari (2LB22CS086)	

Guide

Prof. Ramesh B. Kumbar