EduTutor AI – Detailed Project Report

1. Title Page

Project Title:

EduTutor AI – Personalized Learning Assistant

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2. Introduction

In the modern education system, there is an increasing demand for personalized and interactive learning tools that can adapt to the pace and style of each student.

EduTutor AI was developed as a solution to help both students and teachers by automating two major tasks:

1. Explaining complex concepts in a simple, easy-to-understand way

2. Generating quizzes instantly for practice and self-evaluation

Traditional learning requires students to spend hours searching for clear explanations and teachers to manually create assessments. EduTutor AI bridges this gap by leveraging Generative AI to provide instant, accurate, and interactive learning resources.

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3. Problem Statement

Students often face the following challenges:

Difficulty understanding complex topics in textbooks

Lack of quick access to examples and practical explanations

Limited availability of question banks for practice

Teachers spending significant time preparing quizzes manually

EduTutor AI solves these problems by offering:

AI-powered explanations for any concept

Automatic quiz generation covering different question formats

Instant feedback through a separate answers section

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4. Objectives

The main objectives of EduTutor AI are:

To provide detailed explanations of concepts in simple language

To automatically generate quizzes with multiple question types

To make learning interactive and engaging through a web interface

To minimize teacher workload by automating question creation

To run on free, cloud-based platforms like Google Colab so anyone can access it

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5. Scope & Benefits

Scope

Suitable for school, college, and competitive exam preparation

Can be extended to support subject-specific learning modules

Scalable to include progress tracking, performance analytics, and adaptive learning

Benefits

Saves time for both teachers and students

Improves conceptual clarity and retention

Encourages self-paced learning

Accessible from any device with internet

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6. Literature Review

Several AI-based learning tools exist, such as ChatGPT, Khan Academy AI, and Google Socratic.

However, EduTutor AI is unique because:

It is open-source and lightweight using IBM Granite 3.2 2B model

It provides custom quiz generation with answers, not just explanations

It is simple to deploy on Google Colab without paid infrastructure

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7. Technologies Used

Component	Technology Used
Programming	Python 3.8+
ML Model	IBM Granite 3.2 2B Instruct
Libraries	Transformers, Torch, Gradio
Deployment	Google Colab (T4 GPU)
Version Control	GitHub

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8. System Architecture

The project consists of Frontend, Backend, and Deployment layers:

Frontend (Gradio):

Two tabs: Concept Explanation & Quiz Generator

Accepts user input and displays output in scrollable text boxes

Backend (Python + Granite Model):

Loads IBM Granite model and tokenizer

Processes prompts, generates responses using model.generate()

Deployment:

Runs entirely on Google Colab

Gradio provides a public URL for testing and demonstration

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9. Workflow

1. User enters a topic or concept

2. The input is tokenized and sent to IBM Granite model

3. Model generates detailed explanation or quiz

4. Output is displayed in the Gradio interface

5. User can switch between tabs for explanations or quizzes

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10. Implementation

Code Explanation

Model Loading: Loads IBM Granite from Hugging Face with GPU acceleration if available

Functions:

concept_explanation(concept) → Generates detailed explanation

quiz_generator(concept) → Creates quiz with answers section

Gradio Interface:

Creates two tabs for user input

Launches app with app.launch(share=True) to generate share link

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11. User Interface

The UI is minimal and easy to use:

Textbox Input: For topic or concept

Buttons: To generate explanation or quiz

Output Area: Multi-line textboxes showing results

Tabs: Organized navigation for Concept vs Quiz

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12. Sample Output

Example 1 – Concept Explanation:

Input: Machine Learning

Output:

> Machine Learning is a subset of Artificial Intelligence where machines learn from data and improve automatically...

Example 2 – Quiz Generation:

Input: Physics

Output:

> Q1: What is the SI unit of force? (MCQ)

Q2: Acceleration is the rate of change of velocity. (True/False)

...

ANSWERS: 1. Newton 2. True ...

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13. Testing

Unit Testing: Verified function outputs for various prompts

Manual Testing: Checked UI functionality, switching tabs, and input handling

Edge Cases: Tested long inputs, empty inputs, and special characters

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14. Results

EduTutor AI successfully:

Generated detailed explanations for multiple topics

Produced diverse quizzes (MCQ, True/False, Short Answer)

Displayed answers separately for easy checking

Ran on Google Colab without errors

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15. Future Enhancements

Add PDF export for quizzes

Add voice input and text-to-speech

Introduce score tracking for quizzes

Create subject-specific modules (Math, Physics, Chemistry)

16. Conclusion

EduTutor AI demonstrates how Generative AI can transform education by making learning interactive and personalized.

This project can serve as a foundation for building AI-powered learning platforms that are open-source, scalable, and easy to use