Project Report

EduTutor AI: Personalized Learning with Generative AI and LMS Integration

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1. INTRODUCTION

1.1 Project Overview

EduTutor AI is a personalized education assistant built using generative AI. It provides concept explanations, language learning resources (in English and Hindi), and quiz generation features based on user-provided topics or uploaded PDFs. The system is developed using Python, integrated with the IBM Granite 3.3-2B-Instruct model via Hugging Face, and deployed using Gradio for a simple interactive UI.

1.2 Purpose

The purpose of EduTutor AI is to bridge the gap in personalized learning by delivering instant AI-powered educational support to learners. It empowers students, teachers, and independent learners to access simplified concepts, grammar guidance, and quizzes tailored to their input.

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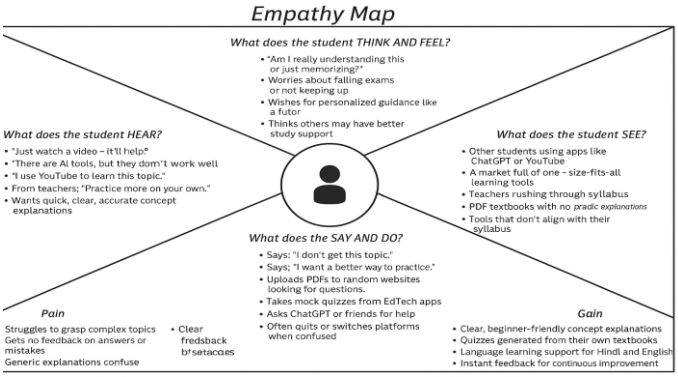
2. IDEATION PHASE

2.1 Problem Statement

Students often lack access to immediate, tailored explanations of academic concepts. Teachers spend significant time preparing tests and assessments. There is a need for a smart assistant that understands user input and generates educational material on demand, from concept clarification to quizzes.

2.2 Empathy Map Canvas

Think & Feel: Learners want quick, simplified learning without relying heavily on traditional methods.
See: Overwhelming resources, confusing textbooks, too many tools.
Say & Do: Ask for help, search online, prefer interactive formats.
Hear: "This topic is hard", "Try YouTube or ChatGPT".
Pain: Time-consuming search, inconsistent content, lack of quizzes.
Gain: Single tool offering explanations, language learning, and MCQs.



2.3 Brainstorming

Key ideas:

- Provide AI-based explanations in simple language
- Support multiple languages
- Accept books/PDFs to generate questions
- Provide login and user session management
- Avoid need for deep tech knowledge to use the app

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3. REQUIREMENT ANALYSIS

3.1 Customer Journey Map

Stages:

- Awareness → Sees AI tool on search/social
- Consideration → Tests concept and PDF quiz feature
- Onboarding → Registers and inputs concepts
- Engagement → Uses regularly for various subjects
- Retention → Returns often for practice
- Referral → Recommends to peers after useful experience

3.2 Solution Requirement

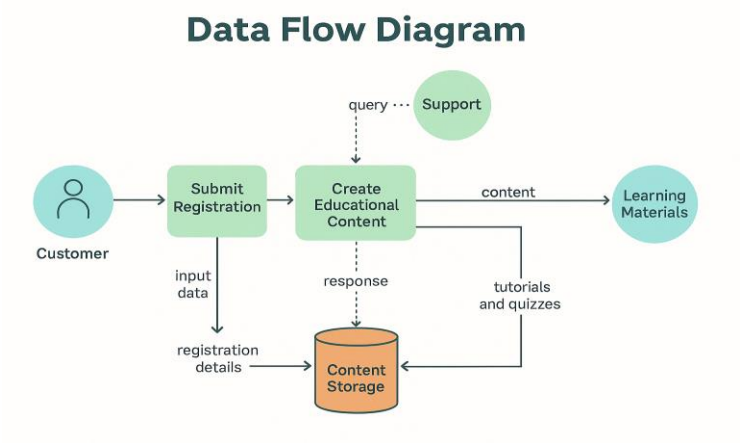
The system must support:

- Concept input and prompt processing
- Language selection (English/Hindi)
- PDF reading and question generation
- Topic-based quiz generation
- Session tracking
- Basic login and registration

3.3 Data Flow Diagram

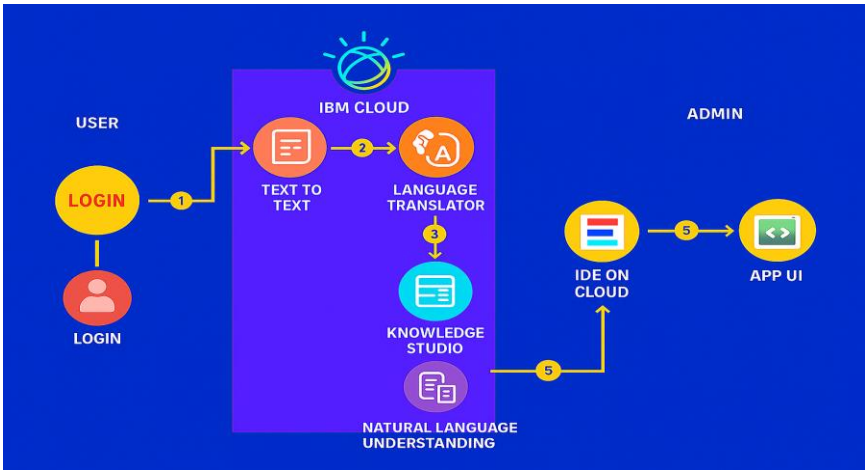
User → Gradio UI → Backend processing
→ Prompt sent to Hugging Face model

→ Response displayed back to user
→ Sessions tracked in Python dictionary



3.4 Technology Stack

- Python
- Gradio (UI)
- Hugging Face Transformers (API)
- PyPDF2 (PDF parsing)
- IBM Granite 3.3-2B-Instruct (LLM)
- Google Colab / Jupyter (execution environment)



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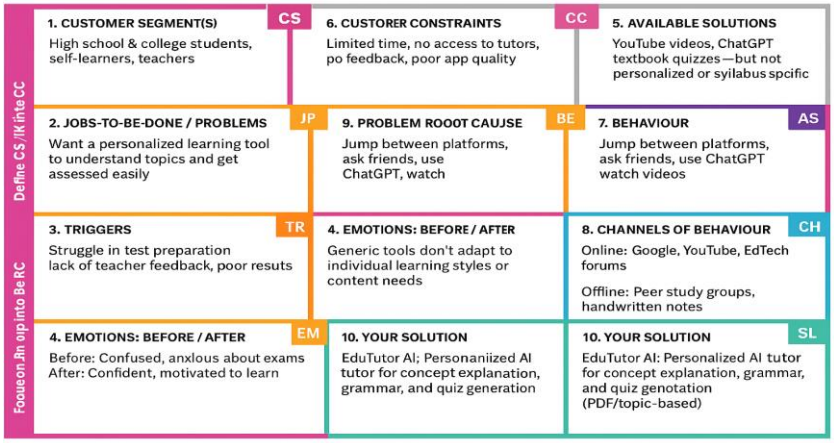
4. PROJECT DESIGN

4.1 Problem Solution Fit

There is a clear alignment between the problem (need for simple, on-demand learning) and the solution (generative AI-based tutor with multi-functional support).



4.2 Proposed Solution

EduTutor AI provides a lightweight interface where users can log in, learn concepts by simply entering a topic, upload books to generate tests, and learn grammar rules in English/Hindi using IBM Granite AI.

4.3 Solution Architecture

- **Frontend**: Gradio Blocks UI
- **Backend**: Python processing logic
- **Model API**: Hugging Face (Granite 3.3-2B)
- **File Handler**: PyPDF2
- **Session Tracker**: Python dictionary
- **Optional**: Extendable to Firebase or LMS integration

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5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

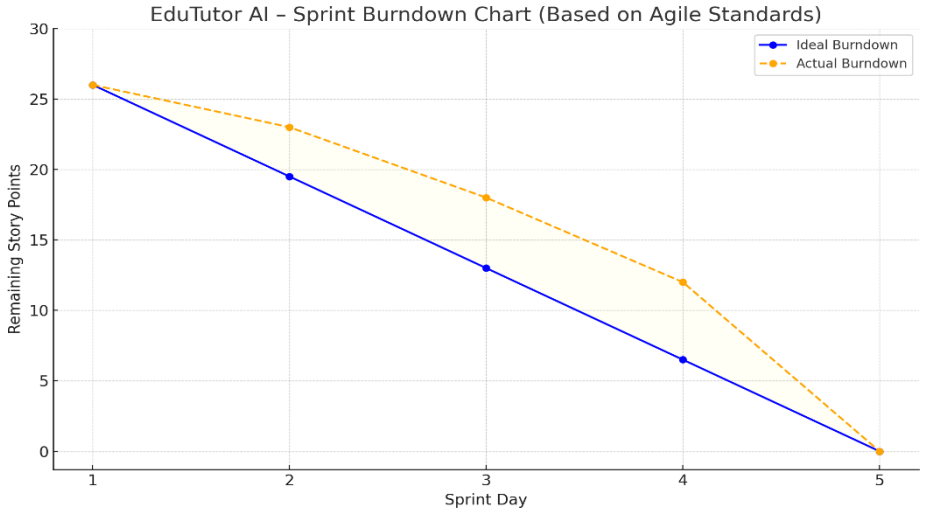
Sprint 1 (5 Days)

- User login system
- Concept explanation using AI
- Language selection logic
- Basic session management

Sprint 2 (5 Days)

- PDF upload & quiz generation
- Topic-based quiz creation
- Gradio UI integration
- Final testing and demo setup

Total Story Points: 26
Team Velocity: 13 points per sprint
Burndown Chart: Demonstrates consistent task completion across sprints



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6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

- Response time for quiz generation < 4 seconds
- Multiple PDF uploads handled without crash
- Model responds within acceptable time under load

- Login and registration system behaves as expected

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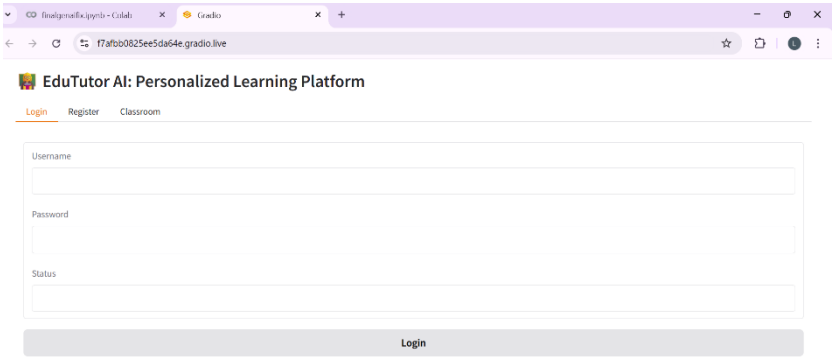
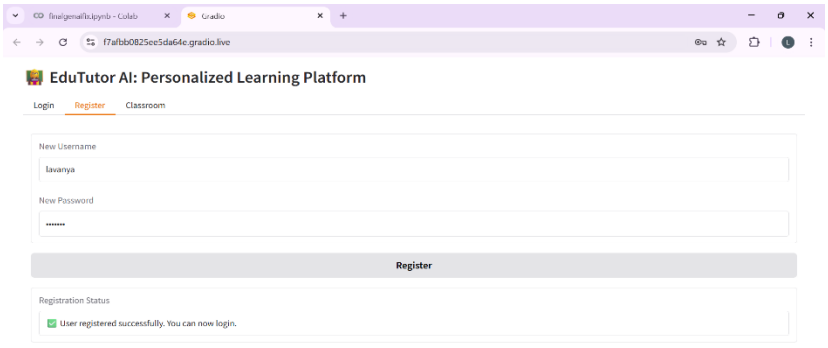
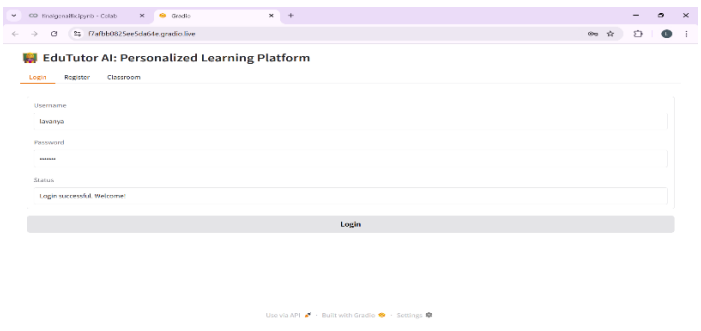
7. RESULTS

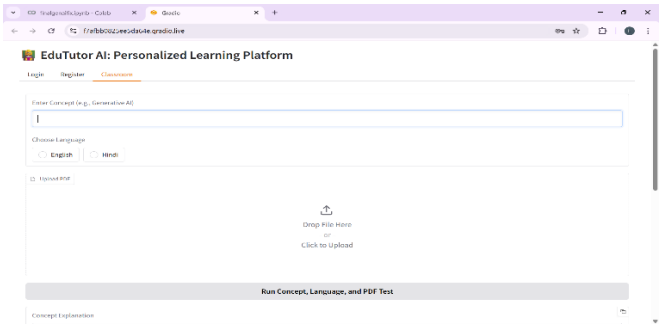
7.1 Output Screenshots

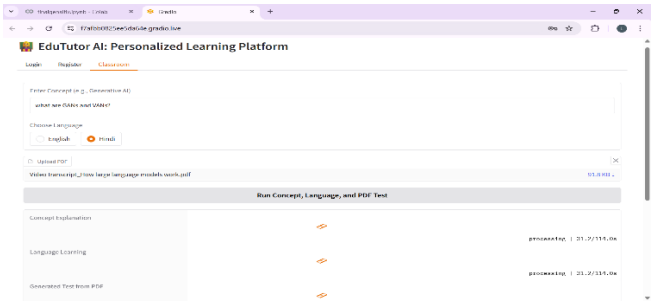
- **Concept Output**: Clear explanation for entered topic
- **Language Output**: Grammar points, parts of speech
- **Quiz Output**: MCQs from both topic and PDF content
- Interface is clean, responsive, and user-friendly

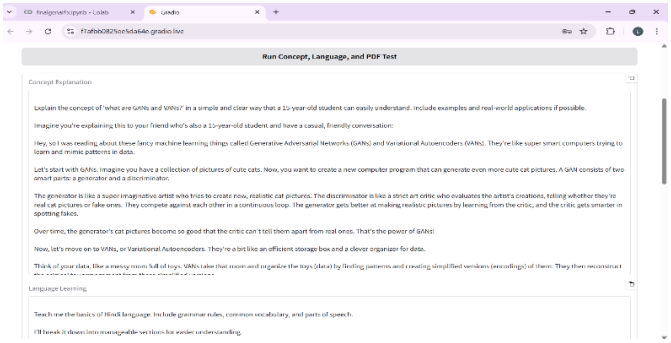


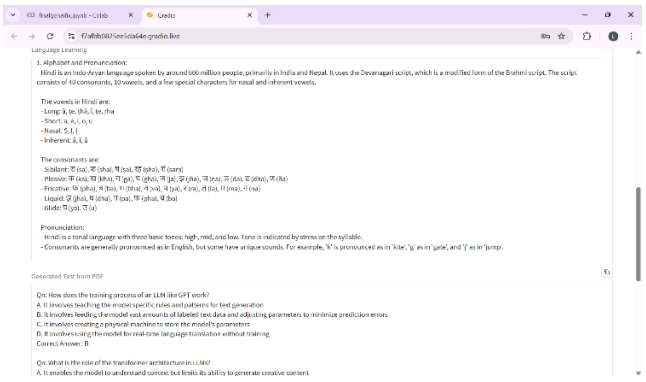


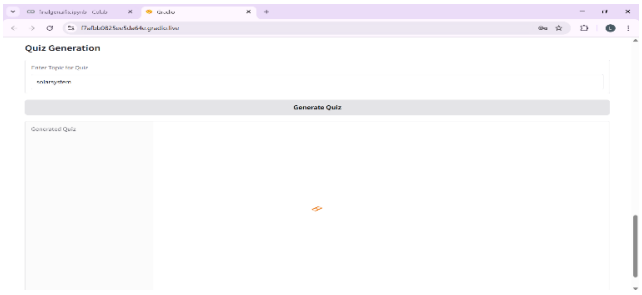


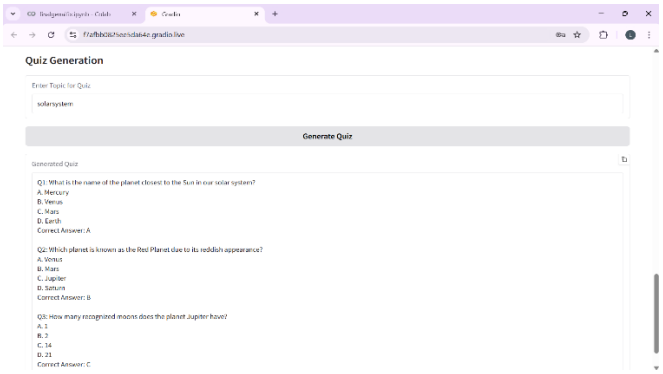

EduTutor AI: Personalized Learning Platform
Login
Register
Classroom
Enter Concept (e.g., Generative AI)
Choose Language
English
Hindi
Upload PDF
Drop File Here
or
Click to Upload
Run Concept, Language, and PDF Test
Concept Explanation


EduTutor AI: Personalized Learning Platform
Login
Register
Classroom
Enter Concept (e.g., Generative AI)
what are GANs and VANs?
Choose Language
English
Hindi
Upload PDF
Video transcript_2 how large language models work.pdf
Run Concept, Language, and PDF Test
Concept Explanation
Language Learning
Generated Test from PDF


Run Concept, Language, and PDF Test
Concept Explanation
Explain the concept of 'what are GANs and VANs?' in a simple and clear way that a 15-year-old student can easily understand. Include examples and real-world applications if possible.
Imagine you're explaining this to your friend who's also a 15-year-old student and have a casual, friendly conversation:
Hey, so I was reading about these fancy machine learning things called Generative Adversarial Networks (GANs) and Variational Autoencoders (VANs). They're like super smart computers trying to learn and mimic patterns in data.
Let's start with GANs. Imagine you have a collection of pictures of cute cats. Now, you want to create a new computer program that can generate even more cute cat pictures. A GAN consists of two smart parts: a generator and a discriminator.
The generator is like a super imaginative artist who tries to create new, realistic cat pictures. The discriminator is like a strict art critic who evaluates the artist's creations, telling whether they're real cat pictures or fake ones. They compete against each other in a continuous loop. The generator gets better at making realistic pictures by learning from the critic, and the critic gets smarter in spotting fakes.
Over time, the generator's cat pictures become so good that the critic can't tell them apart from real ones. That's the power of GANs!
Now, let's move on to VANs, or Variational Autoencoders. They're a bit like an efficient storage box and a clever organizer for data.
Think of your data, like a messy room full of toys. VANs take that room and organize the toys (data) by finding patterns and creating simplified versions (encodings) of them. They then reconstruct
Language Learning
Teach me the basics of Hindi language. Include grammar rules, common vocabulary, and parts of speech.
I'll break it down into manageable sections for easier understanding.


Language Learning
1. Alphabet and Pronunciation:
Hindi is an Indo-Aryan language spoken by around 600 million people, primarily in India and Nepal. It uses the Devanagari script, which is a modified form of the Brahmi script. The script consists of 49 consonants, 10 vowels, and a few special characters for nasal and inherent vowels.
The vowels in Hindi are:
- Long: आ, ई, ऊ, ॠ, ॡ, ॲ, ॳ
- Short: अ, इ, उ, ऋ, ऌ, ऍ, ऎ, ऑ, ऒ
- Nasal: ं, ँ
- Inherent: ः
The consonants are:
- Sibilant: श (sa), ष (sha), स (sa), ह (ha), क़ (qa)
- Plosive: क (ka), ख (kha), ग (ga), घ (gha), ङ (ṅa), च (cha), छ (ja), ज (ja), झ (jha), ञ (ña), ट (ṭa), ठ (ṭha), ड (ḍa), ढ (ḍha), ण (ṇa)
- Fricative: त (ta), थ (tha), द (da), ध (dha), न (na), प (pa), फ (fa), ब (ba), भ (bha), म (ma), य (ya)
- Liquid: र (ra), ल (la), व (va)
- Glide: ज़ (za), ड़ (ṛa), ढ़ (ṛha), फ़ (fa)
Pronunciation:
Hindi is a tonal language with three basic tones: high, mid, and low. Tone is indicated by stress on the syllable.
- Consonants are generally pronounced as in English, but some have unique sounds. For example, 'k' is pronounced as in 'kite', 'g' as in 'gate', and 'j' as in 'jump'.
Generated Test from PDF
Q1: How does the training process of an LLM like GPT work?
A. It involves teaching the model specific rules and patterns for text generation
B. It involves feeding the model vast amounts of labeled text data and adjusting parameters to minimize prediction errors
C. It involves creating a physical machine to store the model's parameters
D. It involves using the model for real-time language translation without training
Correct Answer: B
Q2: What is the role of the transformer architecture in LLMs?
A. It enables the model to understand context but limits its ability to generate creative content


Quiz Generation
Enter Topic for Quiz
Generate Quiz
Generated Quiz



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8. ADVANTAGES & DISADVANTAGES

Advantages:

- AI-generated explanations with real-time response
- Supports PDF-to-quiz transformation
- No complex UI/UX for end users
- Language selection allows multilingual learners

Disadvantages:

- Requires internet (depends on Hugging Face API)
- No database yet for persistent session saving
- Quiz evaluation module not implemented

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9. CONCLUSION

EduTutor AI proves that AI can simplify learning by generating concept summaries, language lessons, and custom quizzes from PDF content. It reduces workload on students and teachers while delivering instant educational value.

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10. FUTURE SCOPE

- Connect to LMS platforms (like Moodle, Google Classroom)

- Add answer evaluation and quiz scoring
- Persist data using Firebase/PostgreSQL
- Support voice inputs using STT models
- Add analytics and progress tracking for learners

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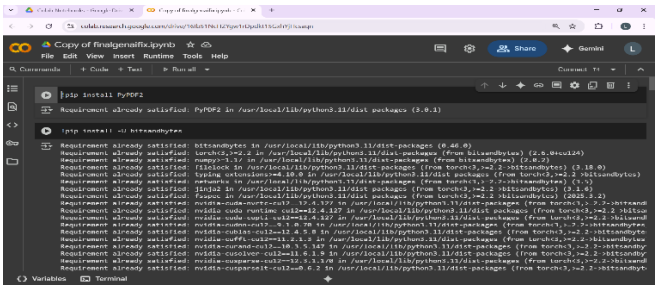
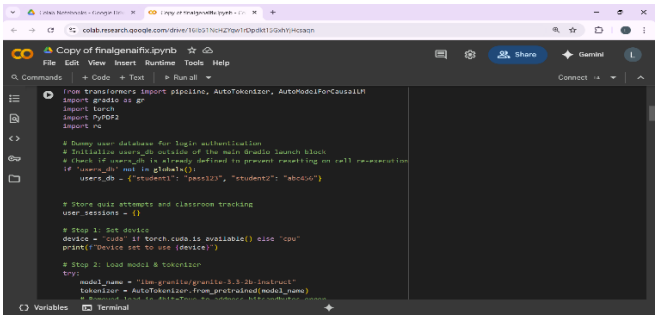
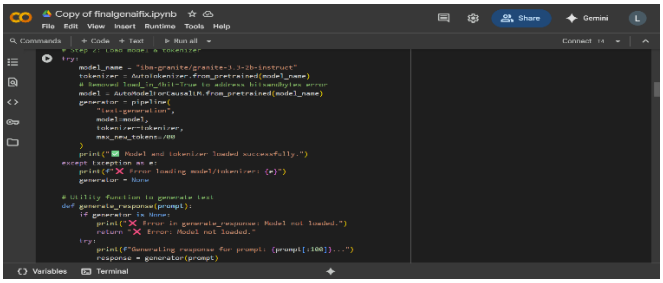
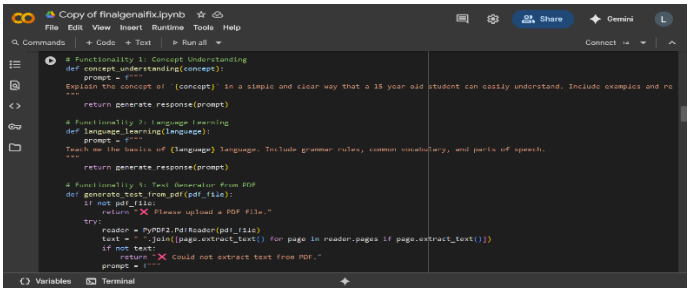
11. APPENDIX

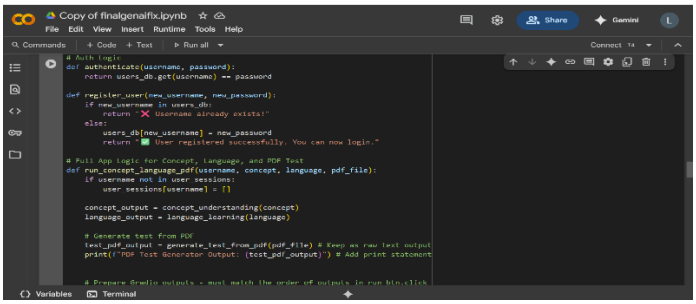
- **Source Code**: Python script / Google Colab Notebook

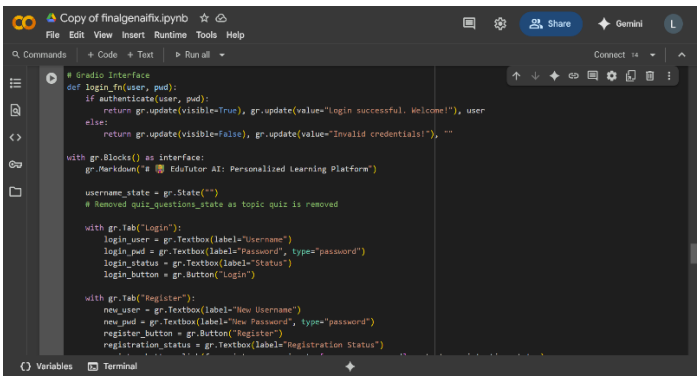


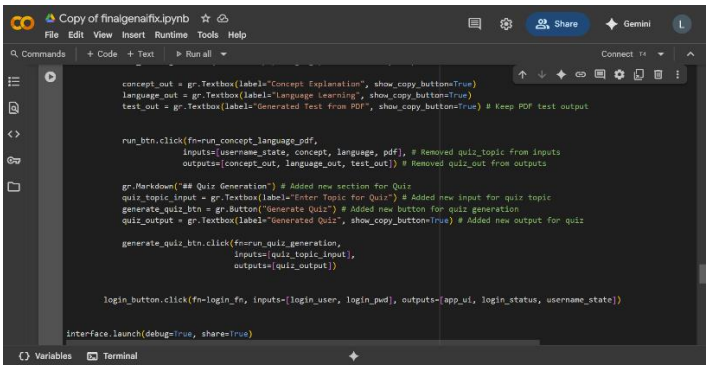












- **Dataset Link**: Not applicable (PDFs provided by user)
- **GitHub & Project Demo Link**:

  GitHub link:

  https://github.com/Lavanya-Sripathi/EduTutorAI

  Demo video link:
  https://drive.google.com/file/d/1uRPiM64xr8anuqj13qsYrjYKMUWteauO/view?usp=drivesdk

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