

EduTutor AI: Personalized Learning with Generative AI and LMS Integration

Intoduction :

Team ID : NM2025TMID06789

Team Size : 4

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Team member : SILAMBARASAN T

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Project description:

EduTutor AI is an AI-powered personalized education platform that revolutionizes the way students learn and educators assess progress. It provides dynamic quiz generation, student evaluation, Google Classroom integration, and real-time feedback—all powered by IBM Watsonx and Granite foundation models. Designed with modular architecture, this platform streamlines personalized education and enhances learning outcomes for students across academic levels.

Scenario 1: Personalized Learning Experience

A student logs into EduTutor AI and synchronizes their courses using their Google Classroom credentials. The platform analyzes course data, generates quizzes on key topics using the Granite LLM, and assesses responses for instant feedback—creating a highly personalized and engaging learning journey.

Scenario 2: Educator Dashboard & Performance Insights

Educators can log in to view real-time quiz performance of all students. The dashboard highlights quiz history, scores, last topics attempted, and insights fetched from the

Pinecone vector database. This empowers teachers to monitor learning progress and personalize their instruction based on data.

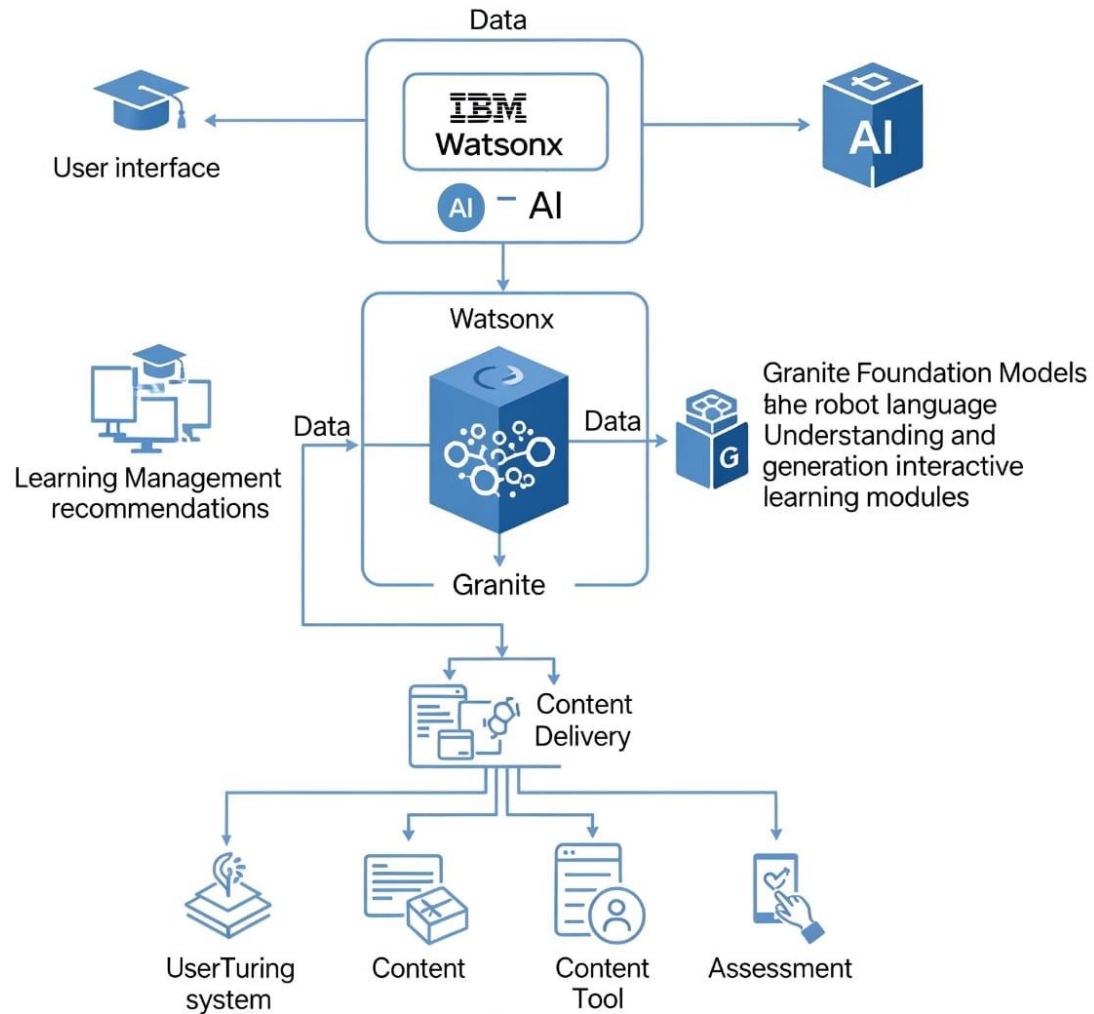
Scenario 3: Diagnostic Testing and Adaptive Quizzing

Upon registration, students undergo a diagnostic test generated by IBM Watsonx models. Based on the results, the platform adapts quiz difficulty and topic relevance, ensuring students are challenged at the right level.

Scenario 4: Google Classroom Integration

EduTutor AI syncs courses directly from Google Classroom, allowing seamless access to student data, class names, and subjects. This enables automatic quiz topic generation and helps maintain consistent alignment with the academic curriculum.

EduTutor AI



project flow

1. **User Input:**
Students log in using credentials or Google Classroom and request a quiz by selecting topic and difficulty.
2. **AI Quiz Generation:**
Watsonx+Granite models generate MCQs, stored temporarily without answers in the frontend and with answers in the backend

3. **User Quiz Submission:**
Students submit answers via UI. The backend evaluates the answers, scores the quiz, and stores it in Pinecone DB. But some errors couldn't be built in the frontend part of it
4. **Feedback Loop:**
5.
 1. Educators access this data in the dashboard.

Milestone 1: Requirements Specification

- **fastapi**
- **uvicorn**
- **langchain_ibm**
- **pinecone**
- **streamlit**
- **google-auth-oauthlib**
- **google-api-python-client**
- **python-dotenv**

Installation:

pip install -r requirements.txt

Requirements

- **fastapi**

- `uvicorn`
- `langchain_ibm`
- `pinecone`
- `streamlit`
- `google-auth-oauthlib`
- `google-api-python-client`
- `python-dotenv`

Installation:

`pip install -r requirements.txt`

Milestone 2: Initialization of Environment Variables

Create a `.env` file with:

`env`

`WATSONX_MODEL_ID=granite-13b-instruct-v2`

`WATSONX_API_KEY=your_ibm_watsonx_api_key`

`WATSONX_ENDPOINT=https://us-south.ml.cloud.ibm.com`

`WATSONX_PROJECT_ID=your_project_id`

`PINECONE_API_KEY=your_pinecone_api_key`

`PINECONE_INDEX_NAME=edututor`

Initialization of Environment Variables

Create a `.env` file with:

env

`WATSONX_MODEL_ID=granite-13b-instruct-v2`

`WATSONX_API_KEY=your_ibm_watsonx_api_key`

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`WATSONX_PROJECT_ID=your_project_id`

`PINECONE_API_KEY=your_pinecone_api_key`

`PINECONE_INDEX_NAME=edututor`

Milestone 3: AI Integration with IBM Watsonx

- **Model Setup:** Granite model is loaded via `langchain_ibm.WatsonxLLM`.
- **Prompt Template:** Dynamically generates quiz questions using LangChain's PromptTemplate.
- **Quiz Parsing:** Watsonx output is parsed into structured JSON for display and evaluation.

Google Classroom Sync

- Uses `google-auth-oauthlib` and `google-api-python-client`.
- User logs in via Google.

Milestone 5: Pinecone Vector DB Integration

- Stores each user's profile with embeddings.
- Quiz metadata (score, topic, date) is updated after submission.
- Allows educators to fetch student data and analyze progress.

Milestone 6: Streamlit Frontend UI

- **Student Panel:**
 - **Login (Manual or Google)**
 - **Dashboard**
 - **Take Quiz**
 - **Quiz History**
- **Educator Panel:**
 - **Dashboard (all student analytics)**

Milestone 7 : functional verification

Modular AI-Powered Architecture

- **FastAPI Backend**
Handles student/educator login, quiz generation, answer evaluation, classroom sync, and metadata updates.

User

POST /user/register Register User

Quiz

POST /quiz/generate Generate Quiz Endpoint

Google Auth

GET /auth/login Google Login

GET /auth/callback Google Auth Callback

Quiz Submission

POST /quiz/submit Submit Quiz

Educator

GET /educator/student/{user_id}/quiz-history Get Student Quiz History

- **Watsonx + Granite Models**
Generates MCQs dynamically from topic input.
Provides instruction-tuned inference via
LangChain Watsonx integration.

[Upgrade](#)
Rohan Patil's Account
Frankfurt

Train, deploy, validate, and govern AI models responsibly.

[Customize my journey](#)

[...]

Chat and build prompts with foundation models

Start chatting...

[Open Prompt Lab](#)

Build an AI agent to automate tasks

with Agent Lab

Tune a foundation model with labeled data

with Tuning Studio

Discover

Developer access

Project or space: Edututor

Project ID: fc5db437-02d8-4bfd-adc8-f16c2fc1393e

watsonx.ai URL: https://eu-de.ml.cloud.ibm.com

Used to call watsonx.ai APIs such as LLM inferencing, embedding, training, and chatting.

[Create API key](#) [Manage IBM Cloud API keys](#)

Developer hub

New watsonx Developer Hub to start coding fast.

Make your first API request to inference a foundation model in watsonx.ai. Find the right foundation models and code libraries for your AI applications.

- Pinecone Vector DB**
stores user profile embeddings, quiz history metadata, and similarity search for adaptive learning.

Indexes

[Create index](#)

Sort by last viewed

Filter by

Showing 1 index

edututor

...

Connect

Host: https://edututor-0cpwldt.svc.aped-4627-b74a.pinecone.io

Cloud: AWS • **Region:** us-east-1 • **Type:** Dense • **Capacity mode:** Serverless • **Dimension:** 2048 • **Model:** llama-text-embed-v2

BROWSER

METRICS

NAMESPACES (1)

CONFIGURATION

Records

SearchList/FetchAdd a record

Namespace

(Default)

Search by

Text

Text

Example text

Top K

10

Search

+ Filter

+ Rerank

Showing 1 hit

1

ID: user123

last_quiz_id: "602af2fb-582e-450c-95b4-289dc0c7230c"

last_score: 2

last_topic: "Photosynthesis"

last_total: 19

last_updated: "2025-04-12T11:36:46.987775"


SCORE

0.0087

...

- **Streamlit Frontend**
provides dashboards for both students and educators with role-based UI, quiz submission forms, and OAuth-based login.

Deploy



Select Role

student

Enter User ID

Login

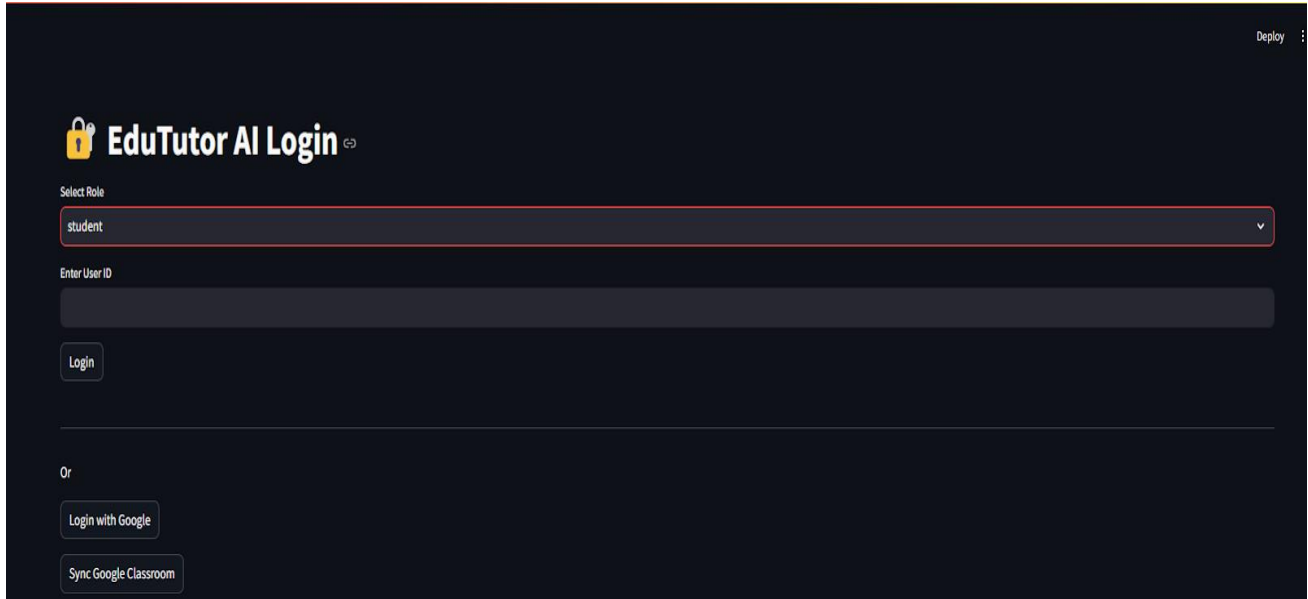
Or

Login with Google

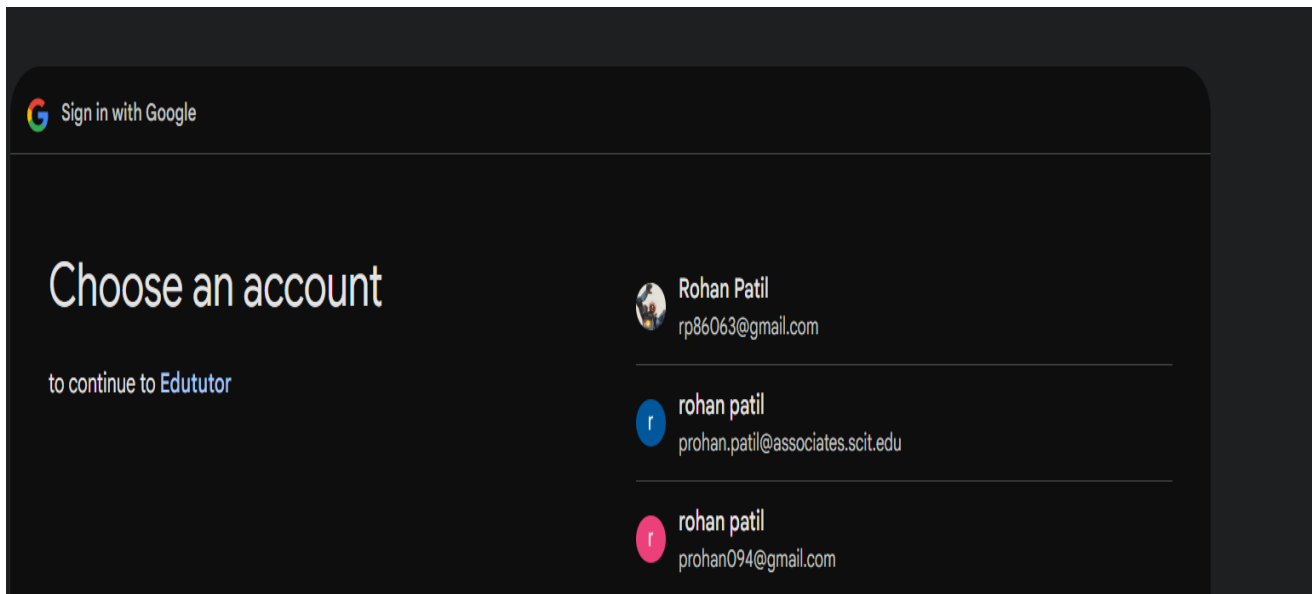
Sync Google Classroom

Project Flow:

1. **User Input:**
Students log in using credentials or Google Classroom and request a quiz by selecting topic and difficulty.



The image shows the 'EduTutor AI Login' interface. At the top right is a 'Deploy' button. The main heading is 'EduTutor AI Login' with a lock icon. Below it, there's a 'Select Role' dropdown menu with 'student' selected. Underneath is an 'Enter User ID' text input field. A 'Login' button is positioned below the input field. A horizontal line separates this section from the next. Below the line, the word 'Or' is centered. There are two buttons: 'Login with Google' and 'Sync Google Classroom'.



The image shows a Google account selection screen. At the top left is the 'Sign in with Google' button. The main heading is 'Choose an account'. Below it, the text 'to continue to Edututor' is displayed. On the right side, there are three account options, each with a profile picture, a name, and an email address:

- Rohan Patil**
rp86063@gmail.com
- rohan patil**
prohan.patil@associates.scit.edu
- rohan patil**
prohan094@gmail.com

2. AI Quiz Generation:

Watsonx+Granite models generate MCQs, stored temporarily without answers in the frontend and with answers in the backend.

localhost:8501

EduTutor Navigation

Select a page

- Dashboard
- Take Quiz
- Quiz History

Take a Quiz

Enter Topic

Photosynthesis

Difficulty

easy

Number of Questions

1 5 10

Generate Quiz

Quiz generated. Answer the questions below!

Q2. The primary pigment involved in photosynthesis is...

- ☒ Chlorophyll a
- ☐ Chlorophyll b
- ☐ Carotene
- ☐ Xanthophyll

Q3. What is the main function of the stroma in plant cells during photosynthesis?

- ☒ It is the site of light-dependent reactions.
- ☐ It is the site of light-independent reactions (Calvin cycle).
- ☐ It stores excess glucose produced during photosynthesis.
- ☐ It is the site of cell division.

Q4. During photosynthesis, which gas is released as a byproduct?

- ☒ Oxygen
- ☐ Carbon dioxide
- ☐ Nitrogen
- ☐ Hydrogen

Q5. What is the role of water during the light-dependent reactions of photosynthesis?

- ☒ It provides electrons for the electron transport chain.
- ☐ It splits into hydrogen and oxygen, releasing oxygen as a byproduct.
- ☐ It is used to produce glucose through the Calvin cycle.

3. User Quiz Submission:

Students submit answers via UI. The backend evaluates the answers, scores the quiz, and stores it in Pinecone DB. But some errors could not build the frontend part of it

Showing 1 hit

1	ID: user123
	last_quiz_id: "602af2fb-582e-450c-95b4-289dc0c7230c"
	last_topic: "Photosynthesis"
	last_score: 2
SCORE	last_topic: "Photosynthesis"
0.0087	last_total: 19
	last_updated: "2025-04-12T11:36:46.987775"

4. **Feedback Loop:**
Educators access this data in the dashboard.