

# Edu Tutor AI: Personalized Learning with Generative AI and LMS Integration



 Educational AI Assistant – Documentation

## Overview

The Educational AI Assistant is an interactive AI-powered application built with Gradio and Hugging Face Transformers. It leverages the IBM-granite/granite-3.2b-instruct large language model to:

1. Explain concepts in detail with examples.
2. Generate quizzes with multiple question types (MCQ, True/False, Short Answer). This tool is ideal for students, teachers, and self-learners to quickly access topic explanations and quizzes for practice.


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# Features

**Concept Explanation:** Enter a concept or topic to receive a detailed, example-rich explanation.

**Quiz Generator:** Generate 5 varied quiz questions (multiple-choice, true/false, and short-answer) with a dedicated Answers section.

**GPU Acceleration:** Automatically uses GPU (CUDA) if available for faster inference.

 **Web Interface:** Powered by Gradio for easy web-based interaction

## Code Structure

Section description

**Model Loading** Loads lbm - granite/granite-3.2b-instruct model and tokenizer from Hugging Face.

**Text Generation Function** Handles inference with temperature-based sampling and padding. **Concept Explanation:** Generates detailed explanations for given concepts.

Quiz Generator produces quizzes with answers based on the given topic.

Gradio UI creates a tabbed web interface with Concept Explanation and Quiz Generator sections.

## Key Functions

1. `generate_response(prompt, max_length=512)`

Generates AI responses using the model.

Parameters:

Prompt (str): Input prompt for the AI.

Max \_ length (int): Maximum response length in tokens.

Returns:

A cleaned response string

2. `concept_explanation(concept)`

Explains a given concept with examples.

Parameters:

Concept (str): Topic or concept to explain.

Returns: Detailed explanation string.

3. `quiz_generator(concept)`

## Generates quiz questions and answers.

## Parameters:

**Concept (str):** Topic for quiz generation.

## Returns:

## A string containing 5 questions and answers

# User Interface

The UI is built using Gradio Blocks with Tabs:

Tab Inputs    Outputs

Concept Explanation	Textbox (Concept name)
<p>1. <b>Concept 1:</b> [Detailed explanation of Concept 1]</p> <p>2. <b>Concept 2:</b> [Detailed explanation of Concept 2]</p> <p>3. <b>Concept 3:</b> [Detailed explanation of Concept 3]</p>	<p>Textbox 1 (Concept name)</p> <p>Textbox 2 (Concept name)</p> <p>Textbox 3 (Concept name)</p>

### Textbox (Detailed answer)

Quiz Generator    Textbox (Topic)    Textbox (Quiz + Answers)

## 2. Application Layer

## Generative AI Engine (LLM-based tutoring)

## Personalization Module (Recommendation system)

## Content Generator (Notes, quizzes, summaries)

### 3. Integration Layer

## LMS API connectors

Authentication & Security services

Cloud storage for course materials

#### 4. Data Layer

Student profiles & learning history

Course content repository

Analytics database

#### 4. Technology Stack

Frontend: React, Next.js, Flutter (for mobile)

Backend: Node.js / Python (Fast API, Django)

Database: PostgreSQL, MongoDB

AI/ML: OpenAI GPT-5, Hugging Face Transformers,  
TensorFlow

Integration: RESTful APIs, GraphQL, LTI (Learning Tools  
Interoperability)

Cloud: AWS / Azure / GCP

Security: OAuth2.0, SAML, Data Encryption (AES-256)

#### 5. LMS Integration

Edu Tutor AI integrates with LMS platforms via: LTI (Learning Tools Interoperability) standard compliance, SCORM / XAPI support for content packaging

Real-time synchronization of grades, assignments, and attendance

Plugin-based integration with Moodle, Blackboard, Canvas, and Google Classroom

## 6. AI Personalization Engine

Student Profiling: Tracks learning style, progress, strengths, weaknesses

Recommendation System: Suggests topics, exercises, and resources

Adaptive Testing: Dynamically adjusts question difficulty

Natural Language Support: Students can ask questions in natural language

## 7. Use Cases

For Students

AI tutor available 24/7

Personalized practice and revision

Interactive learning through simulations and quizzes.

For

Educators

Automated grading and feedback

Insights on student engagement

Course content enrichment with AI-generated material

For Institutions

Scalable cloud-based solution

Improved student retention and performance

Centralized platform for online + offline learning

## 8. Future Scope

AR/VR-based immersive learning

Multi-modal AI (video + text + voice tutoring)

Deeper predictive analytics for career guidance

Blockchain-based certification and credentialing

Cross-platform global learning marketplaces







