**Virtual Education Tutor Agent**

**Problem Statement:**

Many students need personalized tutoring to succeed, but such support is time-consuming and often unavailable outside of office hours. In large classes, students struggle with individual questions, especially in subjects like math and physics where step-by-step guidance is key.

**Goal:**

Build an AI-powered tutor agent that:

* Interacts with students using natural language,
* Diagnoses their learning needs,
* Explains concepts, solves problems, and offers personalized guidance using textbooks and lecture notes via a retrieval-augmented system.

**Value Proposition:**

* Provides students with always-available academic help
* Improves learning outcomes and engagement
* Offers scalable tutoring support without requiring more human instructors

**Scope:**

* LLM-powered tutoring agent
* RAG pipeline for accessing course material
* Step-by-step feedback on practice questions
* Simple web/chat interface

**Further Improvements:**

* Full LMS(Learning Management System) integration
* Voice/multimodal input/output
* Subject coverage beyond 1–2 core subjects

**Key Lean Metrics:**

* Student feedback score (e.g., usefulness/helpfulness)
* Problem-solving accuracy
* Session engagement time
* Query resolution success rate

**Sprint Plan with User Stories:**

**Sprint Duration: 1 week**

**Team:**

* AI Engineer
* UI/Front End/UX Developer
* Test Engineer
* Data Engineer

**Sprint 1: Curriculum and Data Preparation**

**Goal:**

Gather and preprocess learning content (e.g., textbook chapters, lecture notes)

**User Stories:**

* The team should collect and segment course material into topics and subtopics so that the agent can give structured responses.
* Data engineer should clean and preprocess the curriculum so it can be indexed into the retrieval system.
* A product owner should define the target student personas and learning objectives for the MVP(Minimum Viable Product).

**Deliverables**:

* Cleaned topic-wise course content (PDFs, text, or notes)
* Initial 20–30 learning Q&A pairs
* Documented learning goals for MVP

**Sprint 2: RAG Pipeline and Tutor Persona Setup**

**Goal:**

Build the retrieval-augmented generation system and align the LLM with tutor-like behavior.

**User Stories:**

* An AI engineer should fine-tune or prompt an LLM to act as a tutor so it can explain concepts clearly and patiently.
* A backend developer should build a RAG pipeline using tools like LangChain and ChromaDB so the agent can access and retrieve accurate content.
* A tester should evaluate if the agent responds with correct step-by-step solutions for selected problems.

**Deliverables:**

* Functional RAG pipeline with embedded curriculum
* Tutor persona prompt template
* Initial interaction logs and accuracy report
* Sprint 3: Chat Interface and Interaction Flows

**Sprint 3: Chat Interface and Interaction Flows**

**Goal:**

Build a simple student-facing chat interface and connect it to the tutoring backend.

**User Stories:**

* A student would want to ask questions and get detailed explanations in a friendly chat interface so I can learn at my own pace.
* A front-end developer should build a responsive, web-based chat UI that works on mobile and desktop.
* A front-end developer should create flows for hint requests, problem checking, and tutor feedback.

**Deliverables:**

* Chatbot UI with conversational flow
* Live integration with backend agent
* Feedback collection feature (e.g., thumbs up/down or comment)

**Sprint 4: Testing, Evaluation, and Enhancements**

**Goal**: Evaluate system performance, refine responses, and finalize MVP

**User Stories**:

* A tester should test the agent across multiple topics and question types so we can ensure consistent performance.
* Team lead should gather pilot feedback from students to guide next steps.
* AI Engineer should work to improve responses based on retrieval errors or gaps.

**Deliverables**:

* QA report and student feedback summary
* Refined model prompts or retrieval improvements
* MVP deployment and demo

**Continuous Improvement Plan**

* Expand to more subjects (e.g., Chemistry, CS)
* Add voice-based interaction or diagram generation
* Track student learning progress over sessions
* Integrate with LMS for personalization and login support