Sustainable Agentic Tutor — AI for Equity, Education & the Planet
Empowering learning through self-hosted LLMs. Designed for education. Built for sustainability. Driven by DEI.

📚 Overview
This project is a next-generation educational agentic system that:

✅ Creates personalized learning paths using students' quiz responses
🔍 Uses a RAG pipeline powered by self-hosted LLMs to pull knowledge from curriculum PDFs
🔗 Fetches real, trustworthy learning resources (like Khan Academy & YouTube) using live search
🌐 Offers multi-language support with translation capabilities (e.g., English and other languages)
💻 Includes a Next.js web app frontend with a rich, interactive experience
📊 Provides a live dashboard showing energy usage, carbon savings, and cost comparisons
🌱 Why Sustainability + DEI?
Traditional cloud-based LLMs contribute to high energy consumption and carbon emissions. By self-hosting open-source models like Ollama, Gemma, and StableLM, this project:

⚡ Reduces compute footprint
🌍 Promotes green AI adoption
💰 Demonstrates real-time cost savings over services like OpenAI
🤝 Ensures equity by offering free and accessible education tools, adaptable across languages and learning needs
🧠 Agentic Workflow Summary
Student takes a quiz (in English or a variety of other languages)
PDF curriculum is uploaded
Self-hosted LLMs:
Identify student strengths and weaknesses
Use a RAG pipeline to generate a personalized learning path
Topics are extracted from the path
Search APIs fetch real-time educational content (Khan Academy, YouTube)
The LLM filters and cleans the resources for relevance
💻 Frontend: Built with Next.js
Our responsive web app is built using Next.js, providing a seamless user experience where students can:

📋 Take subject-specific quizzes
📎 Upload their curriculum PDFs
📊 View a real-time dashboard of learning recommendations and environmental insights
📊 Sustainability Dashboard
In the Dashboard tab of our app, we highlight measurable impact:

Metric Description

⚡ Energy Usage	Tracks approximate energy consumption per session
🌱 Carbon Savings	Compares emissions from local vs cloud LLM usage
💸 Cost Savings	Token-level comparison: self-hosted vs OpenAI API calls

This level of transparency helps build awareness about the environmental impact of AI — and proves that sustainable AI is possible.

🛠️ Tech Stack

Component	Description
🧠 LLMs	Ollama (mathstral, stablelm2, gemma, deepseek)
📄 PDF Parsing	PyPDFLoader
🧩 RAG Pipeline	Chroma, LangChain, ChatPromptTemplate
🌐 Search	SerpAPI for real-time resource fetching
🗂️ Embeddings	nomic-embed-text via Ollama
🖥️ Frontend	Next.js + TailwindCSS
📦 API Server	FastAPI
🧪 Caching	SQLiteCache (LangChain)

Rag agent based ai chatbot:

a chatbot that will only respond with information that it has within its knowledge base. The chatbot will be able to both store and retrieve information. This project has many interesting use cases from customer support through to building your own second brain!

This project will use the following stack:

- [Next.js](https://nextjs.org) 14 (App Router)
- [Vercel AI SDK](https://sdk.vercel.ai/docs)
- [OpenAI](https://openai.com)
- [Drizzle ORM](https://orm.drizzle.team)
- [Postgres](https://www.postgresql.org/) with [pgvector](https://github.com/pgvector/pgvector)
- [shadcn-ui](https://ui.shadcn.com) and [TailwindCSS](https://tailwindcss.com) for styling