

Project Summary

AI Curriculum Intelligence System (ACIS): Enhancing Education through Data-Driven Curriculum Optimization

Problem

Educators struggle to keep course content aligned with fast-evolving industry skill demands. Student feedback, academic performance results, and job-market insights exist in separate systems, forcing manual reviews and intuition-based decisions. This leads to **outdated course material**, **slow content updates**, and **limited visibility** into whether students are being prepared for modern, industry-relevant technologies.

Solution

The **AI Curriculum Intelligence System (ACIS)** introduces a **multi-agent, autonomous AI framework** that integrates and analyzes academic, behavioral, and market data to generate actionable learning insights.

Built using **MCP (Model Context Protocol)** and **agentic architecture**, it does basic level analysis and provides educators with clear, data-backed curriculum improvement recommendations.

Impact

ACIS transforms traditional course review cycles into a continuous, **data-driven education intelligence loop**, enabling educators to:

- Detect outdated or underperforming modules early.
- Add emerging technologies and skill-based topics proactively.
- Maintain strong alignment between academic learning and job-market demand.

Core Agents:

1. **Feedback Agent** — performs sentiment scoring and qualitative analysis on student feedback using **LangChain + OpenAI** integration.
2. **Performance Agent** — evaluates student marks, GPA, and attendance trends via **Google Gemini API**, identifying learning gaps and key improvement areas.
3. **Trend Agent** — connects course concepts to **job-market trends** using industry datasets and skill frequency analysis.
4. **Recommender Agent** — uses **Retrieval-Augmented Generation (RAG)** and real course materials (PDFs, slides) to propose targeted content enhancements such as adding emerging modules, case studies, or project-based learning units.

Each agent runs as an independent **MCP microservice**, collaborating asynchronously to form a unified, adaptive intelligence loop.

Core Libraries & Frameworks

LangChain / LangChain-Community	LLM orchestration and prompt chaining for contextual AI reasoning
LangChain-Google-GenAI	Integration with Google Gemini models for qualitative and performance analysis
MCP (Model Context Protocol)	Communication framework enabling autonomous multi-agent coordination
FAISS	Vector database for document embedding and retrieval during RAG
OpenAI / Google GenAI SDKs	LLM access for reasoning, summarization, and recommendation generation
Pandas / NumPy / Scikit-learn	Quantitative analysis and statistical computation
Streamlit	Frontend UI for interactive agentic analysis and visualization
ReportLab	PDF generation for final report summaries

Future Integration

The system can be later connected with **university learning management systems (LMS)** and **real-time institutional databases**. This will allow continuous, live monitoring of student outcomes and feedback—automatically generating course improvement insights without manual intervention.