CONVERSATIONAL MULTI-AGENT AI SYSTEM FOR REAL-TIME CONTENT GENERATION AND TEACHING SUPPORT

ABSTRACT

In many under-resourced educational settings, teachers are responsible for instructing multiple grades within a single classroom, often without adequate preparation time, personalized materials, or language-specific resources. This paper introduces a modular, multi-agent AI framework designed to assist educators by automating key instructional tasks through a conversational interface. The system comprises distinct AI agents, each specializing in a specific pedagogical function, and coordinated by a central orchestration layer that processes multimodal teacher inputs - text, voice, and image and routes them to the relevant agent.

The solution offers a robust suite of capabilities: The **Localized Content Agent** generates culturally relevant stories, lessons, and explanations in regional languages to promote engagement and contextual learning. The **Worksheet Generator Agent** creates curriculum-aligned, grade-specific worksheets from either text prompts or textbook images, supporting differentiated instruction in multi-grade environments. The **Visual Aid Generator Agent** produces blackboard-style line diagrams and charts to support visual learners and reduce teachers' preparation load. The **Student Doubt Solver Agent** provides simplified, analogy-based explanations in response to student or teacher queries submitted via text or voice, facilitating conceptual clarity in real time. The **Reading Fluency Assessment Agent** analyzes audio recordings of student reading, compares them to reference passages, and delivers immediate feedback on fluency and pronunciation. The **Lesson Planner Agent** automatically generates structured weekly lesson plans and integrates them with calendar systems, providing daily teaching reminders to support better instructional planning. All of these agents are accessible through a unified, app-free chat interface, allowing seamless interaction using natural language and intuitive inputs.

Preliminary testing of this agent-based framework demonstrates measurable improvements in instructional efficiency, personalization of classroom materials, and student engagement. The design emphasizes minimal infrastructure dependency, making it particularly suitable for deployment in low-connectivity, resource-constrained regions. By enabling teachers to deliver high-quality, adaptive instruction at scale, this system represents a significant step toward equitable access to intelligent educational support.