**Project Proposal: Sahayak EDU**

**An AI-Powered Teaching Companion for Multi-Grade Classrooms**

**Project Title:** Sahayak EDU: An AI-Powered Teaching Companion for Multi-Grade Classrooms

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**Date:** August 26, 2025

**Document Version:** 1.0

**Table of Contents**

1. **Executive Summary**
2. **Problem Statement**
3. **Proposed Solution: Sahayak EDU**
4. **Key Features and Functionality**
   * 4.1 Core Features (MVP)
   * 4.2 Secondary Features (Phase 2)
5. **User Journey and Workflow**
6. **Uniqueness & Competitive Advantage**
7. **Technical Architecture**
   * 7.1 Proposed Technology Stack
   * 7.2 Conceptual System Diagram
8. **Project Plan & Roadmap**
   * 8.1 Development Phases
   * 8.2 Team Roles & Responsibilities
9. **Rationale for Personal Project Scope**
10. **Potential Impact & Future Scope**
11. **Conclusion**

**1. Executive Summary**

**Sahayak EDU** is an AI-powered, teacher-first platform designed to empower educators in multi-grade, multi-lingual classrooms, particularly in rural and semi-urban India. Teachers currently face an overwhelming workload in creating differentiated lesson plans, localized content, and visual aids for students of varying grade levels within a single class. Our solution directly addresses this by providing an intuitive assistant that generates high-quality, culturally relevant teaching materials on demand. Using voice, text, or image-based inputs in their local language, teachers can instantly create stories, worksheets, blackboard-style diagrams, and weekly lesson plans. By automating content creation, Sahayak EDU saves valuable preparation time, enhances personalized learning, and allows teachers to focus on what they do best: teaching. This project transitions from a hackathon concept to a sustainable personal project focused on real-world impact, feasibility, and team learning.

**2. Problem Statement**

In many educational systems, particularly in rural regions, a single teacher is often responsible for instructing students from multiple grades simultaneously. This multi-grade classroom environment presents significant challenges:

* **Excessive Workload:** Teachers must prepare distinct lesson plans, activities, and assessments for each grade level, a time-consuming and exhausting task.
* **Lack of Relevant Resources:** Generic, one-size-fits-all textbooks often fail to connect with students' local culture, language, and context, reducing engagement.
* **Content Differentiation Barrier:** Creating differentiated materials (e.g., simpler worksheets for Grade 2, advanced ones for Grade 4 on the same topic) requires significant effort and pedagogical expertise.
* **Digital and Language Divide:** Many existing EdTech tools are English-centric, complex, and student-focused, ignoring the primary needs and technical comfort of the teacher.

**3. Proposed Solution: Sahayak EDU**

Sahayak EDU is a dedicated AI companion that acts as a personal assistant for the teacher. It is not another student-facing app but a powerful tool for the educator.

The core concept is a simple, intuitive interface (web or mobile) where the teacher can:

* **Request Content:** Using voice or text in their native language (e.g., Tamil, Hindi).
* **Generate Materials:** The AI agent generates customized content tailored to specified grades.
* **Use Visual Inputs:** Upload a photo of a textbook page to generate summaries, questions, and activities based on it.

The platform is designed to be a **creator, planner, and classroom companion,** seamlessly integrating into the teacher's daily workflow.

**4. Key Features and Functionality**

**4.1 Core Features (MVP)**

* **Multilingual Voice & Text Input:** Allows teachers to make requests naturally in their preferred language.
* **Localized Content Generation:** Creates stories, analogies, and explanations using culturally relevant examples. (e.g., "Explain photosynthesis with a story of a local farmer").
* **Differentiated Worksheet Generation:** From a single topic or a textbook image, generates worksheets with varying difficulty levels for multiple grades.
* **Blackboard-Style Diagram Generator:** Produces simple, drawable line diagrams with local language captions, downloadable as PDFs for printing or classroom projection.
* **Weekly Lesson Planner:** Automates the creation of a structured weekly plan with topics, activities, and revision goals for multiple grades.

**4.2 Secondary Features (Phase 2)**

* **Quiz Generator:** Creates quick, formative quizzes with an instant answer key for revision.
* **Audio-Based Reading Assessment:** An optional module where a student's reading can be recorded for the AI to provide a private fluency and pronunciation report to the teacher.
* **WhatsApp/Telegram Delivery:** Option to send generated PDF worksheets and plans directly to the teacher's phone via WhatsApp for easy access and sharing.

**5. User Journey and Workflow**

1. **Login:** The teacher accesses the Sahayak EDU portal via a web browser or mobile app and logs in.
2. **Input:** The teacher selects an action (e.g., "Create Worksheet") and provides a command via:
   * **Voice:** "Create a worksheet on the solar system for Grade 3 and Grade 5."
   * **Text:** Typing the same request.
   * **Image:** Uploading a picture of a textbook chapter.
3. **Processing:** The AI agent processes the request, understanding the topic, grade levels, and required output format.
4. **Generation:** The system generates the requested content (e.g., two versions of a worksheet, a lesson plan).
5. **Review & Download:** The teacher reviews the generated material, can make minor edits if needed, and downloads it as a printable PDF.

[Placeholder for a simple process flow diagram showing the user journey]

**6. Uniqueness & Competitive Advantage**

Sahayak EDU distinguishes itself by being fundamentally **teacher-first.**

| **Competitor/Alternative** | **Weakness** | **Sahayak EDU's Advantage** |
| --- | --- | --- |
| **ChatGPT / Gemini** | General-purpose; not aligned with curriculum or teacher workflows. | Custom-built for pedagogical tasks: worksheet generation, lesson planning, localized analogies. |
| **Khan Academy** | Student-focused, primarily in English, static content. | Teacher-centric, multilingual, dynamic content generation based on teacher's immediate needs. |
| **Govt. Portals (DIKSHA)** | Static content repositories; primarily for content consumption, not creation. | An interactive and creative tool that empowers teachers to generate new, specific content on-the-fly. |

**Our Core USP:** The unique combination of a **teacher-first UX, multi-grade adaptation, and multimodal (voice/image) input** in regional languages.

**7. Technical Architecture**

**7.1 Proposed Technology Stack**

* **AI & ML Models:** Gemini Pro & Multimodal API, with flexibility to integrate OpenAI or open-source models for cost-effectiveness.
* **Speech Recognition:** Vertex AI Speech-to-Text (or open-source alternatives like Vosk).
* **Backend & Database:** Firebase (for Authentication, Firestore DB to store plans/content), built on a Python framework.
* **Frontend:** A simple, responsive web application built with React, or a mobile app with Flutter.
* **File Generation:** Python libraries (ReportLab/PDFKit) for creating and formatting downloadable PDFs.
* **Optional Delivery API:** Twilio (for WhatsApp).

**7.2 Conceptual System Diagram**

[Placeholder for a high-level architecture diagram showing: Frontend -> Backend API Gateway -> AI Services (LLM, Speech-to-Text, Vision) -> Database -> PDF Generator -> User]

**8. Project Plan & Roadmap**

**8.1 Development Phases**

* **Phase 1: MVP (1 Month):** Develop the core web app with text/voice input, content generation (stories/worksheets), and PDF export.
* **Phase 2: Multimodal & Planning (2 Months):** Integrate image-to-worksheet functionality and the weekly lesson planner with database storage.
* **Phase 3: Enhancements (1 Month):** Add the diagram generator and optional WhatsApp delivery.
* **Phase 4: Pilot & Feedback (Ongoing):** Test with a small group of teachers to gather feedback for iterative improvement.

**8.2 Team Roles & Responsibilities (5 Members)**

| **Role** | **Primary Responsibilities** |
| --- | --- |
| **1. AI & ML Integrator** | Manage API integrations (Gemini, Speech-to-Text), prompt engineering, and model selection. |
| **2. Backend Developer** | Design and manage the Firebase backend, database schemas, user authentication, and server-side logic. |
| **3. Frontend Developer** | Build the user-facing application, ensuring a simple, responsive, and intuitive interface. |
| **4. Content & Language Lead** | Oversee the quality of generated content, test for linguistic accuracy (Tamil/Hindi etc.), and create test cases. |
| **5. Project Coordinator & QA** | Manage project timelines, conduct end-to-end testing, document features, and prepare presentations. |

**9. Rationale for Personal Project Scope**

This project originates from a hackathon idea but is being re-scoped for a different purpose. The shift is justified by:

* **Focus on Sustainability:** Moving away from a purely Google-centric stack (a hackathon requirement) to a more flexible, cost-effective architecture using a mix of best-in-class APIs and open-source tools.
* **Deepened Learning:** This scope allows the team to build and integrate modules from the ground up, rather than just making API calls, providing a richer learning experience.
* **User-Centric Iteration:** A personal project allows for a phased rollout and the incorporation of real user feedback, which is impractical in a hackathon timeline.

**10. Potential Impact & Future Scope**

The successful implementation of Sahayak EDU can create significant positive impact by reducing teacher burnout and improving the quality of education in underserved areas.

**Future Scope:**

* **Mobile Application:** A dedicated, lightweight Android app for wider accessibility.
* **NGO & School Partnerships:** Collaborate with educational organizations for pilot programs and real-world validation.
* **Language Expansion:** Systematically add support for more Indian regional languages.
* **Offline Functionality:** Explore lightweight, on-device models for core features in low-connectivity zones.

**11. Conclusion**

Sahayak EDU is more than an application; it is a vision to support the unsung heroes of our education system. By leveraging AI to handle the repetitive, time-consuming aspects of teaching preparation, we empower teachers to dedicate their energy to fostering a creative, engaging, and effective learning environment. We are confident that this project holds immense potential for both social impact and technical learning, and we are eager to bring it to fruition.