# **📖 Detailed Project Idea Document**

## **1. Project Overview**

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

Problem Statement:  
In rural and semi-urban areas, many classrooms are multi-grade (a single teacher manages students of different classes in one session). Teachers face challenges such as:

* Overwhelming workload (lesson planning for multiple grades simultaneously).
* Lack of localized, relevant, and culturally appropriate teaching resources.
* Minimal time for creating differentiated worksheets, quizzes, and visual aids.
* Difficulty explaining complex topics in local/regional languages.

## **2. Solution Concept**

Sahayak EDU is an AI-powered assistant built specifically for teachers in multi-grade rural classrooms.

Instead of replacing teachers, it empowers them by automating lesson prep, content generation, and explanation aids in multiple languages.

👉 Teachers interact with the system by voice commands, typing, or uploading textbook photos.  
👉 The system generates:

* Localized stories/analogies to explain concepts.
* Blackboard-style diagrams & printable handouts.
* Multi-grade lesson plans & worksheets.
* Quizzes & revision exercises with instant solutions.
* Optional student assessment reports (reading fluency, quiz results).

## **3. Why Is This Important? (Impact)**

* Direct user = Teachers (not just students!). Most EdTech tools ignore teachers.
* Saves 2–3 hours of prep time daily, enabling better classroom focus.
* Generates hyper-local content (local stories, examples, explanations in Tamil, Hindi, etc.).
* Bridges digital divide with a voice-first interface (teachers don’t need tech skills).
* Builds trust: the teacher remains the knowledge source; AI is just an assistant.

## **4. Uniqueness Compared to Existing Tools**

| **Tool / Platform** | **Weakness** | **How Sahayak EDU Solves It** |
| --- | --- | --- |
| ChatGPT / Gemini | General knowledge only, not curriculum-aligned, no teacher workflow | Teacher-first workflow: Worksheets, lesson plans, localized analogies |
| Khan Academy | Student-focused, English-centric | Rural teacher-centric + supports voice/image input in Indian languages |
| Govt Tools (Bhashini, DIKSHA) | Translate content / static repositories | Intelligent, adaptive content generation with quizzes/lesson planners |

USP: First teacher-first AI, voice + multimodal input, regional language and multi-grade adaptation → all in one system.

## **5. Feature List – Detailed**

## **🔹 Core Features (MVP)**

1. Voice / Text Input in Local Language
   * Teacher speaks: *“Explain water cycle in Tamil for Grade 3 and Grade 5”*.
   * AI generates multiple differentiated notes.
2. Story & Explanation Generator
   * Personalized analogies: *“Explain fractions with a story about sharing mangoes in a village.”*
3. Blackboard-Style Diagram Generator
   * Teacher requests → AI gives sketch-style diagrams with captions.
   * Downloadable as PDF image for classroom use.
4. Worksheet Generator (From Textbook Images)
   * Teacher uploads a photo → AI analyzes text → Summarizes and generates grade-specific worksheets (MCQ, fill-in-the-blanks, short answers).
5. Weekly Lesson Planner
   * Teacher enters: *“Plan for Grade 3, Science, Week 2.”*
   * AI suggests day-wise activities, recaps, and quizzes.
6. Quiz Generator with Instant Feedback
   * Teachers can ask: *“5 revision questions for ‘Soil’ in Hindi”*.
   * Bot generates — with answer key included.

## **🔹 Secondary Features (Phase-2)**

1. Audio-Based Student Reading Assessment
   * Student reads aloud → AI (speech analysis) gives fluency/pronunciation scoring → visible only to teacher.
2. WhatsApp Content Delivery (Optional)
   * Generated PDFs/worksheets automatically sent on WhatsApp for easy access.
3. Backup Student Mode (Self-learning version for home revision).

## **6. User Journey Flow**

Step 1: Teacher opens web/mobile app → logs in (Firebase login, optional WhatsApp login).  
Step 2: Teacher gives command (via typing/voice/upload).  
Step 3: AI agent (Gemini/LLM API) processes → generates localized content.  
Step 4: Teacher previews → edits if needed → downloads as PDF or shares via WhatsApp.  
Step 5: Data saved for weekly planner.

## **7. Technology Stack**

AI Models

* Gemini Pro (text content generation)
* Gemini Multimodal (textbook image analysis)
* OpenAI (backup alternative if needed)
* Optional HuggingFace (translation models, smaller AI modules for offline use)

Supporting Tech

* Speech Recognition: Vertex AI / Vosk (offline fallback)
* Text-to-Speech (for teacher playback in class): Google / Bhashini
* Backend: Firebase (Auth + Firestore for storing lesson plans)
* Frontend: Firebase Studio / ReactJS / Flutter (for mobile app)
* File Handling: Python (PDFKit/ReportLab for generating printable sheets)
* Optional Delivery: WhatsApp Business API / Twilio

## **8. System Architecture (Conceptual)**

Input → AI Processing → Output → Delivery

1. Teacher Input: (Voice/Text/Image Upload)
2. Preprocessing: Speech-to-text → Language identifier → Translation (if required)
3. AI Output: Gemini/LLM generates stories, explanations, worksheets, diagrams
4. Storage/Access: Firebase stores content per teacher/class/grade
5. Delivery: Download PDF / Send to WhatsApp / Save in planner

## **9. Project Team Roles (5 Members)**

| **Role** | **Responsibilities** |
| --- | --- |
| AI Integrator | Connecting APIs (Gemini, STT, Image analyzer, quiz generator). |
| Backend Developer | Storage, authentication, planner database using Firebase/Python. |
| Frontend Developer | Teacher-friendly interface (mobile-first, simple). |
| Data & Language Specialist | Ensures content correctness in Tamil/Hindi/other local languages. |
| Tester/Coordinator | Testing with mock teachers, managing project timeline, documentation. |

## **10. Development Roadmap (Phases)**

Phase 1 (1 month) – MVP

* Basic app with text/voice input + story + worksheet + simple PDF export.

Phase 2 (1.5–2 months)

* Add textbook-image understanding for worksheets.
* Add weekly planner.

Phase 3 (1–2 months)

* Add diagram generator.
* Add optional WhatsApp delivery.

Phase 4 (Exploratory)

* Add audio-based reading assessment.
* Add backup student mode.
* Pilot with real teachers (collect feedback).

## **11. Why the Scope Is Different from Hackathon**

* Hackathon → judged on Google tools integration and demo impressiveness.
* Personal Project → focused on cost efficiency, feasibility, and real-world adoption.
* Reason for changes:
  + Long-term sustainability (cannot rely only on paid Google APIs).
  + Learning purpose (implementing some modules ourselves, not just API calls).
  + Progressive iteration (teachers’ feedback guiding new features).

## **12. Future Expansion**

* Deploy as a mobile-first
* app for rural teachers.
* Partner with schools/NGOs for pilot testing in multi-grade villages.
* Expand to more languages (Tamil → Kannada → Marathi → Hindi, etc.).
* Explore offline model hosting (lightweight LLMs) for areas with poor connectivity.

# **🔑 Summary**

Sahayak EDU is not just a chatbot.  
It is a teacher’s AI assistant that:

* Speaks their language.
* Understands their constraints.
* Generates content instantly.
* Saves hours of work.
* Helps in real classrooms, not just contests.