

Empowering Educators in Multi-Grade Classrooms: A Google AI-Powered “Sahayak” System Design

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Abstract - The project is about helping teachers who have to teach students of ages and learning abilities at the same time in India. This can be really tough because teachers have to make plans and materials for each group of students. The Sahayak project is going to use Googles Artificial Intelligence technologies like Gemini, Vertex AI, Firebase, Cloud Vision and Speech-to-Text API to make a teaching assistant tool. This tool will help teachers make lesson plans and learning materials for students of grade levels. Teachers can talk to the tool by typing, speaking or using pictures. The tool will understand what they mean. The tool can even work when the internet is slow or not available thanks, to Firebases data caching.

Keywords - Artificial intelligence, Educational technology, Multi-grade classrooms, System design.

I. INTRODUCTION

Multi-grade teaching is something that we see over the country especially in rural areas where not many people live. This is a way to make sure every child gets an education. Teachers who work in these areas have a tough time because they have to teach many students who are in different grades and need to learn different things. It is even harder because they do not have the things they need to teach, like classrooms and the right tools. Also teachers spend a lot of time doing paperwork, which leaves them with little time to make their own teaching materials or change the lessons to fit their students.

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"Sahayak" is like a helper that uses Google AI to make things easier for teachers and help them teach better. This helper will have different tools. The main goals of this system are:

- * To give teachers the tools they need to be better at their jobs and make their teaching more effective with the help of AI.
- * To help teachers make lessons that're just right for each child in their class.
- * To make lessons that're relevant to the culture of the students.
- * To help schools that do not have resources, like books and classrooms by minimizing the impact of not having these things.

II. LITERATURE REVIEW

Artificial Intelligence has changed the way we learn by making it possible for each student to have their personalized learning experience with smart tutoring, automatic grading and content that adjusts to their needs. The use of Artificial Intelligence in schools has become very popular because it can make teaching more effective and help students learn better.

Poursalim did a study in 2024 about how technology can help in classrooms where students are of different ages. The study showed that Artificial Intelligence can assist teachers in handling students who learn at speeds. This can help solve problems like not having teachers and students having different needs. However the solutions that were suggested mainly focused on giving students content and did not provide help to teachers.

Wang and others did a review in 2024 of how Artificial Intelligence is used in education and found that it can be used for things like smart tutoring systems, personalized learning platforms and automatic grading tools. They found that Artificial Intelligence makes students more engaged and helps them learn faster. Most of the systems that exist now are designed for one student at a time and do not work well in classrooms with students of different ages.

Dimitriadou and others looked at how Artificial Intelligence and other new technologies are used in smart classrooms in 2023 and talked about the good and bad things about using them. They found that these technologies can improve the quality of teaching, make learning more personalized and provide data about education. There are still problems like not having the right infrastructure, concerns about keeping student data private and the need to train teachers.

Research on Intelligent Tutoring Systems has shown that they can provide guidance and help students learn in a way that is adapted to their needs. Studies by Guo and others in 2021 and Mustafa and others in 2024 found that these systems can improve student performance by giving them customized content and feedback in time. While these systems are good for students they often do not help teachers with things like planning lessons, making content and managing the classroom.

Ghadirli and Rastgarpour made a web-based Intelligent Tutoring System in 2013 that could teach students in languages. Their work showed how important it is to make educational technology work for students who speak languages. Their system did not have advanced Artificial Intelligence capabilities like understanding natural language and making content on the fly.

New developments in Large Language Models like Google's Gemini models have made it possible to use Artificial Intelligence in education in ways. Systems that use Gemini can make lesson plans, create worksheets, simplify concepts, make visual aids and help with communication in many languages. This makes Large Language Models a good choice for making platforms that help teachers and improve the quality of instruction.

Even though Artificial Intelligence has been used a lot in education there is still a gap in research on how to make systems that work well in classrooms with students of different ages. Most systems focus on helping students or managing the classroom but not many provide comprehensive help to teachers who work in environments with limited resources. Also not much attention has been given to making content in languages, providing educational resources that are tailored to local needs and making sure systems can be used offline.

To solve these problems the proposed SAHAYAK system aims to make an Artificial Intelligence-powered teaching assistant that can make content, create worksheets, plan lessons, assess pronunciation and support languages all in one platform. By using Google Gemini, Firebase and cloud-based Artificial Intelligence services the system wants to make teaching more efficient and improve education outcomes in classrooms with students of ages especially in rural and underserved areas. Artificial Intelligence can make a difference in education and the SAHAYAK system is a step in that direction. The use of Artificial Intelligence in education is becoming more popular. The SAHAYAK system is using Artificial Intelligence to help teachers and students. The system is designed to work with Artificial Intelligence and make education better.

III. PROPOSED SYSTEM

The SAHAYAK system, which is a Smart AI Assistant for Helping and Advancing Young Knowledge is a teaching assistant that uses intelligence to help teachers. This system is especially helpful for teachers

who work in classrooms with students of ages particularly in rural areas and places where resources are limited. The SAHAYAK system uses Google Gemini AI and other tools like Firebase and Speech-to-Text to create content, plan lessons make worksheets and assess students.

The main goal of the SAHAYAK system is to make things easier for teachers while also making education better and more accessible. Teachers can give instructions to the SAHAYAK system by typing or speaking. It will create learning materials lesson plans, quizzes and visual aids that are suitable, for students of different ages and languages.

Teacher logs into the SAHAYAK application. Teacher enters a topic, chapter, or educational requirement. The request goes to the Google Gemini AI model through Firebase backend services. Gemini processes the request and creates:

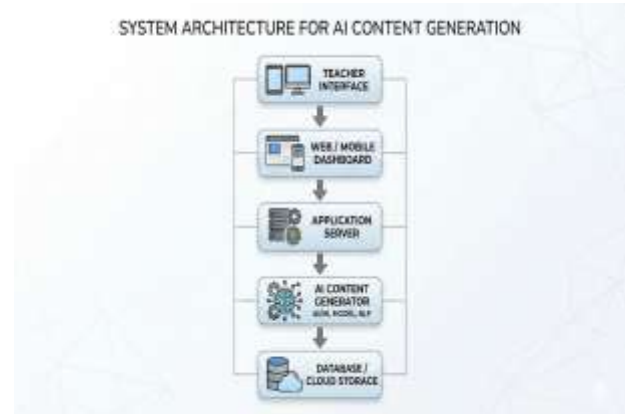
- Lesson plans
- Explanatory notes
- Worksheets
- Quiz questions
- Visual learning content

The content appears on the teacher dashboard. Teachers can download, print, or share the materials. For reading assessment, students read aloud while Speech-to-Text technology checks their pronunciation and fluency. The system saves the generated content and assessment reports in Firebase Cloud Database.

IV. SYSTEM ARCHITECTURE

The Sahayak platform has three layers: the user interface layer, the application layer, and the AI services layer. In the user interface layer, teachers can interact with the platform through a simple dashboard to request learning materials. In the application layer, user requests are processed, and communication between various services is managed. In the AI services layer, generative

AI models create learning materials.



V. METHODOLOGY

1. Teacher enters grade, subject, and topic.
2. System sends request to AI content generator.
3. AI model generates lesson explanation and worksheet.
4. Content is stored and displayed on teacher dashboard.

VI. RESULTS AND DISCUSSION

The initial findings on the effectiveness of the Sahayak platform show positive results in reducing teacher workload. Teachers who used the platform could prepare learning materials much faster than using traditional methods for planning and preparing worksheets. It also allowed teachers to provide different learning activities for students at various class levels.

The platform demonstrates how AI tools can support teachers instead of taking their place. It may help lessen teacher workload and improve student interactions and engagement in learning.

VII. CONCLUSION AND FUTURE SCOPE

This paper has proposed an AI-powered assistant called Sahayak, aimed at assisting teachers in multi-grade classrooms. It utilizes the capabilities of modern AI technologies to create learning materials and assist teachers in planning lessons and provide learning materials in different languages.

In future, we plan to incorporate features like adaptive learning into the system and perform large-scale deployments in rural schools.

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