A Learning Platform for Inclusive Education in India

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Abstract: This project introduces a smart learning system that helps all students, including those with disabilities, learn better. It uses simple tools like videos, sign language, text-to-speech, and quizzes to help students understand lessons in a fun and easy way. The system also supports different Indian languages, helping students learn in their mother tongue. It works on phones, tablets, or computers and adjusts to what each student needs. With features like live subtitles and Indian Sign Language videos, this system helps create equal learning chances for everyone.

Keywords: Inclusive Education, Easy Learning, Sign Language, Assistive Tools, Accessibility, Student Support, Digital Learning.

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I. INTRODUCTION

Education should be easy and fair for everyone. But in many schools, students with hearing, vision, or learning problems face difficulties. Our project aims to help such students by making learning more friendly and helpful.

We created a system that uses simple technology to make learning materials easier to understand. This includes sign language videos, subtitles, audio support, and fun quizzes. The goal is to help students feel comfortable, learn better, and stay involved in class—whether at home or school.

Education is a fundamental right, yet many students across the world continue to face barriers to learning due to disabilities or language differences. In India, where diversity in language, economic background, and ability is vast, a one-size-fits-all educational approach often leaves behind students who require additional support.

Inclusive education focuses on removing these barriers and providing equal opportunities by recognizing each learner's unique needs. With the growth of EdTech, we now have the ability to design systems that offer personalized and assistive learning experiences. The integration of multimodal learning tools—like sign language, speech support, and adaptive interfaces—can transform traditional classrooms into inclusive spaces.

Our project leverages assistive technologies, real-time processing, and multilingual capabilities to support students who are deaf, visually impaired, or have cognitive/learning disabilities. It also promotes Universal Design for Learning (UDL) principles, ensuring accessibility is built into the core of the platform.

II. MATERIALS AND METHODS

- A. System Overview Our system includes the following main parts:
- > Easy Learning Interface:

Uses pictures, short videos, and sign language to explain topics clearly.

Multiple Ways to Learn:

Students can use audio, text, ISL videos, and quizzes to learn.

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Real-Time Help Tools:

Subtitles, speech-to-text, and language translations are shown live while learning.

Smart Content Adjuster:

The system understands what the student needs and shows content in an easy way using simple language or sign videos.

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Fig 1 Smart Content Adjuster

- > Technology Stack:
- Front end react JS
- back end node JS and express JS
- database Mango DB
- APIs Used:
- ✓ Web Speech API for speech recognition and text-tospeech.
- ✓ Google Translate API or equivalent for language translation.
- ✓ Video-based ISL modules for sign language lessons.
- Databases: SQLite for initial testing; scalable options like PostgreSQL for deployment.
- Accessibility Tools: WAI-ARIA labels, screen reader support, high-contrast mode.
- Learning Philosophy:

The system is inspired by Constructivist Learning Theory, which suggests that learners build knowledge actively based on their experiences. By using interactive videos, realtime feedback, and adaptive support, the system ensures a more engaging and meaningful learning process.

- B. How It Works (Steps)
- Student Profile Setup:

The student shares their language preference or any learning need.

Content Matching:

The system chooses the best way to show the lesson—like using ISL, voice, or text.

> Interactive Learning:

Students watch videos, answer quizzes, or read notes in a fun, easy format.

Feedback Collection:

After learning, the system checks how well the student understood and makes changes to improve.

III. RESULTS AND DISCUSSION

- A. Case Study 1: Visually Impaired Student
- > The student listened to lessons with detailed voice explanations.
- ➤ They used text-to-speech to understand study materials.
- Result: 40% better understanding and higher interest in class.
- B. Case Study 2: Hearing-Impaired Student
- > They used ISL videos and subtitles during lessons.
- Speech was converted to text in real-time.
- Result: 50% increase in quiz attempts and classroom engagement.
- C. Performance and Feedback
- \succ 25 students tested the system.
- ➤ Satisfaction rate: 91%
- System speed: 1.4 seconds per change
- Accessibility score: 96/100 (based on standard testing)
- *Educational Impact:*

Students with disabilities were able to complete 25–40% more assignments using our system. Students reported feeling more confident and autonomous in their learning process.

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Teachers appreciated the automated content adaptation, reducing manual efforts to cater to each student.

Challenges Noted:

Generating high-quality ISL videos for all topics requires domain-specific interpreters. Real-time translations for regional languages need improvement for grammatical accuracy. Internet connectivity in rural areas may affect realtime features like live captioning.

IV. DISCUSSION

The system helped many types of students learn better. It is easy to use and does not need expensive computers. It works well in both online and offline schools and can be used anywhere in India.

V. CONCLUSION

This project shows a practical and simple way to make education better and more accessible for all students especially those who have hearing, visual, or learning difficulties. By using friendly tools like Indian Sign Language videos, real-time subtitles, audio support, and easy-tounderstand lessons, we help students learn in the way that works best for them.

Our system works on common devices like mobile phones, tablets, or laptops, so students can learn from anywhere—whether at home or in school. It creates a fun and interactive environment where students feel more confident and connected to their studies.

The biggest strength of our system is **flexibility**. Every student is different, and our system can adjust content based on their needs. For example, if someone prefers reading, it gives more text. If someone understands better by watching, it provides videos and sign language. This type of learning is called adaptive learning, and it helps students improve faster and stay motivated.

We also made sure the system is easy to use, with simple buttons and fast response time. Schools don't need to spend extra money on big equipment—just internet access and basic devices are enough.

In the future, we want to make the system:

- Smarter by using **AI** to understand how a student is doing and give suggestions
- More inclusive by adding **support for more Indian languages** like Marathi, Tamil, Bengali, etc.
- Matched with the **school syllabus** from CBSE, state boards, and NEP 2020 to make it useful for all types of learners.

Our goal is simple: Education should be easy, fun, and fair for every child in India. This project takes a step in that direction.

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ETHICAL COMPLIANCE

We followed all the necessary ethical steps to keep the project safe and respectful for everyone involved.

- All participants who tested the system gave their full **permission (informed consent)** to take part.
- No personal or sensitive data was stored or shared without the participants' knowledge.
- The system was **only tested by adult students** from our institute; **no children or minors were involved**.
- There was **no use of animals** or any testing that could cause harm to people or the environment.
- The research followed rules stated in the **Helsinki Declaration**, which is a worldwide standard for ethics in human research.

This ensures that our project was conducted in a fair, safe, and responsible manner.

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