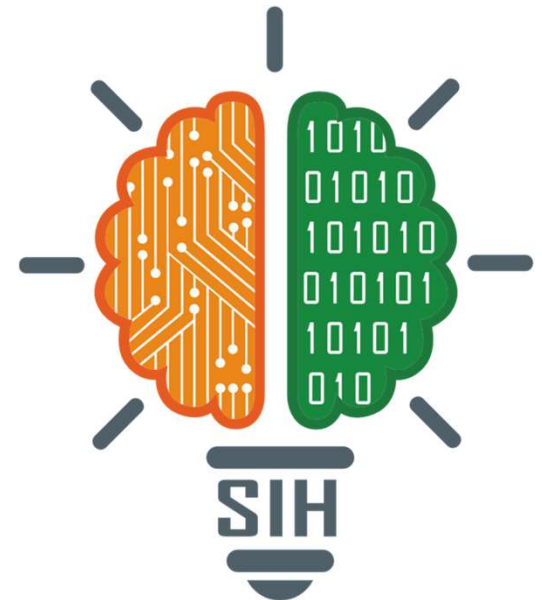


# SMART INDIA HACKATHON 2025



- **Problem Statement ID – 25048**
- **Problem Statement Title-** Gamified Learning Platform for Rural Education
- **Theme-** Smart Education
- **PS Category-** Software
- **Team ID-** 2510101
- **Team Name-** THE CODING EAGLES



# THE CODING EAGLES



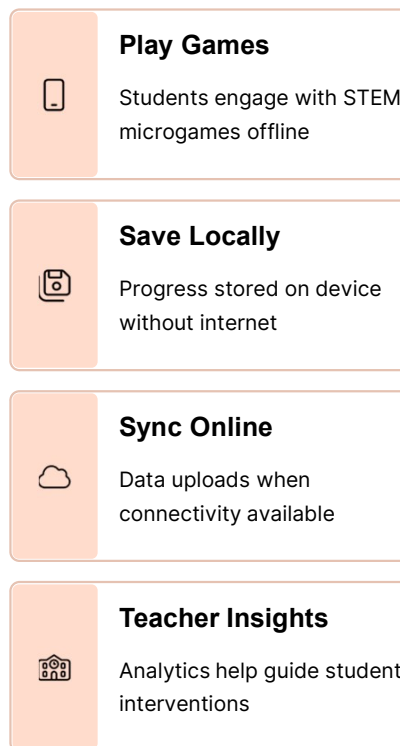
## Proposed Solution

### What We're Building

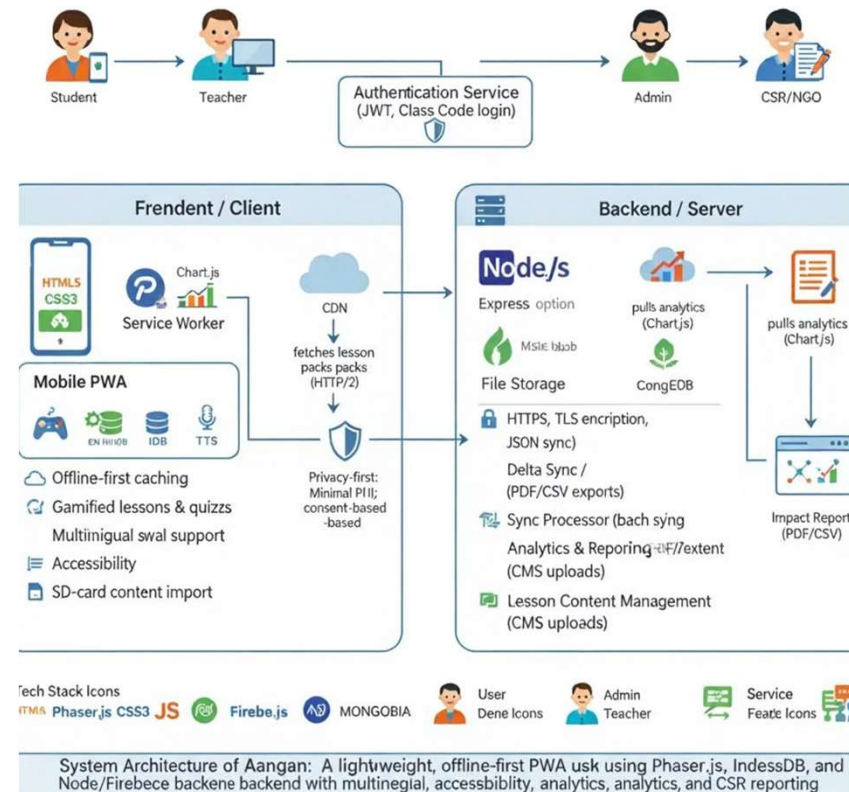
- **Lightweight PWA** with **micro-games & quizzes** for Grades 6–12
- Rural students focus; teachers use **low-bandwidth dashboard**
- **Offline-first, multilingual** (Hindi/Urdu/English), **TTS support**
- **Private leaderboards**, teacher **CSV reports**

### Unique Selling Points

- **Ultra low-MB app & asset-on-demand** (works on low-end phones).
- **Built-in accessibility** (TTS; screen-reader friendly) + Urdu for inclusion.
- **Deployable** via SD card / USB for **zero-data installs**.



### Aangan — Gamified Learning Platform (Offline PWA for Rural Education)



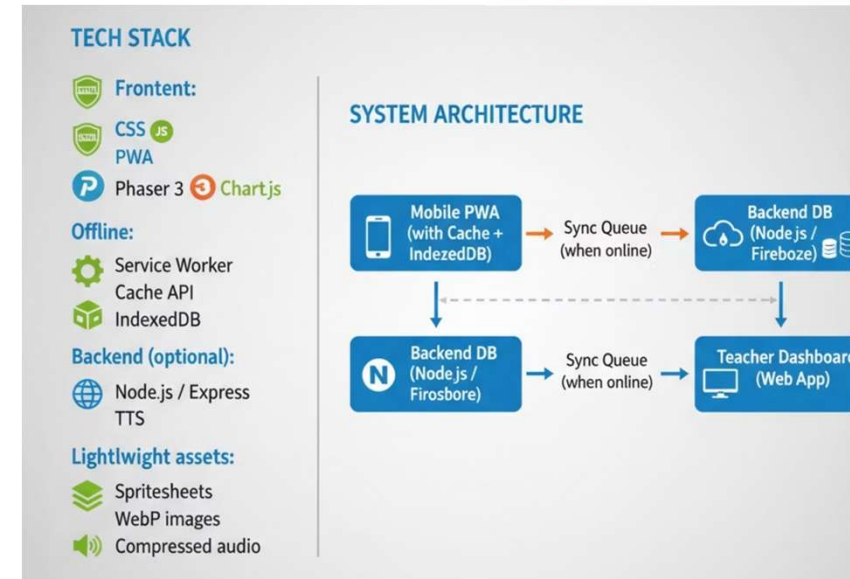
# TECHNICAL APPROACH



## Technology Stack

- **Frontend:** PWA (HTML5/CSS/JS) + Phaser 3 + Chart.js
- **Offline:** Service Worker + Cache API + IndexedDB
- **Backend:** Node/Express or Firebase for sync & reports
- **Localisation:** JSON translation files + i18n + device TTS
- **Assets:** Sprite sheets, WebP images, lazy-load lesson packs
- **AI/ML:** TensorFlow.js for on-device inference, Cloud AI services for advanced analytics (e.g., sentiment analysis on feedback)
- **API Services:** RESTful APIs via Node/Express or Firebase Cloud Functions for data exchange and integrations

**Key Implementation:** Bundler (Vite/Rollup) with tree-shaking keeps app shell under 2MB



## Our Tech Stack



### Key implementation notes:

- Lazy-load lesson packs on first access.
- **Use tree-shaking + bundler** (Vite/Rollup) to keep bundle <2MB.
- **Exportable reports** (CSV/PDF) for CSR / school records.

# Feasibility & Viability



## Feasibility

- Tech feasible: PWA + Phaser runs on low-end devices (<10 MB).
- Content feasible: NCERT-mapped STEM lessons.
- Deployment feasible: SD-card / USB installs for no-internet schools.
- Fact: 75% of rural users access apps <20 MB.

## Viability

- CSR funds: ₹25,000+ Cr annually spent on education in India.
- Proven: Mindspark pilots showed +20% learning outcomes.
- Scalable backend: Node.js/Firebase supports 10k+ users.

## Challenges

- Low device storage & poor connectivity.
- Teacher adoption barrier.
- Multilingual + accessibility increases content effort.

## Solutions

- Compress assets (WebP, spritesheets), lazy-load packs.
- Offline-first architecture + batch sync when online.
- Teacher training (1 hr) + CSV exports.
- JSON translations + TTS engines for lightweight multilingual.



## Business Potential

- CSR partnerships: 10k–50k students per deal.
- Government adoption: DIKSHA / state boards.
- Freemium teacher analytics: ₹500/month/school.
- India EdTech market: \$10B by 2025, rural-first <5% tapped.



## SUPPORTING FACTS FOR FEASIBILITY & VIABILITY

- **Feasibility:** App under 10MB, SD card/USB deployable. 75% rural users access apps <20MB.
- **Viability:** ₹25,000+ Cr annual CSR spend. Mindspark pilots show +20% learning outcomes.

## What We're Building



Lightweight PWA with  
micro-games & quizzes  
Rural students focus; low-bandwidth dashboard



Offline-first, multilingual (Hindi/Urdu/English)  
Deployable via SD card / USB

## Unique Selling Points

- Ultra low-MB app
- Built-in accessibility (TTS; screen-reader friendly) + Urdu for inclusion
- Private leaderboards, teacher CSV reports

# IMPACT AND BENEFITS

Our solution delivers multi-faceted benefits, addressing key areas critical for sustainable rural education development.



## Social

- **Multilingual** (Hindi, Urdu, English) for inclusive access.
- **Accessibility-first** for specially-challenged students.



## Economic

- **Low-cost PWA (<10 MB)** minimises data costs.
- **CSR-funded model** reduces per-school cost.



## Educational

- **Gamified lessons** drive +15% engagement.
- **Offline-first** ensures continuous learning.



## Technological

- **PWA + Phaser + IndexedDB** for lightweight performance.
- **JSON + TTS** for efficient **multilingual rollout**.



## Environmental

- **Digital classrooms** promote sustainability.
- Optimised for older devices, **reducing e-waste**.

## Direct Impact on Key Stakeholders

### Students

Clearer STEM concepts, increased confidence, and improved learning.

- KPI: +15% engagement, +20% mastery.

### Teachers

Dashboards enable faster intervention and personalised support.

- KPI: 30% quicker identification of weak students.

### Specially-Challenged

Independent learning via voice and visual modes for full inclusion.

- KPI: Higher completion rates versus baseline.

### NGOs / CSR / Govt

Transparent reporting and scalable model for widespread impact.

- KPI: Reduced cost/student, facilitating rollout.

### Parents & Community

Increased trust in schools, improved educational quality, reduced dropout rates.

- KPI: Higher retention to the next academic grade.

**+15%  
Engagement**

Achieved within 6–8 weeks

**+20% Mastery  
Improvement**

Demonstrated learning gains

**100k+  
Students**

Target reach in 24 months

# Research & References



**Comparison Table** with existing systems

Feature / Metric	AANGAN	Kahoot!	Prodigy	DIKSHA / Govt
Offline First (PWA)	✓	✗	~	~
Multilingual (Hin/Ur/Eng)	✓	~	~	~
Accessibility (Text-to-Speech, Reader)	✓	~	✗	~
Low-MB / Low-end devices	✓	~	✗	~
Teacher Dashboard + Assignments	✓	~	✓	✓
Curriculum Alignment (NCERT)	✓	~	✓	✓
Gamification	✓	✗	✗	~
Privacy (Minimal PII)	✓	~	~	~

Supported = ✓; Not supported = ✗; Partial / varies = ~;

## References

- 1.DIKSHA** — National digital learning platform (NCERT / MoE)  
<https://diksha.gov.in>
- 1.Phaser 3** — Official HTML5 game framework (docs) <https://phaser.io/docs>
- 1.Progressive Web Apps (PWA)** — web.dev PWA guide  
<https://web.dev/learn/pwa/>
- 1.Web Accessibility (WCAG)** — W3C guidelines  
<https://www.w3.org/WAI/WCAG21/>
- 1.World Bank** — Digital pathways & ed-tech evidence  
<https://worldbank.org/en/topic/edutech>
- 1.Companies Act / CSR guidance (India)** — MCA (Corporate Social Responsibility)  
<https://mca.gov.in>
- 1.PWA checklist & best practices** — web.dev checklist <https://web.dev/pwa-checklist/>