

IMPACT EVALUATION

SUMMARY

TALI-
Local-Language AI Tool to
Close Learning Gaps in
Public Schools

PRESENTED TO

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AI-Powered Learning Companion for Multigrade Classrooms
in Maharashtra, India|
Madha Block, Solapur District, Maharashtra |
Feb–March 2026

855 Students	21 Schools	4 Weeks Duration	0.32 SD Improvement
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Overview

TALI is an AI-powered learning companion built on Gemini 3 , designed for Marathi-medium multigrade classrooms in Maharashtra, India. TALI performs cognitive diagnosis of each child's handwritten responses in the answersheet, identifies growth areas and generates personalised, constructivism-based Learning Improvement Plans (LIPs) in Marathi — helping teachers deliver differentiated instruction in settings where one teacher manages multiple grades simultaneously.

Overview

This evaluation was conducted across 21 Zilla Parishad government schools in Madha Block, Solapur District, Maharashtra, using a Randomized Controlled Trial (RCT) design. The study was co-designed with Arizona State University and executed by Dept. of Education, Savitribai Phule Pune University

Location	Madha Block, Solapur District, Maharashtra, India
Sample	855 students, Grades 3–4, across 21 Zilla Parishad schools
Timeline	Feb 16 – March 16, 2026 (4 weeks)
Subject	Mathematics (State Board Curriculum: Learning Outcomes No- 03.71.08, 03.71.09 for Grade 3; 04.71.03 for Grade 4)
Researchers	PI: Dr. Emilia Gracia – Arizona State University, USA Co-PI: Alissa Nostas –Arizona State University, USA
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The Learning Challenge

India's education system faces a structural crisis in multigrade settings. In Maharashtra alone, over 5.2 million children attend 68,000 Zilla Parishad schools, of which 78% are multigrade classrooms — where one teacher manages multiple grade levels simultaneously (UDISE 2023). Teachers in these multigrade classrooms spend up to 46% of their instructional time on administrative work (MH/GR/Misc-2023/506/TNT-1), leaving minimal time for individual student attention.

With no tools to diagnose learning gaps or personalise instruction, one-size-fits-all teaching persists — disproportionately harming marginalised students who fall behind, eventually drop out, and face reduced lifetime opportunities. Teacher training alone cannot overcome these structural constraints. A new kind of support is needed: one that works within the system's current limitations while unlocking teacher time and potential.

The Intervention

TALI is an AI-powered learning companion that operates entirely in Marathi. Its core mechanism works in two steps:

- **Cognitive Diagnosis** — TALI analyses each child's handwritten responses against a baseline test and identifies precise learning gaps aligned to state curriculum outcomes.
- **Personalised Prescription** — Using a constructivism-based approach, TALI generates Learning Improvement Plan (LIP) tailored to each child's identified gaps, for use in home practice and classroom activities.

The platform is trained and validated by 20 frontline teachers who taught **TALI** their own diagnostic thought process — from recognising handwriting patterns to identifying misconceptions to building improvement plans. Teachers interact with TALI once a week to generate personalised LIPs based on the state curriculum.

The Intervention

This study analyses the effect of TALI in which teachers interacts with TALI once a week to generate learning improvement plan based on state curriculum. The intervention was implemented in Madha block , Maharashtra, India, for four-week period (16th Feb- 16th March 2026), targeting 3rd and 4th graders in a multigrade classroom, who are 9-10 years old.

The intervention aimed to improve learning outcomes (03.71.08 and 03.71.09 for 3rd graders and 04.71.03 for 4th graders) in Math using TALI.

At the beginning, pre-test was carried out in all 21 schools based on state curriculum (a calendar for 3rd graders and 3-digit multiplication for 4th graders). Same concept was taught in all schools by their teachers and then a pre-test was carried out.

The Intervention

Teachers were selected based on criterion- availability of internet in the school, time commitment made by teachers and prior experience of teaching to multigrade classroom.

All the teachers and student's guardians signed consent forms, agreeing to their children's assignment to be uploaded on TALI.

Research Design

This study used a Randomized Controlled Trial (RCT) design, randomising at the school level to minimise contamination across treatment groups. Schools were divided into three arms:

Group	Schools / Students	Description
Control	7 schools, 285 students	Teacher-generated learning plans only (standard practice)
Treatment 1 (AI-Generated)	7 schools, 285 students	AI-generated LIPs produced by TALi with a single teacher prompt
Treatment 2 (Teacher-AI Co-Generated)	7 schools, 285 students	Teacher-AI co-generated LIPs through iterative prompting (3+ interactions)

Pre- and post-tests were administered at the start and end of the four-week period, based on state curriculum standards. On-ground support staff conducted weekly school visits for fidelity monitoring, with additional technical support via WhatsApp.

Research Design

Data Collection:

Qualitative and quantitative data was collected through

- Pre & Post Test
- Teacher logs
- Usage Analytics
- Teacher and Student Interviews

Analysis Approach

The study used a mixed-methods design to combine quantitative rigor with qualitative insight.

- Quantitative analysis
- OLS regression models
- Subgroup analysis

Qualitative data (from interviews, logs, and focus groups) was both inductively and deductively coded in Dedoose using grounded theory and content analysis to surface patterns in teacher engagement, barriers, and adoption dynamics.

Results and Key Findings

Primary Outcome

The intervention demonstrated a significant improvement in student learning in foundational mathematics, as measured by a standardised pre/post assessment aligned to Maharashtra state board curriculum standards.

Outcome Measure	Effect Size (Standard Deviations)
Overall foundational assessment (composite)	0.32 SD (significant)
Mathematics (main outcome of interest)	0.23 SD (significant)

Outcome Measure	Impact
% of students whose learning outcomes improved	32%
Adoption rate in teachers	60%

Results and Key Findings

Heterogeneous Effects

An analysis of heterogeneous effects reveals that TALI benefits students across the baseline ability distribution. Key findings on differential impact include:

- Female students demonstrated the largest treatment effects, suggesting TALI's personalised approach may be particularly effective for girls in multigrade settings who are often overlooked in whole-class instruction.
- Students with higher initial academic performance also showed larger gains, consistent with TALI's ability to extend learning beyond grade-level content.
- The intervention was effective across all groups, with no student subgroup showing negative effects.

Policy Lessons

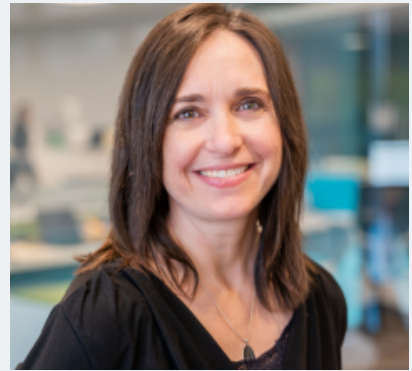
These findings carry several implications for education policy in India and comparable low-resource multigrade contexts globally:

- AI-powered learning companions, when designed in the local language and co-developed with frontline teachers, can deliver measurable learning gains in multigrade classrooms.
- The teacher-AI co-design model — where teachers both train and use the AI tool — shows promise as a sustainable approach to personalised instruction at scale.
- The results are aligned with India's National Education Policy 2020, which emphasises foundational learning, mother-tongue instruction, and technology-enabled personalisation.
- Multigrade instruction challenges are not unique to India. Similar conditions exist across South Asia, sub-Saharan Africa, and Latin America (UNESCO Bangkok, 2015), suggesting potential for replication.

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