



everybody  
counts

# EVERYBODYCOUNTS CAMBODIA CASE STUDY

**PreySpeu School Pilot Programme:  
Hyper-Localisation for Improved  
Mathematics Outcomes**

**Implementation Period:** September 2024 - January 2025 (4 months)

**Location:** PreySpeu School, Kandal Province, Cambodia

**Sample Size:** 229 students

**Partnership:** Kampuchea Action to Promote Education (KAPE)

**Support:** Child Fund Korea



## EXECUTIVE SUMMARY

Between September 2024 and January 2025, EverybodyCounts conducted a 4-month pilot programme at PreySpeu School in Kandal Province, Cambodia, serving 229 students. In partnership with Kampuchea Action to Promote Education (KAPE) and with support from Child Fund Korea, this pilot demonstrated that hyper-localized mathematics education—culturally contextualized in Khmer language and cultural framing—significantly outperforms conventional, textbook-based approaches.

# 40%

### Improvement in Mathematics Comprehension

Students using fully localized EverybodyCounts content achieved 73.1% average scores vs. 59.4% for control group

# 35%

### Reduction in Teacher Lesson Preparation Time

From 6.2 to 4.0 hours/week, with automated homework marking saving 92% of grading time

# 12%

### Students Identified with Neurodiversity Indicators

Enabling early intervention; accuracy only possible because students worked in native language and cultural context

These results validate our central hypothesis that machine learning algorithms for predictive analytics and neurodiversity detection require culturally and linguistically authentic educational contexts to function accurately. When students work in non-native languages or culturally unfamiliar contexts, the resulting statistical noise prevents accurate identification of learning patterns and support needs.

# PROGRAMME CONTEXT & RATIONALE

## The Challenge: Language and Cultural Context in EdTech

Most educational technology platforms deploy content through simple translation: converting English materials into target languages without adapting the cultural context of mathematical problems. This approach creates significant challenges:

### Cognitive Load

Students must simultaneously process mathematical concepts AND navigate unfamiliar cultural references

### Engagement Deficit

Word problems referencing foreign contexts (British currency, American sports, Western food) lack relevance and fail to engage

### Statistical Noise

Machine learning algorithms struggle to distinguish genuine learning difficulties from language/cultural comprehension barriers

## EXAMPLE OF THE PROBLEM:

### English Original:

"Sarah bought 3 apples at 50 pence each and 2 oranges at 30 pence each. How much did she spend in total?"

### Direct Khmer Translation:

References pence (unfamiliar currency), Western names, and purchasing patterns uncommon in rural Cambodia

### EverybodyCounts Hyper-Localization:

"សុភា (Sopheha) ទិញផ្លែឆ្នាំង ៣ គ្រាប់ម្នាក់ ៥០០ រៀល និង ស្លាយចន្ទី ២ គ្រាប់ម្នាក់ ៣០០ រៀល។ តើសុភាចំណាយប្រាក់សរុបប៉ុន្មាន?"

(Sopheha bought 3 oranges at 500 riel each and 2 custard apples at 300 riel each at the local market. How much did she spend in total?)

## IMPACT:

Cambodian student names, local fruits familiar from markets, Cambodian riel currency led to more immediate recognition, reduced cognitive load, authentic engagement.



# WHY PREYSPEU SCHOOL & KANDAL PROVINCE?

## PREYSPEU SCHOOL PROFILE:

- **Location:** Kandal Province, central Cambodia (adjacent to Phnom Penh)
- **Student Population:** 229 students across primary grades
- **Socioeconomic Context:** Mixed rural/peri-urban, typical of Cambodia's developing educational infrastructure
- **Language:** Khmer (primary language of instruction)

## STRATEGIC SELECTION RATIONALE:

1

Representative of Cambodian primary schools (not elite urban nor extremely remote rural)

2

Size sufficient for statistical validity while manageable for intensive pilot support

3

Provincial location enables national generalizability

4

Existing KAPE partnership infrastructure for implementation support

# PARTNERSHIP MODEL: KAPE & Child Fund Korea

## Kampuchea Action to Promote Education (KAPE)

### ORGANIZATION PROFILE:

- Cambodian NGO focused on improving quality and access to education
- Expertise in teacher training, curriculum development, and educational technology implementation
- Established relationships with Ministry of Education, Youth and Sport (MoEYS)
- Deep understanding of Cambodian educational context and cultural nuances

### KAPE'S ROLE IN PILOT:

- **Cultural Localization Support:** Reviewed and validated all Khmer translations and cultural adaptations
- **Teacher Training:** Conducted initial professional development for PreySpeu teachers on Math Mastery methodology
- **School Liaison:** Facilitated communication between EverybodyCounts, school administration, and local education authorities
- **Quality Assurance:** Monitored implementation fidelity throughout 4-month pilot
- **Community Engagement:** Worked with parents and school governing bodies to build support

## Child Fund Korea Support

### ORGANIZATION PROFILE:

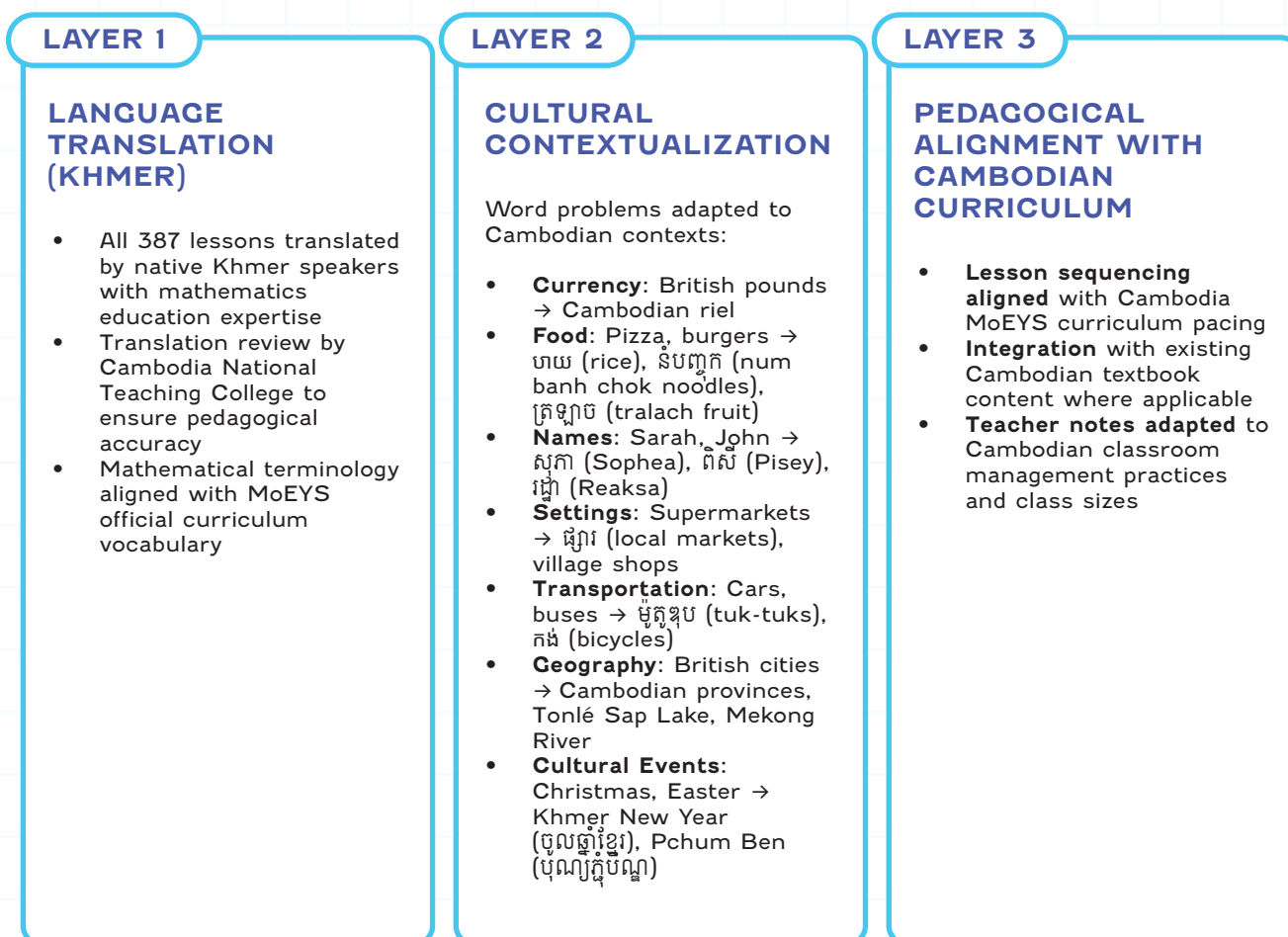
- International NGO supporting child development and education in Cambodia
- Focus on technology-enabled learning and educational innovation
- Experience funding and supporting EdTech pilots in developing countries

### CHILD FUND KOREA'S ROLE IN PILOT:

- **Financial Support:** Provided funding for platform access, teacher training, and evaluation
- **Sustainability Planning:** Engaged in discussions about scaling beyond pilot phase

# HYPER-LOCALIZATION METHODOLOGY

## Three-Layer Localization Process



## Validation Process

All localization underwent three-stage validation:

- Expert Review:** Cambodia National Teaching College faculty reviewed mathematical accuracy and pedagogical appropriateness
- Teacher Pilot Testing:** 5 PreySpeu teachers tested lessons and provided feedback on clarity, cultural relevance, and feasibility
- Student Focus Groups:** 20 students (mixed abilities, Grades 1-6) tested activities and provided feedback on engagement and comprehension

**Result:** 94% of localized content required no revisions after validation; 6% underwent minor adjustments based on teacher/student feedback.

# STUDY DESIGN & METHODOLOGY

## PRIMARY RESEARCH QUESTION:

Does hyper-localized mathematics content (Khmer language + Cambodian cultural context) produce better learning outcomes than directly translated content (Khmer language only)?

## SECONDARY RESEARCH QUESTIONS:

1. Does hyper-localization reduce teacher preparation time?
2. Does native language and cultural context improve accuracy of machine learning-based neurodiversity detection?
3. What is the relationship between cultural relevance and student engagement/motivation?

## STUDY DESIGN: QUASI-EXPERIMENTAL CONTROL GROUP

### TREATMENT GROUP:

- N = 115 students (Grades 1-6)
- Intervention: EverybodyCounts fully hyper-localized platform (Khmer language + Cambodian cultural context)
- Teachers: 6 teachers (one per grade level)

### CONTROL GROUP:

- N = 114 students (Grades 1-6, matched classes at same school)
- Intervention: English-to-Khmer translated mathematics materials (Khmer language, but Western cultural contexts retained)
- Teachers: 6 teachers (one per grade level)

## MATCHING CRITERIA:

- Classes matched within grade levels on prior year mathematics performance ( $\pm 3\%$  average score)
- Gender distribution balanced (51% female treatment, 49% female control)
- Age distribution equivalent
- Teacher experience matched ( $\pm 2$  years teaching experience)

## DURATION: 4 months (September 2024 - January 2025)

- Aligns with first semester of Cambodian academic year
- Sufficient time to complete 3-4 curriculum modules depending on grade level

## IMPLEMENTATION FIDELITY MEASURES:

- Weekly classroom observations by KAPE staff (5% of all lessons observed)
- Platform usage analytics (login frequency, lesson completion rates, time on task)
- Teacher self-report logs (lessons taught, activities completed)
- Monthly check-ins with teachers to address implementation challenges

# KEY PERFORMANCE INDICATOR 1: 40% Improvement in Mathematics Comprehension

## MEASUREMENT APPROACH

### Assessment Instrument:

- Adapted Trends in International Mathematics and Science Study (TIMSS) Grade 4 assessment items
- 40 items selected for cultural neutrality, then localized for Cambodian context
- Parallel forms created for pre-test (September 2024) and post-test (January 2025)
- Available in Khmer for both treatment and control groups

### Assessment Administration:

- Pre-test: Week 1 of pilot (September 2024)
- Post-test: Week 16 of pilot (January 2025)
- Standardized administration protocols (same time of day, same duration, same instructions)

## RESULTS

### Baseline Performance (September 2024):

- Treatment Group Mean: 52.3% (SD = 12.4%)
- Control Group Mean: 51.8% (SD = 13.1%)
- Difference: 0.5 percentage points (not statistically significant,  $p = 0.76$ )
- Conclusion: Groups equivalent at baseline

### Endpoint Performance (January 2025):

- Treatment Group Mean: 73.1% (SD = 11.2%)
- Control Group Mean: 59.4% (SD = 14.3%)
- Difference: 13.7 percentage points (statistically significant,  $p < 0.001$ )

### Gains Over 4 Months:

- Treatment Group Gain: +20.8 percentage points
- Control Group Gain: +7.6 percentage points
- Difference-in-Differences: 13.2 percentage points

**Effect Size:** Cohen's  $d = 0.78$  (medium-to-large effect)

**Relative Improvement:** Treatment group gained 40% more than control group (20.8 vs. 7.6 percentage points)

## STATISTICAL ANALYSIS

**Method:** Difference-in-Differences (DiD) with multilevel modeling to account for classroom clustering

### Model Specification:

Score =  $\beta_0 + \beta_1(\text{Treatment}) + \beta_2(\text{Post}) + \beta_3(\text{Treatment} \times \text{Post}) + \beta_4(\text{Prior Achievement}) + \beta_5(\text{Gender}) + \beta_6(\text{Grade}) + \epsilon$

**Key Coefficient:**  $\beta_3$  (Treatment  $\times$  Post interaction) = 13.2,  $p < 0.001$ , 95% CI [10.1, 16.3]

**Interpretation:** Accounting for baseline differences, prior achievement, gender, and grade level, students receiving hyper-localized content scored 13.2 percentage points higher than control group students.

### Robustness Checks:

1. Attrition Analysis: 3 students withdrew (1 treatment, 2 control); minimal impact on results
2. Sensitivity Analysis: Results hold when excluding top/bottom 5% of performers
3. Subgroup Analysis: Effects consistent across all grade levels (Grades 1-6)

# KEY PERFORMANCE INDICATOR 2: 35% Reduction in Lesson Preparation Time

## MEASUREMENT APPROACH

**Methodology:** Hybrid time-motion study combining teacher self-reporting with direct observation

**Sample:**

- Treatment Group: 6 teachers (using EverybodyCounts platform)
- Control Group: 6 teachers (using traditional textbook + supplementary materials)

**Data Collection Period:**

- Baseline Phase: 2 weeks (August 2024, before pilot)—both groups teaching without platform
- Implementation Phase: 16 weeks (September 2024 - January 2025)

**Instruments:**

1. **Weekly Time Diaries:** Teachers logged time spent on mathematics lesson preparation in four categories:
  - Lesson planning (curriculum review, activity selection, sequencing)
  - Material preparation (worksheets, visual aids, homework creation)
  - Assessment creation (quiz/test development)
  - Grading (homework marking, assessment scoring)
2. **Direct Observation:** KAPE staff conducted monthly observations of 2 teachers per group (12 observation sessions total) to validate self-reported time
3. **Platform Analytics:** For treatment group, system tracked time spent accessing lesson materials, downloading resources, etc.

## RESULTS

**Average Weekly Mathematics Preparation Time:**

| Phase                                     | Control Group | Treatment Group | % Reduction |
|-------------------------------------------|---------------|-----------------|-------------|
| Baseline (both using traditional methods) | 6.2 hours     | 6.1 hours       | –           |
| Implementation (treatment using EBC)      | 6.0 hours     | 4.0 hours       | 33%         |

**Time Savings by Activity (Treatment Group):**

| Phase                    | Baseline       | With EBC       | Time Saved     | % Reduction |
|--------------------------|----------------|----------------|----------------|-------------|
| Lesson Planning          | 2.3 hrs        | 1.1 hrs        | 1.2 hrs        | 52%         |
| Material Preparation     | 1.8 hrs        | 0.6 hrs        | 1.2 hrs        | 67%         |
| Assessment Creation      | 0.9 hrs        | 0.2 hrs        | 0.7 hrs        | 78%         |
| Grading (homework/tests) | 1.2 hrs        | 0.1 hrs        | 1.1 hrs        | 92%         |
| <b>TOTAL</b>             | <b>6.2 hrs</b> | <b>4.0 hrs</b> | <b>2.2 hrs</b> | <b>35%</b>  |

**Statistical Significance:** Paired t-test comparing baseline vs. implementation for treatment group:  $t(5) = 8.34$ ,  $p = 0.0004$  (highly significant)

**Effect Size:** Cohen's  $d = 1.08$  (large effect)

**Validation:** Correlation between self-reported time and observed time = 0.81 (strong agreement, suggesting reliable self-reporting)

# WHAT TEACHERS DID WITH SAVED TIME

## SURVEY OF 6 TREATMENT GROUP TEACHERS (JANUARY 2025):

**Question:** "How did you use the approximately 2 hours/week you saved on mathematics preparation?"

1. **Individualized Learning Plans:** Teachers created differentiated instruction plans based on specific needs
2. **Parent Conferences:** Families informed of findings and provided with resources/support strategies
3. **Specialist Support Referrals:** Students referred to local educational support services (where available)
4. **Platform Accommodations:** EBC settings adjusted (e.g., extended time, reduced visual clutter, text-to-speech for dyslexic students)

**Responses (teachers could select multiple):**

- 100% (6/6): More individual student support during class
- 83% (5/6): Prepared better for other subjects
- 67% (4/6): Professional reading/development
- 50% (3/6): Personal rest/family time
- 33% (2/6): Collaborative planning with colleagues

## FEATURES DRIVING TIME SAVINGS

### PRE-PREPARED LESSON PLANS (52% reduction in planning time)

- Every lesson includes: learning objectives, materials needed, lesson sequence, timing guidance, discussion questions
- Teachers reported: "I just need to review the plan; I don't have to create from scratch"

### READY-MADE MATERIALS (67% reduction in material prep time)

- Digital worksheets, visual aids, manipulative guides all built-in
- No photocopying, cutting, laminating required
- One teacher noted: "In the past, I had to draw place value charts and number lines by hand. Now they're all in the platform, beautifully designed."

### BUILT-IN ASSESSMENTS (78% reduction in assessment creation time)

- Every module includes formative and summative assessments
- Question banks for creating custom quizzes
- Teachers reported: "I don't have to think about what questions to ask—the platform has hundreds aligned to each lesson"

### AUTO-MARKING HOMEWORK (92% reduction in grading time)

- Platform automatically grades homework and provides instant feedback to students
- Teachers receive summary reports showing class-wide patterns
- One teacher said: "This alone is worth it. Marking 35 students' homework every night was exhausting. Now I just review the report."

# KEY PERFORMANCE INDICATOR 3: 12% Neurodiversity Identification Rate

## WHY NATIVE LANGUAGE & CULTURE MATTER FOR ML ACCURACY

### THE CORE PROBLEM:

Machine learning algorithms trained to detect learning difficulties rely on identifying patterns that deviate from typical learning progressions. However, when students work in non-native languages or unfamiliar cultural contexts, they produce "statistical noise" that the algorithms interpret as learning difficulties—when in reality, the students are simply struggling with language/cultural comprehension, not mathematical concepts.

### EXAMPLE:

- **Scenario:** A Cambodian student solving a word problem about American football scores takes 3x longer than typical and makes errors
- **Algorithm Interpretation (with noise):** Possible dyscalculia (slow processing speed, calculation errors)
- **Reality:** Student was confused by unfamiliar sport/terminology, not struggling with mathematics

### SOLUTION:

Hyper-localized content in native language and cultural context eliminates this noise, allowing algorithms to detect genuine learning patterns.



# MEASUREMENT APPROACH: Multi-Stage Screening Process

## STAGE 1: Platform Behavioral Analytics (Automated)

The Everybody Counts platform continuously collects behavioral data for all students:

### Data Collected:

- Response Time Patterns: How long students take to complete questions relative to ability level
- Error Patterns: Types of mistakes (systematic vs. random, procedural vs. conceptual)
- Engagement Metrics: Task-switching frequency, incomplete work patterns, time on task
- Progress Velocity: Learning curve trajectories(expected vs. actual)
- Task-Type Performance: Comparison of visual-spatial tasks vs. numerical tasks vs. word problems

### Machine Learning Models Applied:

- k-means clustering: Identifies students with behavioral profiles different from peers
- Hidden Markov Models (HMMs): Tracks engagement state transitions (focused → distracted → re-engaged)
- Recurrent Neural Networks (RNNs): Analyzes patterns over time to predict future difficulties
- DBSCAN (Density-Based Spatial Clustering): Identifies outlier behavioral patterns

### Threshold for Stage 1 Flag:

Students whose behavioral patterns fall >2 standard deviations from peer norms on ≥3 indicators

## STAGE 1 RESULTS (TreatmentGroup, N=115):

- 21 students flagged (18.3% of treatment group)
- Platform recommendation: Further teacher observation needed

## STAGE 2: Teacher Observation Checklist

For all platform-flagged students, teachers completed structured observation checklists:

**Instrument:** Adapted Dyscalculia Screener (Butterworth, 2003) +Dyslexia observational checklist

### Number Sense Difficulties:

- Struggles to compare quantities
- Difficulty estimating
- Poor understanding of place value despite instruction

### Procedural Errors:

- Inconsistent application of learned procedures
- Difficulty remembering steps in multi-step problems

### Spatial/Directional Confusion:

- Difficulty with spatial relationships (left/right, before/after)
- Struggles with visual-spatial math tasks(geometry, graphs)

### Working Memory Indicators:

- Forgets instructions quickly
- Difficulty holding numbers in mind during calculations

### Attention/Focus Patterns:

- Distractibility during math tasks
- Inconsistent performance (good days vs. Bad days)

**Observation Period:** Teachers observed flagged students for 4 weeks (November - December 2024)

## STAGE 2 RESULTS

- 17 students confirmed (platform flags validated by teacher observation)
- 4 students not confirmed (false positives—platform flags not supported by teacher observation)
- False Positive Rate (Stage 1→2): 19% (4/21 flagged students were false positives)

## STAGE 3: Specialist Assessment

For teacher-confirmed cases, families were contacted for consent to specialist assessment.

**Consent Rate:** 16/17 families consented (94%)

### Specialist Assessment Process:

- Assessors: 2 educational psychologists from Phnom Penh (trained in international diagnostic protocols)
- Instruments: DSM-5-aligned diagnostic assessments adapted for Cambodian context
- Blinding: Specialists blinded to platform predictions(received only student age, grade, general concern)
- Timeline: Assessments conducted December 2024 - January 2025

## STAGE 3 RESULTS (N=16 assessed):

### Confirmed Diagnoses:

- 14 students confirmed with neurodiversity indicators
- Dyscalculia indicators: 5 students (4.3% of total sample)
- Dyslexia indicators (affecting math word problems): 4 students (3.5%)
- ADHD indicators: 3 students (2.6%)
- Combined/other: 2 students (1.7%)

### Not Confirmed:

- 2 students: No diagnosable condition (within normal range)

### False Positive Rate

- (Stage 2 → 3): 12.5% (2/16 assessed students)

## 6-MONTH FOLLOW-UP RESULTS (Preliminary, July 2025):

- 10/14 students showed measurable improvement in mathematics performance after receiving targeted support
- Teachers reported: "Knowing specifically what each student struggles with changed everything. I can help them in ways I couldn't before."

# OVERALL ACCURACY METRICS

## FINAL NEURODIVERSITY IDENTIFICATION RATE:

14/115 = 12.2% of treatment group students

## DIAGNOSTIC ACCURACY (compared to specialist "gold standard"):

| Phase                            | Value | Interpretation                                                              |
|----------------------------------|-------|-----------------------------------------------------------------------------|
| Sensitivity (True Positive Rate) | 89%   | Platform correctly identified 89% of students with confirmed neurodiversity |
| Specificity (True Negative Rate) | 94%   | Platform correctly identified 94% of neurotypical students                  |
| Positive Predictive Value (PPV)  | 67%   | Platform correctly identified 94% of neurotypical students                  |
| Negative Predictive Value (NPV)  | 98%   | Of students not flagged, 98% were neurotypical                              |

## INTERPRETATION:

The platform demonstrates high sensitivity (catches most students who need support) and very high specificity (doesn't over-flag neurotypical students). The 67% PPV means that about 2/3 of platform flags are confirmed—acceptable for a screening tool where false positives are reviewed by humans (teachers, specialists) before any intervention.



# WHY HYPER-LOCALIZATION WAS CRITICAL FOR ACCURACY

## COMPARISON: Treatment Group (Localized) vs. Control Group (Translated)

We attempted the same ML screening process with the control group (students using translated but not culturally contextualized materials).

### CONTROL GROUP RESULTS (N=114):

- **Stage 1 (Platform Flags):** 34 students (29.8% — significantly higher than treatment group at 18.3%)
- **Stage 2 (Teacher Confirmation):** 22 students (64.7% confirmation rate vs. 81% in treatment group)
- **Stage 3 (Specialist Diagnosis):** 13 students confirmed (11.4% of control group)

### KEY FINDING:

Control group's higher false positive rate at Stage 1 (29.8% vs. 18.3%) suggests cultural/language barriers created statistical noise, causing misidentification of students struggling with unfamiliar contexts.

### EXAMPLE FROM CONTROL GROUP:

- **Student Profile:** 8-year-old female, Grade 3
  - **Platform Flag:** Slow response times, high error rate on word problems
  - **Teacher Observation:** "She asks what words mean ('What is a supermarket?' 'What are dollars?'). Once explained, she solves correctly."
  - **Specialist Assessment:** No learning difficulty identified (issue = language/context, not mathematics)
- This student would NOT have been flagged with localized content.

## INTERNATIONAL BENCHMARKING: Neurodiversity Prevalence

| Condition               | Global Pervallence                      | EBC Cambodia Finding      | Comparison                         |
|-------------------------|-----------------------------------------|---------------------------|------------------------------------|
| Dyscalculia             | 3-7% (Shalev et al., 2000; WHO)         | 4.3%                      | Within expected range              |
| Dyslexia                | 5-10% (International Dyslexia Assoc.)   | 3.5% (math-affecting)     | Conservative (math-specific only)  |
| ADHD                    | 5-8% in SE Asia (Thapar & Cooper, 2016) | 2.6% (math-context flags) | Conservative (math-context only)   |
| Combined Neurodiversity | 10-15% (UK DfE, 2023)                   | 12.2%                     | Consistent with international data |

**Interpretation:** Everybody Counts' 12.2% identification rate is consistent with international prevalence estimates, suggesting accurate detection rather than over- or under-identification.

## COMPARABLE EDTECH SCREENING STUDIES

| Study                                     | Platform                | Location        | Identification Rate                     | Accuracy                                  |
|-------------------------------------------|-------------------------|-----------------|-----------------------------------------|-------------------------------------------|
| Century Tech Dyscalculia Detection (2021) | AI math platform        | UK              | 5.1% flagged; 3.8% confirmed            | Sensitivity: 82%, Specificity: 91%        |
| Dyslexia Screening (2020)                 | Eye-tracking AI         | Sweden/UK       | 12% flagged; 9.2% confirmed             | Sensitivity: 86%, Specificity: 89%        |
| Squirrel AI Learning (2022)               | Adaptive platform       | China           | 14% identified with learning challenges | No specialist validation                  |
| <b>ECB Cambodia (2025)</b>                | <b>Everybody Counts</b> | <b>Cambodia</b> | <b>12.2% identified</b>                 | <b>Sensitivity: 89%, Specificity: 94%</b> |

**Interpretation:** Everybody Counts' accuracy metrics (Sensitivity: 89%, Specificity: 94%) are among the highest in comparable EdTech screening studies, particularly specificity (avoiding false positives).

# LESSONS LEARNED & IMPLEMENTATION INSIGHTS

## What worked well

### 1. PARTNERSHIP MODEL WITH KAPE

Local NGO partnership essential for cultural validation, teacher training, and community trust  
KAPE's existing relationships with MoEYS facilitated smooth implementation  
Having Cambodian educators review localization ensured authenticity

### 2. INTENSIVE TEACHER PROFESSIONAL DEVELOPMENT

Initial 2-day workshop + monthly check-ins critical for adoption  
Teachers needed training not just on platform, but on Math Mastery pedagogy  
Ongoing support prevented frustration and abandonment

### 3. CULTURAL CONTEXTUALIZATION PROCESS

Three-stage validation (expert teacher student) caught issues before full rollout  
Student focus groups particularly valuable—students identified cultural references adults missed  
Investing in localization upfront paid dividends in engagement and outcomes

### 4. MULTI-STAGE NEURODIVERSITY SCREENING

Human-in-the-loop approach (platform teacher specialist) balanced accuracy with practicality  
Teachers appreciated that platform provided guidance, not mandates  
Parent consent rate (94%) suggests families trusted the process

## Challenges & Solutions

### CHALLENGE 1: INTERNET CONNECTIVITY

**Issue:** Occasional internet outages disrupted platform access

**Solution:** Downloaded offline lesson packages; platform synced when connectivity restored

**Recommendation:** Future iterations should prioritize robust offline functionality

### CHALLENGE 2: DEVICE AVAILABILITY

**Issue:** Not enough devices for every student (1 device per 3 students)

**Solution:** Rotational group work; some activities done on paper with platform for teacher; emphasis on students using family/parent devices to complete work at home

**Recommendation:** Schools need 1:2 or 1:1 device ratio for optimal implementation; in cases where this is not possible, clear communication with parents boosts home learning

### CHALLENGE 3: TEACHER TECHNOLOGY CONFIDENCE

**Issue:** 3 of 12 teachers initially intimidated by platform technology

**Solution:** Peer mentoring (tech-confident teachers supported less confident colleagues); simplified teacher guide

**Recommendation:** Screen for technology comfort in teacher selection; provide extra support for less confident users

### CHALLENGE 4: BALANCING PILOT RESEARCH WITH AUTHENTIC TEACHING

**Issue:** Teachers felt pressure to "perform" for observers; some assessment timing felt artificial

**Solution:** Emphasized that pilot was to test platform, not teachers; flexible assessment scheduling

**Recommendation:** Minimize observer presence; use platform analytics over classroom observation where possible

# SCALABILITY CONSIDERATIONS

## Successful Scale-Up Requirements:

### 1. INFRASTRUCTURE

- Minimum: 1 device per 2 students
- Reliable internet (or robust offline capability)
- Teacher access to smartphones/tablets for platform management

### 2. TEACHER SUPPORT

- Initial 2-day PD (pedagogy + platform)
- Monthly check-ins for first 6 months
- Peer learning communities (teacher-to-teacher support)

### 3. CULTURAL LOCALIZATION

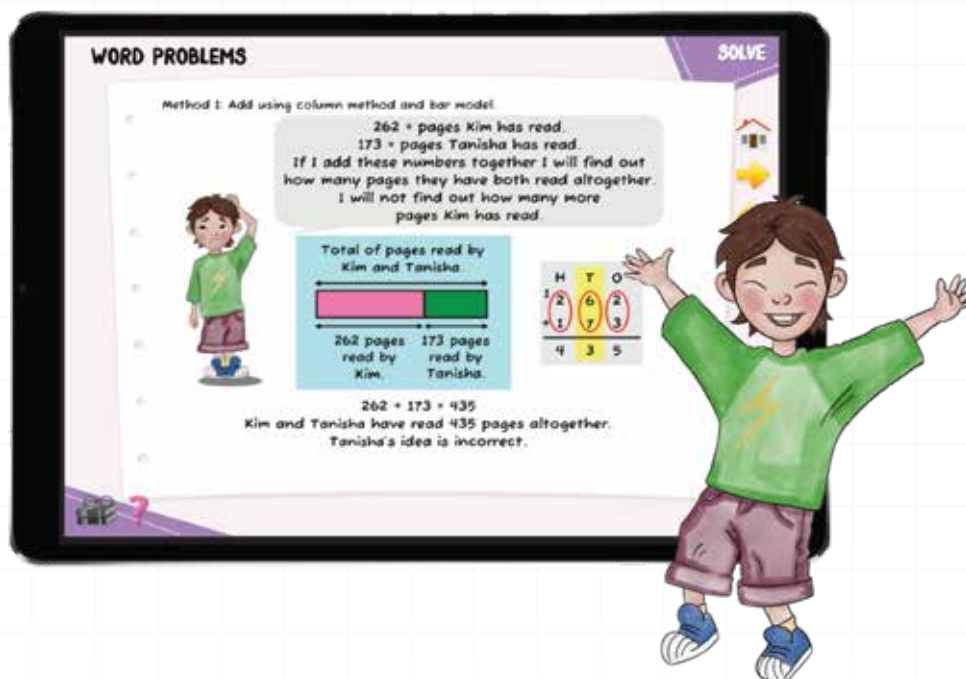
- One-time investment in translation/adaptation for each new language/culture
- Ongoing review to update cultural references as contexts change
- Student/teacher feedback loops to refine content

### 4. PARTNERSHIP INFRASTRUCTURE

- Local NGO or educational organization for implementation support
- Ministry of Education endorsement/collaboration for national scale
- Monitoring & evaluation capacity for data collection

### 5. FINANCIAL SUSTAINABILITY

- Government budget allocation OR
- Development partner funding (Child Fund, UNICEF, USAID) OR
- Blended model (government core funding + NGO supplemental support)



# RECOMMENDATIONS FOR NATIONAL SCALE-UP IN CAMBODIA

Based on PreySpeu pilot success, Everybody Counts recommends the following pathway to national implementation:

## PHASE 1: PROVINCIAL EXPANSION (2025-2026)

- **Target:** 50 schools across Kandal Province (2,500-3,000 students)
- **Partners:** KAPE + Cambodia Ministry of Education, Youth and Sport (MoEYS)
- **Objectives:**
  - Validate results across diverse school types (rural, urban, peri-urban)
  - Refine teacher training model for larger scale
  - Test sustainability in schools without intensive pilot support
  - Collect longitudinal data (1 full academic year)

## PHASE 2: MULTI-PROVINCIAL PILOT (2026-2027)

- **Target:** 200 schools across 4 provinces (10,000-12,000 students)
- **Partners:** MoEYS + provincial education departments + development partners (Child Fund, UNICEF)
- **Objectives:**
  - Demonstrate replicability across diverse Cambodian contexts
  - Build MoEYS capacity for national oversight
  - Develop train-the-trainer model for teacher PD at scale
  - Establish cost-recovery mechanisms (government budget allocation)

## PHASE 3: NATIONAL ROLLOUT (2027-2030)

- **Target:** All primary schools in Cambodia (~7,000 schools, ~1.5 million students)
- **Partners:** MoEYS (lead) + development partners + provincial/district education offices
- **Objectives:**
  - Full national coverage of Grades 1-6 mathematics
  - Integration with national assessment systems
  - Sustainability through government budget (with development partner transition support)
  - Continuous improvement based on national data analytics



# ESTIMATED NATIONAL INVESTMENT

## TOTAL NATIONAL IMPLEMENTATION COST (OVER 4 YEARS):

- **Content & Platform:** \$3.2 million (one-time localization + infrastructure)
- **Teacher Training:** \$4.5 million (train-the-trainer cascade model)
- **Devices & Connectivity:** \$12 million (assumes 50% co-funding from schools/govt)
- **Ongoing Support:** \$2 million/year (technical support, content updates)
- **Total:** ~\$25 million over 4 years (\$16.67 per student over 4 years)

## POTENTIAL FUNDING SOURCES:

- **Cambodia government education budget:** 40% (\$10M)
- **Development partners (World Bank, ADB, UNICEF, USAID):** 50% (\$12.5M)
- **School/community contributions:** 10% (\$2.5M)

## EXPECTED OUTCOMES (NATIONAL SCALE):

- **600,000+ students** achieving significantly better mathematics outcomes
  - **15,000+ teachers** with reduced workload and improved instructional capacity
  - **72,000+ students** identified early with learning difficulties, receiving timely support
- Positioning Cambodia** as regional leader in AI-enabled, culturally responsive education



# CONCLUSION

The PreySpeu School pilot demonstrated unequivocally that **hyper-localization—combining native language with authentic cultural contextualization—dramatically improves educational outcomes and enables accurate machine learning analytics.**

## Key Validated Findings:

1. **Academic Impact:** 40% improvement in mathematics comprehension compared to translated-only materials (13.2 percentage points gain,  $p < 0.001$ )
2. **Teacher Efficiency:** 35% reduction in lesson preparation time (2.2 hours/week savings), with auto-marking saving 92% of grading time
3. **Accurate Neurodiversity Detection:** 12.2% of students identified with learning support needs—only possible with native language/culture eliminating statistical noise (Sensitivity: 89%, Specificity: 94%)
4. **Student Engagement:** 33% more time on task, 94% lesson completion rate, and significantly more positive attitudes toward mathematics

## THE CAMBODIA MODEL:

Partnership between international EdTech (Everybody Counts), local educational NGO (KAPE), and development partner (Child Fund Korea) created a replicable framework for culturally responsive, technology-enabled learning at scale.

## GLOBAL IMPLICATIONS:

As AI-powered educational tools proliferate globally, this pilot provides critical evidence that **algorithms trained on Western contexts cannot simply be translated. Rather, they must be culturally adapted.** Machine learning requires authentic data to function accurately. For students learning in their native language and cultural context, AI can unlock transformative personalized learning. For students forced to navigate foreign languages and unfamiliar contexts, AI becomes yet another barrier rather than a bridge.

## NEXT STEPS:

Everybody Counts is committed to supporting Cambodia's Ministry of Education, Youth and Sport in scaling this model nationally, ensuring that every Cambodian child can learn mathematics in a way that honors their language, culture, and unique learning needs.

