



Your **P**ersonal **A**ssistant for **L**earning™

Palm Beach County Families Using PAL Show Significant Math Gains

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Key Findings

(See page 2 for supporting data and statistical results)

- Children whose families received PAL texts **improved 3-4× more** in early math than those children from families who didn't use PAL.
- 100% of children** in the PAL group improved — compared to 57% in the control group.
- Greater parent engagement with PAL was linked to **higher math gains** for kids.
- Even passive exposure (just receiving texts) showed a **positive effect** on early math learning.

Background

This report highlights the preliminary results from a pilot study of PAL (Personal Assistant for Learning), an adaptive, text-based early math support system for families and educators. Implemented in partnership with the Early Learning Coalition of Palm Beach County (ELCPBC) and Boston College, the pilot explored whether PAL's personalized, developmentally appropriate math activities and real-time guidance, delivered via regular text messages, strengthen early math readiness by empowering parents and teachers to integrate meaningful math moments into daily life.

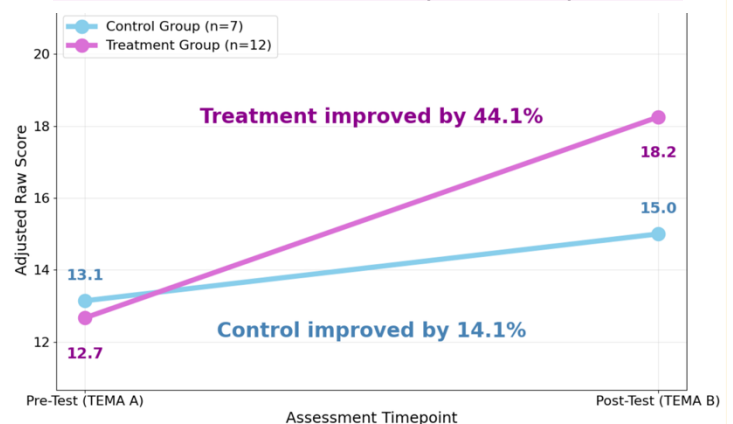
Study Overview

- Two Voluntary Pre-Kindergarten (VPK) classrooms from ELCPBC participated in the Spring 2025 PAL pilot, with one class assigned to the Treatment group (n = 12) and one to Control (n = 7).
- The intervention lasted approximately 3.5-months with Treatment families receiving anywhere from 63-95 text message nudges that included links to curated early math activities.
- Children's early math knowledge was assessed before and after the intervention using the *Test of Early Mathematics Ability (TEMA-3)*.
- Parents completed a pre-survey of math-related activities and routines in the home; *post-surveys and follow-up interviews are currently underway.*

Results

While both group started at similar levels, over 90% of the treatment group participants scored at a Kindergarten level at post-test, while less than 25% of the control group did so.

Figure 1: Mean TEMA-3 Scores
Control vs. Treatment (Pre and Post)



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Results (Continued)

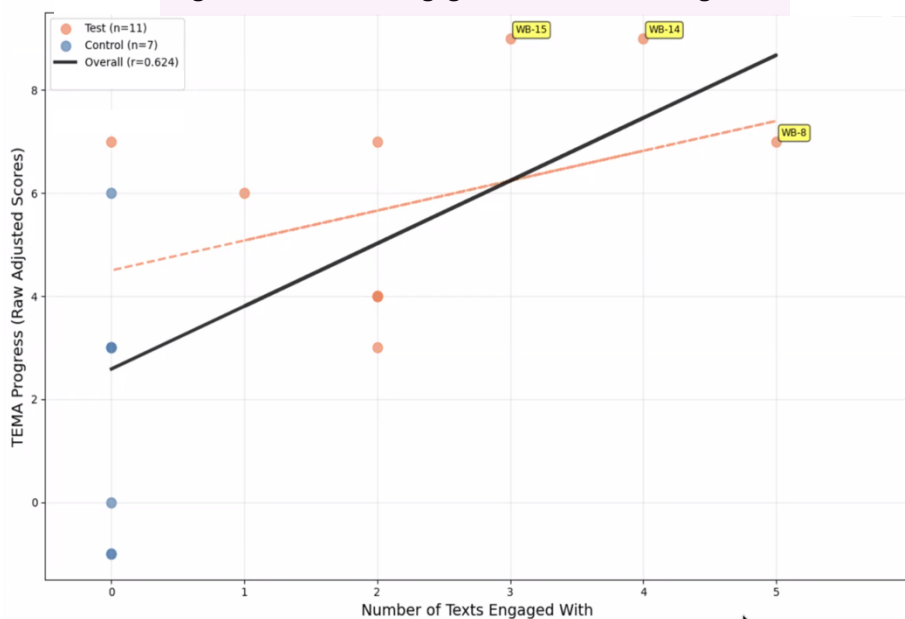
Despite the small sample, an effect of PAL was found. Children whose families were using PAL showed substantial improvement on the TEMA-3 math assessment compared to the Control group. The Treatment group made significantly more progress than the Control group—gaining an average of 5.6 points compared to just 1.9 points. Notably, every child in the Treatment group improved, versus only about half of the Control children.

These differences were both statistically significant* and practically meaningful, with effect sizes exceeding 1.0, which is rarely achieved in educational research. This suggests that ***PAL has the potential to dramatically accelerate math learning for young children.***

*See the section below with more statistical detail

Parent Engagement Matters

Figure 2: Parent PAL Engagement vs. TEMA-3 Progress



The amount of parent interaction with PAL was positively related to gains in children's early math knowledge.* Each click, activity, and feedback provided to PAL by parents translated into measurable growth, with more engaged families seeing larger gains in child math scores.

These results suggest that parent engagement is meaningfully connected to child math learning and that parent interactions with PAL could be a leading indicator of outcomes.

Additional Data: Opportunities to Mathematize Their World

In surveys conducted before starting the PAL pilot, most families reported engaging in math activities with their children only ***monthly, rarely, or never*** (see Figure 3). And when they did engage, it was often through formal tools like worksheets and flashcards, rather than the informal, everyday math talk that research shows is most powerful.

This pattern suggests that many parents may have limited knowledge of early math development and how to support it through daily interactions. PAL aimed to change that by helping families recognize and embrace math learning moments in the world around them—a key shift for lasting impact.

Statistical Details*

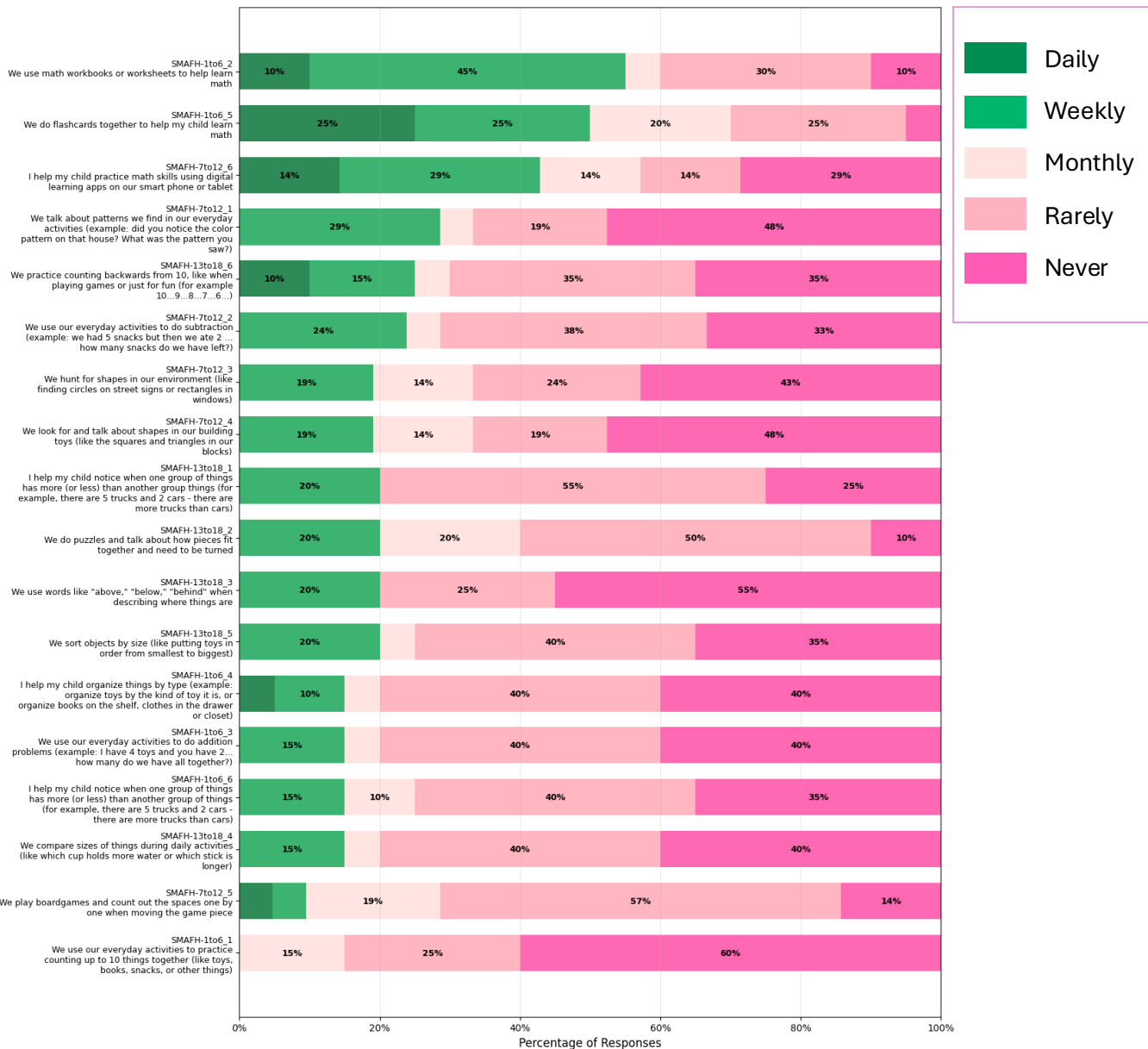
Growth in Child Math Knowledge

- Pre-test: No significant differences ($p = 0.746$, $d = -0.156$)
- Post-test: **Treatment group outperformed Control** ($p = 0.043$, $d = 1.04$)
- Progress: **Treatment gained 5.6 pts vs. 1.9 pts for Control** ($p = 0.004$, $d = 1.59$)
- **100% of Treatment group improved** vs. 57% of Control

Parent PAL Engagement and Child Math Knowledge

- Only includes students with **both pre/post TEMA scores** and **parent survey data** ($n = 18$)
- "Engagement" = parent clicks on PAL content (e.g., opened activity or followed link)

Figure 3: Parent Self-Reports of Math Activity Frequency by Activity Type



PAL's Promise: Empowering Families, Advancing Opportunity

The PAL pilot with ELCPBC, while limited in scale, offers promising evidence for the potential of parent-focused, tech-enabled interventions to support early math development. The outsized learning gains observed among PAL participants, coupled with the system's accessibility and ease of use, suggest that empowering parents with tools and knowledge can be a powerful lever for change.

To build a rigorous evidence base, Learnology Labs is committed to further evaluating PAL through larger, more representative studies that can assess its impact across diverse contexts and populations. Upcoming research will focus on replicating and extending the current findings, exploring factors that influence parent engagement and child outcomes, and refining PAL's design to optimize its effectiveness and scalability.

We look forward to collaborating with the research community, practitioners, and policymakers to build on these initial insights and drive meaningful change for young learners and their families.

