Building Facilitators' Capacity to Promote Early Math in Local Communities

The Count Play Explore (CPE) initiative strives to engage professional learning (PL) facilitators, early childhood educators, families, and children from birth to third grade in the joy and wonder of mathematics. The initiative engages facilitators in PL and coaching while providing them with funding and PL resources to support early childhood educators in their local communities to deliver high-quality math instruction. WestEd serves as the internal evaluator for the CPE initiative. This brief presents evaluation findings related to changes in facilitators' self-reported math mindsets, confidence in early math knowledge and teaching practices, and training and coaching skills following their participation in the CPE PL and coaching from March 2023 to July 2024.

As part of the initiative, CPE implemented a cascade model that offers early math PL to facilitators from 25 agencies across California—including county offices of education (COEs), school districts, and nonprofit organizations (see Exhibit 1). Agency facilitators then provided PL and coaching to educators in their local communities. Most agencies also engaged families in early math experiences.

CPE's goals for facilitators include fostering positive math mindsets, building their knowledge of early math development and pedagogy, and building their capacity to effectively facilitate adult learning in early math.

Exhibit 1. The CPE Cascade Model

Research identifies four aspects of effective PL for facilitators: addressing adult learning for teachers and teaching practices with children, integrating and modeling PL activities, providing ongoing support through coaching and inquiry groups, and offering adaptable resources to align with program goals (Bruns et al., 2023). These practices allow facilitators to effectively facilitate PL to meet the diverse strengths and needs of their communities. The CPE initiative implemented these research-based practices, such as modeling PL activities, offering coaching support, facilitating communities of practice, and providing adaptable resources.

This brief summarizes evaluation findings that address the following questions:

- How did the agency facilitators' self-reported math mindsets, confidence in knowledge and teaching practices, and training and coaching skills change after participating in the CPE PL?
- Was there variation in outcomes based on key characteristics (e.g., race/ethnicity, years of experience)?

Count Play Explore Professional Learning and Coaching for Facilitators

The CPE PL included a hybrid, 1-day institute in September 2023 (5 hours) and six quarterly Communities of Practice (CoPs) held between March 2023 and June 2024 (2.5 hours each), for a total of 20 hours of PL. In addition, facilitators had the option to schedule sessions with a CPE coach to receive individualized support in delivering local PL and coaching to educators.

The PL and coaching offered opportunities for facilitators to reflect on their math mindsets, participate in hands-on math activities, increase their understanding of play-based learning in math and science, develop their training and coaching skills, and learn from other agencies about their ongoing local implementation with educators in their communities.

On average, facilitators participated in about 14 hours of CPE PL and coaching from March 2023 through June 2024. As part of the initiative, facilitators received access to CPE resources, including presentation materials covering various topics in early math (e.g., Number and Counting, Geometry) for PL with educators. The early math PL resources included slide decks, facilitator notes, video examples, reflection opportunities, adult learning activities, child activities, teaching practice examples, and research briefs. Other CPE resources included *Discovering the Math: Book Guides*, *I'm Ready* videos, *Count Play Explore Issues*, and STEAM activities.

Method

The facilitators completed electronic surveys early in their CPE PL and coaching participation (Time 1, September–October 2023) and after participation ended (Time 2, June–July 2024). The surveys assessed facilitators' self-reported negative feelings toward math, perceptions of math usefulness, confidence in their knowledge of children's math development, confidence in early math teaching practices, and confidence in providing training and coaching in early math.

Each of the outcome measures comprised multiple items based on participant self-report. The evaluation team conducted factor and reliability analyses to identify suitable items to create the composite outcome variables. Of note, we administered the Time 1 survey after the first two CoP sessions (March and June 2023); thus, it does not represent a true pre-participation baseline.

We used paired samples *t*-tests to examine change in facilitator outcomes from Time 1 to Time 2. To understand the potentially moderating role of various characteristics in any changes in confidence, knowledge, and skills, we examined each outcome in a set of regression models predicting Time 2 scores from Time 1 scores while controlling for characteristics like race and ethnicity, years of experience providing early math training and coaching, agency type, years participating in CPE, and number of local PL sessions facilitated. Pairwise correlations between those characteristics and Time 1 or Time 2 outcome measures were used to identify the specific variables selected as covariates for inclusion in regression models. Post hoc *t*-tests were used to deconstruct group and interaction effects.

Facilitator Demographics and Professional Background

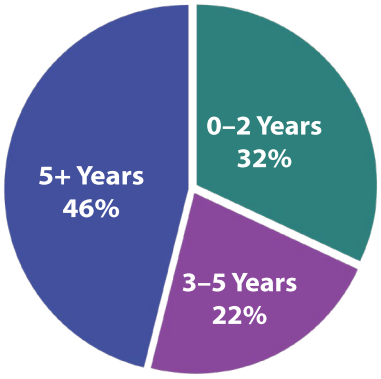
The 25 agencies sent a team of two to four facilitators to participate in the CPE PL. As such, CPE engaged 100 facilitators at any point during this phase of the initiative. Due to staff turnover and transitions, only 85 facilitators received both the Time 1 and Time 2 surveys. This brief reports on the 58 facilitators who completed both the Time 1 and Time 2 surveys (68% of the full sample). Exhibit 2 shows the range of facilitators' racial, ethnic, and linguistic backgrounds. Chi-square tests showed nonsignificant differences in response rates based on key characteristics.

Exhibit 2. Facilitator Demographics

Asian	7%
Black or African American	12%
Hispanic/Latine	34%
White	36%
Multiracial	10%
English Monolingual	64%
English-Spanish Bilingual	31%
English-Other Bilingual	5%

The facilitators were predominantly women (93%) and were highly educated, with a significant portion holding bachelor's degrees (32%) and master's degrees or higher (60%). Facilitators ranged in their prior experience with providing training and coaching in early math (see Exhibit 3).

Exhibit 3. Facilitators' Years of Experience Training and Coaching in Early Math



How did facilitators' math mindsets change over time?

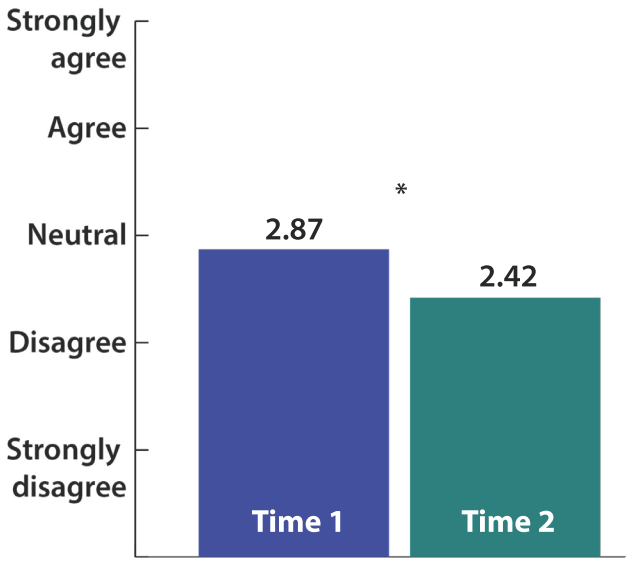
Negative Feelings Toward Math

Facilitators rated their agreement with two items: "I'm not a math person" and "Just the word *math* can make me feel nervous" (using a scale of 1 for *strongly disagree* to 5 for *strongly agree*, with 3 representing *neutral*). A paired samples *t*-test showed a significant decrease ($t[57] = -3.25$, $p < .01$) in facilitators' negative feelings toward math from Time 1 ($M = 2.87$, $SD = 1.07$) to Time 2 ($M = 2.42$, $SD = 1.21$; see Exhibit 4).

Perceptions of Math Usefulness

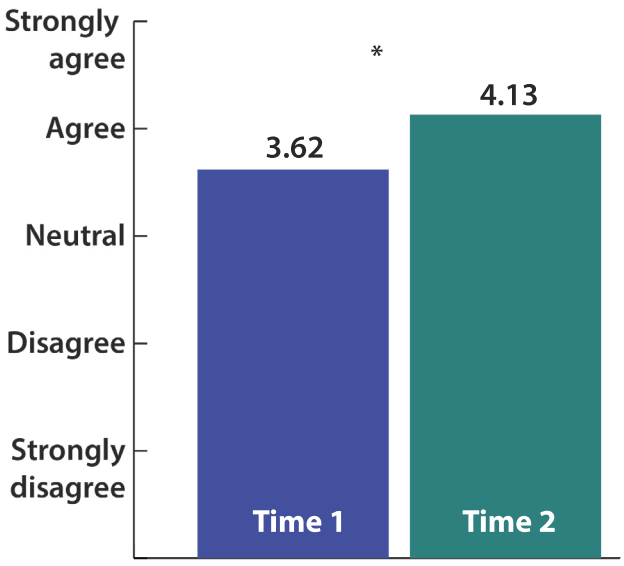
Facilitators rated their agreement with two items: "I like coming up with creative ways to solve math problems" and "Math is a subject I use often throughout my life" (using a scale of 1 for *strongly disagree* to 5 for *strongly agree*, with 3 representing *neutral*). Facilitators' overall perceptions of math usefulness significantly increased ($t[57] = 5.65$, $p < .001$) from Time 1 ($M = 3.62$, $SD = .85$) to Time 2 ($M = 4.13$, $SD = .72$; see Exhibit 5).

Exhibit 4. Change in Facilitators' Negative Feelings Toward Math



* $p < .01$.

Exhibit 5. Change in Facilitators' Perceptions of Math Usefulness



* $p < .001$.

"I am not good at math. … I had built a wall in my head that didn't allow me to teach math to staff. I have been managing and training early educators for over 15 years, and I rarely provided math training until now. [CPE] has changed me."

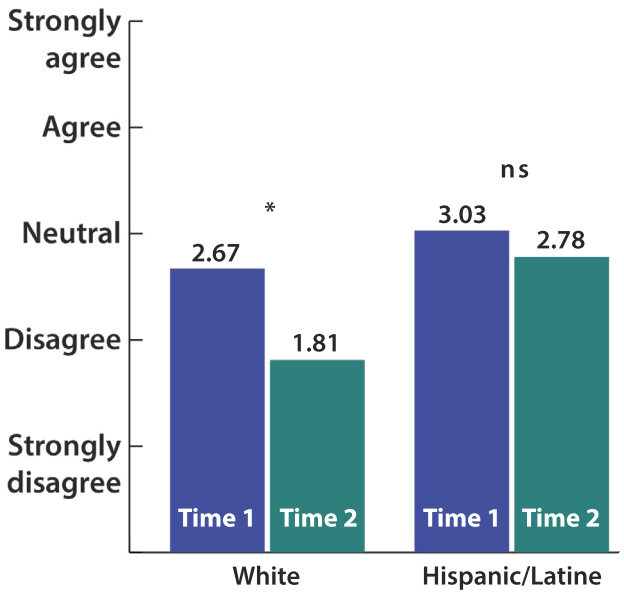
–COE Facilitator, July 2024

Variation in Math Mindsets by Race/Ethnicity

Regression results indicated that race/ethnicity significantly predicted facilitators' negative feelings toward math at Time 2, accounting for their negative feelings at Time 1 and previous years of training and coaching experience. Specifically, facilitators from Hispanic/Latine backgrounds had greater negative feelings at Time 2 than did White facilitators ($b = .97$, $p < .01$).

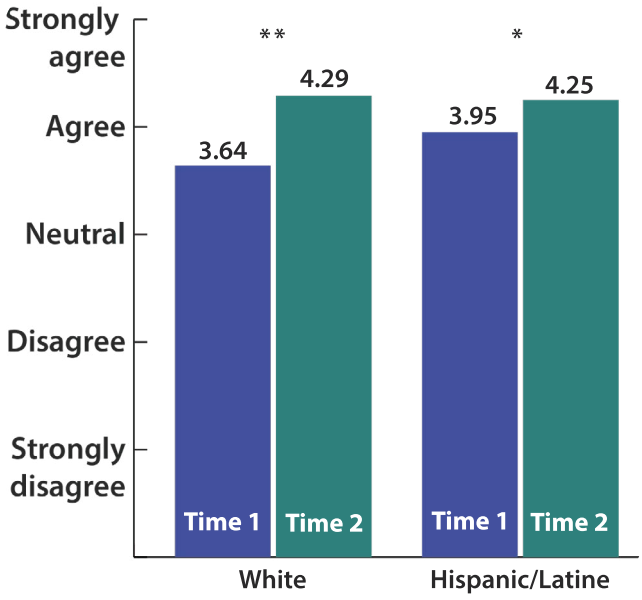
Follow-up *t*-tests showed a significant decrease ($t[20] = -3.80$, $p < .001$) in negative feelings toward math from Time 1 ($M = 2.67$, $SD = 1.14$) to Time 2 ($M = 1.81$, $SD = .87$) among White facilitators and a nonsignificant decrease ($t[19] = -1.15$, $p = .262$) among Hispanic/Latine facilitators ($M = 3.03$, $SD = 1.05$, at Time 1 and $M = 2.78$, $SD = 1.32$, at Time 2; see Exhibit 6). We were unable to test for differences by other racial and ethnic groups due to small sample sizes (i.e., fewer than 10 facilitators identified as Asian or as Black/African American).

Exhibit 6. Change in Facilitators' Negative Feelings Toward Math by Race or Ethnicity



* $p < .001$; ns = not significant.

Exhibit 7. Change in Facilitators' Perceptions in Math Usefulness by Race or Ethnicity



* $p < .05$; ** $p < .001$.

White and Hispanic/Latine facilitators did not differ in their perceptions of math usefulness at Time 2, accounting for their perceptions at Time 1 and previous years of training and coaching experience. Follow-up *t*-tests within race/ethnicity showed that both White and Hispanic/Latine facilitators significantly increased ($t[20] = 4.25$, $p < .001$ and $t[19] = 1.75$, $p < .05$, respectively) in their perceptions of math usefulness from Time 1 ($M = 3.64$, $SD = .71$, for White respondents and $M = 3.95$, $SD = .67$, for Hispanic/Latine respondents) to Time 2 ($M = 4.29$, $SD = .54$, for White respondents and $M = 4.25$, $SD = .70$, for Hispanic/Latine respondents; see Exhibit 7).

How did facilitators' confidence in their knowledge of children's early math development and teaching practices change over time?

Confidence in Knowledge of Children's Early Math Development

This outcome included two composite measures. The first composite (Children's Development) reflected facilitators' confidence in their knowledge of children's developmental progressions in early math, California math foundations and standards, early math assessments, and equitable and inclusive math opportunities for children. The second composite (Math Areas) reflected facilitators' confidence in their knowledge of how children develop concepts and skills in the following math areas: number and counting, operations and algebraic thinking, measurement and data, geometry and spatial thinking, numbers and operations in base 10, and fractions. Using a scale of 1 for *strongly disagree* to 5 for *strongly agree*, with 3 representing *neutral*, facilitators showed significant increases in their confidence in knowledge of children's development and combined math areas from Time 1 to Time 2 (see Exhibit 8).

Confidence in Early Math Teaching Practices

This outcome focused on facilitators' confidence in five core early math teaching practices promoted by CPE: mutual learning, meaningful investigations, materials and learning environment, math language and discourse, and multiple representations (together termed M^5). Facilitators demonstrated significant increases in their confidence in knowledge of M^5 early math teaching practices.

Exhibit 8. Change in Facilitators' Confidence in Knowledge

Confidence in knowledge of …	Time 1 *Mean (SD)*	Time 2 *Mean (SD)*	*t*-value	*p*-value
Children's development	3.66 (.75)	4.18 (.57)	5.15	< .001
Math areas	3.67 (.65)	4.16 (.52)	5.50	< .001
M^5 teaching practices	3.93 (.60)	4.25 (.55)	3.50	< .001

Note. Likert scale of 1 for *strongly disagree* to 5 for *strongly agree*, with 3 representing *neutral*. The *p*-value reflects results from paired samples *t*-tests comparing scores at Time 1 and Time 2.

How did facilitators' confidence in math training and coaching skills change over time?

Confidence in Training and Coaching Skills

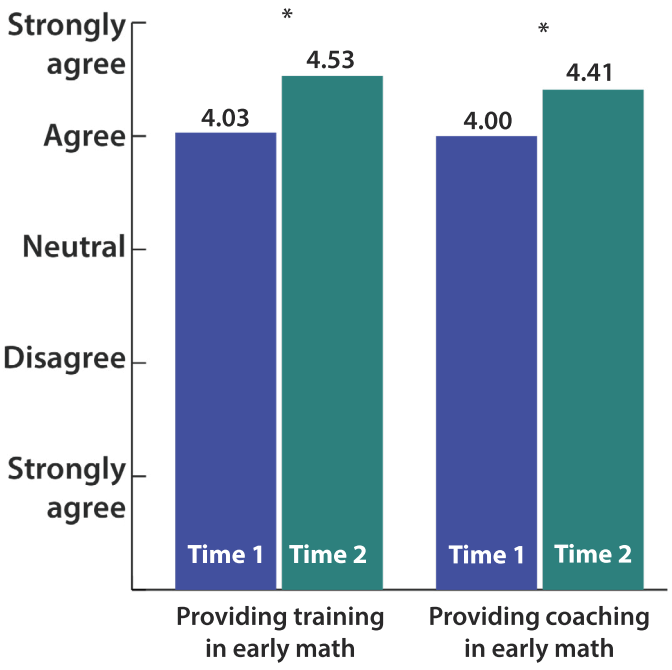
This outcome included two composite measures. The first composite assessed facilitators' confidence in providing early math training to educators. Items included facilitators' confidence in their ability to develop relationships with educators; plan and facilitate early math training; plan and facilitate playful, hands-on math activities for adults; use principles of adult learning in early math training; and collect and use data to improve training.

The second composite assessed facilitators' confidence in providing early math coaching to educators. Items included their confidence in supporting educators with early math–related goal setting and action planning, having reflective conversations with educators, conducting observations of early math learning environments and teaching practices, providing constructive feedback, modeling early math teaching practices, and providing early math resources or materials to support educators' goals and needs. Both composites used a scale of 1 for *strongly disagree* to 5 for *strongly agree*, with 3 representing *neutral*.

Facilitators demonstrated significant increases ($t[57] = 6.19$, $p < .001$) in their confidence in providing early math training from Time 1 ($M = 4.03$, $SD = .52$) to Time 2 ($M = 4.53$, $SD = .48$). They also demonstrated significant increases ($t[57] = 4.02$, $p < .001$) in their confidence in providing early math coaching to educators from Time 1 ($M = 4.00$, $SD = .64$) to Time 2 ($M = 4.41$, $SD = .58$; see Exhibit 9).

Regression results showed that the number of local PL sessions facilitated significantly predicted facilitators' Time 2 confidence in providing early math training after controlling for their years of experience and Time 1 confidence ($b = .05$, $p < .05$). This means that facilitators who facilitated more PL sessions had higher confidence in providing early math training at Time 2.

Exhibit 9. Change in Facilitators' Confidence Providing Early Math Training and Coaching



* $p < .001$.

"Participation in this program has given me confidence and knowledge to set up, prepare, and facilitate trainings on early math strategies. I have interacted with parents and teachers to explain the importance of early math strategies and offered simple and fun ways to use math at home or in class."

— School District Facilitator, July 2024

How did changes in math mindsets, knowledge, and skills vary by previous years of experience in early math training and coaching?

Facilitators' years of experience in providing training and coaching in early math emerged as an important characteristic to understand facilitator growth across CPE participation. Overall, facilitators with more previous years of experience (3–5 years and more than 5 years) in training and coaching in early math reported greater growth across all outcomes compared to those with less experience (0–2 years).

Exhibit 10. Change in Facilitators' Outcomes by Years of Experience

Outcome	0–2 years (n = 16)	3–5 years (n = 11)	5 or more years (n = 23)
Negative feelings toward math	-.22	-.64**	-.50*
Perceptions of math usefulness	.25	.41*	.65***
Confidence in early math development	.29+	.86***	.52**
Confidence in math areas	.52**	.92***	.31**
Confidence in M[5] teaching practices	.29+	.53*	.31**
Confidence in providing training	.51**	.53***	.55***
Confidence in providing coaching	.34	.52**	.53***

Note. Cell values represent mean differences from Time 1 to Time 2 across outcome variables. The p-value reflects results from paired samples t-tests comparing scores at Time 1 and Time 2. + $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

For example, facilitators with less experience (0–2 years) showed nonsignificant decreases in negative feelings toward math and nonsignificant increases in their perceptions of math usefulness, confidence in children's early math development, confidence in M[5] teaching practices, and confidence in providing coaching (see Exhibit 10). However, facilitators with more years of experience (3 or more years) showed significant increases across all outcomes. In contrast to this general pattern, facilitators at all experience levels demonstrated significant growth in confidence in providing early math training and confidence in knowledge of how children develop skills in combined math areas.

Key Insights and Implications

IMPROVED MATH MINDSETS AND CONFIDENCE

From the beginning to the end of their participation in CPE, facilitators demonstrated growth in their math mindsets and confidence in knowledge of children's early math development and teaching practices. Their responses also indicated greater confidence in early math training and coaching skills, which likely contributed to their ability to deliver high-quality PL and coaching experiences to educators working with young children. Please refer to the evaluation brief *Count Play Explore Evaluation Brief: Building Educator Capacity to Promote Children's Early Math Development* for more information on CPE educator outcomes. These improvements suggest that CPE's PL, characterized by playful, active learning experiences, reflection opportunities, and collaborative spaces with colleagues, may have a positive impact on building facilitator capacity to implement early math PL and coaching. In the future, direct assessments and a true pre-survey of facilitator outcomes may strengthen the evaluation findings.

IMPACT OF RACE/ETHNICITY ON MATH MINDSETS

Race/ethnicity emerged as a significant predictor of facilitators' negative feelings toward math, with Hispanic/Latine facilitators experiencing greater negative feelings toward math compared to their White counterparts, despite showing parallel growth in perceived math usefulness and all other outcomes measured. This finding suggests that negative feelings toward math may be harder to change for some groups. The initiative may consider further ways to mitigate the impact of negative stereotypes and implicit biases and how to foster a greater sense of belonging, particularly for those facilitators who come from racial/ethnic backgrounds that are historically underrepresented in math.

FACILITATOR GROWTH VARIED BY EXPERIENCE

More experienced facilitators (3+ years providing math training and coaching) showed greater overall growth in their math mindsets and confidence in knowledge and skills. In contrast, less experienced facilitators did not report significant changes across most outcomes, suggesting the need for CPE to offer further individualized supports to build newer facilitators' positive math mindsets, confidence in their early math knowledge, teaching practices, and coaching skills. These supports could include providing more frequent and intensive coaching sessions and offering content tailored to facilitators' varying levels of prior experience, with multiple entry points to meet their specific needs. However, because CPE required facilitators to implement local PL, the number of sessions they facilitated significantly predicted their confidence in providing early math training, highlighting the importance of opportunities to practice and apply their skills.

Reference

Bruns, J., Hagena, M., & Gasteiger, H. (2023). Professional development enacted by facilitators in the context of early mathematics education: Scaling up or dilution of effects? *Teaching and Teacher Education, 132,* Article 104270. https://doi.org/10.1016/j.tate.2023.104270

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