



Family, Friends, Neighbors, and Math: The Nana y Yo y las Matemáticas Project



Imagine a community center common room dotted with a dozen activity stations, each offering a lively way for caregivers to engage with their infant to five year old charges. At every station, children and caregivers—parents, grandparents, babysitters

and neighbors—explore the theme of the month, nature in our neighborhood, through a different lens, including math. For instance, at the science station, they make patterns with acorns and leaves gathered outside; at the healthy eating station, they use stickers to “vote” for their favorite locally grown fruit; and at the math station, they solve geometric puzzles based on images of local animals.

As adult-child pairs visit different stations, a facilitator circulates to model asking questions that spark children’s mathematical thinking to highlight the math inherent in the activities and to encourage caregivers to consider how and why they might do similar activities at home. With math critical to children’s futures—early math scores are the most important predictor of overall academic success (Claessens and Engel, 2013)—the caregivers are eager for children to approach math with enthusiasm, skill, and confidence.

Welcome to a typical morning at one of several Nana y Yo y las Matemáticas sites around San Jose, California. Funded by the Heising-Simons Foundation, Nana y Yo y las Matemáticas is a partnership between the YMCA of Silicon Valley and the MIXING IN MATH group at TERC. The project builds upon the Y’s Nana y Yo early childhood program, which simultaneously engages children and their caregivers in an informal preschool setting. As children experience a range of enriching activities, caregivers, many of whom have little formal education, gain skills promoting and sustaining children’s enthusiasm about learning.

Establishing an environment comfortable for local caregivers is fundamental to the Nana y Yo model. Program sessions, always free of charge, take place at neighborhood venues such as community meeting spaces, cultural centers, and library branches. Program facilitators come from the same demographic as caregivers. And, in order to ensure cultural resonance, facilitators design activities appropriate for the particular participants in each neighborhood they serve.

Prior YMCA evaluation has shown that the Nana y Yo model is highly successful in many areas but less so in math. Like many informal educators, the facilitators have had scant experience designing activities that engage children in exploring math content. Although Nana y Yo has tremendous potential for bringing many and varied mathematical experiences to caregivers and children, until recently, this potential went untapped.

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More math meets Nana y Yo

Nana y Yo y las Matemáticas is bolstering the mathematical component of the program for all three audiences: facilitators, caregivers, and children. The aims are to expand the quantity, nature, and contexts of mathematical experiences for caregivers and children, and to broaden facilitators’ and caregivers’ understanding of young children’s mathematical development.

To accomplish these goals, the project in its first year is creating and piloting a sequence of math activities for Nana y Yo and weaving in elements of math professional development. The program is conducting ongoing evaluation to illuminate evolving math-related opportunities and challenges as they evolve and looking for signs of an impact on the facilitators, caregivers, and children.

TERC's MIXING IN MATH group is leading the mathematical components of the project, drawing upon a history of collaboration with informal educators to craft mathematically rich programs that resonate with local interests and projects, draw in the mathematically reluctant, and serve as a catalyst for change when in-depth math professional development is not feasible.

Designing for the realities of Nana y Yo

Through ongoing evaluations in the first months of the project, we identified several challenges and opportunities, and shaped project processes accordingly:

Activities must be self-guided and accessible to those with low literacy. Caregivers encounter the math station activities without a formal introduction as they move around the room, just as they would encounter exhibits in a museum. While nearly all caregivers speak Spanish or English (the languages in which we provide materials) some can barely read in either.

To offer guidance for those with low literacy in English and Spanish, we convey activity instructions graphically, with minimal accompanying text (Figure 1). To encourage sharing of mathematical thinking, we include sample conversation starters at a low reading level (labeled “Talk About” or “Para Conversar”). As needed, facilitators model these as they circulate by the math station.

Most math professional development needs to take place “on the job.” Although facilitators have some opportunities for reflecting on children’s mathematical development at monthly staff meetings, available time for this is minimal, given the many goals of the Nana y Yo program.

Activities are designed both as a way to do math and a way for facilitators to learn about mathematical thinking. As children and caregivers engage in math activities, facilitators and caregivers have an opportunity to observe children’s blossoming math abilities. As facilitators model conversation starters or listen in as caregivers do so, they gain first-hand experience with math talk that goes beyond reciting a correct answer.

Despite the desire for children to gain math skills, caregivers have historically been reluctant to congregate at the math station. Although facilitators encourage visits to all the stations, caregivers are free to focus their attentions as they wish, and math has never been a popular station.

To ensure that caregivers not only visit the math station but stay to thoroughly explore the activity and return next time, we asked facilitators which stations typically draw the largest crowds and why. We then incorporated features of those

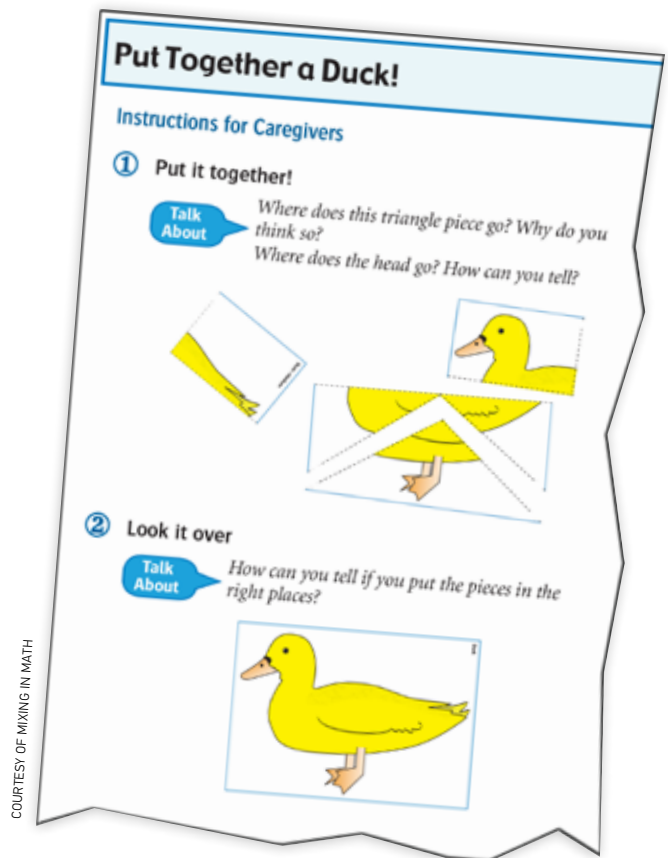


Figure 1. Sample math station activity, geometric puzzles. Instructions rely largely on images. “Talk About” conversation starters model ways to engage children in math talk.

stations into our math activities. For instance, we learned that crafts are very popular, so we incorporated a craft element into many of our math activities.

Facilitators are accustomed to creating their own curriculum. Community resonance is critical to Nana y Yo, so facilitators consider the particular families in the neighborhood when designing activities for each station. Nana y Yo y las Matemáticas is different because facilitators are given math activities to use. However, we design activities to be readily adapted to the specific community, while retaining a solid mathematical scaffolding. For example, the activity in Figure 1 can be adapted by using a different image with the geometric puzzle grid we provide.





FEATURE // BY MARLENE KLIMAN // CONTINUED

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COURTESY OF MAKING IN MATH

Nana y Yo y las Matemáticas activities: Making counting books with fruits and vegetables, and sorting foods into categories.

Math experiences and understandings: What changes?

Although the final impact evaluation for the year is still months away, we compare pre- and mid-year data to offer initial glimpses of its impact.

IMPACT ON FACILITATORS

At baseline, the facilitators and the Y staff involved have expressed confidence in their ability to engage children in activities involving numbers. When asked to describe a favorite preschool math activity, they invariably mentioned one that culminated in counting a quantity or reciting a counting sequence. Facilitators acknowledged that they had less familiarity with geometry, patterns, measurement, and logic. They also noted that they would like to build their skills for engaging caregivers and children in math conversation.

At midyear interviews, several themes emerged:

Facilitators are altering their views of what constitutes a successful preschool math activity. After six months, facilitators said that some of their favorite math activities were projects and experiences that typically involved content other than numbers. One facilitator described an activity of measuring with paper chain links, explaining that it “showed me that something so simple could have so much math in it. And they can do it at home. We measured height, we made links to measure things in the room, and we made patterns out of links.”

Facilitators are learning, and learning to explain, that preschool math is more than counting and right answers. As the math portion of Nana y Yo has expanded to embrace content beyond numbers, facilitators report having had to justify to themselves and to caregivers that children are engaged in mathematical thinking and learning. One facilitator noted that when observing children doing a sorting activity, she realized—and later explained to a caregiver—that, “it’s logic, it increases visual skills, and you learn even if you get it wrong, because you see that things don’t go together.”

Facilitators are starting to model and listen for math conversation. They report a growing awareness of the role of communication in teaching and learning math. As one explained, “I’m learning that when helping caregivers do math with children, [I] model an example question.” Another described learning to listen for caregivers’ and children’s appropriate use of relevant math vocabulary like “circle” and “pattern.”

Facilitators are learning to modify the contexts of an activity while retaining the underlying mathematics. For instance, one facilitator described adapting a pattern-making activity so that it would align with a thematic focus on feelings. Instead of colored squares, she offered children three types of stickers—happy face, sad face, and neutral face—with which to make patterns.

IMPACT ON CAREGIVERS AND CHILDREN

At the beginning, all of our sample of caregivers reported wanting to learn how to help children build math skills, but few expressed confidence in their own ability to do so. Only 30% believed they knew how to support children’s learning in number and arithmetic, and only 10% in other topics such as

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geometry, patterns, and measurement. Very few reported doing any kind of math at home with children, although nearly all said that they'd like to learn how.

Halfway through the year, we asked facilitators for their views on impacts on caregivers and children, and they reported changes that parallel their own—perhaps in part as a reflection of what facilitators are coming to observe and encourage in others.

Caregivers and children flock to the math station!

Facilitators noted the popularity of the math station, reporting “Their favorite part is the math. They go right to the math,” and, “Children and caregivers seem to enjoy math like it is one of the art centers. I believe it was something they used to be afraid of.” When asked why math is so compelling this year, facilitators talked about different types of activities, like crafts or movement, as well as the opportunities for communication. They also reported that the activities foster caregiver-child interaction, which is a fundamental goal of the Nana y Yo program.

Caregivers are initiating more math conversations, and not just about numbers. Facilitators report that caregivers are following their lead in using the conversation starters. Some caregivers use them as a springboard for their own math prompts. For example, while making patterns from colored squares, a caregiver followed the conversation starters to engage a child in describing the pattern. The caregiver then introduced her own open-ended questions, such as, “If I move this [colored square] here, how does the pattern change?”

Caregivers and children are increasingly adopting a mathematical lens. Facilitators report observing caregivers and children initiating math throughout Nana y Yo. One facilitator noted that after a caregiver and child explored patterns at the math station, they went on to an art station, and spontaneously began to make patterns of circles, squares, and triangles with play dough.

Caregivers and children are doing more math outside of Nana y Yo. Caregivers have shared with facilitators that children are eagerly showing family, friends, and neighbors the math activities they did at Nana y Yo. Several caregivers spoke of an impact extending to home life, like the mother who said Nana y Yo inspired her to engage her son in math through his daily chores. Now he also looks for those opportunities himself, such as pairing socks in the laundry, or giving out one of something to each person to share it fairly.

Communities are the key

Nana y Yo y las Matemáticas offers all three audiences a new vision of what it means to do math. Math is no longer focused on numbers, with activities structured around arriving at a single answer. It's now a rich arena for making, doing, and discussing, it's relevant to everyday experiences, and it's something to share with others.

The activities provide opportunities for caregivers and children to experience math together, they enable caregivers and facilitators to observe children's mathematical thinking, and they form the basis for facilitator professional development. Caregivers and their charges have come to enjoy math and to seek it out at the math station, throughout Nana y Yo, and in their daily lives.

While the desire to help young children achieve in math may be near-universal, it is essential that the strategies for engaging adults in that success be local—relying on factors ranging from locally prevalent forms of childcare, to caregiver demographics, to the status of math in the spectrum of priorities for the caregiver. As we look to the future with other YMCA programs and beyond, we know that our strategies and outcomes may vary, but our commitment to crafting approaches to math learning in partnership with community agencies will remain steadfast.

REFERENCES


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