## Education Issue Brief

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# Scaling Up Early Math Programs: Recommendations from a Study on Engaging Families with Early Math

*Young children's exposure to early math concepts is important in their development, in their confidence in math skills, and in their ability to use math later in life.[1,2] In 2013, the Heising-Simons Foundation embarked on an innovative path to support children's early math development. The Foundation invited several family engagement providers to develop, test, and integrate research-based early math projects within their existing family engagement programs. The Foundation has since supported two providers—Reach Out and Read (ROR) and the YMCA of Silicon Valley (YMCA)—as they refined their early math projects and scaled them up in new sites. Mathematica conducted an implementation study that examined the scale-up effort during 2018 and 2019.[3] We share the study findings in this brief so program operators, practitioners, and policymakers interested in scaling up early math programs can benefit from the experiences and lessons learned from these two pioneering organizations.*

After successfully developing and pilot testing an evidence-informed early math intervention within a family engagement program, program operators may choose to scale up the intervention, that is, to extend the intervention to more people and more locations. The intent of scaling up interventions, like the early math projects developed by ROR and YMCA, is to extend the positive impacts to more communities, families, and children. Ensuring that more users experience those positive impacts requires careful attention to implementation; if the intervention is not delivered as intended when it is scaled (for example, if participants receive only half the intended number of sessions and content), the intervention is unlikely to achieve the same effects as the initial pilot sites experienced.

Scaling up interventions is challenging and requires a well-defined plan to ensure success. Drawing on the experiences of ROR and YMCA, this brief lays out practical research-based recommendations for program operators, practitioners, and policymakers to consider as they prepare to scale up an early math intervention.

The findings from this study are specific to early math interventions, but the findings may also be useful to other types of interventions within family engagement programs.

### Key terms

**Early math project:** The math activities that target ages birth to five and were developed and implemented by each organization, including training and resource materials.

**Family engagement program:** The program that each provider implemented before the early math project.

**Math activities:** Activities for caregivers and children in which early math content is infused.

**Math content:** Subject areas, such as numeracy, geometry, or measurement.

**Math talk:** Using words about numbers, shapes, space, and dimensions to talk to children about math; also involves asking children open-ended questions to stimulate discussion about math.

## Background on the early math projects in this study

To understand the scale-up efforts of programs that engage families in early math, this study gathered comprehensive information from multiple perspectives on the early math projects and how each organization scaled them up. ROR and YMCA implemented very different family engagement programs and differed in their approaches to supporting early math development. However, both programs aimed to enhance early math education for caregivers with children from birth to age 5. Both projects involved a variety of math activities, such as demonstrating to caregivers how to use math talk with children and infusing math into a wide variety of daily activities. Both organizations shared a goal for scaling up their early math projects nationwide within their respective networks. For more details on these two organizations' early math projects and scale-up efforts, see Box 1.

### Study participants

**Caregivers:** The parents, extended family members, friends, or neighbors who serve as caregivers for the child and participate in the child's early math development

**Leaders:** The provider staff who oversee and coordinate the early math project

**Practitioners:** The providers who interact with caregivers and children about early math skill development
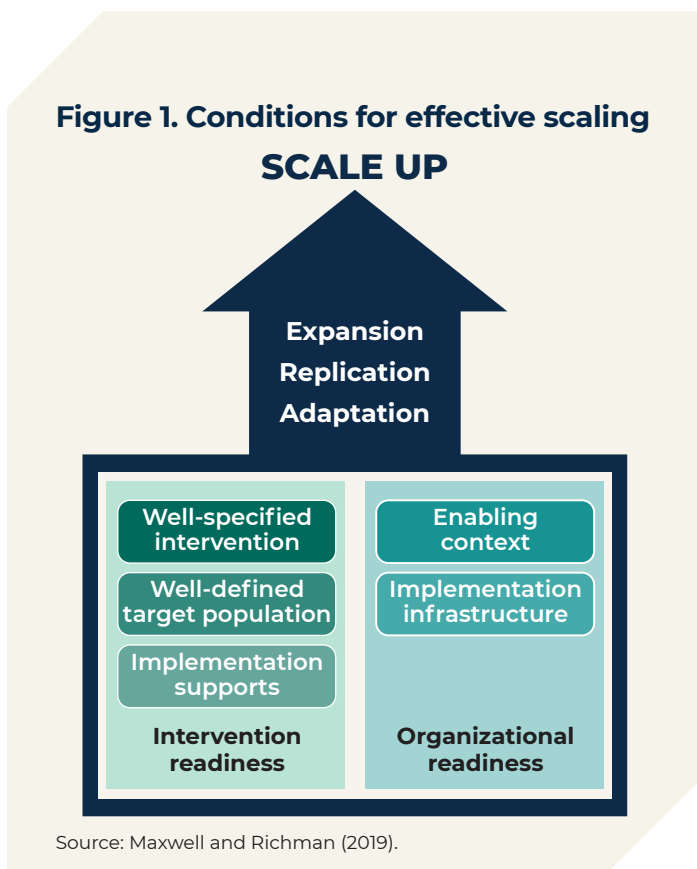
### Box 1. Family engagement programs in the study

**Reach Out and Read (ROR)** supports medical providers who encourage parents to read to their children and give free books to families during well-child visits. ROR serves nearly 5 million children across 5,500 sites in all 50 states. Its early math project is an extension of the model in which medical providers teach caregivers how they can use books to support their children's early math development. Providers encourage caregivers to make the math content explicit to children while reading stories and to engage children in math talk in their daily lives.

ROR began developing its early math project in 2014 with the help of a math consultant. Between 2014 and 2017, the project was initially piloted at two sites in California and later piloted in three additional sites in Minnesota. During the pilot years, ROR took the feedback received from the pilot sites and revised materials in preparation for scale-up. Beginning in 2018, ROR worked with its network of state directors to identify scale-up sites. During the study, ROR scaled up its early math project in 16 new sites in five states (Arizona, Minnesota, New Jersey, Oklahoma, and Texas). During the study, the early math project reached approximately 6,000 children and families across the 16 sites.

**YMCA's Early Learning Readiness (ELR)** program serves children from birth to age 5 and their caregivers. In 2017 the ELR program was implemented in 90 sites across the nation. The program involves 2.5-hour sessions twice weekly over the course of nine months. At each session, caregivers and children interact at 13 interest centers to explore various topics such as literacy, science, art, and math. The goal of the YMCA's math project was to strengthen the math activities for caregivers and children to increase caregivers' capacity to support their children's early math development. The early math activities were developed by TERC in partnership with YMCA.

YMCA's early math project was piloted at a few sites run by one ELR program in California in 2014. The next year, the piloting effort was expanded to include 3 new sites in New Jersey and Massachusetts. By the third year of piloting, the program was implemented in 14 sites and reached more than 200 families. During each of the three pilot years, YMCA and TERC collected feedback and revised early math materials to prepare for scale-up. During 2018, YMCA scaled up its early math project in 5 new sites within a new ELR in California. During the study, the early math project was implemented with nearly 550 caregivers and children during the weekly ELR sessions, and caregivers participated in several workshops.

To examine the scale-up effort, the study team talked with program leaders, practitioners who worked with families, and caregivers. We also observed early math trainings for practitioners and observed YMCA practitioners working with caregivers on early math activities. In addition, we looked closely at early math project materials from both providers. To guide the study, we used a research-based framework that identifies the conditions that both the intervention itself and an organization need to be ready for scale-up (Figure 1). [4–7]

## Figure 1. Conditions for effective scaling

### SCALE UP

**Expansion
Replication
Adaptation**

| Well-specified intervention | Enabling context |
|---|---|
| Well-defined target population | Implementation infrastructure |
| Implementation supports | |
| **Intervention readiness** | **Organizational readiness** |

Source: Maxwell and Richman (2019).

As shown in the figure, research indicates the importance of intervention readiness—that is, interventions that are supported by guidance, materials, tools, training, and other supports to facilitate scale-up. Research suggests that even with intervention readiness conditions in place, the readiness of the organizations within which an intervention is implemented is equally important. For example, organization leaders and key stakeholders should support the intervention (and its scaling), and the organization's culture should support innovation, learning, and improvement.

The rest of this brief draws on the implementation study and broader research base on scaling up interventions to present practical questions and recommendations for program operators, practitioners, and policymakers to consider as they design, implement, and prepare to scale up an early math intervention.

## Are you ready to scale up? Questions to ask before your organization scales up an early math or other intervention.

The following questions and recommendations are based on a research-based framework on intervention scale-up supported by this study's findings.[8] These recommendations can help you develop a plan to scale up your early math programming, or another intervention within family engagement programs. Many of these factors are useful to consider when beginning to design a new program, helping you ensure maximum success when you eventually scale up your program.

**Intervention readiness**

**Is your intervention content well specified and well defined before scale-up?**

To ensure healthy development and scale-up of an intervention, consider the following intervention qualities and guidance before scaling.

- **Document your intervention.** A well-specified intervention includes clearly defined documentation for those who will implement the program once scaled, including:

  - Service delivery strategies and content

  - Intended dosage and duration of services

  - Staffing requirements, including staff qualifications and staff-to-participant ratios

  - Standards for assessing whether the intervention is being delivered with fidelity[9]

Each of the providers in this study had well-defined interventions with accessible materials and preservice training resources. Both early math programs were originally designed with the partnership of expert consultants in early math to be integrated seamlessly into existing family engagement programs. The consultants brought knowledge to help ensure that the early math projects had strong math content and pedagogy. The providers were experts in family engagement programming and designed early math activities with practitioner capacity in mind. The developers' attention to practitioner capacity for implementing early math activities likely contributed to practitioners reporting that implementation of the early math activities was relatively easy once they learned about early math content and pedagogical approaches.

- **Identify a target population for your intervention.** It is essential to clearly identify the population and setting for which the intervention is developed.[10] At the start of scaling up their early math projects, both providers had extensive experience in working with clear target populations, and they designed their early math projects with those specific populations in mind. This greatly facilitated practitioners' and caregivers' buy-in, which helped each organization scale up its project.

- **Ensure your intervention has flexibility by providing guidance on fidelity and acceptable variations.** Allowing flexibility within an early math program is critical because some sites

implementing the early math activities might need to modify them to meet local needs and succeed.[11] However, it is important for your guidelines to clearly define what constitutes the intervention and for you to develop systems for monitoring the fidelity of implementation so that organizations are implementing the early math activities in new sites with acceptable levels of fidelity. Practitioners implementing the intervention should understand the range of acceptable variations.[12] Consider providing clear guidance or documentation, and give context on minimum fidelity and acceptable variations.

### Do you have the support and tools to implement the intervention?

Now that you've considered how to ensure your intervention is scalable, it is important to consider the supports and tools needed to scale up your intervention. These supports include tools to monitor program fidelity, training and staff supervision and support requirements, a team to monitor implementation, a communications system to support coordination among key staff and partners, and data systems that support decision making.[13,14] Together, these are sometimes called the implementation support system.

- **Ensure a strong scalable implementation system is in place before scale-up.** Consider whether you have a sufficient implementation support system, and develop or use partnerships if needed[15] When scaling up your early math or other program, be sure you or a partner has the reach, influence, and capacity to support a larger level of implementation. Look for organizations willing and interested in implementing the program and build a system capable of implementing in that program setting. For instance, ROR had a strong support system in place through its network of state ROR leaders who served as intermediaries between the ROR national office and individual clinics. State leaders trained clinic staff, facilitated communication, and provided ongoing support and oversight within their geographic areas.

### Components of fidelity[6,7]

**Adherence:** The extent to which the practitioner carries out the intervention according to the project's guidelines

**Competence:** The skillfulness in delivery of the project

**Participant responsiveness:** The level of engagement with which participants respond to the project

**Implementation support system components**

Tools to monitor program fidelity, training and staff supervision and support requirements

Team to monitor implementation

Communications system to support coordination among key staff and partners

Data systems that support decision making

- **Foster staff excitement for the intervention.** When scaling up programming to new sites, it is imperative for an organization to foster staff's excitement and buy-in for the intervention. This might also encourage buy-in from caregivers themselves. Initially, when the early math projects were developed, some ROR and YMCA practitioners expressed nervousness about engaging caregivers with early math. However, as practitioners and caregivers learned that early math can be easily accessible through training developed by early math experts, both groups soon demonstrated widespread acceptance of and excitement about supporting children's early math development. Practitioner buy-in and excitement grew even stronger when they had positive responses from caregivers and children—the key was to get practitioners to a place where they received positive reinforcement from caregivers and children about math.

- **Build sustainable capacity through training and follow-up support.** As you scale up your program, be sure to have a system for providing initial and follow-up training to practitioners through multiple methods. It is important to develop sustainable ways to train staff in order to support implementation.[16] For example, using technology to deliver training and resources can help train a wider range of staff across wider geographic areas, support training for

new practitioners in instances of staff turnover, and provide refresher training over time. However, if content is best delivered through in-person training, consider the network of training staff necessary to support that approach. In addition to learning about sustainable ways to train staff, ROR and YMCA also learned that offering training through brief and easily digestible segments was helpful. Practitioners strongly advocated for easy-to-read resources, such as websites and brief documents about math content, to support practitioners' and caregivers' own learning when they had time and interest.

## Organizational readiness

**Does your organization have the infrastructure and culture to support scale-up?**

- **An organization should have infrastructure for implementation.** Infrastructure to support the intervention's scale-up includes physical space, staff and supervisors, and sufficient funding.[17–19] Be sure to look for infrastructure needed to support scale-up and seek partners that both have the authority and infrastructure to scale up and possess the knowledge and commitment to maintain the integrity of early math content. Consider developing intervention documentation and implementation manuals, systems to provide initial training and follow-up support, and fidelity standards and tools for monitoring fidelity. These can initially be drafts or outlines to fill in over time as the intervention is developed. ROR had a well-developed support system with wide reach that helped it scale up to 16 new sites. YMCA's strong partnership with TERC helped it scale up with a focus on fidelity.

In addition, an organization's culture should support innovation, learning, and improvement to make changes that facilitate scaling. Site staff from both providers reported that the work reflected the organization's purpose and that their organization had a learning environment and strong support for professional development. In interviews, staff also reported that they felt supported by their organization.

Organizations may find it helpful to proactively use staff surveys, interviews, or focus groups to assess infrastructure and culture when designing a new program, ensuring the early identification and resolution of any scale-up issues.

- **Pay attention to emerging research.** To increase the likelihood that pilot efforts can be scaled up and sustained over time, encourage organizations to consider the conditions that support effective scale-up as they develop an intervention. Encourage staff to draw on steps that research suggests will support successful scale-up, pay attention to emerging research on effective scale-up, and refine plans to incorporate new findings when appropriate. For instance, research like this study on scaling up early math interventions is relatively new, and we expect to see more findings on effective scale-up that will be useful in informing future interventions like those in this study. ROR and YMCA began their efforts before much research was available; both organizations stated that they wished they had access to some of the research earlier in the process and expected that using the research base going forward would be helpful in their ongoing efforts.

- **Assess the strength in leadership to ensure conditions are appropriate for scaling up.** Ensuring that conditions are appropriate for scaling up means making certain that organization leaders can support the intervention and its scaling.[20] Leaders at both ROR and YMCA had a deep understanding of their staff and programs, and they worked with experts in early math content to help develop the early math projects. Leaders also partnered with sites and practitioners who strongly supported the early math projects. In interviews, staff reported that their leaders were knowledgeable and supportive of the early math projects. Leaders provided material and financial resources to support implementation, they arranged for training in early math, they enlisted a point person at each site to supervise and support implementation, and all leaders were reportedly accessible and willing to answer questions as they arose. Consider developing a leadership plan, for example, to facilitate success in pilot and scale-up efforts, seek organizations that can commit to the sustainability of leadership or provide a well-defined transition plan in case leadership changes. Similarly, if an organization does not have the content expertise within its leadership, it might wish to build a long-term partnership or consulting agreement to ensure input from a content expert as it scales a program. For example, YMCA partnered with TERC and drew on TERC's extensive expertise in early math and curriculum development to help develop and scale their early math project.

## Conclusion

One of the key strategies of the Heising-Simons Foundation's Education Program is to create wider recognition of early math learning opportunities as a catalyst for enabling children to achieve their full promise and potential. The Foundation's Education Program and its partners are dedicated to lifting up and recognizing the strengths of children and families of color, those who speak several languages, and those living in low-income communities. To that end, this brief seeks to give program operators, practitioners, and policymakers interested in scaling up early math programming ideas about how to scale up early math projects within family engagement programs by drawing on the work and experiences of two organizations that serve racially, linguistically, and economically marginalized communities. Grantmakers might also find the recommendations outlined in this brief a useful tool for guiding decisions on supporting scale-up of programs like these. The successes achieved by the two providers featured in this brief in implementing early math projects highlight the importance of considering not only the content of the intervention but the organization's plans and supports for successful scale-up to inform decision making.

This study drew on implementation science to inform readers about early math supports within family engagement programs. The providers, with funding from the Heising-Simons Foundation, developed and implemented a rich array of early math activities in a variety of settings. Their efforts show that regardless of the type of family engagement program, there is room to integrate mathematical thinking and activities. We hope this brief has been a source of actionable ideas about how you can successfully scale up new projects.

## Acknowledgments

**Want to learn more about integrating early math into your family engagement programs?** Check out Mathematica's issue brief, "Integrating Mathematical Thinking into Family Engagement Programs", which lays out seven practical tips that emerged from the initial pilot effort involving several family engagement providers, including ROR and YMCA, as they developed, tested, and integrated research-based early math projects into their existing family engagement programs.

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