





## How was Building Blocks implemented?

This section provides details of how preschool sites implemented Building Blocks in the three studies that contribute to this intervention report. This information can help educators identify the requirements for implementing Building Blocks and determine whether implementing this program would be feasible in their districts, schools, or early childhood education centers.

Teachers implemented Building Blocks through weekly whole- and small-group instruction, center activities, and computer activities. In addition, a letter was sent home each week describing the mathematics children were learning and related activities the families or other caregivers could do at home to support their child's learning. Teachers regularly assessed children's learning and adapted activities to build



## What research did the WWC review about Building Blocks?

This section provides details about the studies of Building Blocks that the WWC examined in its systematic review, including (1) the WWC's ratings of the quality of the available research, (2) the findings from the three studies that meet WWC standards, and (3) the characteristics of the studies that meet WWC standards.

### The quality of evidence in the available research about Building Blocks

The WWC identified seven studies that investigated the effectiveness of Building Blocks from a literature search in the Education Resources Information Center (ERIC) and other databases of research studies from January 2005 to January 2022. Of these seven studies, three meet WWC standards and contribute to the summary of evidence in this intervention report. Studies that either do not meet WWC standards or are out of scope of this review do not contribute to this intervention report.

- Two studies meet WWC standards without reservations. Two studies were cluster randomized controlled trials with low cluster-level attrition and low individual-level nonresponse.
- One study meets WWC standards with reservations. This cluster randomized controlled trial provides evidence of effects on individuals by satisfying the baseline equivalence requirement for the individuals in the analytic intervention and comparison groups, but has high individual-level nonresponse.
- Three studies do not meet WWC standards. Two cluster randomized controlled studies do not satisfy the baseline equivalence requirement for the individuals in the analytic intervention and comparison groups. One study was a cluster randomized controlled trial study that does not satisfy the baseline equivalence requirement for the clusters in the analytic and comparison groups.
- One study is out of scope of this systematic review. This study examined the effectiveness of an intervention that bundles the Building Blocks program with another intervention, so the effectiveness of Building Blocks cannot be isolated in this study.

The citations for these seven studies are included in the references. For information on how the WWC determines study ratings, see the version 4.1 [Procedures and Standards Handbooks](#), [WWC Standards Briefs](#), and the [Review Protocol for Preparing Young Children for School](#) available on the WWC website.

### More details about the three studies of Building Blocks that meet WWC standards

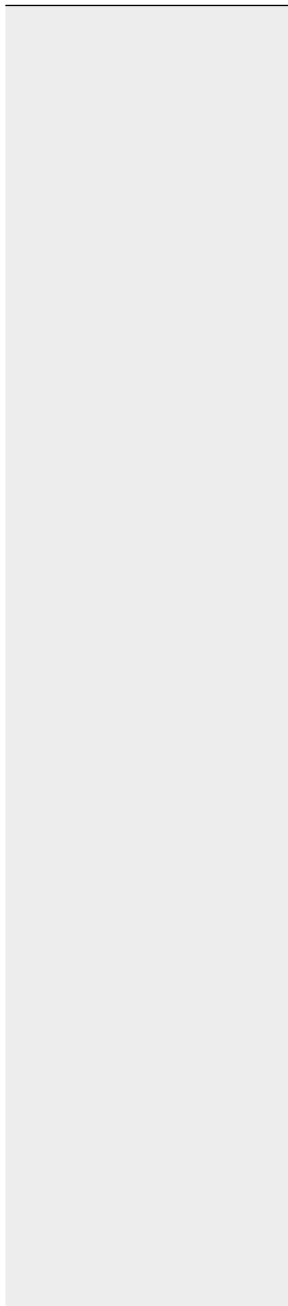
The three studies that meet WWC standards examined the effects of Building Blocks on one measure of preschool mathematics. Table 4 lists the main measure of preschool mathematics (y) that met WWC standards.

Table 4. Findings by outcome domain from three studies of Building Blocks that meet WWC standards

Outcome	Timing of measurement	Sample	Setting	Means (standard deviations)		Findings		
				Intervention group	Comparison group	Effect size	Improvement index	Statistically significant (p value)
<b>Mathematics outcome domain</b>								
Research-Based Early Mathematics Assessment (REMA)								
measurement								

Table 5. Characteristics of the three studies of Building Blocks that meet WWC standards

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## References

### Studies that meet WWC standards with reservations

Clements, D. H., & Sarama, J. (2008). Experimental evaluation of the effects of a research-based preschool mathematics curriculum. *American Educational Research Journal*, 45(2), 443-494. <https://eric.ed.gov/?id=EJ795943>

Clements, D. H., Sarama, J., Spitler, M. E., Lange, A. A., & Wolfe, C. B. (2011). Mathematics learned by young children in an intervention based on learning trajectories: A large-scale cluster randomized trial. *Journal for Research in Mathematics Education*, 42(2), 127-166. <https://eric.ed.gov/?id=EJ918252>

### Studies that meet WWC standards with reservations

Hofer, K. G., Lipsey, M. W., Dong, N., & Farran, D. C. (2013). Results of the early math project: Scale-up cross-site results. *Seabody Research Institute*. <https://eric.ed.gov/?id=ED623690>

### Studies that do not meet WWC standards

Clements, D. H., & Sarama, J. (2007). Effects of a preschool mathematics curriculum: Summative research on the Building Blocks project. *Journal for Research in Mathematics Education*, 38(2), 136-163. <https://eric.ed.gov/?id=EJ757034>

Clements, D. H., Sarama, J., Layzer, C., Unlu, F., & Fesler, L. (2020). Effects on mathematics and executive function of a mathematics and play intervention versus mathematics alone. *Journal for Research in Mathematics Education*, 51(3), 301-333. <https://eric.ed.gov/?id=EJ1255793>

Morris, P. A., Mattera, S. K., & Maier, M. F. (2016). Making pre-k count: Improving math instruction in New York City. MDRC. <https://eric.ed.gov/?id=ED569994>

### Studies that are out of scope for this intervention report using the topic area synthesis protocol

Sarama, J., Clements, D. H., Starkey, P., Klein, A., & Wakeley, A. (2008). Scaling up the implementation of a pre-kindergarten mathematics curriculum: Teaching for understanding with trajectories and technologies. *Journal of Research on Educational Effectiveness*, 1(2), 89-119. <https://eric.ed.gov/?id=EJ873867>

### Additional sources

The WWC examined additional sources (such as preliminary reports, working papers, or other associated publications) related to the citations in the references to complete its review of these studies. The additional sources are listed on the WWC pages for each study review.

### How possible conflicts of interest were addressed when preparing this report

Clements and Sarama led and/or contributed to the development of the Building Blocks program and the measure used to assess the program's impacts. They co-authored two of the three articles that were reviewed and used for evidence for this intervention report. They contributed evidence from their work to the third study, which was completed under a subcontract to their IES grant. Because Clements and Sarama are the developers of the intervention and the measure used in those studies, the studies included in this intervention report are not independent evaluations of the program.

The intervention report was prepared by Instructional Research Group (IRG), under contract to the Institute of Education Sciences. The WWC team, including the WWC reviewers who assessed the quality of the research, was not involved in developing the program or studying its effectiveness and has no financial interest in the program. All studies that meet WWC standards and the synthesis of their findings were checked and verified through a peer-review process. The Statistics, Website, and Training (SWAT) team conducted an independent review of the evidence to ensure that the WWC's findings are accurate. The Tools, Online Assistance, Standards, and Training (TOAST) team conducted an independent review of the intervention report and the synthesis.

## Recommended Citation

What Works Clearinghouse, Institute of Education Sciences, U.S. Department of Education. (2023, December). Building Blocks. <https://whatworks.ed.gov>

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<sup>1</sup>Bodovski, K., & Farkas, G. (2007). Mathematics growth in early elementary school: The roles of beginning knowledge, student engagement, and instruction. *The Elementary School Journal*, 108(1), 115-130; Clements, D. H., & Sarama, J. (2009). Learning and teaching early math: The learning trajectories approach. New York: Routledge; Clements, D. H., Sarama, J., Spitler, M. E., Lange, A. A., & Wolfe, C. B. (2011). Mathematics learned by young children in an intervention based on learning trajectories: A large-scale cluster randomized trial. *Journal for Research in Mathematics Education*, 42(2), 127-166; Sarama, J., & Clements, D. H. (2009). Early childhood mathematics education research: Learning trajectories for young children. New York: Routledge.



<sup>2</sup>Clements, D. H. (1984). Training effects on the development and generalization of Piagetian logical operations and