

Building Blocks and TRIAD

Review: November 2019

Note on provider involvement: This provider has agreed to EIF's terms of reference, and the assessment has been conducted and published with the full cooperation of the programme provider.

Building Blocks is a preschool mathematics curriculum for children between the ages of 3 and 4. It is delivered in preschools and aims to improve mathematics ability. Building Blocks includes software and print materials for children, teachers, and families.

TRIAD (Technology-enhanced, Research-based, Instruction, Assessment and professional Development) is a scale-up model that supports the Building Blocks curriculum via professional development for teachers (including a Web application that supports teaching based on learning trajectories), classroom materials and classroom coaching.

The overall programme is particularly designed for children who live mainly in poverty and are, therefore, at risk of experiencing difficulty in education. The intervention is delivered by trained teachers.

The maths activities are aimed at moving the children through developmental levels to meet learning goals. Teacher training sessions are focused on the learning trajectories for each mathematical topic.

Evidence
rating: **3+**

Cost rating: **1**

EIF Programme Assessment

Building Blocks and TRIAD has evidence of a **short-term positive impact** on child outcomes from at least one rigorous evaluation.

Evidence
rating: **3+**

What does the evidence rating mean?

Level 3 indicates **evidence of efficacy**. This means the programme can be described as evidence-based: it has evidence from at least one rigorously conducted RCT or QED demonstrating a statistically significant positive impact on at least one child outcome.

This programme does not receive a rating of 4 as it has not yet replicated its results in another rigorously conducted study, where at least one study indicates long-term impacts, and at least one uses measures independent of study participants.

What does the plus mean?

The plus rating indicates that this programme has evidence from at least one level 3 study, along with evidence from other studies rated 2 or better.

Cost rating

A rating of 1 indicates that a programme has a low cost to set up and deliver, compared with other interventions reviewed by EIF. This is equivalent to an estimated unit cost of less than £100.

Cost rating: **1**

Child outcomes

According to the best available evidence for this programme's impact, it can achieve the following positive outcomes for children:

Enhancing school achievement & employment

Improved maths ability

Based on study 1a

7.35-point improvement on the Research-based Elementary Math Assessment (REMA)

Improvement index: **+26**

This means we would expect the average participant in the comparison group who did not receive the intervention (ie, someone for whom 50% of their peers have better outcomes and 50% have worse outcomes), to improve to the point where they would have better outcomes than 76% and worse outcomes than 24% of their peers, if they had received the intervention.

Immediately after the intervention

Based on study 1b

Based on study 1c

Based on study 2

Based on study 3

Improved language ability

Based on study 1a

Key programme characteristics

Who is it for?

The best available evidence for this programme relates to the following age-groups:

- Preschool

How is it delivered?

The best available evidence for this programme relates to implementation through these delivery models:

- Group

Where is it delivered?

The best available evidence for this programme relates to its implementation in these settings:

- Children's centre or early-years setting

The programme may also be delivered in these settings:

- Primary school

How is it targeted?

The best available evidence for this programme relates to its implementation as:

- Targeted selective
-

Where has it been implemented?

Ecuador, England, United States

UK provision

This programme has been implemented in the UK.

UK evaluation

This programme's best evidence does not include evaluation conducted in the UK.

Spotlight sets

EIF does not currently include this programme within any Spotlight set.

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About the programme

What happens during delivery?

How is it delivered?

- Building Blocks/TRIAD is delivered to children 15 minutes per day on most school days, by trained preschool teachers.

What happens during the intervention?

- Teachers attend training to learn about the curriculum and the learning trajectories for each mathematical topic.
- Learning Trajectories is the core of the Building Blocks/TRIAD curriculum. The print materials provide information on children's development along the trajectories, the instructional activities move the children through developmental levels to meet learning goals.
- Children (aged 3 – 4) are taught the Building Blocks/TRIAD curriculum through software and print material.
- The curriculum is aimed at developing children's geometric thinking, spatial skills, measurement, understanding of patterns and more.

What are the implementation requirements?

Who can deliver it?

- Building Blocks/TRIAD is delivered by trained teachers in preschool, with a minimum of NFQ-level 6 qualifications.

What are the training requirements?

- The practitioners have between 2-6 days of programme training. Booster training of practitioners is recommended.

How are the practitioners supervised?

Practitioner supervision is provided through the following processes:

- It is recommended that practitioners are supervised for a total of 24 hours per full programme delivery by one host agency supervisor (qualified to NFQ level 7/8), with 8 hours of programme training.

What are the systems for maintaining fidelity?

Programme fidelity is maintained through the following processes:

- Training manual
- Other printed material
- Other online material
- Video or DVD training
- Face-to-face training
- Fidelity monitoring.

Is there a licensing requirement?

Yes, there is a licence required to run this programme.

How does it work? (Theory of Change)

How does it work?

- High-quality curriculum-based educational experiences increase young children's mathematics competencies.
- The Building Blocks curriculum provides multiple resources to support teachers in providing high-quality educational experiences to young children.
- In the short term, children increase their mathematical knowledge (concepts and processes).
- In the longer term, children also develop language and executive function competencies, and those who are most at risk for school have higher achievement in mathematics.

Intended outcomes

Enhancing school achievement & employment

Contact details

Kelsey Jenkins Product Marketing Manager Building Blocks/TRIAD
kelsey.jenkins@mheducation.com

<https://www.mheducation.com/prek-12/program/building-blocks-pre-k-20132013/MKTSP-TMB01M0.html?page=1&sortby=>

www.triadscaleup.org

About the evidence

Building Block's most rigorous evidence comes from a cluster RCT which was conducted in the US (study 1a).

This study identified statistically significant positive impact on a number of children.

This programme has evidence from at least one rigorously conducted RCT along with evidence from an additional comparison group study. Consequently, the programme receives a 3+ rating overall.

Study 1a

Citation: Clements et al., 2011 Sarama et al., 2012 Watts et al., 2017

Design: Cluster RCT

Country: United States

Sample: 1305 children enrolled in Pre-Kindergarten Schools

Timing: Post-test

Child outcomes:

- Improved maths ability
- Improved language ability

Other outcomes:

- None measured

Study rating: 3

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.

Available at <https://www.nctm.org/Publications/Journal-for-Research-in-Mathematics-Education/2011/Vol42/Issue2/Mathematics-Learning-by-Young-Children-in-an-Intervention-Based-on-Learning-Trajectories-A-Large-Scale-Cluster-Randomized-Trial>

Sarama, J., Lange, A., Clements, D. H., & Wolfe, C. B. (2012). The impacts of an early mathematics curriculum on oral language and literacy. *Early Childhood Research Quarterly*, 27(3), 489–502.

Available at

<https://www.sciencedirect.com/science/article/pii/S0885200611000937?via%3Dihub>

Watts, T. W., Clements, D. H., Sarama, J., Wolfe, C. B., Spitler, M. E., & Bailey, D. H. (2017). Does early mathematics intervention change the processes underlying children's learning? *Journal of Research on Educational Effectiveness*, 10(1), 96–115.

Available at

<https://www.tandfonline.com/doi/abs/10.1080/19345747.2016.1204640?journalCode=uree20>

Study design and sample

The first study is a rigorously conducted RCT.

This study involved random assignment of children to a treatment group and a business as usual group.

This study was conducted in the USA, with a sample of children aged between 3 and 4. The majority of the children in the sample were low SES (85% free school meal eligibility), and were from an ethnically diverse population living mainly in poverty.

Measures

Maths achievement was measured using the Research-based Elementary Math Assessment (REMA) (expert observation of behaviour).

Language skills were measured using PALS-PreK (Invernizzi, Sullivan, Swank, & Meier, 2004), MCLASS:CIRCLE (Landry, 2007), and The Renfrew Bus Story – North American Edition (RBS; Glasgow & Cowley, 1994)

Findings

This study identified statistically significant positive impact on a number of child outcomes.

This includes:

- Maths ability
- Language ability

Study 1b

Citation: Sarama et al., 2012

Design: Cluster RCT

Country: United States

Sample: 1218 children enrolled in Kindergarten Schools

Timing: 1-year follow-up

Child outcomes:

- Improved maths ability
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Other outcomes:

- None measured
-

Study rating: 2+

Sarama, J., Clements, D. H., Wolfe, C. B., & Spitler, M. E. (2012). Longitudinal evaluation of a scale-up model for teaching mathematics with trajectories and technologies. *Journal of Research on Educational Effectiveness*, 5(2), 105–135.

Available at <https://www.tandfonline.com/doi/abs/10.1080/19345747.2011.627980>

Sarama et al. (2012) describes additional outcomes from study **1a** described above. In this case:

- At a one-year follow-up, maths achievement was measured using the Research-based Elementary Math Assessment (REMA)
- This study identified statistically significant positive impact on a number of child outcomes.
- The treatment group performed significantly better than the control group on the Research-based Elementary Math Assessment (REMA).
- The conclusions that can be drawn from the findings reported in this paper are limited by methodological issues pertaining to study attrition.

Study 1c

Citation: Clements et al., 2013

Design: Cluster RCT

Country: United States

Sample: 1079 children enrolled in Prime Grade Schools

Timing: 2-year follow-up

Child outcomes:

- Improved maths ability
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Other outcomes:

- None measured
-

Study rating: 2+

Clements, D. H., Sarama, J., Wolfe, C. B., & Spitler, M. E. (2013). Longitudinal evaluation of a scale-up model for teaching mathematics with trajectories and technologies: Persistence of effects in the third year. *American Educational Research Journal*, 50(4), 812 – 850.

Available at <https://journals.sagepub.com/doi/abs/10.3102/0002831212469270>

Clements et al. (2013) describes additional outcomes from study **1a** described above. In this case:

- At a two-year follow-up, maths achievement was measured using the Research-based Elementary Math Assessment (REMA)
- This study identified statistically significant positive impact on a number of child outcomes.
- The treatment group performed significantly better than the control group on the Research-based Elementary Math Assessment (REMA).
- The conclusions that can be drawn from the findings reported in this paper are limited by methodological issues pertaining to study attrition.

Study 2

Citation: Clements & Sarama, 2008

Design: Cluster RCT

Country: United States

Sample: 253 children

Timing: Post-test

Child outcomes:

- Improved maths ability
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Other outcomes:

- None measured
-

Study rating: 2

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.

Available at <https://journals.sagepub.com/doi/10.3102/0002831207312908>

Study design and sample

The study was an RCT. This study involved random assignment of children to a treatment group and a business as usual group.

This study was conducted in the USA, with a sample of children aged between 3 and 4. Many of the children attended schools that serve children from low-SES families.

Measures

Maths achievement was measured using Early Mathematics Assessment (EMA) (expert observation of behaviour).

Findings

This study identified statistically significant positive impact on a number of child outcomes.

This includes:

- Maths ability

The conclusions that can be drawn from this study are limited by methodological issues pertaining to a lack of clarity in terms of baseline equivalence, and a lack of clarity in terms of intention-to-treat analysis, hence why a higher rating is not achieved.

Study 3

Citation: Clements & Sarama, 2007

Design: QED

Country: United States

Sample: 68 children

Timing: Post-test

Child outcomes:

- Improved maths ability
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Other outcomes:

- None measured
-

Study rating: 2

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.

Available at <https://www.nctm.org/Publications/Journal-for-Research-in-Mathematics-Education/2007/Vol38/Issue2/Effects>

Study design and sample

The study was a QED study.

This study was conducted in the USA, with a sample of children aged 4 attending schools that serve children from low-SES families.

Measures

Maths achievement was measured using an individual interview format, with explicit protocol, coding, and scoring procedures (expert observation of behaviour).

Findings

This study identified statistically significant positive impact on a number of child outcomes.

This includes:

- Maths ability (number & geometry test).

The conclusions that can be drawn from this study are limited by methodological issues pertaining to a lack of clarity in terms of baseline equivalence and a lack of clarity in terms of attrition, hence why a higher rating is not achieved.

Guidebook

The EIF Guidebook provides information about early intervention programmes that have at least preliminary evidence of achieving positive outcomes for children. It provides information based on EIF's assessment of the strength of evidence for a programme's effectiveness, and on detail about programmes shared with us by those who design, run and deliver them.

The Guidebook serves an important starting point for commissioners to find out more about effective early interventions, and for programme providers to find out more about what good evidence of impact looks like and how it can be captured. As just one of our key resources for commissioners and practitioners, the Guidebook is an essential part of EIF's work to support the development of and investment in effective early intervention programmes.

Our assessment of the evidence for a programme's effectiveness can inform and support certain parts of a commissioning decision, but it is not a substitute for professional judgment. Evidence about what has worked in the past offers no guarantee that an approach will work in all circumstances. Crucially, the Guidebook is not a market comparison website: ratings and other information should not be interpreted as a specific recommendation, kite mark or endorsement for any programme.

[How to read the Guidebook](#)

[EIF evidence standards](#)

[About the EIF Guidebook](#)

EIF

The Early Intervention Foundation (EIF) is an independent charity and a member of the What Works network. We support the use of effective early intervention for children, young people and their families: identifying signals of risk, and responding with effective interventions to improve outcomes, reduce hardship and save the public money in the long term.

We work by generating evidence and knowledge of what works in our field, putting this information in the hands of commissioners, practitioners and policymakers, and supporting the adoption of the evidence in local areas and relevant sectors.

www{EIF.org.uk | [@TheEIFoundation](https://twitter.com/TheEIFoundation)

10 Salamanca Place, London SE1 7HB | +44 (0)20 3542 2481

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