

Mathematical Reasoning (re-grant)

The Mathematical Reasoning programme aims to improve mathematical attainment by developing pupils' understanding of the logical principles underlying mathematics. The Literacy and Morphemes programme aims to improve pupils' spelling and reading comprehension. Both programmes are delivered to year 2 pupils during normal lesson time.



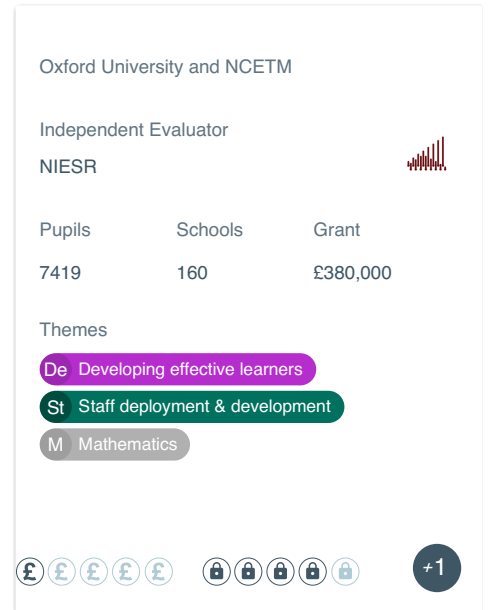
EEF Summary

Previous studies suggested both programmes offered affordable approaches to improving pupil outcomes. Based on this, the EEF funded a trial (Improving Literacy and Numeracy in KS1) to test the impact of the two programmes under developer-led conditions. Pupils receiving Mathematical Reasoning made an additional three months' progress in maths compared to other pupils in comparison schools. There was no evidence that Literacy and Morphemes improved spelling or reading outcomes.


The EEF then funded a follow-up evaluation which examined the impact of a scalable version of Mathematical Reasoning in a larger number of schools and with less involvement from the original developer (co-funded by the Worshipful Company of Actuaries). The National Centre for Excellence in the Teaching of Mathematics (NCETM) helped to develop the training model, and coordinated its delivery through its national network of 'Maths Hubs' (partnerships of schools focused on maths education). In this second, larger trial, pupils who received Mathematical Reasoning made the equivalent of one additional month's progress in maths, on average, compared to other children.

There are some differences between the two projects which may explain the smaller impact in the second trial. First, it used a different delivery model. Rather than doing the teaching training directly, the programme developers (the University of Oxford) trained Maths Hub teachers who then delivered the teacher training to participating schools. This may have affected how faithfully the programme was delivered in the classroom. Also, although a precise comparison is difficult, there was evidence that the comparison schools in the second trial were more likely than in the first trial to provide alternative support for children's reasoning in maths. This may have reduced the difference seen between Mathematical Reasoning pupils and other pupils.

Together, these trials provide evidence for the effectiveness of Mathematical Reasoning. The project will remain on the EEF's Promising Projects list and we will explore the potential for bringing it to more schools.



Research Results

Outcome/Group	<u>Impact</u> - the size of the difference between Mathematical Reasoning (re-grant) pupils and other pupils	<u>Security</u> – how confident are we in this result?
Maths	+1 Months' Progress	
Maths (FSM)	+1 Months' Progress	N/A

Were the schools in the trial similar to my school?

- There were 160 schools in the trial, located in eight Maths Hub areas throughout the country.
- 26% of the pupils in the trial had ever been eligible for free school meals.
- On average, the schools had 74% of their pupils working at the expected standard or above at Key Stage 1 in 2016.
- 12% of the pupils in the trial spoke English as an additional language.

Could I implement this in my school?

- There is one initial day of training for teachers, and one support visit during programme delivery
- Teachers receive lesson plans and powerpoint slides to deliver the intervention.
- Learning is supported by online games, which can be used by pupils both at school and at home.

Eight maths hubs were trained to train teachers to deliver the programme. These Maths Hubs could offer training and support for schools interested in the programme:

- Archimedes (North East, Durham and Tees Valley region)
- Central (Birmingham)
- GLOW (Gloucestershire, Oxfordshire, Worcestershire)
- Kent and Medway
- London South East
- North West Three
- Salop and Herefordshire
- Sussex

 delivered by
Teachers

 participant group
Whole Class

 intervention length
15 Weeks

How much will it cost?

The average cost of Mathematical Reasoning for one school was around £1,073, or £8 per pupil per year when averaged over 3 years.

 Cost per pupil
£8

 No. of Teachers/TAs
Variable

 Training time per staff member
1 Day

Schools 160	Pupils 7419	Key Stage Key Stage 1
Start date October 2015	End date July 2017	Type of trial Effectiveness Trial

Evaluation Conclusions

1. Pupils who received Mathematical Reasoning made the equivalent of one additional month's progress in maths, on average, compared to children who did not. This result has high security.
2. Among pupils eligible for free school meals, those who received Mathematical Reasoning made an average of one additional month's progress compared to those who did not. This result may have lower security than the overall finding because of the smaller number of pupils.
3. There was some evidence that the programme also had a positive impact on mathematical reasoning.
4. The intervention was generally well received by schools. Teachers reported positive experiences with the training and materials, and were positive about the programme's focus on fundamental mathematical principles.
5. The process evaluation found that there was some variation in how schools implemented aspects of the programme, particularly in relation to the use of the online games.