

Mathematical Concepts made visible

When Block Play is well-organised and well-structured children see the mathematical elements of the blocks and this makes explicit the underlying mathematical concepts of attributes and properties, pattern and symmetry, composition and transformation of shape.

Problem-solving and reasoning are “hard-wired” into Block Play as children develop ideas of what Block will fit or tessellate or balance with another.

Pattern and Art, Transformation and Equivalence, Balance and Symmetry, Tessellation and Composition are all Mathematical ideas that are brought to life through Block Play.

Playing with Patterns helps Block Play

We know the Firm Foundations of all Mathematical Development are Pattern and Spatial Reasoning.

We found that if we gave children lots of ‘patterning experiences’ – using all sorts of materials from loose parts, drawing, painting and printing, pattern books and patterned objects, Tangrams and Pattern Blocks, numerical patterns in dice, numicon, dominoes, unifix – then their Block Play became increasingly complex.

It is essential to grow our ‘palette’ of patterning and spatial reasoning provision so that children can build on what they know and make links between Block Play and other experiences around pattern play.

There is a “power” in pattern play!

The Adult Role needs confidence in Early Maths Subject Knowledge

The Adult Role in Block Play is responsive and reflective.

Some children in some circumstances needed more direct teaching about the names, properties and possibilities of how to use the blocks – growing their familiarity and confidence slowly and overtime.

Some children were best supported by an Adult Role that observed and made timely suggestions, challenging children to make increasingly complex constructions!

The Adult Role was also about knowing Early Maths Subject Knowledge.

Becoming confident in our own Mathematical Subject Knowledge supported how we responded to children’s Block Play. Developing a rich understanding of all the wide and complex aspects of Spatial Reasoning meant we were best positioned to scaffold learning – sustaining play through curious questions or suggestions, offering complexity and challenge.



The Brilliance of Blocks

How does Block Play support children’s Early Maths development?

This is a summary all about our Block Play research in Nursery School and our current findings and thinking about how the Blocks support children’s Early Mathematical development.

Why Block Play research?

Maths is essentially the search for pattern and relationships and Block Play affords children a very concrete experience of the relationship between shape, space, measures and pattern.

Spatial Reasoning is all about how things fit together in the world, including ourselves!

We use our spatial reasoning everyday, enabling us to predict and solve problems, finding things, recognising objects by their shape, navigating around, fitting things together and into spaces, and interpreting photographs, diagrams and maps.

There is overwhelming evidence linking spatial reasoning with achievement in mathematics so we have been really keen to find out what mathematical talk and thinking, concepts and ideas, knowledge and understanding is supported by Block Play?



What are the benefits of doing this research?

- We are looking to deepen our understanding of how children learn maths
- how we can develop practice to support children’s mathematical knowledge skills and understanding
- improve outcomes and progress for children
- ensure ALL children have opportunities for PLAYFUL MATHS



Getting started – questions and curiosity

We know that Blocks are an interesting mathematical tool and have the potential of offering children challenging tasks and mathematical investigations.

We created a Block Play environment full of Community Playthings blocks, Montessori materials, recycled and scrapstore resources, loose parts and natural resources, mirrors, wood, building and architecture books, maps and atlases and globes, large and small vehicles, large clipboards and rolls of paper.

Our Research Questions were :

- How do children use the Blocks?
- How does Block Play supports Early Maths learning?
- How can adults can best support Block Play?
- What are the best ways to ‘document’ learning to support mathematical development, particularly spatial reasoning

We introduced the Blocks in small groups so that children had plenty of opportunities to rehearse, revisit and reflect upon the properties of the different shapes, the possibilities of how they could be combined together to balance, to create symmetries and patterns, to stack, bridge, enclose and represent real structures and buildings.

We ‘listened carefully’ to children’s Block Play, aware of the learning potential they were bringing to the Blocks and encouraged their curiosity by showing a real interest in their investigations and enquiries.



Learning mathematics should be empowering, life enhancing and joyful

Maulfry Worthington, 2017

What did we learn from the children?

Children explored and discovered the properties and possibilities of the blocks through carrying, stacking, bridging, enclosing, using pattern and symmetry, representing other buildings or objects.

Children – of course – are ‘holistic’ learners and don’t separate or compartmentalise their learning into different areas or aspects of learning.

So, their Block Play was full of Science, Technology, Engineering, Maths, Creativity and the Arts!

All at the same time!

When looking at Block Play through a “mathematical lens” we could see children’s incredible Early Maths learning – their models and Block creations full of balance and symmetry, full of patterns and properties of shape, different compositions, transformation and orientation.

Their Block Play was full of geometry and algebra!

By playing with the Blocks and understanding how they ‘relate’ to each other, how they ‘fit’ together in different compositions, the children were exploring ideas around fractions, part-whole relations, angles and comparisons, transformations and equivalence.

Children demonstrated such absorption and concentration, collaboration and independence, creative and divergent thinking, making links and distilling learning as they returned again and again to repeat familiar structures, explore novel ideas, use books, photographs and pictures to inspire, imitate and ignite imagination.

“...it’s because the blocks don’t need a language, they have their own language.”

Daniel Spry, 2020

What do we think now?

Time and Space for open-ended exploration is essential

Blocks are an essential resource.

They are so open-ended and full of endless possibilities.

Open-ended play is essential, with children given the opportunity to explore and discover freely.

It is essential children are given time and space to return to the Blocks again and again – to grow familiar, confident and then creative with the blocks. Their Block Play becomes increasingly complex and intricate.

Inclusive and rich in collaborations

Blocks have their own ‘language’ and are incredibly inclusive. Children can ‘communicate’ with each other using the Blocks.

Collaborations through ideas of how to build and balance structures, how to decide on the shapes needed to provide symmetry or tessellation, how to interpret photos and pictures of buildings to create true likeness or representation of a ‘real world’ building could all take place without even having to share the same language!

