

Embracing Nature: Enhancing Early Years Mathematics through Outdoor Learning

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Exploring the wonders of nature can be a powerful way to foster early mathematical skills. Integrating mathematics into nature offers a unique and effective approach to early childhood education, deeply linking with the principles of the [Early Years Foundation Stage \(EYFS\) Statutory Framework](#). The EYFS Statutory Framework emphasises the importance of providing a broad and balanced learning experience, and maths in nature perfectly aligns with this vision by fostering a holistic development of young learners. Nature serves as an ever-present, dynamic classroom where children can explore mathematical concepts in a hands-on, meaningful way.

The Early Years Statutory Framework has a section on Educational Programmes. The Educational Programmes are high level curriculum summaries which set out what should be taught in settings for each area. They must involve activities and experiences that enable children to learn and develop, as set out under each of the areas of learning. This is the summary for mathematics:

“Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically. Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers. By providing frequent and varied opportunities to build and apply this understanding - such as using manipulatives, including small pebbles and tens frames for organising counting - children will develop a secure base of knowledge and vocabulary from which mastery of mathematics is built. In addition, it is important that the curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures. It is important that children develop positive attitudes and interests in mathematics, look for patterns and


relationships, spot connections, 'have a go', talk to adults and peers about what they notice and not be afraid to make mistakes."

All of the above Educational Programme summary can be achieved through everyday experiences in both the indoor and outdoor learning environments. For example, counting the petals on a flower, measuring the length of a stick, or observing the symmetry of leaves can all provide practical experiences with numbers, measurement, and spatial awareness. These activities are not only engaging but also help children see the real-world applications of maths, making abstract concepts more tangible and understandable.

Recent insights from the Education Endowment Foundation's (EEF) [Mathematics Evidence Store](#) and their "[Improving Mathematics in the Early Years](#)" also highlight several approaches that can be integrated into the natural environment. Recommendation 2 from the 'Improving Mathematics in the Early Years' can be particularly focused on during outdoor learning and all of the approaches from the Evidence Store can seamlessly integrate into a natural setting:


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Dedicate time for children to learn mathematics and integrate mathematics throughout the day






- Dedicate time to focus on mathematics each day.
- Explore mathematics through different contexts, including storybooks, puzzles, songs, rhymes, puppet play, and games.
- Make the most of moments throughout the day to highlight and use mathematics, for example, in daily routines, play activities, and other curriculum areas.
- Seize chances to reinforce mathematical vocabulary.
- Create opportunities for extended discussion of mathematical ideas with children.

Early Years Evidence Store
Supporting Early Mathematics in the Early Years




Evidence consistently shows educators can implement approaches that benefit children's mathematical skills and knowledge. The EEF's Early Years Toolkit estimates that effective early numeracy approaches can, on average, provide seven months of additional progress. Using multiple approaches together could aid children's mathematical development. To support effective maths teaching, educators need to know how children's maths skills develop, how to teach maths, and have knowledge of maths itself. The approaches and practices summarised below support educators with understanding how to teach maths.







Effective approaches to support Early Mathematics	What is it?	Evidence summary of the approach	Put the approach into action
 <p>01 Teaching the Association between Number and Quantity</p>	<p>This approach involves teaching the child to understand numbers and quantities. This could include using objects and pictures to visualise quantity, modelling counting sets, teaching the rules of counting, as well as recognising very small amounts without counting (subitising).</p>	<p>This approach has a positive impact on children's maths outcomes.</p> <p>While the research hasn't yet pinpointed which practices are most influential, it does indicate supporting children to match or compare quantities, providing opportunities for subitising, exploring how numbers are made up of other numbers and helping children to pair one number word with only one item when they count, can be effective activities. This approach often involves adults making numbers visual through drawings, number lines, objects, or EdTech.</p> <p>Targeting and tailoring learning to match children's next steps can be beneficial, particularly for children from lower-income families.</p>	<ul style="list-style-type: none"> Naming and labelling quantity Estimating Emphasis Visualising
 <p>02 Promoting Fluency with Numbers and Sequences</p>	<p>This approach involves using daily routines and moments throughout the day, such as singing, recognition and repetition, to promote fluency with recognising numerals and saying the count sequence.</p>	<p>There is evidence that this approach can have a positive impact on children's maths when used alongside other maths approaches.</p> <p>While the research hasn't yet pinpointed which practices are most influential, it does indicate supporting children to practise and repeat the count sequence and match a number word or name with a number symbol are effective. Children can practise using EdTech and numerical board games, for example.</p> <p>If providing the approach equally to all children, careful monitoring and assessment will be required. Providing the</p>	<ul style="list-style-type: none"> Repetition Choral response Questioning to prompt recall Naming and labelling numerals


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Effective approaches to support Early Mathematics

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 <p>03 Teaching Problem-Solving Skills for Maths</p>	<p>This approach involves teaching and modelling maths problem-solving skills, including showing how to use objects or number tracks to solve problems and communicate thinking.</p>	<p>There is evidence that this approach can have a positive impact on children's maths when used alongside other maths approaches.</p> <p>Research has not yet pinpointed which practices are most influential. However, it does indicate that sequencing and breaking tasks down and providing prompts to use problem-solving strategies can be effective. Using objects and pictures, helping children to work together and explain their thinking can also be effective.</p> <p>If providing the approach equally to all children, careful monitoring and assessment will be required. Providing the approach through additional targeted support may be necessary for some children.</p>	<ul style="list-style-type: none"> Narrating Thinking aloud Reminding Providing a menu of strategies Using mistakes as teaching and learning opportunities Modelling using representations to solve a mathematical problem Reflecting
 <p>04 Teaching and Modelling How to Make Comparisons and Connections</p>	<p>This approach involves providing opportunities for children to make comparisons and notice connections, by discussing what is the same, similar or different and identifying units of repeat in patterns. It may involve mathematical tools such as scales and measuring jugs.</p>	<p>There is evidence that this approach can have a positive impact on children's early maths.</p> <p>Research has not yet pinpointed which practices are most influential. It does indicate, however, that comparing sets of objects, arranging them in order of size, location and position can be effective. Using ordinal numbers and identifying the odd one out from a set can also be effective. Activities involving block building and weighing scales may also be effective.</p> <p>Scaffolding, matching learning to children's levels of development and breaking down learning into manageable steps can be helpful when targeting and tailoring support to children.</p>	<ul style="list-style-type: none"> Commenting Emphasis Thinking aloud Imitation Making links Composing and decomposing
 <p>05 Facilitating Mathematical Language</p>	<p>This approach involves intentionally using specific informal and formal mathematical vocabulary and modelling its use in context, giving explanations to develop understanding of concepts and prompting children to use mathematical language.</p>	<p>There is evidence that this approach can have a positive impact on children's maths when the approach is used at the same time as other maths approaches.</p> <p>Storybooks can be a helpful context for teaching maths language. In the research, educators also narrated their mathematical observations, giving reasons and encouraging children to explain their reasoning aloud, or providing carefully chosen vocabulary and definitions through planned lessons.</p>	<ul style="list-style-type: none"> Narrating Naming and labelling Repetition Commenting Questioning Explaining and showing Imitation Extending Recasting





Explore the Early Years Evidence Store to find out more about Early Mathematics and other themes, including PSED and Communication and Language. Scan the QR code for detailed examples and videos of the approaches in action.

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The EEF's reports emphasise that such real-world experiences are not just enjoyable but also deeply educational, supporting the development of a strong mathematical foundation. By utilising the natural curiosity that children have about the world around them, practitioners and parents can create rich, meaningful learning opportunities that align with evidence-based practices.

Nature provides an endless supply of resources and scenarios for mathematical exploration. Whether it's observing patterns in flower petals or calculating the time it takes for a shadow to move, the natural world is a vital classroom. According to the EEF's guidance, embedding maths in everyday activities can significantly boost children's confidence and skill in the subject, setting them on a path to long-term success.

The EYFS framework highlights the need for play-based learning, and outdoor maths activities seamlessly blend play with education. Children naturally learn through exploration and discovery, and the diverse environments offered by nature stimulate their curiosity and problem-solving skills. This type of learning supports several of the EYFS early learning goals, particularly in developing numeracy, understanding the world, and fostering communication and language skills. Moreover, integrating maths into nature supports the EYFS's commitment to fostering positive attitudes towards learning. By making maths fun and relevant, children are more likely to develop a love for the subject and build confidence in their abilities. Activities such as sorting and classifying natural objects, estimating the number of steps to a tree, or creating patterns with stones encourage children to think critically and creatively, enhancing their cognitive development.

Here are what I regard as the top 10 advantages for combining mathematics and outdoor learning. These benefits incorporate evidence-informed research combined with my 18 years experience of working with early years children:

1. **Hands-On Learning:** Engaging with real-world objects like leaves, sticks, and stones makes abstract concepts concrete, aiding comprehension and retention.
2. **Improved Engagement:** The dynamic and stimulating outdoor environment captures children's interest, making learning more enjoyable and motivating.
3. **Enhanced Problem-Solving Skills:** Natural settings provide unpredictable challenges that encourage critical thinking and adaptive problem-solving.
4. **Physical Development:** Outdoor activities promote physical health through movement and coordination, which are crucial for young children's development.
5. **Sensory Stimulation:** Nature offers diverse sensory experiences that can enhance cognitive functions and memory.

6. Encourages Curiosity and Exploration: The natural world is full of wonders that stimulate curiosity, fostering a mindset of exploration and discovery.

7. Environmental Awareness: Learning maths outdoors helps children develop a connection with nature, promoting environmental awareness from an early age.

8. Social Skills and Teamwork: Group activities in outdoor settings often require collaboration, enhancing communication and social skills.

9. Stress Reduction: Being in nature has a calming effect, reducing stress and anxiety, which can create a better learning environment.

10. Holistic Development: Combining cognitive, physical, and emotional learning aspects supports overall child development and well-being.

In conclusion, by embracing the strategies outlined in the EEF's Evidence Store and 'Improving Early Maths' report, educators and parents can ensure that early maths education is both effective and enjoyable, cultivating a lifelong love of learning in young children. By doing so, they not only adhere to the EYFS Statutory Framework but also enrich the educational experiences of young children, setting them on a path of enthusiastic and lifelong learning. The importance of maths in nature cannot be overstated. It aligns perfectly with the EYFS statutory framework's goals by providing a rich, engaging, and comprehensive approach to early years education. Embracing this method ensures that children develop essential mathematical skills in a natural, enjoyable, and impactful way.

