

# How Many Altogether?

**Case Study:** Supporting a Child's Understanding of the Cardinal Principle through Counting Collections and Mark Making



*Written by Sarah Jenkinson-Evans, Nursery Class Teacher and Outdoor Learning Co-ordinator at Weoley Castle Nursery School & Pre-School in Birmingham.*



# Contents

|                                 |    |
|---------------------------------|----|
| Context                         | 3  |
| Observed Challenge              | 4  |
| Action Taken                    | 5  |
| Impact & Observed Challenge     | 7  |
| Further Intervention & Strategy | 9  |
| Reflections                     | 11 |
| Next Steps                      | 12 |
| References                      | 13 |

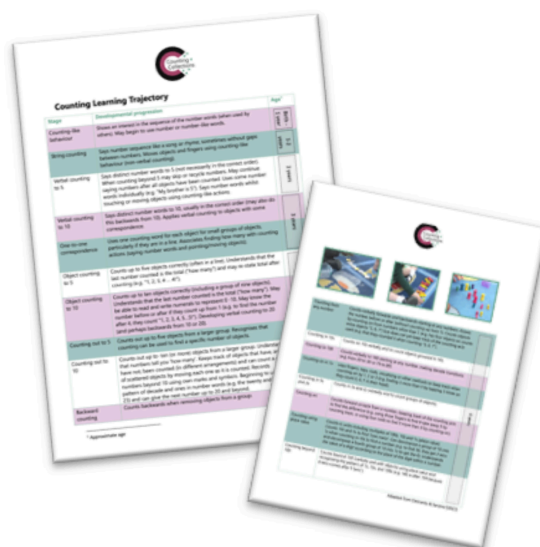
# Context

[Counting Collections](#) is a four-part routine that helps children develop number sense and skills through hands-on activities.

This case study focuses on a child, Evie, aged 4 years 5 months, attending a nursery setting in Birmingham.

Evie is a quiet child who benefited from secure relationships with key adults. During greeting time, Evie had shown difficulty in number sequencing (stable order principle) and accurate counting.

Reflecting on whole-staff training and utilising the Counting Collections learning trajectories, staff examined previous stages in typical mathematical development to identify potential gaps in understanding.



***It is essential to ensure gaps are filled before moving on, to help secure understanding for children and to prevent difficulties in later learning.***



## Observed Challenge

During counting experiences and in play, Evie could recall some number names in order and then would jump between numbers, '7, 9, 5'.

To support Evie's ability to recite numbers in order and support accurate counting skills ([stable order principle](#) and [1-1 correspondence](#)), a Counting Collections intervention was delivered.

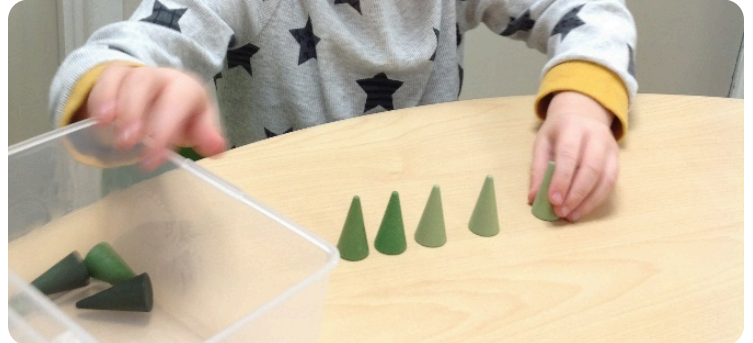


It is worth noting that this was alongside the nursery curriculum, which includes teaching number rhymes, greeting time, adult mathematical modelling and interactions in play, as well as utilising everyday mathematical opportunities such as counting or subitising how many cups are needed at snack time.

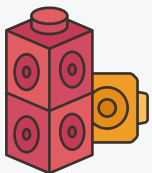


# Action Taken

Within a small group, Evie and her peers would access sets of collections to **choose, plan, count**, and later **record**.



- **Choose:** Children decide which collection they would like to count.
- **Strategy/Plan:** Children plan how they will count the objects in the collection (using tools such as cupcake cases, 5 frames, pots).
- **Count:** Children count the objects.
- **Record:** Children represent their laid-out collection of objects.



A **manipulative** is an object that children or practitioners can interact with and move to represent mathematical ideas.

Manipulatives could include everyday objects such as pine cones, buttons, and small toys, as well as resources like interlocking cubes, Cuisenaire rods, Dienes blocks, and building blocks.

**EEF Evidence Store: Using manipulatives and representations to develop understanding**

In the Early Mathematics section of the Education Endowment Foundation (EEF) Evidence Store, [Using manipulatives and representations to develop understanding](#), it states that:



“

*Manipulatives and representations can be powerful tools for supporting young children to engage with ideas across many areas of mathematics. They can help children make sense of mathematical concepts, develop visual images, increase engagement and enjoyment, help practitioners see what children understand and provide a bridge to abstract thinking (1). Children benefit from practical, first-hand experiences of moving and interacting with manipulatives to develop mathematical ideas.*

”



Each collection is stored in a clear box, and the collections range from 1-10. Each collection has a set of objects within that are the same shape/size and shade. This is known as ‘low cognitive load’ and creates beautiful, inviting sets to investigate.

Staff reported that not having the collections in continuous provision increased the children’s engagement, but importantly, that skills learnt were transferable into their free play using different items.

The open-ended nature of the objects provoked lots of noticing, comparing and talking, initially modelled by the adult, then led by the child.

## Tips in practice:

- Allow time for the children to get to know the objects.
- Avoid rushing the children.
- Begin with small sets (1-5), then (1-10).
- Count with the children and talk to them about their strategy: “I’m going to count the...”, “I think there’s more than 3 in my box”, “I’m not sure what to use for my counting!”
- Encourage and share examples of children’s counting: “Look, C is placing one shape in each cup to help his counting. I’m going to try that.”



# Impact & Observed Challenge

As the term went on, the impact of the direct teaching of counting with 1-1 correspondence and playful practising during Counting Collections and the wider environment was evident.

Evie would now touch each item as she said each number name, initially 1-5, then 1-10. It appears to have 'clicked' for her and the staff and Evie's parents were thrilled.

Importantly, staff had observed these skills being practised and applied in broader scenarios, both inside the classroom and outside, independently and alongside adults.

Evie could now verbally count objects in sequence with growing accuracy. However, when asked, "**How many are there altogether?**" Evie often restarted the count or gave an incorrect number, suggesting that [the cardinal principle](#) had not yet been securely grasped.

*The **cardinal value** of a number refers to the quantity of things it represents, e.g. the numerosity, 'how manyness', or 'threeness' of three. When children understand the cardinality of numbers, they know what the numbers mean in terms of knowing how many things they refer to.*



*Counting is one way of establishing how many things are in a group, because the last number you say tells you how many there are. Children enjoy learning the sequence of counting numbers long before they understand the cardinal values of the numbers.*

*Subitising is another way of recognising how many there are, without counting.*

## Counting Collections

This was demonstrated during a nature play session. Evie was independently collecting pebbles and then decided to count them out of her basket onto the log.

She would count each item as she moved it, but then she appeared unsure at the end when asked, **“How many pebbles do you have altogether?”** Evie simply counted again from 1, unable to hold the last number counted in her mind.



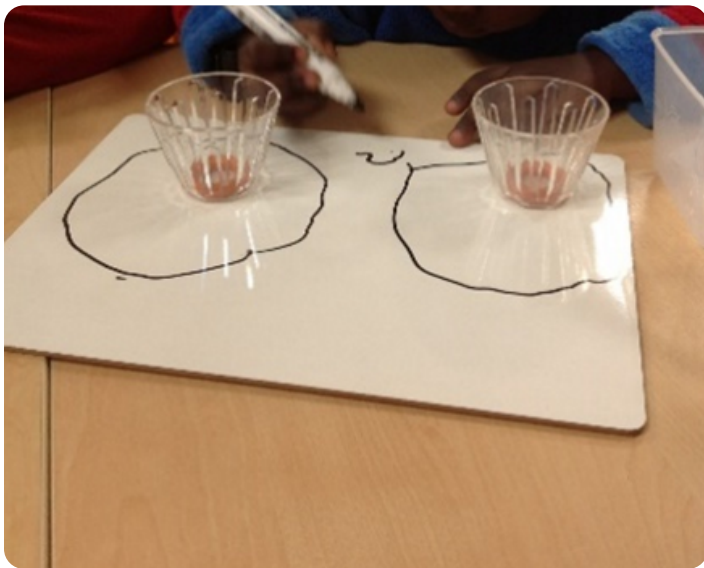


# Further Intervention & Strategy

To further support Evie's mathematical understanding, the nursery team focused on the use of mark making to record.

The intention was to:

- Provide a visual and physical way to keep track of counted items.
- Support memory and help solidify the connection between the act of counting and the total number.
- Encourage mathematical recording as a foundation for future abstract thinking.



## Approaches included:

- Encouraging recording through adult modelling. To draw a line, circle, representation or make a tally mark for each item counted.
- Using fingers, whiteboards, clipboards, and paper with a range of mark making tools (pens, chalks, crayons).
- Adult modelling of this process, *"I need 2 more cups for snack"*, as she makes two tally marks on her list.

- Adult scaffolding with consistent language, e.g., *"One more mark, one more object. Now let's count your marks to see how many you have altogether."*
- Numeral formation as final stage.



A 'representation' refers to a particular form in which mathematics is presented (2). Representations include informal drawings, mathematical symbols, and more formal diagrams, such as a number line or graph.

**EEF Improving Mathematics in Early Years and KS1**





# Reflections

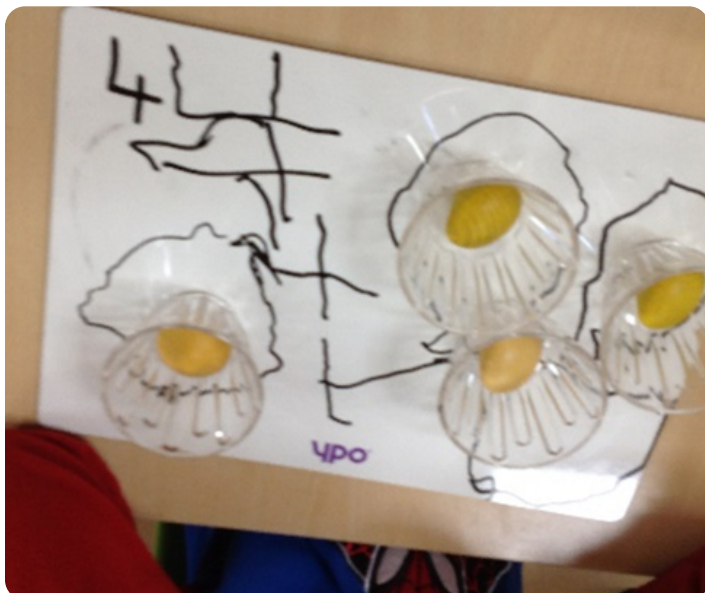
The combination of this hands-on approach with a focus on recording, in varying ways, appears to be the piece of the jigsaw that supported not only Evie but also many children within the class in acquiring a greater understanding of the cardinal principle. Evie was able to count accurately and recall how many altogether! It was a light bulb moment for Evie and the staff team.

This case study highlights the value of integrating mark making (recording) into early counting routines; it is as important for mathematical learning as it is for literacy.

For children like Evie, who are developing an understanding of the cardinal principle, the act of recording through marks provides a bridge between concrete experiences and abstract number concepts.

## Using mark making:

- Promotes active engagement and ownership of learning.
- Supports working memory, especially for young children still internalising key number concepts.
- Encourages early mathematical representation, an important foundation for later formal math learning.





# Next Steps

---

As early years practitioners, we all know that maths isn't just about numbers on a page. It's about helping young children build confidence, explore and make sense of the world around them.

Something that has become really clear for the staff team and supported by the Counting Collections research and EEF Evidence Store is just how important practitioner mathematical knowledge is when it comes to teaching maths well.

We need to understand:

- How children learn maths
- The importance of using correct mathematical language
- The next steps and the previous steps in mathematical development

## **As a staff team, we continue our journey and plan to:**

- Introduce representations, symbols and numerals alongside mark making to connect visual marks to written numbers more in our everyday teaching.
- Extend counting opportunities to include grouping and comparing quantities more.
- Continue observational assessment to track progress in cardinal understanding and wider number sense to increase depth of understanding for our learners.



# References

---

1. Griffiths, R., Back, J. and Gifford, S. (2016) Making Numbers: Using Manipulatives to Teach Arithmetic, Oxford: Oxford University Press
  2. National Centre for Excellence in the Teaching of Mathematics (2014). '[Curriculum Glossary](#)'.
- 

## Glossary of words

**Stable order principle:** Consistently use the number words in the same order.

**1-1 principle:** Count every item in a set only once, using only one number word.

**Cardinal principle:** Understand that the last number word used represents all items counted so far (from Gelman & Gallistel, 1978).

---

## Links to the Early Years Foundation Stage (EYFS)

Counting Collections supports several areas of learning and development within the EYFS.

## Mathematics: Counting

“

*Children develop a strong grounding in number, which is essential so that all children develop the necessary building blocks to excel mathematically.*

”

- Children count real objects, reinforcing one-to-one correspondence, cardinality, and conservation of number.
- They explore grouping, comparison, and patterning, laying foundations for addition and multiplication.
- Collections can be used to model subitising, estimating, and problem-solving.



## Early Learning Goals (ELGs) supported:

1. **Number:** Children count reliably, understand the 'how many' concept, and use number names in order.
2. **Numerical Patterns:** They explore odd/even, doubles, and grouping through sorting and counting.

## Communication and Language

“ *The development of children’s spoken language underpins all seven areas of learning and development.* ”

- Children describe their strategies, explain their thinking, and engage in mathematical dialogue.
- Adults can model rich vocabulary: more than, less than, altogether, estimate, group, and compare.

## Early Learning Goals (ELGs) supported:

1. **Speaking:** Children articulate their reasoning and use full sentences to explain their approach.
2. **Listening and Attention:** They listen to peers’ strategies and respond appropriately.

## Personal, Social and Emotional Development (PSED)

“ *Children’s personal, social and emotional development (PSED) is crucial for children to lead healthy and happy lives.* ”

- Children collaborate, take turns, and make decisions together, e.g. “How shall we count these?”
- They build confidence through choice and autonomy in selecting and organising collections.

## Early Learning Goals (ELGs) supported:

1. **Managing Self:** Children persist with challenging tasks and reflect on their learning.

2. **Building Relationships:** They work with peers, share ideas, and celebrate success.

## Understanding the World

“ *Understanding the world involves guiding children to make sense of their physical world and their community.* ”

- Collections can be themed around natural materials, cultural artefacts, or seasonal items.
- Children notice similarities and differences, sort by attributes, and connect maths to real-world contexts.

### Early Learning Goals (ELGs) supported:

- **Past and Present / People, Culture and Communities / The Natural World:** Children explore and discuss the origins or uses of items in their collections.

## Expressive Arts and Design

“ *The development of children’s artistic and cultural awareness supports their imagination and creativity.* ”

- Children can create visual representations of their counts (e.g. arranging in patterns, using colour).
- Collections can be used in collage, sculpture, or storytelling, blending maths with creativity.

### Early Learning Goals (ELGs) supported:

- **Creating with Materials:** Children use collections to design, build, and express ideas.
- **Being Imaginative and Expressive:** They invent stories or games around their collections.

---

## Further Reading

[Counting Collections – A hands-on approach to teaching and learning early number](#)

[Counting Collections Preschool ESPD Report](#)

[How children learn maths | Education Endowment Foundation](#)

[EY Pedagogical Continuum | Education Endowment Foundation](#)