

Using stories to support learning: How a picture book strengthened number bond understanding

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This case study explores how a picture book stimulus supported conceptual understanding of number bonds to 10 for Year 1 pupils with cognition and learning needs. It examines how narrative reduced cognitive load, strengthened attention and enabled inclusive access to mathematical structures.

The lesson formed part of a National Centre for Excellence in the Teaching of Mathematics (NCETM) Maths Hub Teaching Research Group (TRG), allowing teacher reflections and post-lesson analysis to be captured. Our focus was to explore how narrative contexts can reduce cognitive load, >

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- › anchor attention and support pupils to access mathematical structures. The class included pupils with working memory difficulties, attentional needs, slow processing, emerging language skills and SEMH-related maths anxiety. These needs often make abstract tasks overwhelming, which informed our decision to use a picture book as a familiar, emotionally engaging context that supported attention and reduced abstraction.

Why use picture books in mathematics?

Research indicates that picture books can play a powerful role in supporting early mathematical learning, particularly for pupils with cognition and learning needs. Familiar narrative structures help to reduce cognitive load by providing a predictable frame through which new ideas can be introduced (Mulholland, 2022), while meaningful story contexts anchor abstract concepts in situations to which pupils can easily relate (Harberfield, 2022). The visual cues and repeated phrasing typical of picture books support memory, offering stable reference points to which pupils can return as they reason about number (Mulholland, 2022). In addition, stories can increase motivation and emotional engagement, creating a calmer, more inviting entry point into mathematics for learners who may otherwise experience anxiety or disengagement (Furner, 2018).

Our reflections closely echoed the research, showing how the narrative structure supported pupils with

cognition and learning needs. Teachers noted that pupils who usually struggled to sustain attention were more engaged during the story, suggesting that its familiarity and predictability provided an accessible entry point into the maths. The combination of clear visuals and a shared storyline offered a stable reference point, reducing cognitive load and helping pupils to connect number bond relationships to something meaningful. For many, the story acted as a cognitive and emotional anchor, allowing them to focus on mathematical structure rather than task mechanics.

These observations aligned strongly with research recommendations, particularly the way in which pupils with attentional difficulties became visibly more engaged when the story was read. The pattern suggested that narrative offered something uniquely supportive: predictable structure, rich imagery and a shared reference point that helped pupils to make sense of new ideas. This prompted us to consider how these benefits could be harnessed in maths, and whether a story-based approach could provide an inclusive route into number bond relationships for pupils who often struggle with abstraction.

Lesson overview

The picture book used a simple dogs-and-sausages storyline that mapped directly onto number bond structures. Each page showed a different distribution of sausages, which the teacher paired with a ten-frame.

Repetitive phrasing, systematic variation and a consistent stem sentence ('How many more...?') drew attention to underlying number bond structure. These choices aligned with the NCETM's Five Big Ideas (2023), and created a coherent sequence that enabled all pupils, including those with cognition and learning needs, to both access and reason about number bonds.

How the picture book supported cognition and learning needs

Drawing on our data, the teacher reflections and post-lesson discussions, a number of themes emerged that illustrated how the story functioned as a cognitive and emotional support for pupils with diverse learning needs. These themes highlight the specific mechanisms through which the narrative reduced cognitive load, strengthened understanding and created an inclusive learning environment.

1. Supporting attention through narrative engagement

The story introduced an engaging twist to the maths lesson, capturing pupils' curiosity and sustaining the attention of those who typically struggle to remain focused. The narrative offered emotional engagement and predictable pacing, giving pupils a clear reason to look, listen and follow the unfolding mathematical ideas.

2. Reducing cognitive load through simple, familiar language

The book's short, familiar phrasing played an important role in reducing linguistic and cognitive demand. By keeping the language simple and predictable, pupils were not overwhelmed by unnecessary vocabulary, allowing their working memory to remain available for reasoning about number relationships.

3. Strengthening conceptual understanding through dual coding

Throughout the lesson, each page of the story was shown alongside the corresponding mathematical representation. This deliberate pairing supported dual coding, helping pupils to connect the narrative to the ten-frame structure. It reduced reliance on mental imagery, made abstract ideas more concrete and supported retention. Many pupils later drew on the story images to recall number bonds, demonstrating how narrative cues can compensate for working memory limitations.

4. Lowering anxiety and creating a safe entry point

For pupils who experience anxiety around mathematics, beginning with a story created a calmer, more familiar starting point. This reduced emotional pressure and helped pupils to feel more secure, which in turn supported working memory capacity and enabled more effective engagement with the mathematical content.

5. Supporting EAL learners through visual and linguistic accessibility

- › The visual clarity and familiar imagery within the story also supported pupils learning English as an additional language (EAL). The illustrations provided an accessible reference point that helped pupils to interpret the mathematical ideas without relying solely on verbal explanation, reinforcing the universality of the scaffold.

6. Enabling success through open-ended questioning

The teacher's use of open-ended prompts, such as 'What do you notice?' and 'What can you see?', allowed all pupils to participate meaningfully, regardless of their starting point. These questions created multiple entry routes into the task and enabled pupils to respond at their own level, reflecting an inclusive pedagogical approach to teaching mathematics.

7. Supporting working memory through repetition and story recall

The repeated structure of the story, combined with the consistent use of a stem sentence, created a rhythmic pattern that supported memory consolidation. This predictable structure reduced cognitive load and helped pupils to internalise the number bond relationships more securely.

Pupils entered the task more confidently and sustained attention for longer than usual. Many used the story to justify their reasoning, drawing on narrative cues to self-correct number bond errors. Pupils with working memory needs recalled number bonds by

referring to the images, demonstrating conceptual understanding even without rapid retrieval. Pupils also contributed more readily to partner and whole-class discussion, suggesting that the familiar narrative reduced anxiety and supported mathematical dialogue.

This case study shows that picture books can act as effective cognitive scaffolds, not only in mathematics but across subjects where pupils must engage with abstract ideas. For learners with cognition and learning needs, narrative provides a familiar, emotionally secure structure that reduces cognitive load, anchors attention and supports meaning-making. Embedding number bond relationships within a story enabled pupils to access underlying structure without being overwhelmed by language or procedure. Rather than diluting rigour, the narrative made key concepts more visible, memorable and connected.

These findings highlight wider curriculum implications: carefully chosen stories can offer inclusive entry points into complex ideas across subjects, supporting conceptual understanding through context, imagery and repetition. They also reinforce the importance of context in mathematics, helping pupils to make sense of concepts and the symbols used to represent them (Eames et al., 2026).

Implications for practice

- Use picture books intentionally to introduce, explore or consolidate key concepts across the curriculum



- Pair stories with consistent representations, such as visuals, diagrams and models,
- Use structured questioning to draw attention to underlying ideas rather than surface features
- Keep the class together through shared story moments that build collective understanding, particularly for those with SEND (special educational needs and disabilities)
- Ensure that fluency or practice tasks are directly connected to the conceptual focus, whether in maths or in other subjects.

These principles can be adapted flexibly to different subjects, offering a way in which to support pupils with cognition and learning needs, while maintaining high expectations for depth and reasoning.

Conclusion

This case study illustrates how a picture book supported pupils with cognition

and learning needs to understand number bonds to 10. Through narrative, representation and questioning, the teacher created an inclusive mastery lesson in which all pupils could access, reason about and generalise mathematical structure. More broadly, the findings suggest that story-based pedagogy can reduce cognitive load, strengthen attention and support conceptual understanding across the curriculum. When used thoughtfully, stories offer a shared, meaningful context that helps all learners, including those with cognition and learning needs, to engage confidently with complex mathematical concepts.

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REFERENCES

- Eames K, Palmer H and Trundle R (2026) Making context count. *Mathematics Teaching* 299: 21–25.
- Furner JM (2018) Using children's literature to teach mathematics: An effective vehicle in a STEM world. *European Journal of STEM Education* 3(3): 14.
- Harberfield A (2022) Maths in stories. *Equals: Mathematics and Special Educational Needs* 27(1): 8–10.
- Mulholland K (2022) Using storybooks to promote high-quality talk in maths. Education Endowment Foundation. Available at: educationendowmentfoundation.org.uk/early-years/storybooks-maths (accessed 23 January 2026).
- National Centre for Excellence in the Teaching of Mathematics (NCETM) (2023) Five Big Ideas in teaching for mastery. Available at: ncetm.org.uk/teaching-for-mastery/mastery-explained/five-big-ideas-in-teaching-for-mastery (accessed 9 March 2026).