
Low-stakes, High-interest

Maths Learning

Outdoors:

the what, the why

and the how.

with Dr Lewis Barrett-Rodger





A Vision for Maths

Mathematics is a **creative** and highly interconnected discipline that has been developed over centuries, providing the solution to some of history's most **intriguing** problems.

It is **essential** to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the **beauty and power** of mathematics, and a sense of **enjoyment and curiosity** about the subject.

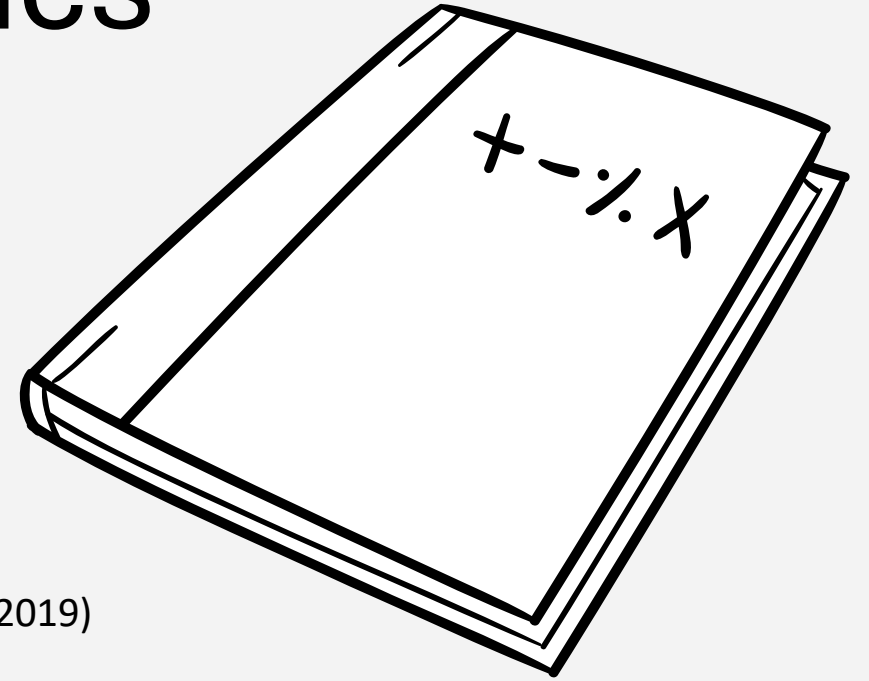
Department for Education (2021). National curriculum in England: mathematics programmes of study.



Experiences of Mathematics

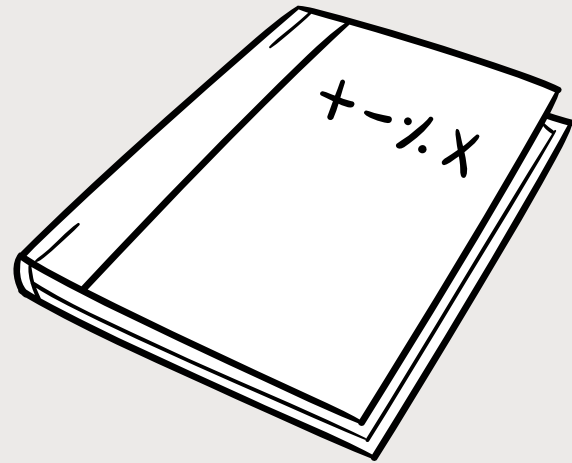
The contemporary literature tells us that children can experience maths:

- Through anxiety. (Ashcraft and Moore, 2009)
- Best when an interactive learning process. (Carey, et al., 2019)
- As a difficult subject. (Musa and Maat, 2021)
- As for some and not for others. (Francome and Hewitt, 2020)
- As irrelevant to their lives. (Jensen and Hanghøj, 2020)
- As procedural and routine. (Howley, Pendarvis and Gholson, 2005)



Experiences of Mathematics

Barrett-Rodger, 2023.



Scoping Review 1:

Children's Experiences of Mathematics

Interaction with others

- Competition
- Negative attention
- Sense of place in the class hierarchy
- Support from others
- Collaboration

A difficult subject

- Physical reactions from anxiety
- Abstract and theoretical concepts
- Fixed mindset approach

Relevance to the world

- Lacking purpose
- Procedural and routine
- Boring

Modes of knowledge acquisition

- Through transmission predominantly
- Teacher provides the learning
- Lack of autonomy
- More rarely connectionist or through first-hand experience

What Children Say About Mathematics

“Lost throughout the lesson.”

(Musa and Maat, 2021, p.942)

“Learning from the board.”

(Sneck, et al., 2022, p.12)

“does not allow you to be creative.”

(Pepin, 2011, p.541)

“Sums in a row.”

(Russo, Russo and Roche, 2021, p.11)

“You have a certain amount of maths ability. You can't really change it.”

(Francome and Hewitt, 2020, pp.486-487)

“Fractions are hard. They burn like lava!”

(Kulkin, 2016, p.28)

Outdoor Learning in the Literature

Outdoor learning has been shown to:

- Inspire creativity ^{1 & 4}
- Support mathematical development ¹
- Develop a sense of wonder ¹
- Improve engagement ^{1 & 2}
- Support positive behaviour ¹
- Enhance social skills ¹
- Promote confidence and self-esteem ¹
- Encourage positive health and wellbeing ^{1 & 2}
- Improve employment pathways ²
- Improve academic achievement ^{1 & 3}

¹ Plymouth University (2016). Transforming Outdoor Learning in Schools: Lessons from the Natural Connections Project.

² Merchant, E., Todd, C., Dredge, S., Jones, H., and Reynolds, D. (2019). Curriculum-based outdoor learning for children aged 9-11.

³ Department for Education and Skills (2006). Learning Outside the Classroom Manifesto.

⁴ Waite, S. (2010). Teaching and Learning Outside the Classroom.

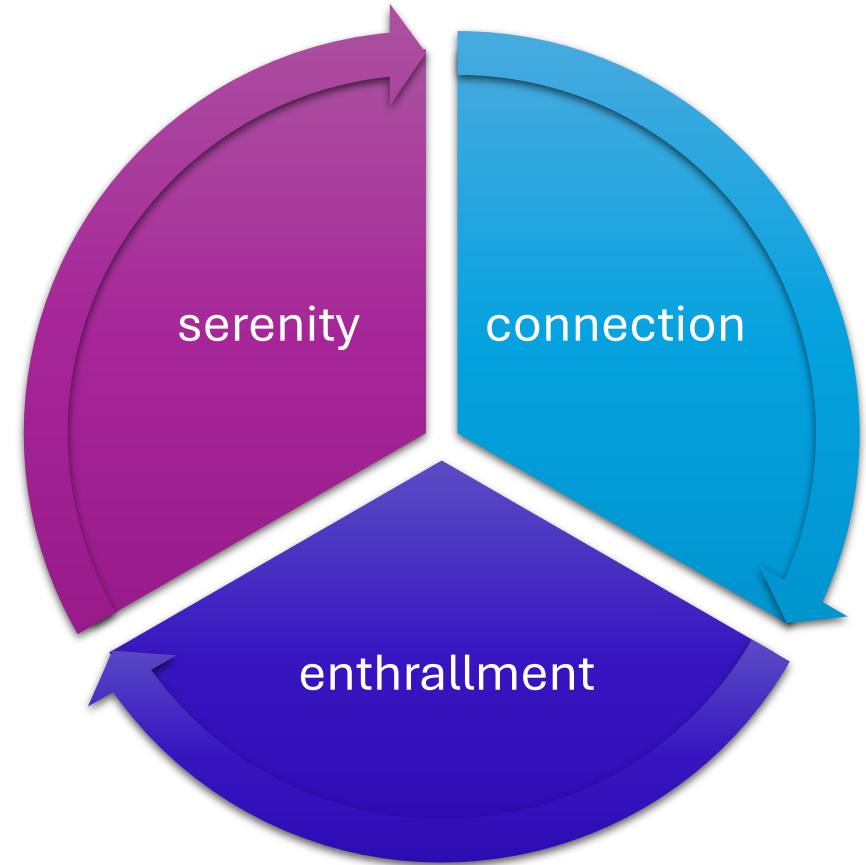
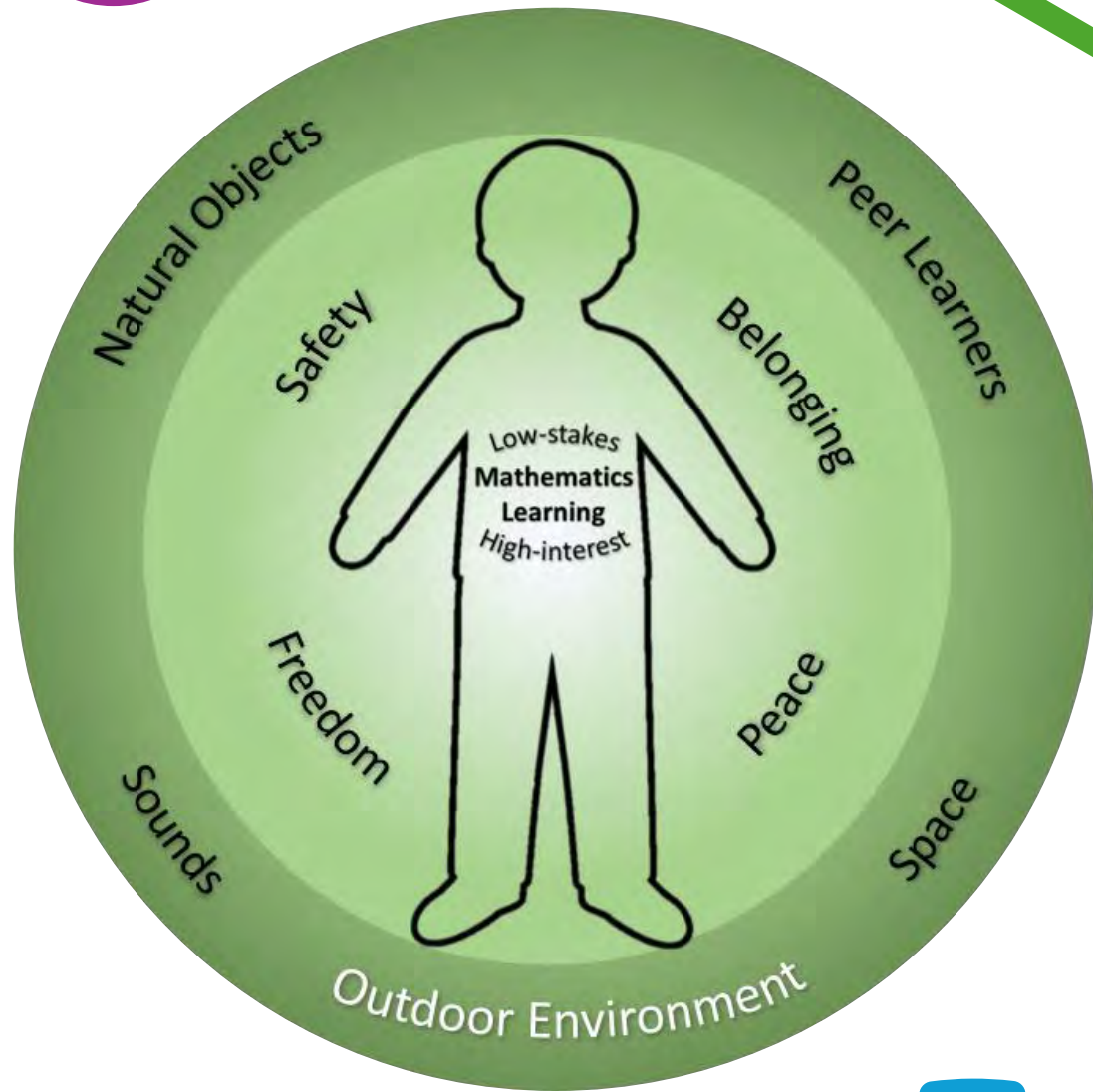


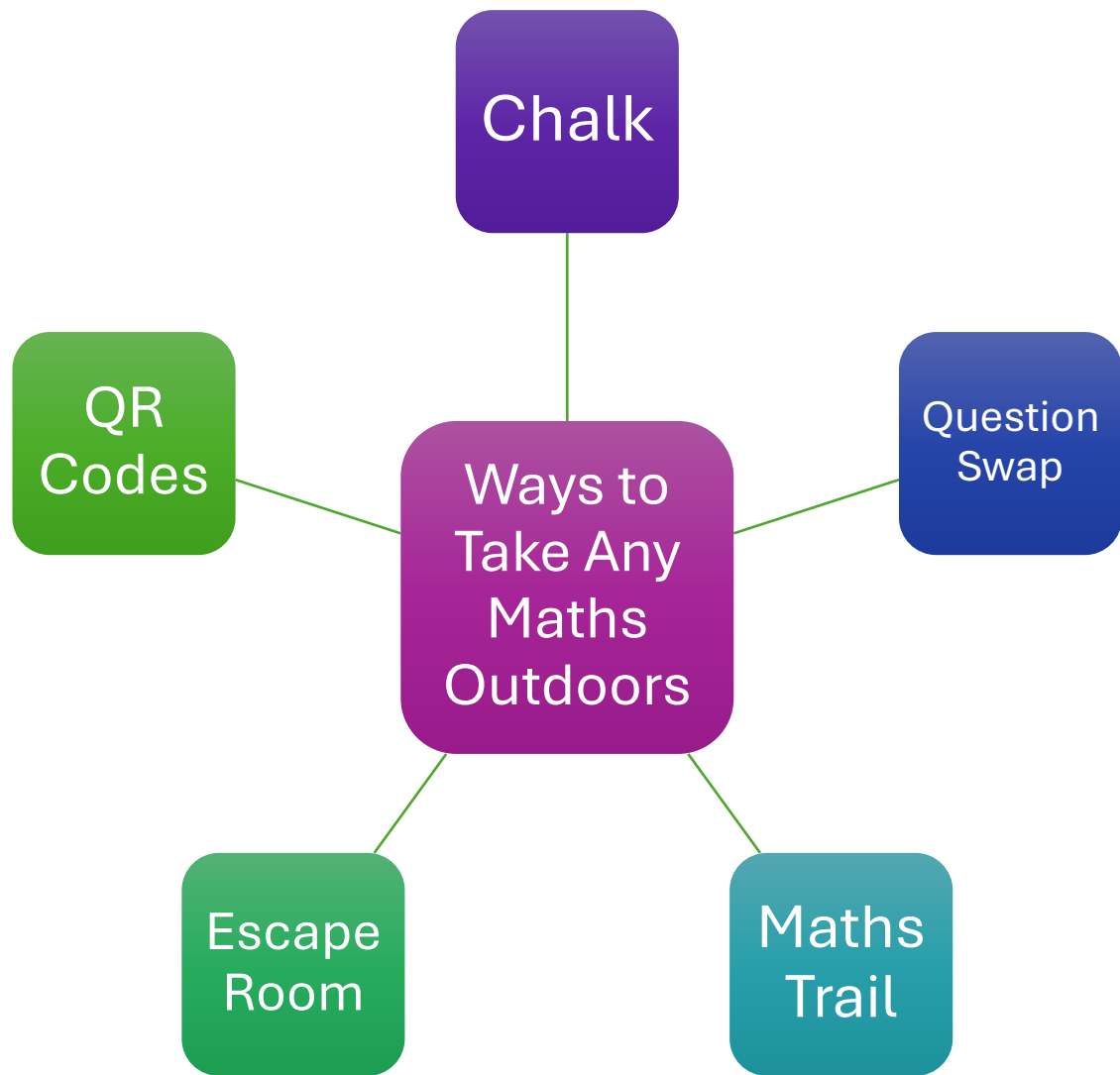


A Phenomenological Study

- Participants: Five 10-year-olds
- Unstructured interviews incorporating arts-based methods and vocative exercises
- Data analysis
 - Crafted stories
 - Wholistic, selective and detailed reading
 - Phenomenological thematization
 - Phenomenological writing

Insights







Convention 1 - Playground Chalk



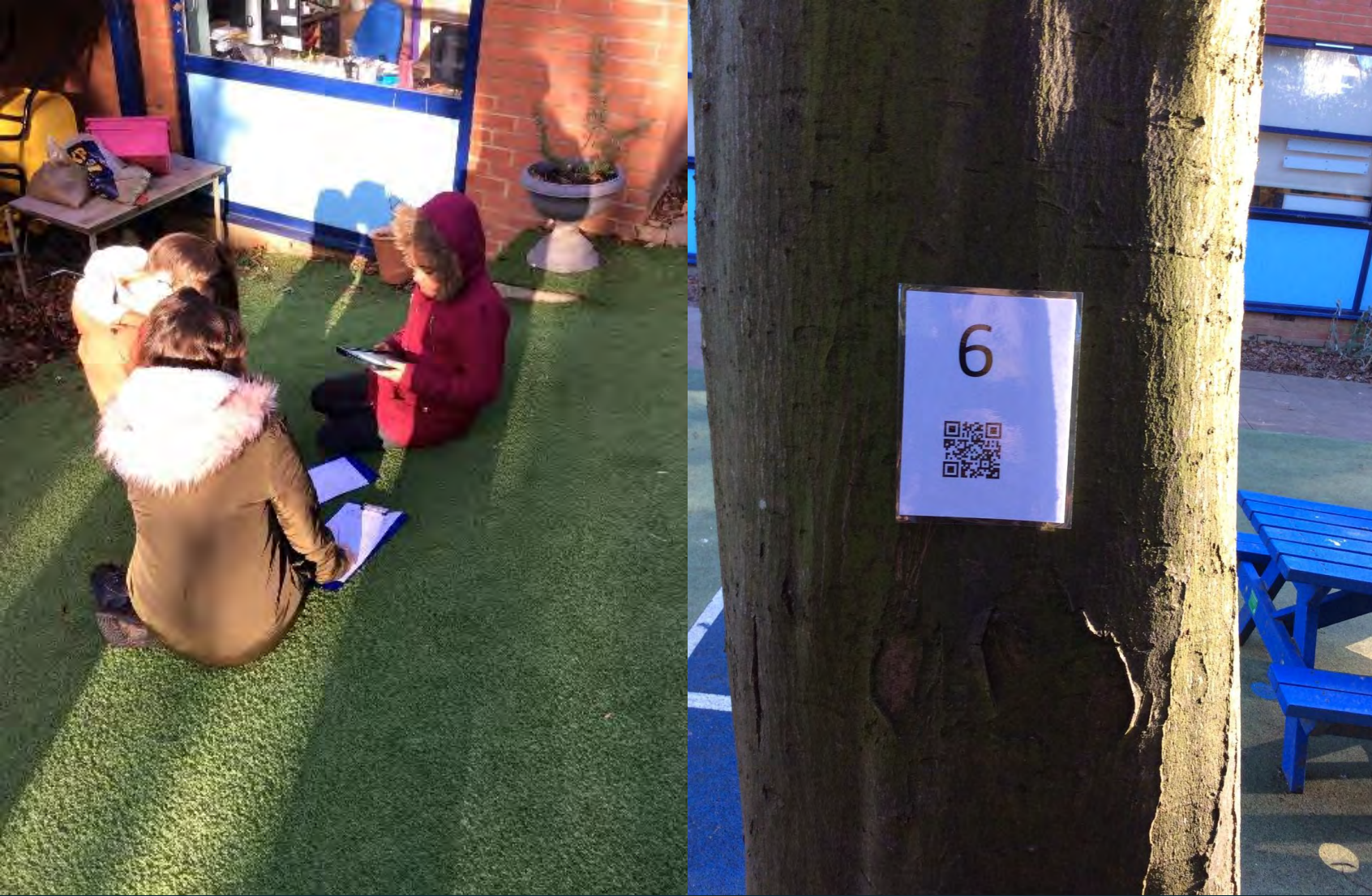
Convention 2 – Question Swap



Convention 3 – Maths Trail



Convention 4 – Escape Room



Convention 5 – QR Codes

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