

# Playful mathematics

Helen J Williams discusses learning mathematics playfully.



Figure 1: What might play out? (Photograph by Esther O'Connor)

Lay out a large, plain tablecloth on the floor, your collection of chocolate box innards and baskets of loose parts such as pebbles, cones, shells, beads, penny coins, bottle tops, buttons, along with a collection of dice (See Figure 1).

I wonder what will play out? What might I notice? I am ready to hear some counting, which is why I have chosen large quantities of loose parts to invite organisation and containers to count into, some subitising, which is why I have chosen dice with few dots and maybe some patterning, as children decide what to pick out to count and how to arrange their items. Prepare to listen to the children, rather than for something specific, and to play alongside them. Take their leads. Make some mental notes of what to follow up on. Are they interested in playing a collecting game? Can they articulate some rules for their game? Should I provide containers with lids next time to encourage filling to see how many each holds?

Mathematics could be like roller-skating, but usually it is like being told to stop roller-skating and come in and tidy your room. This is not a superficial matter. (Winter 1992, p99)

This quotation from Richard Winter opens my book *Playful Mathematics for Children 3 to 7*, and I would have liked 'Roller-skating rather than tidying' as my book title. However, the publisher indicated that it

would not be clear what the book was about. Fair point. The task above is an invitation for practitioners to try something with children in the spirit of the quotation.

I have always been interested in the intersection of play and mathematics. Play is intrinsically motivating. It is memorable and mindful. We can use that to make mathematics that is much more in touch with the learners we work with, providing a space where they can build on their prior experiences. Although I am writing about Early Years, recognised internationally as the period from birth to eight years of age, I am aware that some, perhaps many, of the messages have something to say about the learning and teaching of mathematics more generally. I hope my writing raises questions for discussion amongst colleagues teaching mathematics in all phases. I believe firmly that a playful approach to teaching mathematics is one way of approaching a more humane mathematics education, or rather, in the words of Francis Su a 'mathematics for human flourishing' (Su 2020). Doing mathematics is part of being human. Each and every learner is entitled to a broad and deep experience of mathematics that connects with their existing knowledge and understanding and helps them to flourish.

Firstly, play and playfulness. Play is an "ambiguous and slippery concept" (Sutton-Smith 2001) as the word encompasses such a heterogeneous assortment of activities, from the private to the public performance. I choose to use 'playful'. I also choose to use 'playful' to emphasise that, even if it is the adult that has initiated the mathematics, it is possible to grant the learner agency in what plays out after that. A key characteristic of play is that the experience is self-directed. Being playful combines play and guidance. We can utilise the motivation and creativity that children bring to their free play with a Vygotskian recognition that children's learning can be expanded when sensitively supported by an adult. Skene and her colleagues refer to this as 'guided play' (Skene *et al* 2022) which includes time for children to take a lead in what happens.

I was alerted by a colleague to two ways to think

about playful mathematics:

- play that has opportunities for mathematics within. Often children's free play presents rich opportunities for us to develop some mathematics, but this needs spotting and nurturing; for example, children playing at being on stage or doing a dance could gradually become involved in arranging some ticket sales for a show.

and

- mathematics that has opportunities for play within. When I introduce a taught episode of mathematics, where I am clear what I would like to be learned, I ensure I include an element of playfulness and an opportunity for the child(ren) to have choice and agency over what takes place. This provides me with fresh ideas to develop over time.

I think it does help me to think about whether I am mathematising play or playing with mathematics. Both are important. Here are examples of each.

#### An example of mathematising play



(Photograph by Maeve Birdsall)

I have put a masking tape 'line' around each transparent container in the water tray. I model how to fill the different containers using a jug, carefully to the 'fill up to' line.

On others I add a vertical strip of masking tape for children to mark where the water comes up to when a jugful is poured in. Here, play is already taking place, and I aim to focus our attention on the amount of liquid in the various containers to enable our later discussions comparing these using and extending our mathematical vocabulary.

#### An example of playing with mathematics



(Photographs by Maeve Birdsall)

I have prepared some work on measuring length by greeting the children as they arrive and handing them a length of tape or ribbon cut into different lengths: "Good morning Sam, here is your measuring tape for today. We will be doing a lot of measuring this week." I observe them comparing their tapes with each other and encourage them to talk about what they notice. I ask them what they are going to measure. Can they find something somewhere that is *exactly the same length* as their measuring tape? Here, I have begun the mathematics and am encouraging children to play with the idea.

If we accept that play is a major factor in children's cognitive development, and there is plenty of evidence out there to support this, there are four issues from the play literature that I think are particularly relevant to effective and enjoyable mathematics learning:

Play promotes **curiosity**

Play presents **challenge**

Play provides **time**

And, as play is revocable and uncoupled from the usual consequences of actions, then an additional important issue for mathematics is that of identity. How we think of ourselves in relation to a subject

and our self-image influences how well we do and how we approach a subject. And this, in the words of Richard Winter from the opening of this article, “is not a superficial matter”. There is an emotional as well as a cognitive aspect to mathematics and learning is about relationships as well as subject matter. The relationships we establish with both our students and with the subject itself. I believe from all my work with children and adults that making sure there is time for play as well as approaching tasks with playfulness can affect both these relationships positively. This is a more humane view of teaching and learning, with relationships and emotion at the heart of what and how I plan to interact with the children.

Mathematics should take place in a safe space for learners to question, try things out, explore, think and voice ideas. Play and playfulness provide space and time for learners to think and play with the ideas we are teaching them. Moreover, being playful and allowing plenty of space for children’s own ideas helps them realise their potential as mathematicians and models respect for the ideas of others – adults and peers alike. I hope this article provides some starting points for working in this way, for humanising our mathematics teaching, in whatever phase you work.

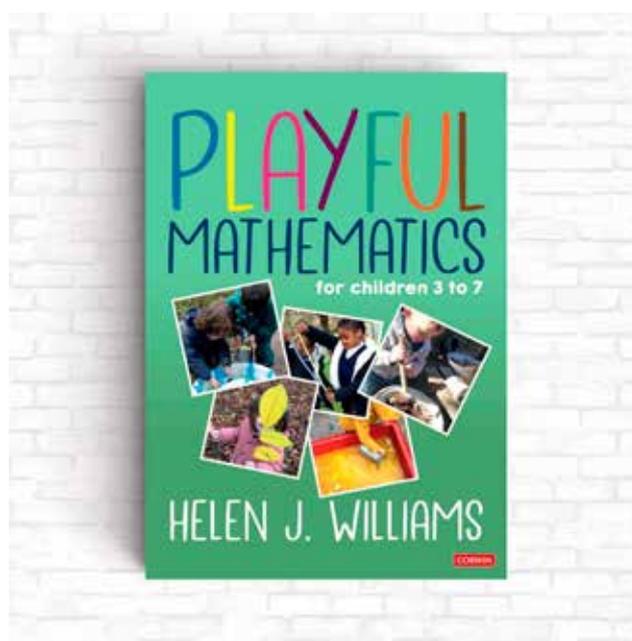
## References

- Skene, K., O’Farrelly, C. M., Byrne, E. M., Kirby, N., Stevens, E. C., and Ramchandani, P. G. (2022). Can guidance during play enhance children’s learning and development in educational contexts? A systematic review and meta-analysis. *Child Development*, 00, 1–19.
- Su, F. (2020). *Mathematics for Human Flourishing*. New Haven: Yale University Press
- Sutton-Smith B. (2001). *The Ambiguity of Play*. Cambridge, Mass.: Harvard University Press.
- Williams, H.J. (2022). *Playful Mathematics for Children 3 to 7*. London: Sage
- Winter, R. (1992). ‘Mathophobia’, Pythagoras and roller-skating, in Nickson, N. and Lerman, S.(eds.) *The Social Context of Mathematics Education: Theory and practice*. London: Southbank Press.

**Helen Williams is a freelance educator and the author of *Playful Mathematics for Children 3 to 7*.**

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**Loughborough University’s LUMEN PD videos include one where Helen discusses how she sees the role of playfulness in mathematics learning: <https://www.lboro.ac.uk/services/lumen/professional-development/playful-mathematics/>**



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