

Creativity and mathematics: Practitioner Perceptions

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With the introduction of the Foundation stage curriculum in England (2000) – now the Early Years Foundation Stage (EYFS), came a renewed interest in ‘creativity’. We had seen how very creative the processes of learning mathematics can be for young children and in 2003/2004 carried out another study with over 200 teachers and practitioners in the 3 – 7 year age-range.

We were interested to discover to what extent teachers see mathematics as providing opportunities for creative thinking and ways of working in mathematics. What sort of things had they seen children do in mathematics that they identified as ‘creative’? What did they know about any official guidance on teaching early ‘written’ mathematics? How did their understanding of early childhood development – particularly of the importance of self-initiated play, talk, thinking and mark-making to support children’s learning inform their practice?

NOTE: Below we use the term ‘teachers’ to include teachers and practitioners in the study.

Data was collected from:

- 231 practitioners in three areas of England completed questionnaires, with follow-up telephone interviews with approximately 10% of teachers, to explore responses in greater detail
- Practitioners were from maintained nurseries; voluntary pre-schools; private day nurseries; Reception classes; Reception / Y1 classes

Some findings:

- 65% of practitioners thought that mathematics was either ‘quite’ or ‘a lot’ creative: 29% thought it was ‘very’ creative
- The majority (over 79%) gave non-specific examples (resources or activities) of children engaged in ‘creative’ mathematics

Examples of ‘creative mathematics’

- Role Play – 12%
- Patterns – 12%
- Construction – 9%
- Art (printing, painting, collage) – 7.5%
- Songs and rhymes – 5.1%
- Sand – 4.6%
- Other (various) – 40.8

- Examples cited suggest that practitioners tend to see creativity in mathematics as concerned with specific *resources or activities*, rather than *processes*

We invited practitioners to provide specific examples of something they had seen a child do that was creative in mathematics: however, only one teacher out of 231 responded in this way. This may suggest that teachers fail to 'see' mathematics when observing children

- Almost 43% said they were either unsure or confused by the official guidance for teaching early 'written' mathematics – or left this question blank
- Mathematics through self-initiated play, talk and thinking were cited as creative by only 9% of practitioners
- Just 5% cited children's mathematical mark-making - their mathematical marks or early 'written' mathematics (children's mathematical graphics) as creative

In another study with teachers on the use of children's own written marks and written methods (see Worthington and Carruthers 2003b) teachers told us that they rarely kept examples of children's informal mathematical marks, thereby missing valuable opportunities to inform their understanding of individual children's development. This suggests that children's own marks - particularly when they are made within child-initiated play contexts – are not seen as significant in contributing to the children's developing understanding: children's 'written' mathematics appears to be seen as significant only when it is the outcome of a teacher-directed activity.

We also compared examples of 'creative mathematics' identified by teachers in this study (Carruthers and Worthington 2005b), with examples of children's *mathematical graphics* from our earlier research (Carruthers and Worthington, 2006; Carruthers and Worthington 2005a).

Teachers and practitioners appear unclear about many of these critical aspects, suggesting that the guidance for practitioners in the Foundation Stage document (and also the guidance from the Numeracy strategy, for reception teachers) both need to provide greater clarity. There is also much for practitioners to consider in respect of pedagogy of early written mathematics.

Carruthers, E. and Worthington, M. (2005a) 'Making sense of mathematical graphics: the development of understanding abstract symbolism'. *European Early Childhood Research Association Journal*, (13(1), 57-79.

Carruthers and Worthington, (2005b) 'Creativity and Cognition: the Pedagogy of Children's Mathematics'. *European Early Childhood Research Association (EECERA) Conference*, Dublin: (unpublished).

Carruthers, E. and Worthington, M. (2006) (2nd Edition) *Children's Mathematics, Making Marks, Making Meaning*, London: Sage Publications.

Worthington, M. (2005) 'Reflecting on creativity and cognitive challenge: visual representations and mathematics in early childhood – some evidence from research' TACTYC: <http://www.tactyc.org.uk/pdfs/worthington.pdf>