

Martin Hughes Memorial Scholarship: Bristol University

The Pedagogy of Children's Mathematical Graphics in Calculation: Teacher Perspectives.

Elizabeth Carruthers; first recipient of the scholarship

My research has its roots in Hughes' 1986 work on children and number. Hughes observed that four year olds could represent quantities in a variety of ways. The noteworthy aspect of his research was that children were using their own thinking; they were not told what to draw or write or given a model to copy. Therefore his research uncovered young children's own and unique abilities to represent their thinking mathematically. My original work with Maulfry Worthington (Worthington and Carruthers, 2003; Carruthers and Worthington, 2005) confirmed and expanded on Hughes 1986 work. Hughes methodology was based on quantitative data using clinical studies with children; our work followed children's own mathematical thinking in all mathematical areas using ethnographical enquiry.

Building on my research on *Children's Mathematical Graphics* the scholarship work is researching teachers' deep awareness of their mathematics teaching encompassing children's thinking in calculation.

Ginsberg's (1977) and later Hughes (1986) studies revealed that children have difficulty with writing and understanding standard forms of mathematics. Equally teachers find introducing the abstract symbolism of mathematics difficult (Ofsted, 2011). This is one of the key questions of my study; what are the difficulties that teachers of young children have in teaching written mathematics?

This is participatory research (Garibaldi, 2012) with reception and nursery teachers. They are reflecting on their own educational practice in mathematics focusing on their developing knowledge about children's own ways to represent calculation that support their mathematical understanding.

The theoretical perspective on learning and teaching is open and democratic putting forward theories of mediation (Wertsch 2007) and obucherie (Scrimsher and Trudge, 2003) based on a sociocultural perspective (Vygotsky, 1978). Similarly this research also takes a positive stance on young children's ability to enquire and analyse. In 1984 Martin Hughes conducted research in nursery schools and homes with Barbara Tizard and they uncovered the power of young children as meaning makers.

'Despite their limited years we found ourselves being continually surprised and impressed by these young children. As we studied their conversations we were forced to admire their curiosity, their open questioning minds, and above all, the persistent and logical manner in which they struggled to make sense of their world.'

Tizard and Hughes (1984)

It is this energy and enthusiasm for young children's learning that also drives my research, funded by the Martin Hughes Memorial Scholarship.

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Elizabeth Carruthers (2013)