Carruthers, E. and Worthington, M. (2011) *Understanding Children's Mathematical Graphics: Beginnings in Play*. Maidenhead: Open University Press.

FOREWORD

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> *Each picture told a story; mysterious often to my undeveloped understanding ... yet ever profoundly interesting* (Bronte, 1994: 10-11).

When asked to write this Foreword, I confess to having a very 'undeveloped understanding' of children's mathematical graphics as determined by the book title. Whilst children's pictures and drawings have always held a profound interest for me and many other early years educators, the rationale behind children's representations and creations has often eluded me and I have resorted, no doubt like many readers, to saying 'Tell me about your picture' in the hope of some elucidation of what I might do or say next to the child! Within a few pages of starting to read this book, I felt a certain 'guilt' that I could have done considerably more to understand the meanings behind children's playful representations especially in mathematics.

Graphics appear to be so much more than 'drawing' – graphics are ways of representing thinking, in this case, that of children from birth-to-six-years. As Embree (2010) enquires:

> Why do we include graphics … to summarize computations, to explain difficult ideas ... A graphic demands at least as much care as the text that surrounds it, often rather more. (no page number).

This is exactly what children are trying to do, according to the authors of this book – explain their own ideas and computations. Through a series of carefully observed and convincing examples of children's play, the authors outline their understanding of how children's mathematical graphics develops. They show how, with sensitive adult interaction, analysis and interpretation, what might be described as playful 'scribbles' or 'marks' made by children can have a deep, well-conceived meaning to the individual child and relate closely to his or her intellectual development.

The authors make it clear that ‘graphics’ is so much more than merely an ‘outcome’. Graphics in mathematical experiences are part of the processes of maths learning and the whole problem-generating and problem-solving ethos that we try, as educators, to develop in, and for, our learners. Those playful mathematical experiences and challenges which are initiated by the child are likely to be richer and more motivating as well as being a stimulus for children’s sense of self-worth, self-confidence and competence. They are also more likely to ensure that the children’s voices are clearly heard amongst the (necessary but sometimes overwhelming) bureaucracy and direction which seem to permeate curriculum and assessment in England especially. ‘Child-initiated experiences rely on the child being competent and knowledgeable about their own needs and choices’ (Moyles, 2008: 33), a point also stressed throughout the chapters of this book.

The emphasis we, as educators, tend to put on ‘outcomes’ of maths and other ‘work’ for children, can militate against them developing their own deeper cognition and indicate that adults are sometimes working against the children’s understanding rather than extending it. Practice, as explained in this book, should be geared towards adults’ waiting, really listening to children, and, in so doing, thoroughly understanding what children can already achieve in mathematical thinking through their representations, leading to knowledge of how to extend their learning. Superb examples proliferate in this book which will effectively support playful pedagogies (Moyles, 2010).

The importance of appropriate pedagogies and the building of environments that support children’s mathematical thinking are key factors in determining success for educators and children. The adults’ roles – and their reflection on those roles and provision for learning (Moyles, 2010) – cannot be overstated, especially in observing and planning for spontaneous mathematical opportunities for learning, both of which are richly expressed in Elizabeth Carruthers’ and Maulfry Worthington’s writing. As Goouch 2010) asserts:

> To accompany children in their play is a sophisticated role that can be achieved only by those who know and understand children, who are able to allow the sometimes complex intentions of children at play to take precedence and who will demonstrate respect for such intentionality (p.55-56).

The emphasis on the ‘intentionality’ of young children’s graphics is an excellent point for readers to appreciate given that children’s actions sometimes defy adult logic! Children are not merely making marks but more often than not have logical intentions behind the shapes, forms and lines they represent. It is up to the adults to interpret, alongside the children, what are their deeper intentions and meanings, sharing power and knowledge and achieving success and motivation in mathematics.

The close links between children’s mathematical graphics and algebra and trigonometry are undisputable and whilst it may seem that young children are still a world away from needing that level of mathematical understanding, it is clear in this book that they start at a very early age instinctively to develop these complex ideas. Aside from children, the book will really make readers explore the concept of mathematics and graphics as a personal understanding of a complex system which children – if freed from directive teaching – can readily use to make sense of maths for themselves.

One cannot fail to be enamoured throughout this book by the thoroughness of the arguments and examples put forward by the authors as well as the way in which the writing is totally embedded in children and their daily graphical/mathematical experiences. The taxonomy of mathematical graphics developed by the authors over several years from many meticulous observations will effectively enable early years educators to sustain children’s mathematical learning and understand for themselves how development and progress occurs. If you struggle to teach maths and are concerned about ‘written’ evidence, then you will appreciate the comprehensive coverage of the issues surrounding maths teaching to young children, especially the birth-to-threes. Even those who are already keen and skilled early years maths teachers will enhance their own learning and practice substantially through absorbing the contents of this book.

Returning to the beginning and the Charlotte Bronte quote, the many examples of children’s graphical representations contained in this excellent book have certainly proved ‘profoundly interesting’, have unravelled the ‘mysterious’ and enabled me to develop my very ‘undeveloped understanding’ of this area. The many illustrations of children’s mathematical graphics tell their own story as is illustrated in the oft-quoted saying: ‘A picture [in this case a *graphic*] is worth a thousand words’ (unknown origin). As very young children often cannot express what they mean in words, our recourse, as educators, must be towards their graphics and other representations.

I feel certain that, through this book, other readers will develop their mathematical knowledge and that young children's intellectual and emotional development will be enhanced as a result of early educators using the taxonomy and carefully conceived ideas generated throughout this book.

References

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