



### *Design + play = maths*

*Sue Southey*

Sue teaches pre-Prep aged children at Springwood Community Kindergarten. Recently seconded to the Office for Early Childhood Education and Care, Sue has provided professional support for long day care services working with the Queensland kindergarten learning guideline. Sue is Vice President of the Early Childhood Teachers' Association and a sessional lecturer and tutor at Griffith University, Gold Coast. In 2009 she was a State and Territory recipient of the ASG NEITA award.

#### **Why mathematics in kindergarten?**

Traditionally, kindergarten practice has focussed on creative domains such as literacy, visual arts, social play and music. Mathematics, perhaps because it is perceived to be less creative, is often overlooked in responding to children's everyday experiences. However, an increasing focus in literacy and numeracy outcomes for children, is placing pressure on educators to develop mathematical skills and knowledge in young children (Hirsh-Pasek, Golinkoff, Berk, & Singer, 2009). The risk of emphasising mathematical content knowledge is that educators, who are not confident mathematical thinkers, may revert to didactic forms of teaching such as worksheets, rote and drill to build mathematical understandings. One solution to this challenge is to engage children in active learning that enables them to construct their own mathematical understandings through building and design. Traditionally, this has taken place in block and construction play. However, an alternative form of play is 'arranging' in which children design, using open-ended materials.

#### **What is 'arranging'?**

'Arranging' has similarities to block play. In both construction and design play, children are managing and controlling objects in space. Like block play, arranging play can be done either individually or collaboratively. However, in contrast to block play, arranging is done on a smaller scale and allows children to use a wider



*Managing and controlling objects in space.*



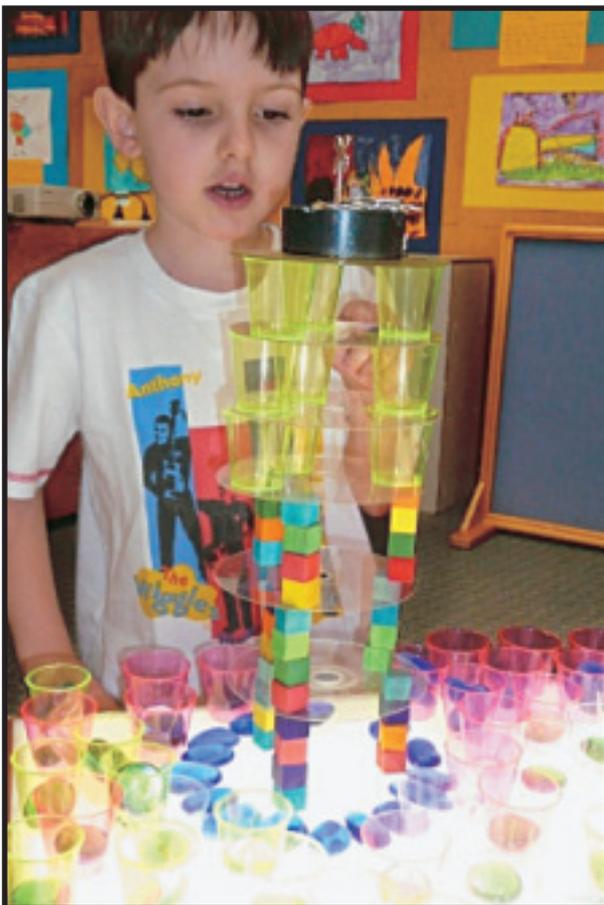
*Arranging.*

range of materials. Whilst the units of block play are all similar, only varying in size, the objects for arranging are much more varied, and are always offered in sets. Baseboards, such as mats, mirrors or light boxes, provide a manageable space upon which to design.

### **How does arranging build mathematical understanding?**

As children design either in two or three dimensions, they create elaborate and aesthetically pleasing creations. It appears that children's pleasure in this design work is motivated both by a need to impose order on the objects and to create beautiful designs.

*Children create rules for themselves that allow them to build features such as lines, matching objects one for one, enclosing space, building towers, bridging, creating symmetry, patterns and tessellating shapes.*



*Designing.*



*Imposing order.*

These rules and features reflect relationships between objects which can be described in mathematical ways. Experience with these mathematical relationships builds foundations for children's understanding of concepts such as number, patterns and algebra, measurement, shape, and geometry.

### **What are the intentional teaching strategies?**

This creative work supports learning in a range of learning domains. However, of particular interest is the way in which this design work can be used to build children's mathematical understandings. Intentional teaching in this context is more than facilitating time, space and resources. It requires educators to see the



*Creating complex designs.*

possibilities for connecting children's everyday experiences with mathematical ways of thinking (McLachlan, Flear, & Edwards, 2010). Although children are conscious of creating their own rules as they impose order on these objects, they are unlikely to have the appropriate mathematical language to describe what they are doing (Gifford, 2005).

*By mediating between the child's creation and the relevant mathematical language, children can be given the tools to think more abstractly and mathematically about their designs.*

As children work alongside each other, and collaboratively, they share ideas, describe their actions and problem-solve together. This provides shared sustained conversations (Siraj-Blatchford, 2009) using mathematical language about the children's own designs and creations.

*Children's ability to persevere and create complex designs, seems to indicate that many of these designers are engaging in high level thinking that transforms the way they think about everyday objects.*

To summarise, 'arranging' provides a useful tool for engaging young children in mathematical learning within a play-based curriculum approach. The educator's role is both to facilitate the play by providing resources, time and space, and to mediate between the child's play and mathematical concepts. In a political environment where

there is increasing pressure to demonstrate mathematical learning, 'arranging' provides a context that both aligns with play-based approaches and facilitates learning.

### References

- Gifford. (2005) *Teaching mathematics 3-5*. Maidenhead: Open University Press.
- Hirsh-Pasek, K., Golinkoff, R. M., Berk, L. E., & Singer, D. (2009) *A mandate for playful learning in preschool: Presenting the evidence* Oxford: Oxford University Press.
- McLachlan, C., Flear, M., & Edwards, S. (2010) *Early childhood curriculum: Planning, assessment and implementation* Cambridge: Cambridge University Press
- Siraj-Blatchford, I. (2009) Quality teaching in the early years. In A. Anning, J. Cullen & M. Flear (Eds.), *Early Childhood Education: Society and Culture* (pp. 147-157). London: Sage.



*Aesthetically pleasing creations.*