



Title	Using appropriate resources to assist in developing mathematical ideas
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# Using appropriate resources to assist in developing mathematical ideas

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One of the recommendations of the *Early Childhood Mathematics Position Paper* is that educators provide appropriate resources. These resources, both human and material, assist young children in learning about mathematical ideas and ways of thinking. This elaboration provides those who work with young children with some ideas about appropriate resource provision.

## **Physical environments**

A physical environment rich in resources can support children's early mathematical learning. The materials provided should stimulate questions, encourage thinking and provide challenge. Frequent changes of equipment can stimulate new questions and build new understandings. These resources may take many forms, such as appropriate technology, children's literature and hands on manipulative materials; all of which contribute to children's learning of important mathematical ideas.

## **Hands-on manipulative materials**

Young children learn about their world through exploration, play and hands on experiences with objects. By manipulating objects, children build visual images of mathematical ideas such as number, shape, pattern and size which helps them deal with increasingly abstract ideas in later years of schooling.

Research in England, Japan, China, and the United States supports the idea that mathematics instruction and student mathematics understanding will be more effective if manipulative materials are used (Canny, 1984; Clements & Battista, 1990; Dienes, 1960; Driscoll, 1981; Fennema, 1972,1973; Skemp, 1987; Sugiyama, 1987; Suydam, 1984) (all cited in Heddens, 1997)

In the early years, children need access to a wide range of hands-on materials which challenge their thinking and develop their problem solving skills. Activities such as simple jigsaw puzzles and 'posting' boxes for shapes are ideal for young learners and experiences with counters and other manipulative materials help build ideas about number, pattern and measurement in the early years of schooling.

It is important to note that just giving children the manipulative materials will not lead to mathematical learning. It is the questions asked of children, the activities planned for them and the interactions between adults and the children as they explore and use the materials which will lead to the development of mathematical ideas and thinking.

## **Everyday items**

Many useful learning resources can be readily sourced from around the house, child care centre or the local environment. Children do not need expensive toys and games to build early mathematical ideas. They can learn to count by using pegs, bottle tops,

shells, toys or straws and can learn to recognise numbers by using a calendar or having numbers pointed out in the environment; e.g., on car number plates or street signs.

Boxes and other containers help children learn about shapes, sizes and they benefit from building and stacking with them. Containers can also be used in play with sand, water and other materials to explore measurement (“How many cups of sand fill the bowl?”).

Everyday texts such as supermarket catalogues, maps, cereal boxes, milk cartons and junk mail are also useful resources to talk with children about numbers, shapes, locations, sizes and measures.

## Literature

Young children love to listen to stories and involve themselves in songs and rhymes. Many of these include mathematical ideas which can be drawn out, talked about and shared with young learners. Books such as *The Very Hungry Caterpillar* and old favourites such as *Goldilocks and the Three Bears* and *The Three Billy Goats Gruff* highlight number and size. Remember to talk with children about the mathematical words in the books and use the illustrations to point out ideas; e.g., “Look at this big bear and this middle size bear.”

Rhymes and songs often use mathematical words and there are many old favourites which help children to build understanding of the sequence of numbers used to count. These include *One, two, three, four, five once I caught a fish alive* and *Three jellyfish*.

## Technology

Today’s children live in an increasingly technological world. Many mathematical experiences can be gained from their interactions with computers, calculators and other technologies, such as mobile telephones, MP3 players, etc.

Basic calculators can be incorporated into play situations even for very young children; e.g., a “shop” or a “post office” might be set up to encourage dramatic play and the use of appropriate mathematical language. Teachers, carers, parents and others can develop this language and mathematical ideas by involving themselves in the play and challenging children through asking questions and modelling the use of technological resources. For example the adult might say:

“I need a big envelope to post my papers in and I’d like a \$1.00 stamp for it. Can you use your calculator to tell me how much that will be?”

“I need to make a booking at the hairdressers; can I use your phone to call them up? The number is 333445559.”

Many computer programs and websites are also useful for encouraging young children to engage with mathematical ideas such as counting, numeral recognition, ordering and naming shapes. When selecting websites, try to look for interactive, open-ended and challenging activities, rather than repetitive tasks.

## Human resources

Some of the most important resources to assist young children in their mathematical learning are the people they interact with. By talking with children, questioning their thinking and modelling the use of mathematical language, thinking, tools and materials, adults scaffold children's understandings and encourage them to solve problems in creative ways. "Young children learn powerful lessons when [adults] model problem solving strategies, convey the joys of finding solutions and acknowledge the frustrations during challenging moments" (Copley, 2000).

Interactions with peers are also important in helping children use appropriate language and understand that the same problem may be solved in different ways but still reach the same conclusion. They learn from listening to other children as they talk about ideas such as size, shape and number, and benefit from hearing mathematical language.

## Concluding comment

Young children benefit from access to and interactions with a wide range of physical resources for learning early mathematics. However, any amount of materials will not replace quality interactions between adults and children which are vital in maximising learning opportunities.

## References

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Some resources available from the AAMT catalogue to support the provision of appropriate resources:

- 2Calculate* (n.d.) [software]. 2Simple Software Australia.
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- Swan, P. (2006). *Developing Mathematics with Pattern Blocks*. Greenwood: RIC publications.
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Go to <http://www.aamt.edu.au/shop> for more information about these and other AAMT resources.