



The Early Years Learning Framework Professional Learning Program



Being numerate

Setting the scene

'Becoming literate' was the subject of the EYLF PLP e-Newsletter No. 18. Early childhood educators are sometimes more confident with 'literacy' than they are with 'numeracy' and yet both are essential foundations for living and learning.

The *Early Years Learning Framework* (EYLF) (DEEWR, 2009) defines numeracy (p. 38) as:

... the capacity, confidence and disposition to use mathematics in daily life.

Spatial sense, structure and pattern, number, measurement, data argumentation, connections and exploring the world mathematically are the powerful mathematical ideas children need to become numerate.

Everyday learning about maths (Connor & Neal, 2005) explains (p. 3) that:

Mathematics plays an important part in our everyday lives. We use maths when we read a bus timetable, find our favourite TV program, weigh out ingredients for cooking, check our money at the supermarket, or set the table for dinner.



The foundations of numeracy

The EDL referred to above, reminds us (pp. 5–14) that babies are 'learning about numeracy' as they move their bodies about in space and listen to older children and adults counting baby's fingers and toes ... 'this little piggy went to market', singing number rhymes, counting steps as they go 'up, up, up' and talking as they dress the baby ... 'one button, two socks, a big, warm jacket for this cold day'.

Toddlers learn about numeracy as we:

- count things, look for shapes
- use words about weights and measures
- talk about the volume a bucket will hold
- estimate distances ... It's a long way to the Mulberry tree, but the sandpit is much closer
- divide up and share out food.

Preschoolers are beginning to recognise numerals in the environment and discuss their purposes—house numbers tell location, bus numbers show destination, car number plates indicate ownership. Children in this age range talk about numbers, shapes and measurements—'I'm as tall as the door knob now'—and they solve problems involving numeracy all the time, as they decide things like: How many trains will go in the station? How high can I build my tower before it falls over? Is the tower stronger if I put bigger blocks on the bottom and smaller ones higher up?

They are beginning to use symbols, such as numbers and letters (often mixed up) in their drawings and paintings.





Numeracy is more than 'numbers'

In their Research in practice book *Stars are made of glass: Children as capable and creative communicators* (2010), Leonie Arthur, Felicity McArdle and Marina Papic provide valuable definitions and examples of the elements that comprise 'numeracy':

(p. 7) Spatial understandings include two- and three-dimensional shapes, position (under, over), location (near, far) and orientation (turn, roll).

(p. 7) Measurement understandings include concepts such as height, length, mass and temperature.

(p. 8) Predicting and estimating involve using 'data' or information to suggest, for example, which object will be fastest, or which will sink.

(p. 8) Problem solving involves investigation, questioning, trial and error, divergent thinking and decision making.

(p. 6) Number understandings involve the capacity to count and order numbers and to recognise and write numerals. Number also involves comparing quantities and dividing objects and groups into smaller parts.

(p. 10) Sorting, ordering and classifying are important maths/numeracy concepts and educators support children in this learning when they provide and ask children to find, collections of objects, such as pine cones, shells, leaves and pebbles.

Children enjoy making patterns with such objects and sorting them into groups defined by particular attributes—all the long ones, brown and red ones, rough and smooth ones, spiky and round ones ... Educators help children to compare objects—bigger/heavier/longer/less/more—and to sort and order items into similar and different groups.

And, number is more than counting. One of the most important understandings is that a number can be used only once to refer to an item. 'One-to-one correspondence' takes more time and practice to learn than simply counting. We help children to develop this understanding when we ask them to hand out items to other children, for example—one for Ben and one for Mercy ... that's two, and one for Sarah ...

Numeracy in action

Kathy noticed that some children in the 3–4 room were struggling to complete unfamiliar puzzles. She'd also noticed that Sienna mentioned that 'her bed has four corners'. So, Kathy planned a game about 'corners':

We began by looking at different shapes and counting the sides and the corners. Then we played the game: One person called 'It', sat in the middle of the mat and counted to 10, while others quietly moved from one corner to the next until 'It' called stop. We all stopped on a corner and the next 'It' was chosen by calling out the number of a corner, for example, one, two, three or four.

Kathy linked this learning to Outcome 4: Children are confident and involved learners. She planned to introduce the correct names for shapes and to talk about edges and surfaces.

Kathy also noticed that Alex was trying to put a glove from the home corner on his 'wrong hand'. She helped Alex to draw around his hands and to compare his 'monster hand' with the glove on, with his 'real hands'.

Kathy introduced the language of size. She provided concrete materials for Alex to make comparisons.

Janet observed Reuben working hard to create a pizza from play dough, using a plate to ensure it was round and rolling long pieces for the meat strips and small pieces for the vegetables. He then used a knife to cut it into pieces and shared it among children at his table.

Janet interpreted this learning as: Cooperative play, communication skills, manipulation and fine motor skills and developing concepts for maths and numeracy.

This was a great opportunity for us to talk about maths, as we spoke about 'the whole' and 'parts' and how the pieces would 'fit back together again'. It won't be long before Reuben begins to understand that 'fractions' are equal parts of a whole.

Deanna was amazed at the maths and numeracy understandings demonstrated when Jake constructed a 'scoop machine' and then used rectangular wooden blocks to make a fence around it, aligning each piece perfectly, horizontally, ensuring they were stable and balanced.

She noted his persistence, creativity and problem solving, deciding that he was 'a confident and involved learner' able to resource his own learning (Outcome 4) and was developing understanding of space, shape and spatial relationships (Outcome 5). She planned to introduce mathematical language relating to spatial understandings.



Numeracy and EYLF Outcomes

'Numeracy' is embedded in several EYLF Learning Outcomes:

Outcome 3 (p. 32):

Children demonstrate spatial awareness and orient themselves, moving around and through their environments, confidently and safely.

Outcome 4 (p. 35):

Children create and use representation to organise, record and communicate mathematical ideas and concepts.



Children contribute constructively to mathematical discussions and arguments.

Outcome 5 (p. 40):

Children demonstrate an increasing understanding of measurement and number using vocabulary to describe size, length, volume, capacity and names for numbers.

Children use language to communicate thinking about quantities to describe attributes of objects and collections, and to explain mathematical ideas.

(p. 43) Children notice and predict the patterns of regular routines and the passing of time.

Children begin to recognise patterns and relationships and the connections between them.

Children begin to sort, organise and compare collections and events and attributes of objects and materials.

Conclusion

One of the most valuable ways an educator can support young children's developing numeracy is to provide the language to talk about maths and mathematical ideas.

That means that educators need to understand mathematical concepts and to recognise the potential of everyday situations for rich numeracy learning.

A set of useful cards was developed a few years ago in a DEST-funded project (DEST, 2006). The cards explain the 'maths' behind setting the table, sharing food, jumping on a trampoline or cooking, for example:

- Heavy and light are about mass
- Sharing is about division
- Half here! Half over there! is about fractions
- Straight, curved and bent are about shape
- Top and edge are about area.

Educators can talk with families about numeracy and put up charts with fun ideas for numeracy at home:

- Counting as children dress in the mornings and pack their lunch
- Locating items of clothing using positional language—over, under, beside, on top of ...
- Measuring—the days of the week, the time on the clock, the number of sleeps until a birthday ... the distance to Nanna's, or the shops ...
- Talking about weight, volume and capacity when cooking, comparing food packaging and clothes sizes
- Sorting, ordering and classifying as goods are put away when they come home from the supermarket
- Finding numerals in the environment and talking about their purposes; counting out table settings and sharing out portions.

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Acknowledgments

Balaclava Road Children's Centre, Cairns, Qld
Gurlongga Njininj Child Care Centre, Perth, WA
Subicare Child Care Centre, Perth, WA
Yarrabah Pre-Prep, Yarrabah, Qld
Cooloon Children's Centre, Tweed Heads, NSW

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Books to support numeracy

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The EYLF Professional Learning Program is funded by the Australian Government Department of Education, Employment and Workplace Relations.