OUTDOOR MATHEMATICS

Jackie Kennard describes how to use the outdoor environment for some exciting early years mathematics.

The activities and suggestions in this article reflect my experiences over the past 40 years. One of the most interesting developments in teaching has been the growing importance of the outdoor environment. Whether it be playground, garden or field, the outdoors offers a range of challenging experiences, especially in the delivery of early mathematics. Oral feedback to parents, together with photographic displays, show that we plan and value the experiences with the same care as we do indoor activities.

Practicalities

Appropriate clothing and large apparatus such as trikes, trolleys, hoops and steps need storage in a shed, which can also contain large building blocks, stepping stones, hoops or construction kits. Large, numbered carpet squares, bouncy balls and large dice are useful too. A parachute is a wonderful aid to mathematical adventures. The fun element is so rewarding when you see children jumping along a number line, counting out lengths of piping or moving blocks around. Do join in, but remember to keep a spare set of clothes in the cupboard as a precaution!

Checking resources is important. Sand and water play equipment needs suitable covers. Hide-and-seek, counting, sorting and comparative activities mean that resources have to be checked, updated and stored with labels. I involve the children in this, as it is interesting to note who can share, organise and tidy-up.

Some initial ideas

Outside is a good place to set up mathematical areas of interest such as a garden centre or a builder's yard. How about a take-away or a railway station?

A portable table or large baskets can be a rich source of early money work and comparison of weights. Use ***My Granny went to market: A round the world counting book*** (Blackstone, 1995), to introduce market stalls from many countries.

Markings on the playground can be mathematically stimulating. A clock face without hands, a hopscotch pattern, a spiral, concentric circles, a snake with numbered segments and a set of numbered squares provide inspiration for children of all ages. Paving blocks beside the playground can be used as 'canvasses' and become Rangoli mats for chalk patterns at Divali, the segments of a dragon at Chinese New Year as well as the background for painting with brushes of varying widths.

Outdoors with a topic

If you plan a topic such as 'Islands of adventure' or 'Pirates', mathematical experiences may include:

Labels and counting:

- Can you . . . put the ships, flags, mugs, shells in order? . . . match objects with numerals and names?
- If I have flags numbered 1. . . 4. . . 7 on my line, which are missing? Can you continue with one more? Can you find, match, make, write the numbers?

- Can we add the 'cannon balls' or flags from two or more ships together? Is the answer more or less than the numeral in my hand?
- Shake the dice and take away the appropriate number of fish. How many are left? Use the number line?

Comparisons:

- Treasure chests! Which is heavier . . . larger? Investigate size, lengths and patterns. Weigh the 'gold' rocks. Are there more rubies than emeralds? How did you find out?
- Arrange in order different lengths of rope. Make a circle with each one? What do you notice? Can you make a spiral? Can you see circles and spirals around you?
- Can you visit different islands (ships) to collect the treasure bags? Which will give us the greatest/fewest number of bags/coins? Which will add to 9, 10? How many more do we need if we all want a bag? How could we share the coins out fairly?
- If everyone in our group wants two coins, how many do we need in total to share out fairly? (The preparation work for much later multiplication and division is introduced through play and hands-on experience at this age.)

Shape awareness:

- Can you make a ship, lighthouse or home using the blocks / boxes?

Being noisy and messy outdoors

- Sing or dance number rhymes on a large scale. ***All join in*** (Blake, 1992) offers scope for keeping a steady beat with real or improvised instruments such as tin mugs, sticks, and home-made shakers.
- Throw large dice then tap, bang or scrape the number shown.
- A bag of compost is a wonderful resource for measuring activities.
- Hammering a set number of golf tees into a pumpkin brings concentration and scooping out the interior is delightfully messy. How many scoops will it take to empty?

Pattern

- Look at and describe patterns on shells or large leaves; use magnifying glasses. Can the children follow the lines of the veins with natural materials like small shells or pebbles, or man-

made materials like buttons or plastic mini-beasts? Use a digital camera or a video to record and compare results.

Bookworms and calculations

- Find a comfortable, shady spot. Spread out some cushions and books for browsing, look for numbers or making calculations. Books by Shirley Hughes, Nick Butterworth, Mick Inkpen, Brian Wildsmith and Eric Carle are favourite sources of mathematical inspiration.
- Count a group of objects, as seen in a book, in different ways and recognise that the total is still the same. This is fun with seeds, vegetables and fruit. Lay the matching objects in rows or columns.

A mathematics trail

Young children enjoy a sense of mystery or adventure, so an introduction to maths trails is a must. Begin with a ball of bright wool tied securely at the beginning of the trail. Decide in advance on possible 'recording stops' and the positional language you want to include. Do you want a link with a bear-hunt, or picnic with teddy bears or ***Rosie's Walk*** (Hutchins, 1992)?

Sequence some activities. Here are some examples:

- Count reliably to 10. Fill a mug or cover a plate with bricks, small dinosaurs or counting bears. Do you know, or can you find, a song or rhyme with this number in it? ***The Oxford 123 Book of Nursery Rhymes*** (McGough, 1992) is useful.
- Hide and seek. Six or ten toy ducks can be hidden and discovered. Have we found them all? How do we know? Can we put them in order?
- Collect plastic eggs of different colours in various containers. Sort according to size, material or colour. Then count and label. What would happen if we all wanted one for tea? Do we have enough? How many more do we need? How many are left over?
- Stop and play skittles. How can we record scores?
- Do we have enough cups/mugs for each of us to have a drink? How many bottles do we have in our carrier? Are they full, empty, nearly empty? How many cups can each one fill? Begin this as an adult-led activity and then let the children take over.

Planning issues

Think about how you will rotate groups. Will the activity be repeated, adapted, extended for differing abilities? Do you want adult-intervention or independent first-hand experiences? When are you planning to join in, to respond and extend children's understanding? Are you building up to a specific mathematical learning objective? But do allow time to explore, trickle, sweep, spoon and sieve sand before diving into a game or learning objective.

It is worthwhile monitoring the use of activity areas. What works/does not work? Would this be better indoors? Is the surface right? Do you have a teaching assistant or helper reporting back to you? Would checklists, photos, notepads, colour coding help? Try to be flexible and adapt the activities or resources if the learning activity can be improved.

Out and about

I took my classes to visit our chair of governor's back garden over the year and used this for mathematical discoveries and investigations. We would start our explorations in the autumn term and return to gaze over the garden wall or perhaps enter the magical space in the spring and summer terms.

- At the bottom of the garden we had practical capacity work with watering cans and cups. The tomatoes were sorted for colour and size, different shapes, sizes and colours of leaves, fruit and flowers were compared.
- Trees, bushes and sunflowers gave us scope for height comparisons.
- In the central area were rows of potatoes to dig up and to compare, as well as worms! Drying onions were also compared and sorted.
- The top of the garden close to the house revealed numbers and dates on manhole covers, walls and other houses. We counted windows, roofs and houses.

In the end, every class in the school visited the garden and I thank Len Tozer, Chairman of Governors at Bude Infants School, for his welcome and patience!

Enjoy the outdoors! It is from such happy first-hand experiences and an imaginative approach that young children will build a firm foundation for knowledge and understanding of mathematics and the world around them.

Jackie Kennard works as an independent consultant. She worked in schools and colleges in the Bahamas and latterly for twenty years in Bude Infants School until her retirement.

References

Lively texts on a multi-cultural theme:

Blackstone, S. (1995) *My Granny went to market: a round the world counting book*, Barefoot Books

Bruce, L. (2001) *Engines, Engines,* Trafalgar Square

Hooper, M. (1997) *Honey Biscuits,* Kingfisher

Oneyefulu, I. (1995) *Emeka's Gift*, Frances Lincoln Ltd

Some favourite books for an outdoors setting are:

Blake, Q. (1992) *All join in*, Red Fox

Burningham, J. (2001) *Mr. Gumpy's Outing*, Red Fox

Brown, R. (2001) *Ten Seeds*, Anderson

Carle, E. (1970) *The Very Hungry Caterpillar*, Puffin

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