

Numeracy in the Home: Children's Access to Kindergarten

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Hi, my name's Thelma Perso and I work for the Northern Territory Department of Education and Training as the Executive Director for Central Australia.

I'm going to talk to you about numeracy and mathematics and, in particular, the role that parents can play in supporting their children to be ready for schooling and the sorts of mathematics and numeracy that they'll be doing at school to prepare them for life.

The first thing I want to share with you is about numeracy and mathematics because there are a lot of misconceptions about that out in the community. We need to know that these two things are not the same and that maths and numeracy are different in that mathematics is actually the toolkit for numeracy. So, you might have a toolkit to help you use that in an application out there in the real world of the mathematics. And I guess it's the same as a doctor – you can do a lot of theory and practice in training to be a doctor, but unless you've got the confidence to actually use that with patients, then you can't really be called a doctor. And in the same way, you can have a lot of mathematics knowledge, but not be numerate, unless you've actually got the confidence to use that mathematics out in the real world. And part of that is actually about identifying that some maths will help here and then having the confidence and the disposition to use that. So parents can help their children to develop that confidence before they even start school and a lot of that is actually about language. Let's talk a little bit more about that.

So, knowing some mathematics isn't the same as being numerate. Children need to learn mathematics in ways that promote their confidence to use mathematics outside of the mathematics classroom or outside of school. The main thing that parents can do to help their children to be ready for schooling with numeracy is to confidently model the use of mathematics every day in their homes. Dad might use a street directory and, by doing, that he is showing his children that a street directory, and being able to read that, is an important part of life. Mum might weigh amounts in the kitchen, or measure amounts, and so might Dad. And so, I guess that by doing that, parents are showing children that weighing and measuring are important activities and that, when they go to school, they'll learn how to do those things.

One of the main things about numeracy, though, in terms of weighing and measuring, is that parents need to be showing children that there are some situations that require more accuracy than others. So, for example, if you want to know whether a wardrobe will fit through a door, it's all right to use a hand span and say, 'Okay, well that's going to be about ten hand spans wide' and then go over to

the doorway and show that the wardrobe will or won't fit through the doorway. You don't actually have to use a tape measure to do that because that level of accuracy isn't necessarily needed.

Parents can also tell the time and set a video recorder to record something from the TV. They can count and compare quantities. And it's important to know that, actually, counting is about comparing; so, we count to know who's got more so that we can compare those quantities. We can also share amounts equally when we're dishing out the dinner or giving children lollies or toys to play with. And we can critically analyse other people's use of mathematics, so children need to see their parents doing that when they're watching TV and saying, 'Well, the chance of rain tomorrow is about forty per cent' or things like that. Children need to see their parents thinking, 'Okay, what does that actually mean?' and talking about some of that.

One of the most important things that parents can do is to immerse their children in the language of mathematics before they get to school.

The language of mathematics is interesting because a lot of parents use this language every day and aren't even aware of its connection to mathematics. A lot of parents have misconceptions about mathematics and think it's about sitting at the desk and doing lots of sums. The language of maths and understandings that go with that is actually what gives children access to the mathematics that they do at school and results in numerate behaviours. And that is critically important for children.

For example, a lot of Indigenous children grow up in homes where the language of mathematics isn't used because it's not necessarily valued as part of the culture. So it's important that teachers, in particular, don't assume that children have those backgrounds and the language and the words that they need when they're accessing schooling, particularly in the early mathematics lessons in the first couple of years of school.

In school maths, there are five areas: one is about Number concepts; another one is about Measurement; then we look at Chance and Data; Patterns and Algebra; and Space. So let's talk about the words in each of those five areas of mathematics that children need to be immersed in at home.

Number concepts is probably the most important area for children to learn about. And the first thing that parents can help their children know, is the number names in order, up to twenty or even beyond that. I guess most of us think that we would call that 'counting', but children aren't necessarily counting when they say the number names in order. They can learn those off by heart. But that's not really what counting is about. Counting is a lot richer and more meaningful than that. It's about children knowing that the last number they say, tells them how many. And that they know the numbers before and after each number in the sequence so that, if they're interrupted when they're in the middle of rote-parroting the numbers off by heart, they can start

again at that number and don't have to go right back to 1. That's what counting is about and we can help children have access to the counting they need to learn actually those number names in order and so that they can learn them off by heart.

The next thing that parents can help children do, is to learn that some numbers are actually used as labels. So when they see numbers on footy jumpers and car number plates, they're not being used in a quantification sense. Parents can also help children learn a little bit about the word 'half'. And that doesn't mean the exact meaning of half in an equal sense, that children do at school, but it's actually about half being two pieces and a part of something that's a whole. Parents can help children know what words like 'more' and 'less' mean and to know the difference and who's got more. So, 'Has Jenny got more than you, Tom?' or 'Have you got less than Jenny?' Those sorts of things parents can play a major role in helping their children knowing those mathematics concepts before they come to school, just by using words and asking questions in the home.

Children can also know what the word 'share' means, which is a very important word in mathematics. They can share out quantities. So parents can say, 'Okay, how many in your share?' and 'Here's a piece for you and here's a piece for you.' and to keep giving out quantities until the whole lot is gone. We talk about children having equal shares and it's important to know the difference between sharing out and having an equal share. Parents can help children learn the word 'half' in terms of folding pieces of paper and material. And they can look at small groups of objects and say how many there are without actually counting. We call that 'subetising' and it's a very important skill that children can have. For example, when you look at the groups of things on a pack of cards, you can see that there are three there, or are five there. Another important thing we can help our children with, is to learn the words of taking away. So what does it mean to take something away from something else and to model that? So, take three lollies off one child and give them to another child. That's a really important concept and parents can help their children with that.

The language of measurement is critical. Particularly words of comparison. So children need to know words, such as 'smaller', 'taller', 'shorter', 'smartest', 'brightest', 'longest'.

And they need to use those words in sentences. The reason it's critical is because a lot of those words are actually part of different cultural groups. So a lot of Indigenous cultures, for example, that I've worked with and that I'm working with now, don't have those words in their language. And so, if children are coming from homes where those words aren't used, then there's no way that they'll be able to slip into using them and know what their teachers are using in their classrooms. So those words need to be taught in the home. Children need to be immersed in those situations. And they can learn those sitting in the sandpit or on the floor and playing with toys. 'Johnny, have you got a smaller toy than Sam?' Those are sorts of questions that parents can ask just in play and in working with their children and just caring for them

every day. They then need to know words of how objects look and feel. So: 'Find some things for me that are flat.'; 'Find something that's heavy and light.'; 'Which is the heavier of these two?' And parents can model that by hefting objects and saying, 'Well, I think this one's heavier.'

Those sorts of words and the language, it is critical. Children need to know words of extreme. So, 'near' and 'close' and 'far'. And parents can say: 'Oh, let's go down the shop. It's not very far.' or 'Who's sitting nearer to me, you or you?' They need to know the difference between words like 'full' and 'empty'. And parents can display those and do those things with their children just by filling up a glass full of cordial or milk. They need to know the difference between the 'start' and the 'finish'. For example, when they're setting the video recorder, a parent can say, 'I'm going to set this to start at 3 o'clock and finish at 4 o'clock.' So children can learn that what those words mean is that time can be measured. And this is one of the critical things for children because elapsed time is one of the hardest things to teach young children: because you can't actually use objects to show that. So parents can teach that by immersing children in the activities that are about time or drawing attention to things like: you spend a lot more time at sleep at night than you do having lunch. That's a hard thing for children to get their head around.

Let's talk about the language of Chance and Data. Chance and Data is probably an area that a lot of parents didn't even study when they went to school. But it's become increasingly important in our society because it's about information. Data is about information. So one of the things we can do to help children to be prepared for this, is to help them to sort objects and classify objects into piles, based on what's the same and what's different. So we play games.

So children are actually learning about criteria in which they can sort objects. Children also need to know that guessing can result in being right or wrong. And there are lots of games that we can play about guessing.

They need to know words like 'will' and 'won't' and that they're actually the extremes of guessing, because they're the things we can be certain about. 'Will I come to school tomorrow with blue hair or won't I?' And they can guess about things like that and find out the next day whether they were right or not. They need to learn to respond correctly to questions about 'more' or 'less' and I talked a little bit about that in measurement, but that's equally important for this area. 'Go and collect some things.' and 'Collect some toys.' or some forks to set the table, or some knives.

I guess the other thing that I really want to talk about here is about asking questions. Because the way we get information is by asking questions. And many cultural groups don't ask questions to find information. For example, some of the Indigenous cultures that I've worked with only ask questions for social reasons. So, they want to know people's names and where they come from and what their country is and those questions are used to find out more about people, if you like. But they don't

necessarily ask questions to find information. And this is something that we do a lot of in schools. Teachers ask questions to find out whether children know the answers and so questioning is used for a teaching purpose. And so we can't be assuming that our children come to school knowing that that's what questions are for. And often, certainly the Indigenous children that I've taught in my career, often they'll just sit there and stare at me with lovely, beautiful eyes, thinking, 'Well, why's the teacher asking us? She knows the answer because she's the teacher.' So we need to be teaching our children that questions are used to find information and to get some data.

Patterns and Algebra is an interesting area of the mathematics curriculum. In fact, many parents will just have some frightening memories of algebra and think it was something they hated because it was about letters instead of numbers. But, in fact, algebra is more than that. It's actually about generalising. And so that's why it's connected to pattern. So children can be prepared for that by getting in order in a line and remembering the same order and being able to use that order next time. Or they can make bead patterns with a red, blue and a green one, and a red, blue and green, and understanding that order. And saying, 'Okay, well, we can actually show that order in different ways.' So I can show that repeating pattern of red, blue, green, by saying, 'There are three things here and they come one after the other.' So that same pattern can be in your actions, like a clap and a stamp and a flick, and a clap and a stamp and a flick. Or some of the things that they might do when they're singing. They learn that there's a repeat in a chorus. All of those things are very important for algebra.

The other thing that children can learn to do, is knowing when something undoes something else. So we can teach them to do their shoelaces up and undo their shoelaces. Or set the table and clear the table. Or get dressed and get undressed. And knowing that relationship is really important for their early algebra understanding. They also need to understand what's happening in patterns. So, I talked a little bit before about beads. And it's important to know that children are learning about pattern in the environment. So they can see things that repeat over and over and they can generalise about that. And seeing what's applying in one environment that is also applying to another environment, so they can learn about generalisation. And that will really help them later on in understanding pattern and algebra.

Space is the last area of mathematics that I want to talk to you about. It's a very, very important area in mathematics and there's lots and lots of language that children need to learn about before they come to school in order to access the spatial concepts that are taught in mathematics and these concepts that will lead to them being numerate. They need to learn words like 'round', 'flat', 'sharp', 'pointy' correctly and to use those in simple sentences. Parents can help them do that. They need to recognise that a box is distinct from a ball and a square is distinct from a circle; that some things are flat and two-dimensional and some are three-dimensional. We don't

necessarily have to use all those words with young children, but it helps to have them aware that those words exist and that they are actually related to objects.

They need to say and talk about 'shape' words.

Another critical thing is about imagination. And children have fabulous imaginations – they use them all the time. But they need to actually know what the word 'imagine' means, so that they can picture things in their mind and we can say to them, 'Imagine a square.' or 'Imagine a plate.' and they can picture those things and the qualities that those things have by thinking about them in their mind.

They need to be able to respond correctly to folding, in, say, 'Fold a piece of paper.' or 'Flip that thing over'. Those are words of Space. An important area of space is about positional language and this again can be about culture. A lot of Indigenous cultures, for example, don't have words of positional language and I'm talking about words like 'next to' and 'behind' and 'under' and 'above' and 'on top' and 'between'. Those words are just critical for mathematics, even when we're counting. 'Which number goes before three?'; 'Which number is two more than five?' and 'Where are those numbers on a number line?', which is the visualisation. So, knowing that positional language is absolutely critical.

Let me just share a short story with you about an Aboriginal friend of mine, a lady, who said to me, 'When I want my children to go and get something I never use those words I just point with my chin and they look at where I'm pointing and go and get it. Whereas I might say to my daughter, 'Go and get your chair from behind the table.' or 'Look under your bed for your shoes that are lost'. So those words aren't necessarily fixed in any particular culture and, as teachers, from my perspective, we have to be really careful that we don't assume that children know what those words mean. We have to teach them explicitly. For parents, you can do that and prepare your children for those words before they come to school.

Another thing, too, is about knowing words like 'side' and 'top' and 'bottom', so when we're talking about a box, children know which the side is and how many sides a box has got; which is the top; and can tell you, for example, the colour of the bottom. All of those words are extremely important and parents can help their children be prepared by knowing what those words mean before they come to school.

So we've talked a lot about language and, particularly, what parents can do to prepare their children for schooling and for the mathematics and numeracy that they'll be learning about. I guess it's important to know, as parents, that we've got to change our mindset about what mathematics at school is. It's not about worksheets and sums and formal sitting at desks in rows and doing the things that we did when we went to school, but it's a lot more than that. And, particularly, it's about language. So numeracy before school is more about language, play-based experience, and it's about parents modelling the things that children need to do before they get to school – modelling the use of mathematics and the confidence, by reading a street directory

or weighing out the flour to cook a cake. Those things are really important and you probably didn't even realise it before, but when you do those things you're helping children to understand that mathematics is an important part of life. And so, when they come to school, they won't say to their teacher, 'When are we ever going to have to use this?'