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Ian Thompson offers a possible explanation as to why young children sometimes experience difficulties with the ‘terrible teen’ numbers. Come back next month for Ian’s reflection on place value.

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We go back to Teachers TV for our CPD session this month.

*Contributors to this issue include Cherri Moseley and Ian Thompson.*
Editor’s Entrée

Have you booked your place at the event of the year yet? Check the details below and make sure you book your place before it’s too late! NCETM national CPD conference Professional Learning Networks: learning better through learning together is on 1 December 2010 from 10am to 4pm at Sheffield Megacentre.

Join teachers from across the country to explore the benefits of networking and collaboration to enhance your mathematics teaching and learning. Hear from practitioners who have created networks of all sizes across their department, school or college, local cluster group, HEIs and industry to discover how collaboration by individuals and organisations can help tackle issues, deliver practical resources and increase pupil attainment.

The day will include:

- an exhibition showcasing NCETM-funded projects that focus on creating networks to share ideas between individuals, departments and institutions, tackle issues in mathematics learning and support professional development
- interactive group sessions to explore the power of working and learning together
- workshops to present examples of collaboration and networks from schools, colleges, subject associations and organisations
- keynote presentations from inspiring individuals who utilise networks.

The conference is free and is open to teachers, lecturers and advisers from all sectors. To book your place, please email events@ncetm.org.uk.

Don’t forget to check out recent issues of the Primary Magazine. Issue 28 looked at Black History Month, proof, how you might use a visualiser, and much more, while Issue 29 looks at the art of van Gogh, John Venn, data handling, and much more. Take a look - there will often be useful activities for the Foundation Stage too.

So what are Practitioners’ Experiences of the Early Years Foundation Stage? The DfE has produced a research report describing the context, design, conduct and findings of an inquiry into practitioners’ experiences of the Early Years Foundation Stage. The study asked how the EYFS influences day-to-day practice with children and families; how, if at all, has the EYFS supported improvements in the care and education offered by practitioners; and what obstacles and difficulties do practitioners face in the effective use of the EYFS. The report runs to over 100 pages, so you can download a brief summary if you prefer, though you run the risk of losing the very observations that prompted the conclusions. Also available is a report entitled Achievement of Children in the Early Years Foundation Stage Profile. This report uses data on children’s achievement by the end of the Early Years Foundation Stage to examine the proportion of children achieving a ‘Good Level of Development’, and the size of the Achievement Gap (inequality), as three-year trends. It also looks at the progress by local authorities in increasing performance and shrinking the Achievement Gap. Of the...
24 respondents to the question, What changes would practitioners like to see?, many wanted no or only minor change. The greatest desire for change concerned the ‘statements’, the Early Learning Goals and the Development Matters. The statements were considered to be inconsistent and should be rewritten. In addition, the focus on emergent literacy and numeracy were pursued at the expense of others. Take a look at section 4:10 on pages 88 and 89 for more detail on these and other comments.

Finally, don’t forget to check Mathematics in the News regularly to find out about what’s new, relevant and interesting in the world of mathematics and education. This includes government policy affecting mathematics education, new professional development opportunities, news about mathematics in everyday life, and much more.
Focus on… Mathematical learning in the role play area

There cannot be many early years practitioners who have not spent hours preparing a role play area and making or collecting appropriate things to go in it. But how successful is such an area in promoting mathematical talk and activity? It seems that a number of early years specialists are beginning to question the thinking around this area.

In Issue 4 of this magazine, Helen Williams, Freelance Educational Consultant, talked about the Teacher Enquiry Funded Project (TEFP) that she was about to embark on – Children’s Play: Enriching the Early Mathematical Experience. Helen explained that her ten-month action research project included, among others, two mixed classes of Reception and Year 1 children and that her focus was how to develop role play to broaden children’s mathematical experiences.

Helen’s starting premise was that role play is valuable as it allows for mathematical application, creativity, and the possibility of seeing maths ‘in context’ that is connected to young children’s interests. However, she acknowledged that there is some evidence that, left to their own devices, young children do not engage in mathematics when role playing. Her questions included; Is this true? Can this be changed? Does adult intervention or behaviour alter this? Does role play only enhance particular aspects of the mathematics curriculum?

Like Helen, I turned to Sue Gifford for her thoughts on the subject. Her book, Teaching Mathematics 3 – 5, has long been one of my early years bibles. As early as the introduction, Sue comments “We used to arrange and price the goods, I would model the shopkeeper’s role and they would pay the correct price with coins. Then I would go off and leave them to it, but inevitably, whenever I looked, they were stuffing bags full of goods without paying (i.e. shoplifting) or paying arbitrary amounts and then demanding huge quantities of change from the shopkeeper.” (Gifford, 2005, p1) Sue explained that when she tried to refocus the play by going in and asking the price of things, all she succeeded in doing was killing the role play completely. After describing some further experiences, Sue states, “I began to conclude that children’s role play was concerned with the larger themes of life, like love and power, rather than mundane things like the price of potatoes.” (Gifford, 2005, p2)

After looking at other research, Sue quickly concluded that although the opportunities for mathematics are there in the role play area, children will not necessarily pick up on them – children simply do not use much mathematics in independent play. Indeed, it seemed that adult involvement is needed to focus learning, particularly for number. Would Helen reach the same conclusion?

In her final report, Helen comments that “Nationally, there is an issue about how much control children have over their learning and what ‘child initiated’ and ‘adult initiated’ learning might look like, particularly in the Early Years.” Helen was interested in furthering understanding of terms such as these, as well as ‘free play’ and ‘structured play’; and what ‘child directed’ and ‘adult directed’ might look like in different classrooms and with different age groups. Helen’s conjecture is that describing play or activity as ‘child initiated’ or ‘adult initiated’ is a red herring, “What matters, is who ‘directs’ the play/activity after it has been initiated. We have noticed that a productive mathematics learning and teaching relationship can develop where there is a degree of co-direction between learner and adult.”
Tracey, teacher of one of the R/Y1 classes Helen focused on, commented “The jury is still out on role play, as the children are not initiating maths for themselves at all. It’s brilliant having something to hang the maths on, though. Basing our maths on the role play area has been very successful as a focus for learning creatively about maths.” The children did not replicate or apply their mathematical skills in their self-initiated play. When left alone in the counting house/castle without a ‘task’, play deteriorated. Money was thrown around and no recognisable mathematics took place.

After two terms, developing related activities away from the area to ‘feed into’ the play began to pay off. Tracey noted incidents of children’s spontaneous use of wider mathematical vocabulary, mathematical talk and some simple mathematics being used in wider ‘free play’ situations, both indoors and outdoors, although not always directly related to what had been planned or taught. Tracey’s role play tasks, although teacher initiated, had taken account of her children’s current interests, as the maths activities she planned outside the role play area reflected what was going on in the children’s role play. It seemed safe to conclude that when the mathematics ‘outside’ the role play area became more closely linked to the role play ‘theme’ and what was happening in the role play, more mathematics took place in the role play area.

Tracey’s model for her children’s mathematics became:
- plan some maths linked to the role play theme
- teach/model math skills
- use/practice in context
- debrief.

Helen comments that, “One consideration that has come out of Tracey’s class in particular, is what the teacher (adult) roles might be. We (initiate) set the situation up with some maths in mind (hot air balloon, spaceship...), we consider appropriate props (money, spring balance, learning to count down...) but we can also play with the children; be a player in the story. This seems to be about collaborating in order for some mathematics to happen. Collaborating is seen here as co-directing how the activity and the mathematics develops from a given starting point.”

Helen concludes:
“Our findings in summary are:
- children can demonstrate high levels of engagement and resilience in tasks set in a role play context that they understand and are committed to – we believe this is of fundamental importance;
- adult intervention of differing sorts, eg. playing alongside, adding a prop, work outside the area, linked to observations made of children’s play can fundamentally affect the amount and depth of mathematics engaged in independently;
- uninterrupted time – by which we mean some extended time put aside for children to work at one task, although not necessarily at one sitting – can lead to mathematical thinking at a deep level, and children quite happily tackling mathematical ideas outside their usual curriculum ‘level’;
- children appear to be willing to take mathematical risks because they are not ‘themselves’;
- although it is virtually impossible to predict accurately what will attract deep commitment from children, it is our conjecture that introduction of cognitive dissonance will nearly always work; e.g. the 27 didn’t share between 3, my bag was reading as zero weight…”

So, it seems that Helen and Sue agree – simply setting up a role play area and letting it ‘run’ will not encourage mathematics within the role play area. Adult support is needed. By playing alongside, linking
work outside the area and integrating the observed play in mathematical activities, the use of mathematics within the role play area can and will develop.

It only remains to ask what happens in your role play area. Do you ensure that mathematical play develops by linking mathematical activities to the role play area? Tell us about your experiences – could your observations become a short article for the case study area of the magazine? Contact us: we’d love to hear about your experiences.

**Relevant references:**

The structure of counting word systems
Ian Thompson, Visiting Professor, Edge Hill University, Ormskirk, Lancashire

In international surveys of the mathematical attainment of primary school pupils carried out over the last few decades, British children have consistently fared worse than their East Asian counterparts. However, there is one seemingly trivial but, quite possibly, important contributing factor that appears to have been ignored in discussions of these results.

In a book written 20 years ago (Durkin and Shire, 1991) that dealt with issues of language in mathematical education, Karen Fuson and Young Shim Kwon introduced many of us involved in maths education at that time to the idea – generated from their research – of the important differences between the structure of the counting word sequence in East Asian and in European languages (Fuson and Kwon, 1991).

Oral counting in East Asian languages (and Welsh, cf. Dowker and Lloyd, 2005) begins as in English by proceeding from one to ten. However, this is then followed, not by eleven, but by the equivalent of ten one, ten two, ten three… ten nine, two ten, two ten one, two ten two… After two ten nine comes three ten, and the decade numbers (30, 40, etc.) continue this pattern up to nine ten. Within this system, the number which is one less than a hundred is nine ten nine.

East Asian numeral for ten

The structure can therefore be seen to be highly regular, logical and systematic. This consistency and regularity inevitably makes it easier to learn number names in a system where new numbers can be inferred rather than needing to be learned by rote. Indeed, research in the USA has shown that Chinese four- and five-year-olds are able to count to a much higher limit than their American peers.

The English counting word system, on the other hand, contains several number words which are likely to conceal the basic tens and ones pattern of the system. For example, the teens contain words which reverse the underlying tens and ones pattern: we say fourteen and sixteen, but twenty-six, thirty-six and ninety-six. This problem is further exacerbated when we express numbers in symbolic form, because the spoken reversal of the teens is not extended to the written representations of these numbers. For example, even though we say the ‘four’ before the ‘ten’ in fourteen, we then proceed to write the number as 14, with the ‘teen’ before the ‘four’. Is it any wonder that many young children, when learning to write numbers, sometimes reverse the digits in the teens, writing 41 for 14 or 61 for 16?

English also possesses the two ‘strange’ number words eleven and twelve, which give no indication whatsoever of the fact that they mean ten and one and ten and two respectively. The problem is exacerbated by the fact that there are further irregularities – thirteen and fifteen – that have an idiosyncratic pronunciation of three and five, and do not even follow the straightforward ‘digit-teen’ pattern associated with the numbers from sixteen to nineteen.
A further important difference between East Asian languages and English concerns the frequency of use of the word for ‘ten’. In Japanese, the teens and the decade words all involve the conspicuous presence of the word ju (ten) to describe numbers such as ten two (12), three ten (30) or nine ten (90), whereas English uses two differently spelled and differently pronounced variations of the basic word ten, namely -teen in the second decade and -ty in successive decades. Neither of these factors is likely to make it obvious to a young child searching for pattern that the concept of ten is involved. In fact, a close scrutiny of Asian languages shows that because of the completely logical structure of the number word system, the word ju is used in ninety of the numbers below one hundred (all except the first nine numbers), thereby helping to reinforce the basic underlying regularity of the number word system. In contrast, the English word ten appears only once in those same ninety-nine numbers.

A further potential source of confusion in young children’s minds is the irregular pronunciation of the decade words twenty, thirty and fifty. Because they do not have the regular form two-ty, three-ty and five-ty, as do sixty and seventy, these particular number words do not make it easy for children to see the way in which the words two, three, etc. are re-used in the naming of the decades. The words conceal the relationship between the decade names and the first nine counting numbers, a connection which is more clearly observed in larger numbers such as sixty, seventy, eighty and ninety. This relationship is greatly emphasised in the highly logical structure of the counting word sequence found in East Asian languages.

It is also unfortunate that all of these irregularities occur in the early teens and decade names – twelve, fifteen, twenty, thirty – the very numbers that young children are experiencing and coming to terms with in their early number work at home and at school. This also means that English-speaking children have to memorize a long sequence of seemingly unrelated number names before the patterns become visible. Indeed, research does exist to show that there is a long period of months, extending to years in some cases, during which young children continue to learn the teen and decade names.

This article is not an argument for a major change in the structure of the English counting word system, but rather offers a possible explanation as to why young children sometimes experience difficulties with the ‘terrible teens’.

References


Games - Number tracks, dots and dice games

This month we bring you some simple number tracks with suggestions of how you might use them. Also included are some dot and dice ideas to help extend children's subitizing range. Instant recognition of the six common dice and domino patterns allows more complex games to be developed. The focus can shift from counting the dots to using two dice for addition or subtraction, strategic games play and much more.

Make a 1 to 6 number track for each child and provide a bowl of counters. Children could make their own tracks or you could download and use ours. Enlarge to A3 for ease of play and laminate if you are going to reuse them. The children take turns to roll a spot dice, count the spots if necessary and then place that number of counters on the matching numeral on the number track. The winner is the first person to match every number on their track. As the game progresses, ask the children which numbers they still need and how many spaces they have left. Extend by using a 1 to 9 track and two dice (1 to 6 and 1 to 3) and allowing the children to choose whether to use one or both dice during each turn. Alternatively, use a 1 to 9 spinner.

Play spot snap. Using blank playing cards or thin card, make at least two sets of spot cards. Use the standard dice and domino patterns for one to six, but if you extend the sets to nine, you will need to decide on your own arrangements. Combine the sets to play snap with a small group of children. Encourage instant recognition of the number of spots as the children become more familiar with the cards. Use the spot cards and number tracks to practice instant recognition of spot patterns. Each child needs a track and a matching set of spot cards. Shuffle the cards and turn them over one at a time and match with the appropriate numeral. When the children are familiar with the activity, they could race against a one minute timer. Who can match all the cards before the sand runs out? Who is the fastest? Reinforce recognition by chalking or sticking dot patterns on the walls and floor outside. The children will invent their own games, but you can also give the children fun challenges such as ‘Run to number 3 then number 5,’ ‘Hop to number 2,’ Stand by number 4 and clap four times’.

Make a six by six grid on a piece of A4 paper or download and use ours. Put a different numeral in each square in random order. Using 1 to 6, you'll need to repeat each numeral six times. You could change the numerals to suit the needs of the children. Print out a copy for each player and provide them with a pot of counters too. Each group of players will also need a spot dice. The game is played by taking it in turns to roll the dice and place a counter on one copy of the matching numeral. If all the copies of that
numeral are covered, the player misses a turn. The winner is the first person to complete a line of counters from one side to the other, or from top to bottom.

There are bound to be many more uses for these simple number tracks, cards and grids. Why not simply leave them on a table for children to explore and use in their own games.
Case Study

This month’s case study comes from the Teacher Learning Academy, part of the General Teaching Council for England.

Teaching young children listening skills

Children aged 3 to 3½ years who were easily distracted and not ready to listen were selected to take part in a listening programme. The programme had originally been developed for nursery children with complex learning difficulties. A control group of ten children drawn from a nursery department and feeder nursery of similar schools continued with their normal nursery curriculum for listening activities. Careful record keeping, using prepared sheets, helped to monitor the progress of each child.

The structured programme first developed attention control by stating the rules for effective listening – STOP, LOOK, LISTEN – while demonstrating the desired behaviour with gestures, e.g. finger on lip, cupping ear with hand. The rules were restated as necessary during each 10-minute session.

Activity 1 used sets of four sound-makers e.g. bells, tambourines, clackers etc. After the teacher demonstrated the sound made by one of the sound-makers, it was passed around the group to encourage the children to make the same sound. The teacher then used the matching instrument, from behind a screen, to make the sound together with each child in turn. The activity was developed in subsequent sessions by using the second and third instruments separately and so on. In session 5, all four sound makers were used in turn. After six weeks the sound-makers were changed to maintain the interest and enthusiasm of the children.

Activity 2 was designed to develop auditory memory. The teacher presented eight objects, e.g. cup, pencil, ball, etc. one at a time to the children while naming it. The objects were placed on the floor and, when all were in front of the children, each child in turn was asked to select a named object. The number of objects each child was asked to select increased each week. In week 4, the objects were placed out of sight of the children so that, when they were asked to select 2 named objects, they had to rely on their auditory memory alone (rather than visual and auditory) to remember which objects to select. During week 5 the children had to collect three objects and during week 6, four objects. It was important that children did not move on to the next part of the programme before they were secure on the current part.

By the end of the programme, more children in the intervention group than in the control group had made progress on a test of comprehension. Eighty-four percent of children in the intervention group and 80% in the control group made some progress. However, nine children (28%) improved by 15 marks or more in the intervention group, compared to 1 child (10%) in the control group who made similar progress.

Some children began to apply the strategies learnt in the group sessions to other activities in the classroom and teachers felt that the project had also been useful for their own professional development. They noticed if children were attentive before they issued instructions and used the Stop, Look, Listen gestures to gain attention in other classroom situations. They also became alert to their own classroom language: “I’m more conscious of what I say.” “I think more carefully about explanations and instructions.”
Extract from: Teaching young children listening skills. For other case studies on the Effective provision of pre-school education, visit TLA resources - Research for Teachers, part of the General Teaching Council for England website.
Maths to share - CPD for you and your colleagues

We return to Teachers TV for this month’s CPD session. We are using a programme, Inspirational CPD Training - APP for Primary Science - Counting Caterpillars with Deborah Herridge, so you will need to introduce the programme and explain that practitioners will need to ignore the title. All will become clear as you watch the programme.

The programme summary states that, ‘This video demonstrates a fun, low-cost and practical science investigation which will help cover the APP criteria for pattern-seeking and data collection, for KS1 and KS2’ but it also an excellent mathematics and science activity for the early years.

Watch the programme together, duration approximately five minutes. Ask practitioners to simply fold a piece of paper in half and record what they can use on one half and what to ignore on the other half. When the teachers discuss their response to the activity in the programme, one talks about how excited the children would be to go outside and get hands-on experience. Deborah talks about how the evidence generates itself. Both these comments resonate fully with the Early Years Foundation Stage way of working. Did practitioners notice these comments?

Check that practitioners agree to ignore the same aspects of the programme, for example all mention of APP. However, you could discuss the EYFS equivalents. For example, which Early Learning Goals and Development Matters does the activity relate to?

Discuss which aspects of the programme could be useful in the early years, for example the activity itself, the relay at two-minute intervals, instant recording and some of the discussion questions used to explore the results. Would practitioners use the relay idea or send everyone off at once? How would that affect the use of the recording board?

Ask practitioners to consider how they might make the recording board, first seen in any detail at 56 seconds. What could the sticky strips be made of? What will stick to them? Will that change depending on what the strips are made of? When it comes to using the board, discuss whether practitioners would use the board the same way up consistently or sometimes in one way, sometimes in another. Would the way up be influenced by the activity?
Complete the session by brainstorming similar activities. What else could be scattered outside? How could the collection of those items be counted or measured in some way? Which Early Learning Goals or Development Matters would the new activities address? Invite practitioners to try the original activity or one of the suggested new ones. Specify a date in the not too distant future where the first 10 minutes of a CPD or staff meeting will be given over to sharing experiences.