SA NUMERACY CHAIR PROJECT

Early Number Fun
Grade R Teacher Development Programme

Session Four Teacher Handbook

Name

_____

School

_____

DECLARATION
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Last updated: 20th July 2016

To cite this document:
South African Numeracy Chair Project. (2016). Early Number Fun Grade R Teacher Development Programme: Session Four Teacher Handbook. Grahamstown, South Africa: South African Numeracy Chair Project (Rhodes University).

Maths is fun

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Introduction to session

In this session we will build on various activities and resources given in the previous session. In particular, we will recap working with the umbrella story-book to emphasise learner development of:

- numeral recognition
- comparative language development and key word recognition (e.g. more less)
- pattern recognition
- bonds to five
- one more, one less concepts

We will work with a range of simple card games that further support these concepts but also support the development of the executive functions of working memory, inhibition (cognitive control) and flexibility.

Five-based strategies

This involves using five as a base and representations that involve arrangement of items in fives (such as 5-frames, bead strings etc.) or fingers. Using five as a reference point means that combining and partitioning numbers involving five receives a special emphasis. Promoting and working with base five is likely to be facilitate development of advanced addition and subtraction strategies. (Wright, Martland & Stafford, 2006). Promoting and working with five as a base, allows for extension to working with ten as a base at a later stage.

Representations: Dot patterns and subitising

The process of instantaneously recognising the number of items in any spatial structure without counting is known as "subitising," which comes from the Italian word "subito" meaning "immediately." (Bobis, 2008 p.6)

Bobis points out that:

> "Organising dots into recognisable subgroups facilitates recognition and naming of groupings with number words. Joining and separating visual patterns provides a basis for developing part–whole number relationships. Children who can partition a spatial arrangement of dots into its composite parts and recognise the whole in this way are using a more advanced form of subitisation: conceptual subitisation. This type of subitisation is evident when a child can explain that an arrangement of six dots, for example, comprises combinations of 4 and 2 or 3 and 3"(p. 6).

Learner cognitive control

Recall that learner executive functioning (or cognitive control) can be used to assess school readiness and involves 3 main components of:

- **Working memory**: ability to maintain and manipulate information over a brief period of time
- **Inhibition** (interference control): ability to suppress a dominant or automatic response
- **Shifting attention** (flexibility): ability to shift attention from one aspect or mental state to another (so for example from sorting shapes according to colour to sorting according to shape or size – this also involves inhibition as one must suppress earlier mental state to work flexibly with a different state (Garon et al., 2008; Diamond et al., 2007)

In this session we introduce a number of playing card games that focus on developing working memory and inhibition.

References

Bobis, J. (2008). Early Spatial Thinking and the Development of Number Sense. *Australian Primary Mathematics Classroom*, *13*(3), 4–9.

Diamond, A., Barnett, W., Thomas, J., & Munro, S. (2007, November). Preschool program improves cognitive control. *Science*, *318*(5855), 1387–1388.

Garon, N., Bryson, S. E., & Smith, I. M. (2008). Executive function in preschoolers: a review using an integrative framework. *Psychological Bulletin*, *134*(1), 31–60.

Wright, R. J., Martland, J., & Stafford, A. K. (2006). *Early numeracy: assessment for teaching and intervention*. London: Sage Publications Ltd.

This section provides details of the activities that are be presented in this workshop.

Every workshop will have a similar section so you know where to look in the handbook.

Resources

Patterning and puzzle activities
Page: 6

Cognitive control activities
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Page: 11

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Number grid

You have been provided with a grid that looks like this.

	write month here if required								
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31									

Preparation

- Cut out the shaded-in rectangles and keep them in an envelope or place them onto the wall next to the number grid with Prestik.
- Place the grid up on the wall near your 'matwork' area, close to your normal calendar.
- You can write the month at the top of the grid using a dry wipe marker (and then change this each month to bring attention to the changing months as the year unfolds.

Activities

- Ask learners to read the numbers from 1 to 10 with you. Then continue reading the numbers all the way up to 31 for the learners (they can read them or rote call them with you as they hear the counting pattern).
- Ask learners if they know what today's day is, month is and day is. Show them this day on your calendar. Write the month at the top of the grid.
  Now ask the learners if they can find that same day (number) on the 1-31 grid. Circle this number with a dry wipe marker.
- Ask learners if they can guess why the numbers here stop at 31.
- Cover the numbers 11-31 with paper – focusing on the row of numbers from 1-10. Tell learners that you are going to cover one number with a block and they must figure out what number is covered.
  Ask learners to close their eyes and you cover any one number on the grid.
  E.g. if you cover 6 then ask learners what number did I cover? And how do you know that number is 6?
  The aim here is to help learners to use their knowledge of the order of number names in the counting from one to 10 to figure that if the number before it is 5 then the hidden number must be 6. They can go all the way back to counting from 1 to figure this out each time but at some point (after a few days of the activity) try push learners to see if they can figure out the number without counting from 1.
- Cover a number as above, and ask a learner to write the number that is underneath.
- Cover a number as above. Ask learners what number comes before and after

Extension

- Once learners are fluent in the activities above use the other blocks to cover two and three numbers and again ask them if they can figure out what the hidden numbers are and how they know that they are the hidden numbers.
- An extension activity for learners who might manage the activity would be to do this with the rows 11-20 and 21-30.

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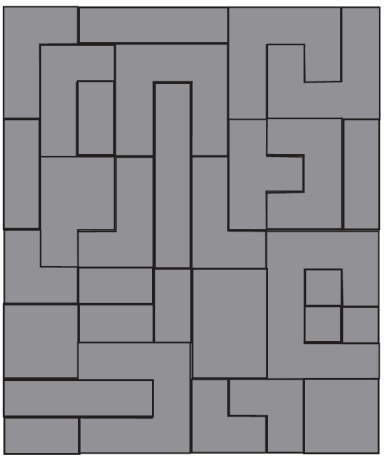
Shape Puzzles



Use the puzzle pieces provided in session 3.

Object of learning:

1. Shape recognition and description of shapes
2. Spatial reasoning and measurement
3. Developing language of comparison

Activities

- Cut up each of your laminated puzzle boards into individual pieces by cutting along the lines.
- Place the pieces of each board into a Ziploc bag or container and give these to each pair of learners you are working with on the mat.

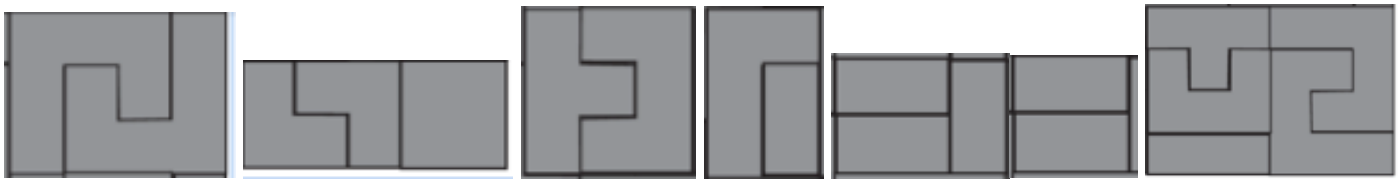
Build rectangles

- Ask learners to show you a rectangle in the classroom (they could point to the door, or windows or carpet, tiles etc.).
- Ask them why they say those are rectangles and discuss the properties of the opposite sides being equal and usually we have 2 long sides and two short sides and the upright (not slanty or pointy) corners.
- Now ask the learners to use some shapes to build you a rectangle.
- Then ask them to see if they can build another different rectangle (e.g. a longer, fatter or thinner one).
- Ask learners to compare their rectangle to a friend's and describe how they are the **same** and **different** using words such as longer, shorter, fatter, wider, thinner, thicker, smaller, etc..
- Ask them how they know this i.e. putting the shapes next to / on top of each other to make comparisons.

Build squares

- Ask learners to explain what a square is and to show you a square in the classroom.
- Discuss why it is a square (i.e. all the sides are equal – and so it is a special case of a rectangle).
- Now ask the learners to use some shapes to build you a square.
- Depending on the size of the square learners have built, ask them to see if they can build another smaller or bigger square.

Some examples are given below:



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Cognitive Control activities

PLAYING CARD SORT

Mathematical object of learning: Pattern (subitising) and number recognition ***Executive functions*:** flexibility and working memory	***You need:*** 1 deck of cards per pair / group. When you first play the game take out the 7 to 10 cards, picture cards and jokers	Learners work with a partner	***IDEAS FOR SORTING CARDS*** • Colour (black / red) • Suit (Diamonds / Hearts / Spades / Clubs (flies) • Numbers • Pictures and numbers

Preparation

- Shuffle the cards.

Activity

- Ask the children to find a way to sort the cards. Give the child some time to think about how they could sort the cards. If they are stuck, you could give some suggestions from the box to the right.
- Once they have sorted their cards ask them to say how they sorted them (e.g. by numbers, by colours, or by the pictures (diamonds, clubs, hearts etc.)
- Once they have chosen a way to sort the cards, ask them to sort the cards in a different way.

Variation and extension

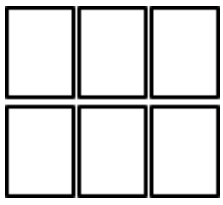
Once learners are familiar with sorting you can extend the card range from 1-10 and later you can include picture cards.

MEMORY (CONCENTRATION)

Mathematical object of learning: Number recognition, subitising ***Executive functions*:** working memory	***You need***: 1 pack of cards WITHOUT picture cards. You can include the Jokers for a bit of colour if you want.	Learners work with a partner or in a small group of up to 3

Preparation

- Select any three pairs of identical cards (e.g. 2 jokers; 2 five of clubs; 2 Aces of hearts)
- Mix the cards up and arrange the cards **face down** in 2 rows of 3 as shown



Play

- Players take turns turning over a pair of cards. If the cards match, the player wins the two cards and takes another turn
- If the cards do not match, they're flipped **face down** and the next player has a turn
- Play continues until all number matches are found

Extension

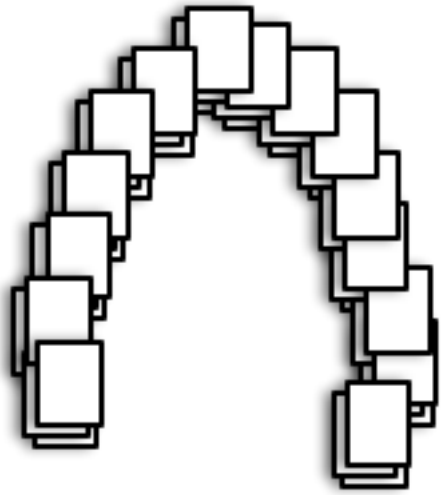
- Once learners are fluent with 3 pairs, extend this to different (even numbered) arrays of pairs of cards, such as 5 by 2, 4 by 4 and so forth

DINGAAN'S KRAAL

Mathematical object of learning: Number recognition, subitising, ***Executive functions***: working memory, inhibition	***You need***: 1 deck of cards per pair / group. When you first play the game take out the 6 to 10 cards, picture cards and jokers	Learners work with a partner or on a group of 3 or 4.

Preparation

- Shuffle the cards.
- Lay the cards out **face down** in a kraal shaped ring as shown



Play

- A learner takes one card and places this face up in the ring.
- The second learner takes another card and places it in the ring.
- If the cards are a match (the suits and colours do not matter in this game) then the learner takes the pair of cards and has another turn.
- If it does not match, then both cards stay in the ring.
- Learners continue taking turns to see if their chosen card matches any card in the ring.
- Continue in this way until all cards are taken (and paired).
- Learners then count the cards they have taken and the one with the most cards wins.

Variations and extension

- Once learners are fluent with recognising pairs of cards in this range, gradually extend the game to include all cards in the pack.
- Another extension that builds on the bonds to 5 developed in the number stories is to select all the cards from 1 to 5 and 2 jokers (the jokers can represent zero. Play this game in the same way but this time learners must pair cards that together make 5. i.e. they take a 2 and a 3 or a joker and a 5.
- For learners wanting further extension one could extend these to bonds to 10 but only once this has been supported through other representations such as bead strings, 10-frames and unifix blocks.

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SNAP

Mathematical object of learning: Number recognition, subitising, ***Executive functions***: working memory, inhibition	***You need***: 1 deck of cards per pair / group. When you first play the game take out the 6 to 10 cards, picture cards and jokers	Learners work with a partner or on a group of 3 or 4.

Preparation

- Decide what the object of the game will be:
    - Matching numbers (dots) on the cards
    - Matching suit on the cards
    - Matching colours on the cards
- Shuffle the cards
- Deal the cards out equally to all players, **face down**
- Learners must make their cards into a pile, still keeping them face down

Play

- One learner starts by placing the first a card from the top their pack into the centre of the table, face up
- The next player does the same. If the card matches the requirements, that learner takes the pile and adds it to their pack.
- If there is not a match, play continues, with each learner taking a card from their pack and placing it in the pack in the centre of the table.

Variations and extension

- Once learners are fluent with recognising pairs of cards in this range, gradually extend the game to include all cards in the pack but only once this has been supported through other representations such as bead strings, 10-frames and unifix blocks.

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Game-based activities

ORDERING CARDS

Mathematical object of learning: Number sequencing (forward and backward number sequences)	***You need***: 1 deck of cards per pair / group. Take out cards from 6 to 10, picture cards and jokers.	Learners work in a group of 4

- Sort the cards by suit and give one suit of 5 cards to each child. Explain to learners that the Ace is one
- Learners must sort their cards:
    - Smallest to largest (1 to 5)
    - Largest to smallest (5 to 1)
- Follow this up with:
    - Point to four, three etc
    - How many cards are there altogether?
    - Point to four. What comes before? What comes after?

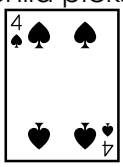
Variation

- Sequence from 1 to 10 using 10 cards

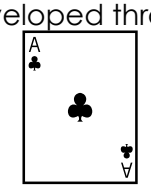
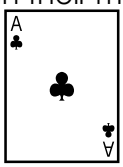
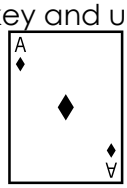
MAKE 5

Mathematical object of learning: Making number bonds to 5 (working with five as a base)	***You need***: 1 deck of cards per pair / group. Take out cards from 6 to 10, picture cards and jokers.	Learners work in a group of 3 or 4

- Deal out the cards equally to all players. Explain to learners that the Ace is one
- First child picks a card from their pile and places it in the middle of the table

e.g. 

- Other learners must look in their piles to see if they have a (or number of) card of any suit that will go with the selected card to make 5. Connect this to their knowledge of the bonds to 5 developed through their monkey and umbrella number stories.

e.g.  or  or 

- The cards in the middle of the table must never make more than 5.
- Players put the cards back in their piles.
- Next child pulls a card out and others must again find a card that makes 5.

Extension

- Extend learners to make another number such as 6 but only once this has been supported through other representations such as bead strings, 10-frames and unifix blocks.

MORE and LESS

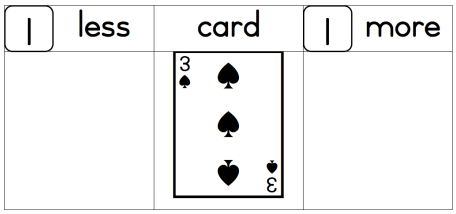
Mathematical object of learning: More and less	***You need***: 1 **More or less game** board per group of learners 1 deck of cards per pair / group. Take out 6 to 10, picture cards and jokers (24 cards) Dry wipe markers	Learners work with a partner

Preparation

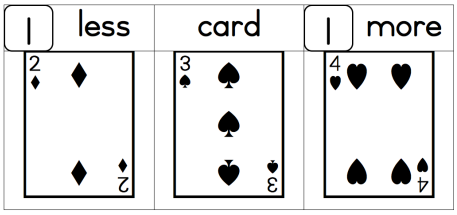
- Start with 1 more / 1 less. Write the number '1' in the square on the game board.
- Give each child 10 cards. Explain that the Ace is one.

Play

- Using the game board, the first child chooses a card and places it in the middle of the board as shown



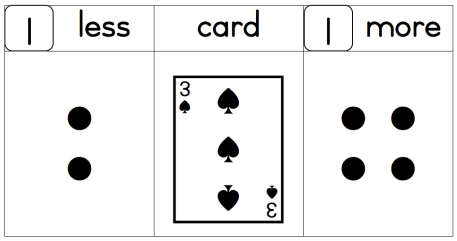
- The other child must search through their cards to find a card that is 1 less and 1 more. Place these on the board under the "one less" and "one more" spaces as shown



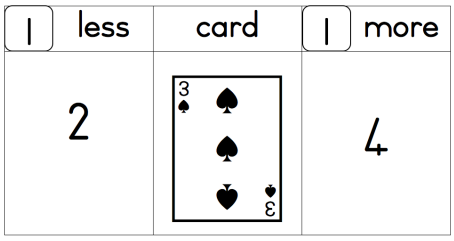
- The other learner must check that the cards placed are correct
- Take the cards off the board and return them to the learner piles.
- The second learner takes a turn to choose a card for the middle.

Alternate play

- Using the game board, the first child chooses a card and places it in the middle of the board as shown



- The other child uses a dry wipe marker to either:
  - Draw dots that are 1 less and 1 more under the "one less" and "one more" spaces as shown
  - Or write numerals that are 1 less and 1 more under the "one less" and "one more" spaces as shown



- The other learner must check that the dots or numerals are correct
- Take the card off the board and return them to the learner piles.
- The second learner takes a turn to choose a card for the middle

Extension

- Extend the card range to any number up to 10
- Get learners to find the cards that are two more and two less. The frog story-book to come will support the concept of two more and less when two frogs jump from one lily pad to the other.

ENF NUMBER GRID 1 to 31

	write month here if required								
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31									

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ENF MORE and LESS GAME BOARD (ENGLISH)

less	card	more

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ENF MORE and LESS GAME BOARD (AFRIKAANS)

minder	kaart	meer

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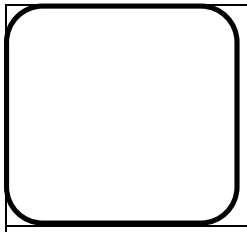
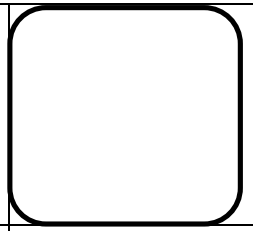
ENF MORE and LESS GAME BOARD (ISIXHOSA)

 zimbalwa	udlala ikhasi	 ongeza

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ENF 1 – 10 GRID (ENGLISH)

less	more

zero	one	two	three	four	five	six	seven	eight	nine	ten
0	1	2	3	4	5	6	7	8	9	10

before	after

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ENF 1 – 10 GRID (AFRIKAANS)

minder	meer

nul	een	twee	drie	vier	vyf	ses	sewe	agt	nege	tien
0	1	2	3	4	5	6	7	8	9	10

voor	na

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ENF 1 – 10 GRID (ISIXHOSA)

zimbalwa	ongeza

nothi	nye	bini	thathu	ne	hlanu	thandathu	sixhenxe	sibhozo	lithoba	lishumi
0	1	2	3	4	5	6	7	8	9	10

ngasemva	ngaphambili

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