HOW I TEACH USING THE "BEETLE" DICE GAME FOR DEVELOPING ADDITION AND MULTIPLICATION IN GRADE 3 AND 4 LEARNERS

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INTRODUCTION

In this talk we describe how we use the Beetle game activity in our after school Maths Club for developing fluency in number. In 2012, we saw an article in the 'Ukufunda / Fun with Maths' supplement of our local newspaper. The article was put together by a numeracy project at Rhodes University. We contacted the project and they provided us with support for starting an after school club in the latter part of 2012 and provided us with a number of critical resources. We are continuing to run these clubs in 2013 with Grade 2 and 3 learners.

Short games, particularly those played with dice, are very accessible to younger learners and can aid in the development of core number skills, mental agility and fluency in number. Mathematical games are 'activities' which involve a mathematical challenge, are governed by a set of rules and have a clear underlying structure, normally have a distinct finishing point and have specific mathematical cognitive objectives (Way, 2013).

The Foundation Phase CAPS (Department of Basic Education, 2011, p12) document states that "mental mathematics plays a very important role in the curriculum", so dice games are ideal for incorporating into mental sessions as they are easy to set up, implement and tidy away. Other benefits include motivation, developing positive attitudes towards maths and allowing children to operate at different levels of thinking.

CONTENT OF THE TALK

We will briefly describe the game and the mathematics that can be developed by playing it. If time allows, we will play at least one game.

Overview of the game

Beetle is a British party game in which one draws a beetle in parts. The game is played with pencil, paper and a dice (Wikipedia, 2013). This game was one of the key resources provided by the numeracy project. They have adapted the game as described below so that it can work in a classroom or small group context. The adapted version can be beneficial for:

- Developing collaboration and turn taking in learners
- Developing mathematical fluency in a non-rote way. For example it can help develop fluency in simple addition, use of efficient addition strategies, multiplication (repeated addition), doubling or having. It can also be used for developing estimation strategies.

Mase, Y. & Koliti, N (2013). How I teach using the "beetle" dice game for developing addition and multiplication in Grade 3 and 4 learners. In Z. Davis & S. Jaffer (Eds.), *Proceedings of the 19th Annual Congress of the Association for Mathematics Education of South Africa*, Vol. 2. (pp. 98 – 102). Cape Town: AMESA.

- Learning to follow game rules

Basic Play

- Allocate about half an hour for the game and then about 15 minutes for the estimation and concluding part at the end.
- Work in pairs with 1 dice per pair. They need a scorecard (see Appendix) between them and scrap paper for drawing their beetles
- One learner will draw the beetle and the other will throw the dice
- The learners must throw a 6 for the body in order to start drawing. Once they have thrown a 6 to start, they do not have to throw the dice in any particular order - except that they must throw a 5 to draw the head before they can draw feelers and eyes.
- Throw the dice repeatedly in order to draw the beetle.
- When a pair has drawn a complete beetle, they shout "Beetle" and everyone must stop playing.
- Each pair counts the number of body parts they have drawn with the maximum being 14. Write this on a scorecard. The pair who shouted "Beetle" will of course have a score of 14.
- Learners swap roles and play another game
- Play between 4 and 6 games, depending on how much time you have

Drawing the Beetle

There are 14 body parts to draw: a body, a head, 2 wings, 6 legs, 2 feelers, 2 eyes

- you must throw a 6 to start - and you can then draw the *BODY*
- when you throw a 5 - draw the *HEAD* – must be drawn before eyes & feelers
- when you throw a 4 - draw the *WING* (you will need 2 of these)
- when you throw a 3 - draw a *LEG* (you will need 6 of these)
- when you throw a 2 - draw a *FEELER* (you will need 2 of these). You must have the head first
- when you throw a 1 - draw an *EYE* (you will need 2 of these). You must have the head first

THE MATHEMATICS OF BEETLE

After the entire game is finished (i.e after 4 to 6 games), it is time to see which pair is the overall winner.

- Before each pair adds up the scores for all individual games, the whole group can *estimate* which pair of learners they think has the highest score and lowest score.
- Discuss strategies for how they know this. Record their ideas on a black or white board.
- Then each pair adds up their score. Pairs can add up their scores using any strategies they wish.

- They then swap their score card with another pair who check and agree/disagree with the final score.
- Finally, check actual scores against estimates given at the beginning of the process

Other Game Variations for different mathematical skills

- *Practice doubling or halving:* Score as above but at the end of the entire game, double or halve the final game scores. Discussion might result about how to halve odd numbers.
- *Practice working in multiples (or repeated addition):* Rather than scoring 1 point per body part, use the actual values of each body part as the score. This will get the learners thinking and working on strategies. The maximum score for each game will then be 43. e.g.
- Body Head Eyes Feelers Legs Wings
  6 5 2 x 1 2 x 2 6 x 3 4 x 2

1. *Draw crazy creatures*: Throw the dice a certain number of times (for example 12) and draw the creature that you get. Add up the values of the body parts drawn. See Figure 1 where I threw the dice 12 times and drew my 'creature' as I went along: three bodies (6s), four legs (3s), one head (5), two feelers (2s) and two eyes (1s), to get a score of 41(South African Numeracy Chair Project, 2012, pp18-19).

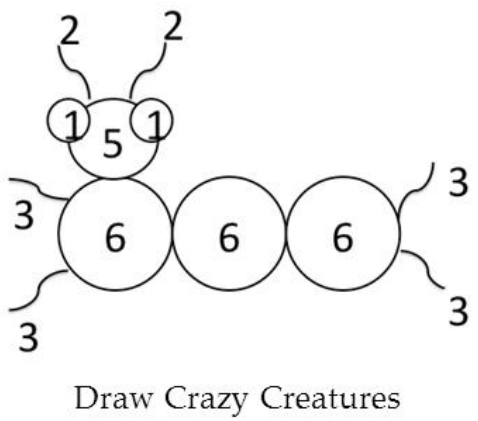

Figure 1. Crazy figure for 12 dice throws

One way of working this out could be like this:

A.	*Head*	*Body*	*Legs*	*Eyes*	*Feelers*					
	5	+	3 x 6	+	3 x 4	+	2 x 1	+	2 x 2	
	5	+	18	+	12	+	2	+	4	= 41

CONCLUDING REMARKS AND FURTHER SUGGESTIONS

We play this game in the first or second session of a new club as it is an ideal way to model how the club ethos works. Once played, we have found that the learners love this game and constantly ask to re-play it.

We have printed a number of scorecards and have laminated them, so they can be re-used with dryboard markers.

We have also encouraged learners to play the game at home with their family as a way of encouraging learners to use maths outside of school and getting other family members involved.

The game has been used extensively around the world as fund-raising mechanism. In South African specifically it is used by the Boy Scouts and Girl Guides as a way of raising funds. It could be used in your school for the same purpose. When used as a fund-rasiser there is less focus on the mathematics and the game is much faster. For information on how it is used differently as a fund-raiser, see the links below[1].

ACKNOWLEDGEMENT

We are grateful for the support provided by Debbie Stott and the financial assistance for attending this conference from the South African Numeracy Chair Project at Rhodes University.

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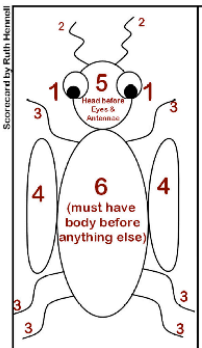
[1] Fundraiser ideas can be found on these websites: http://www.better-fundraising-ideas.com/beetle-drive.html OR http://www.1st-thatcham.org.uk/joomla_new/images/stories/scouts/resources/BeetleDriveInstructions.pdf

APPENDIX

Scorecard by Ruth Hennell



SANC Maths Clubs Beetle Game

The round ends when the first pair in the room draws a complete beetle and shouts "BEETLE"

The pair adds up their score. 1 point for each part of the beetle drawn. Total of 14 body parts.

For Variations, see **SANC Games Booklet**

1 SCORE	**2** SCORE	**3** SCORE	1
			2
			3
4 SCORE	**5** SCORE	**6** SCORE	4
			5
			6
Name		Total Score	

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