

Students' Understanding of Everyday English and Kimberley Kriol in Mathematics Classrooms

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Forty seven Aboriginal students in the Kimberley were interviewed in English and Kimberley Kriol to investigate their understanding of 'everyday' words used within mathematics classrooms. The results showed that some of the Kindergarten and Pre-primary students had difficulty with both the Kriol and English words, indicating they need to learn concepts associated with these words. The research also showed that many of the Year 3 students understood most of the Kriol words, but still needed to learn some of the commonly used English words and phrases.

Often, as teachers, we think of the language of maths and focus on words, like for example, *multiplication* and *triangle*. However, the everyday words used within mathematics lessons can be more problematic and are much harder to recognise. Students need to have an understanding of these everyday words if they are to access the mathematics concepts they are being introduced to. This can be particularly difficult for students in remote Aboriginal communities who do not have English as their first language, such as the students in the Aboriginal Independent Community Schools (AICS) in the Kimberley.

Language reflects the world view of its speakers; it reflects what people attend to, what is important within the community of speakers. (Roberts, 1998) One focus of Western mathematics is on comparing quantities and hence there is a range of words used to discuss this idea. (Harris, 1991) In one Kimberley language, *Nyikina*, there are 34 words used to show location, which shows that this is a focus of thinking for this group of people. (Sullivan & Grootenboer, 2010)

Aboriginal languages have always been able to discuss Aboriginal mathematical ideas and there is appropriate vocabulary and specific grammatical structures to do this. However, Aboriginal cultures did not use mathematics in a Western way: that is to say, they did not quantify, specify relationships, locate themselves or use shapes for design in the way the Europeans traditionally have. (Roberts, 1998, p10)

Research has shown, (Malcolm et al, 1999) that, "in general, precision is much more central to western society than in most Aboriginal contexts." This means that in English we have many words that are used to show relationships between quantities and to show exactness in measurement and location. In the diagrams below (Berry & Hudson, 1997, p115), Figure 1 shows six different English words used to describe the position of the snake, whereas in Figure 2, Kriol speakers use the one word, *langa*, to describe all of the different positions. English speakers typically choose between the words to find the one which gives the exact location of an object. Kriol speakers may choose to use other words with the word *langa* to show the precise location if they need to, but will typically choose the more general term.

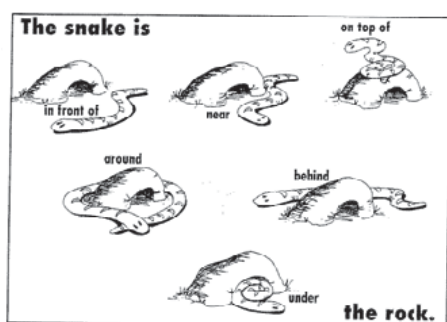


Figure 1. English words used to describe position.



Figure 2. Kriol words used to describe position.

The National Numeracy Review (2008) recommends:

... that the language and literacies of mathematics be explicitly taught by all teachers of mathematics in recognition that language can provide a formidable barrier to both the understanding of mathematics concepts and to providing students access to the assessment items aimed at eliciting mathematical understandings (p34).

The importance of language and literacies of mathematics is recognised by teachers and researchers, (Meiers, 2010, Schleppegrell, 2007, Zevenbergen, 2001, Adams, Thangata & King, 2005) but what do we mean by the language of maths? Often the language of maths refers to the more technical maths words, like for example, *multiplication* and *triangle*, which have a particular mathematics meaning. Sometimes these words are used within everyday language, with a different meaning, for example the word *volume*, which refers to how loud something is, or *take away*, which can refer to food from the community shop.

These technical mathematics words are not usually difficult for teachers to recognise within their mathematics lessons, and so they tend to spend time helping students to learn and understand them. Indeed, learning what these words mean is a focus of mathematics teaching as students learn the associated concept. For example, learning what multiplication means can be a major focus of teaching for many years in lower primary.

There are other everyday English words which are used within the mathematics classrooms to discuss the mathematics concepts. Such words are *most*, *forwards* and *between*. Having an understanding of these words at the lower levels of primary school is critical if students are to be able to access the mathematics concepts they need to learn. For example, the word *forward* is often used in relation to counting. 'Let's count forwards from 13...'. These everyday words are typically used to indicate position, movement and direction, and to compare quantities. Indeed, many everyday words are used in lower primary to refer to movement and position of numbers within the number sequence.

Teachers often don't realize that the everyday words used within mathematics lessons pose difficulties for children. Hence, they don't realise they should help students to learn and understand them. This is particularly challenging in schools where the students do not speak English as their first language. In the Kimberley most students speak Kimberley Kriol, which is a language in its own right.

Early work within the AIC schools suggested that students were having difficulty with the everyday English language used within mathematics lessons. For example, when students were asked to play a *guess my number game*, where the clues followed the format of 'is your number more than' most of the students had difficulties interpreting the clues

and locating the numbers, even when a number track was available. This suggests that a focus on everyday language could be helpful, but the question is, what words and phrases do students know, and more importantly, what do they need to learn?

The focus of this research was on identifying the everyday English words and phrases that may impact adversely on the Aboriginal students' mathematics learning within the community schools; to find out if students understood the concepts when presented in their home language, Kimberley Kriol, and to find the English and Kriol words and phrases that teachers need to focus on within lessons if they are to help students connect their home language with the everyday language of the mathematics classroom.

Methodology

Forty seven students from Kindergarten through to Year 3 were interviewed in English and in Kimberley Kriol using an assessment tool developed by the Kimberley District Education Office (2001) called *Talking Concepts: the language of maths and science*. This included all students from these year levels in three of the larger Aboriginal Independent Community Schools. The assessment tool consists of a set of pictures and instructions in English which assess 50 everyday words and phrases commonly used within mathematics and science classrooms. The students are asked to put a cross somewhere on the picture, according to the given instruction. For example, using the diagram in Figure 3, students were asked to 'put a cross of the top of the Toyota' to find out if they understood the word *top* and have the associated concept.



Figure 3. Example picture from the Talking Concepts booklet.

The *Talking Concepts* booklet originally included only English instructions. Kimberley Kriol instructions were added by a research assistant who was fluent in both the written and oral language. The 50 items within the test were reviewed and reduced to a list of 42 words and phrases commonly used within mathematics classrooms. (The initial list included maths and science words, whereas this study focussed on maths words.)

The students were asked to complete the whole test firstly in English and then they were reinterviewed by the research assistant in Kriol on the items with which they had difficulty. After the first couple of interviews with Kindergarten students, it was found that they were not able to answer any of the questions in English, so the interview process was varied for these students to ensure that they were not subjected to undue stress. The Kindergarten students were asked one question at a time, first in English and then in Kriol. If they showed no understanding of the English words after the first five, then the interview was completed in Kriol only.

Results

Whilst working with the research assistant to create the words and phrases in Kriol, it became evident that some English words and phrases did not have a direct match with a Kriol word and so a word or phrase that was close in meaning was used. For example, the English word *forwards* which was connected to a series of pictures of boys on bikes was replaced with the Kriol, *e gorn*, which means that the person in the picture has gone away, rather than meaning a movement forwards as in English. It also became evident that some Kriol words and phrases were used for a number of different English words. For example, the Kriol word *saimsaim* was used to refer *as many as*, *pair*, *double* and *equal*. This suggests that some of the words, and associated concepts within English are not a focus within the communities who use Kimberley Kriol.

The students' results

In general, the older students had more familiarity with both English and Kriol versions of the words and phrases, and the younger students had more difficulties. The younger students had difficulty with most of the English words, and with some of the Kriol words. One Kindergarten student for example did not know any of the English words and had difficulty with twelve out of the forty two Kriol words. The most problematic of these were the Kriol version of the following; before, after, between, end and pair. This is not surprising, as young students are still learning words and concepts within their first language. Figure 4 shows the average number of errors for each year group, as a percentage, so that the data can be compared. This shows that the Kindergarten students had far more errors in English (60%) than in Kriol (24%). The students' understanding of English improved at the Pre-primary level, and then plateaued until Year 3, where marked improvement is shown. The improvement in students English from Kindergarten to Pre-primary suggests more engagement with the language as students enter school and hear and use it more often. The improvement from Year 2 through to Year 3 is not so easily explained and warrants further investigation.

When looking at the students' results across all of the year levels, (see Table 1) the data showed that some of the words and phrases assessed were more problematic for students than others. Some words were problematic in both languages; some were problematic in English but not in Kriol and some were not difficult for the students in either of the languages.

Table 1

Results of students assessed on everyday English and Kriol words

English	Number of errors /47	Kriol	Number of errors /47	English	Number of errors /47	Kriol	Number of errors /47
top	7	ondopway	2	beginning	30	starding	11
next to	7	sideway	0	as many as	23	saimsaim	12
through	15	insideway	1	more than	4	bigmob	0
most	6	bigmob	0	greatest	11	bigmob	1
part	28	seeim lilbit	8	furthest	10	longwai	3
widest	24	fadwun	4	second	9	seginwun	5
less than	24	lilbit than dijun	3	backwards	3	rongwai	3
behind	6	beehienway	0	before	30	ee guddu	29
row	32	straidline	24	forward	17	e gorn	2
between	27	middle lu	8	centre	24	middle	7
bottom	15	ununeet	1	largest	22	bigmob	1
every	10	orlud	1	half	33	harfwun	28
end	19	longwai	8	thinnest	14	skineewun	0
over	11	oaba	6	pair	25	saimsaim	7
side	7	wunsiedwai	3	full	8	fuoolwun	2
last	5	larswun	2	double	23	saimsaim	11
whole	12	foolwun	2	similar	30	lil bit saim	7
different	5	rongwun	3	none	16	nuthing	4
above	13	ondopwai	2	equal	36	too saimsaim	21
below	21	ununeet	4	towards	18	e gorn	4
after	28	finij	11	empty	4	emteewun	0

The words that were difficult in both languages suggest that the associated concept is not a focus of thinking within these communities. For example, with the word *before*, 30 students had difficulty with this in English and 29 had difficulty with the Kriol version of, *ee guddu*. Figure 5 shows the % of errors for the English word *before* and the Kriol version, *ee guddu*. The Kindergarten, Pre-primary and Year 3 students had more difficulty with the Kriol version than the English version, whereas in the Year 2 students had more difficulty with the English version.

For the word *equal*, 36 students had difficulty with the English version and 21 had difficulty with the Kriol version, *too saimsaim*. Figure 6 shows that students had significant difficulty with the English version from Kindergarten through to Year 2, and fewer problems in Year 3. Students has less of a problem with the Kriol version, *too saimsaim* however 25% of students in Year 3 were not able to understand this in the

context of the assessment. With 38% of Year 3 students unable to understand the English version, this could be a major problem in mathematics classrooms when teachers are talking about the idea of one set being equal to another.

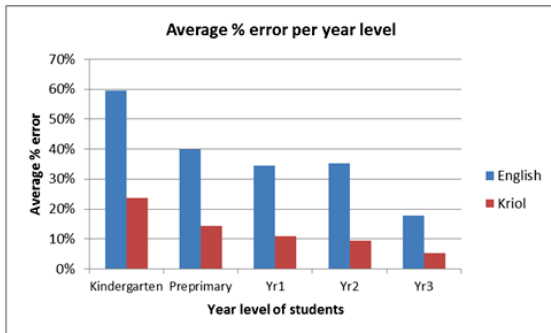


Figure 4. Average percentage of errors per year level.

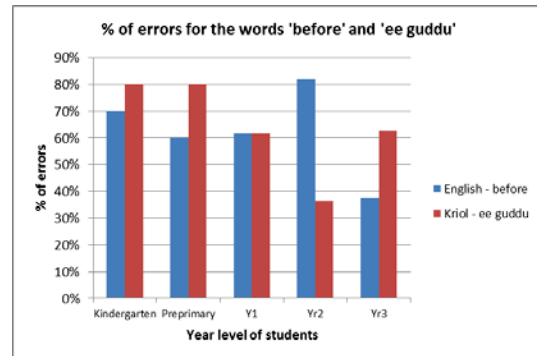


Figure 5. Percentage of errors for the words 'before' and 'ee guddu'.

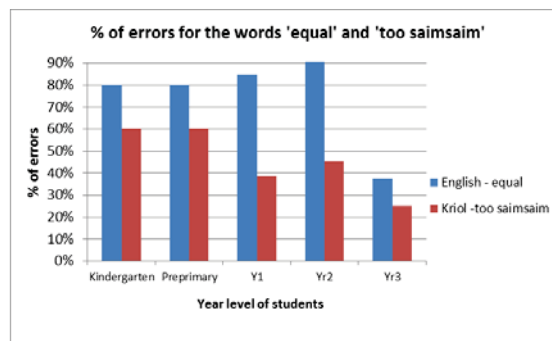


Figure 6. Percentage of errors for the words 'equal' and 'too saimsaim'.

Students also had difficulty with both versions of the words, after, beginning and as many as. This suggests that these words will need to be explicitly taught within mathematics classrooms if students are to understand phrases like, What number comes after 36? What number is at the beginning of the sequence? Show me the set that has as many things as this one.

The word half was a problem in both languages. This assessment item asked students to identify half a pie, choosing from a whole pie, three quarters of a pie, half a pie and a quarter of a pie. Students who chose incorrectly mostly selected the picture showing three quarters. Research has shown that many young students think of a half as one of two pieces and do not attend to the size of the two pieces. (Department of Education WA, 2004) This suggests that the problem with this word was lack of exposure to the mathematics of fractions.

The word row was also a problem in both languages. In reviewing this with the research assistant, it was decided that the assessment item was not a fair one. The students were asked to identify the picture showing a row of trees from others that showed bunches of trees. Within a two dimensional drawing, it was quite difficult for the researchers to say

which showed a row of trees. This item needed to be tested with solid objects, rather than a picture.

There were a number of words that students had difficulty with in English, which were not, in general, as difficult in Kriol. For example, for the word part, 28 students had difficulty with this in English, and only eight had difficulty in Kriol. Figure 7 shows that 50% or more in all year levels had difficulty with the English version of this word, with this peaking at 82% at Year 2 level. Less than 30% had difficulty with the Kriol version seeim lilbit, with 18% of students having difficulty with this in Year 2. This suggests that students understand the concepts associated with words such as part, and that they are a focus of thinking within the communities. However, the English versions of the words are not familiar to the students. This included the following words; part, widest, less than, between, bottom, every end, over, whole, above, below, greatest, furthest, forward, largest, centre, thinnest, pair, double, similar, none, towards. These words need to be a focus of teaching if students are to access the mathematics within the classroom.

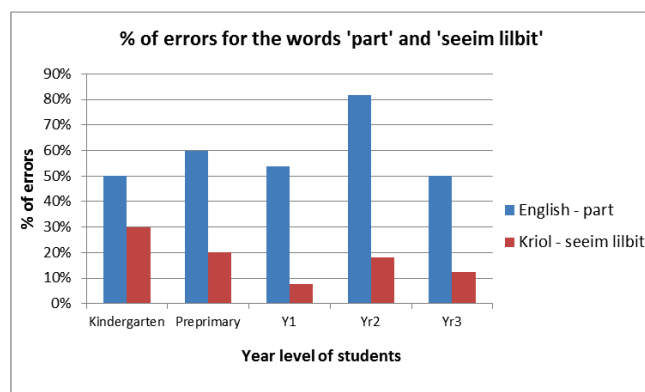


Figure 7. Percentage of errors for the words 'equal' and 'too saimsaim'.

Some words were not difficult for students in either language. For example, four students experienced difficulty with the English word more than and no students had difficulty with the Kriol equivalent. This was at first surprising as this was one of the phrases initially noted as being problematic, prompting this research. However, on reflection, this phrase has been the focus of professional development and work with teachers in schools over the last two years, which may have contributed to an improvement in students understanding of this term.

Implications for the Classroom

The research suggests that students need to firstly learn the concept and the associated word in Kriol, and then learn the English word that matches the concept. As many of the young students had no understanding of the English words, and had difficulty with many of the words presented to them in Kriol, it seems that they need to develop an understanding of the concepts within their home language. Learning for example, what is meant by the word *ee guddu*, (before) will help them when teachers ask questions in English such as *what number comes before 7?*

Working with an adult who speaks the home language of the students, such as an Aboriginal Education worker will help the students to connect their understanding of concepts in Kriol to the English words used. This is not easy as words are often used in

different ways according to the context. For example, when the words *before* and *after*, are used in everyday English to talk about before and after the rain, the words show the location of events in time. In mathematics, the words *before* and *after* are used to show the location of numbers in relation to each other. Many of the words listed above are used to show the location of numbers within the number sequence. For example, we talk about counting *forwards*, ask what numbers come *between* and which are *more* or *less* than others.

It is a challenge for us as teachers to recognise when we use these words, and then to notice how we are using them. However, making an effort to recognise the everyday language of the mathematics classroom should help teachers to ensure that students are not alienated from the world of mathematics before they begin.

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