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CHORUS RESPONSE IN CAPE TOWN SCHOOLS

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In this paper I am going to look at the roles and uses of unison response in the teaching and learning of mathematics. This work is based on a collection of field-data from mathematics classes in Cape Town. Although the context of the data is important, the issues which arise may be universal but this paper is too short to give anything but a brief introduction. A longer paper is in preparation.

CONTEXT AND METHOD

I observed nineteen secondary mathematics classes, containing between 40 and 50 students each, taught by thirteen teachers in four schools. Classes ranged from year 8 to year 12. Compulsory mathematics ceases at the end of year 9 but anyone who wants to go to college must continue until year 12. Two of the schools (K and P) are in townships of immense social deprivation, are under-resourced and have some poorly qualified staff. Students in these schools are unlikely to come from educated homes, or to have had continuous education. One of the schools (G) has a more stable history, with pupils from a wide range of social backgrounds and qualified teachers. The other school (W) was formerly mono-culturally European and well-resourced.

In the classrooms I was seen as an interested visitor from abroad. This made systematic observation and enquiry difficult. I took verbatim notes of oral routines which included unison response. Sometimes this was not possible because teaching was in Xhosa or Afrikaans, or because I could not hear well. While pupils were working on exercises I would observe some of their work and ask them about it. Typically, I would ask "how did you do this?" or "what did you say to yourself while you did this?". Sometimes I would engage in more direct questioning in order to find out the precise nature of their difficulty. Sometimes I talked with the teacher after class, but my status, and organisational problems, made this unproductive in research terms. Consequently I have little evidence of pedagogic intentions.

"THE AFRICAN ORAL TRADITION"

People speak of "the oral tradition" of African culture and epistemology. In schools K and P all students have African backgrounds, there are few textbooks and teachers rely heavily on oral teaching. However, just because teaching relies on chorused oral response does not necessarily mean that it is culturally-based; it is a fallacy to equate rote-learning with oral tradition.

There is no global African culture or epistemology, but there are views of knowledge and learning which are relatively pan-African and illuminate the notion of oracy. For example, many African epistemological beliefs are based around the notion of knowledge as accumulated experience, sometimes validated by elders or forebears (Coetzee and Roux,1998). Learning, therefore, is experience.

The accumulated knowledge of a group of people might be communicated through stories, proverbs, puzzles and songs, and repetition of these is a mark of an educated person. According to Reagan (1995) the role of these is to stimulate intellectual and social development. Proverbs and riddles are used to develop reasoning power; stories about behaviour contain information about cultural norms and expectations and provide help to resolve dilemmas; word games 'strengthen' memory; rhymes encourage counting and the use of number words. There are also arithmetic puzzles which challenge the hearer's logic and stimulate discussion (one involves 11 steps to solution). Memorised phrases therefore provide the raw material for thought, discussion, and intellect. They are not the final products of the learning process but are indicators of knowledge.

It may be patronisingly romantic to refer to an oral tradition as part of the school-pupils' culture, particularly in view of political events and urbanisation of the last century. If oral tradition still is a high-status cultural inheritance, it is about making meaning with learnt phrases, not about memorising as an end in itself.

TWO EXAMPLES OF CHORUSED RESPONSES

Here are two contrasting examples of chorused response. Both took place in school K with different teachers. In the first, the teacher is showing pupils how to multiply two binomial expressions in brackets to make a trinomial. As the teacher writes the terms of the product she recites phrases loudly and slowly, leaving pauses where the pupils insert words in unison.

Teacher:	the first multiplied by the first gives the
Pupils:	first term
Teacher:	and the first multiplied by the second gives the
Some pupils:	second term
Teacher:	and the second multiplied by the first gives the
Some pupils:	third term
Teacher:	and the last by the last gives you the
Pupils:	last term

I cannot be sure that all pupils were answering for the first and last terms, many may have been joining in a very short time after taking a lead from a few who knew what to say, but it sounded like unison response. There was a noticeable difference between the loud, confident, bright sound of the first and last response and the less secure, lower tones of the middle two responses.

In the second case, the class are identifying the value of the angles in a fairly complicated geometric diagram using facts about angles and parallel lines. Before they started they were asked:

Teacher: What can you tell me about vertically opposite angles?

Pupils: Vertically opposite angles are equal.

Other facts were similarly recited and most of the class seemed to be joining in.

These two examples show different uses of chorusing. In the first, the pupils are being encouraged to remember an algebraic routine, but they only have to fill out small gaps in what the teacher says. In fact, the gaps are so small that there are not many possibilities for what might fill them, given the context. There is a certain rhythm to the words (first, first and first; last, last and last) which breaks down in the middle. However, filling the gap might be more to do with rhythm and participation than active, intelligent choice. In the second example, pupils are having to do much more than fill a gap; they have to recite a fact which they are about to use, and have to link it to some technical words relating to angles.

In each class I was able to see the work pupils did after these interactions. For many pupils in the algebra class the order in which terms were multiplied was not a problem: they knew what they needed to do but not necessarily how to do it. I had an impression that even many of those who did not join in the chorus knew which pairs of terms to multiply. Reasons for getting the wrong answer were more likely to be errors in multiplying or attempts to combine unlike terms in the product. Perhaps the learnt phrases which instructed them about these subprocedures were not being brought into play as they had not been reminded of them.

In the geometry class most students were unable to apply the learnt geometrical facts to the diagrams. There were several reasons for this. Two of the difficulties were expected, springing from a poor understanding of angle and the difficulty in recognising angles which were not in a familiar orientation. The third reason was a widespread inability to reason with the learnt fact. They were nearly all able to say "vertically opposite angles are equal" but were not able to use this statement to ascribe values to angles in the diagram. The statement did not tell them what to do. It functioned like a proverb or story, in that it needed to be interpreted and applied.

A CLASSIFICATION OF CHORUSED RESPONSES OBSERVED IN CLASSROOMS

These two events enabled me to begin to discriminate further between types of chorusing by considering the mathematical nature of the statement being chorused, the chorusing routine, and the subsequent use of it. Some examples are given in the following table. There are others omitted due to space restrictions.

Type of statement	Context and teacher utterance	Chorus response	Comment
Facts to be reasoned with	Teacher says: what do you/we know about vertically opposite angles?"	Vertically opposite angles are equal	It is intended that the angles be equated, but pupils did not turn it into an instruction.
Facts to be used as instructions	Teacher says: what do we/you do with two minuses?'	Two minuses make a plus	Intended as inner monologue to tell pupils what to do, often applied in inappropriate circumstances, such as "-2-3 = +5".
"Facts" to be used as instructions which need specifying	Teacher is working on the board, doing an example with a commentary, and says "seven from four..."	You can't	Inner monologue, sometimes inappropriate, into which specific facts are inserted. Pimm calls this ritual speech (p.73): pupils recognise a linguistic shape and give a well-known response.
Reasoning routines	Teacher says: If it isn't positive it must be	Negative	Teacher models how she hopes pupils will think, but this is oversimplistic; it ignores zero. Chorused phrases usually have symmetry which is interrupted by special cases! This reasoning routine also depends on the pupil knowing that she should consider signs and hence bring the routine into play.
Instructional routines	Teacher says: What we do to one side we do to the Teacher says: We take out the	 Other Common factor	Teacher models a monologue she hopes pupils will use on their own. As above, it can be used inappropriately. The recalled routine "take out the common factor" is often followed by omitting the comon factor altogether.The phrase "take out the common factor" was chorused when solving equations, when simplifying algebraic fractions and when factorising and pupils assumed it was always followed by "cancelling", omitting it. put a line through it and leave it out.
Completing calculations	In finding the area of a compound shape, at the end of all the geometric reasoning the teacher says: 3 times 4 is	12	Is the teacher testing arithmetic? Instead of thinking about area the pupils are asked to produce the final, relatively simple, part of the associated arithmetic.
Factual recall routines	Teacher says: A square must have four equal Teacher says: A square must have	 sides four equal sides	In the first case the sentence must end with a noun, so choice is limited and most pupils said "sides". In the second case response was much less united and several pupils were silent as they were not being prompted to recite a well-known phrase.

Examples of Chorused responses

PURPOSE OF CHORUSING

Pimm says, there is

> .. a deep-rooted belief on the part of many teachers that there is a power in someone saying things aloud, and therefore it is better for the pupils to say the central part for themselves, rather than merely hear it expressed by the teacher (1987, p.54).

Learned responses may provide scaffolding for pupils to develop appropriate inner monologues which are versions of the speech patterns offered by experts. Brodie (1989) points out that this process may be especially prevalent where pupils are, as in these four schools, learning mathematics in a second language. What is unclear from the above examples is whether the teaching style offers any scaffolding for *meaningful* internalisation, or for the transformation of knowledge.

In some of these interactions it is hard to find any cognitive justification for asking pupils to respond. It is far more likely that the teacher's intentions are social rather than cognitive. There is an energy in a class of pupils all calling out things in unison which convinces the teacher they are participating and may energise the pupils. When chorusing fails to happen, such as in the second example of "a square has...", this brief community becomes disparate, pupils are faced with the fact that they do not know something, and the teacher realises that there is a difficulty to which she must give some special attention. It is as if the energy of chorusing is a rejoicing at what has been achieved in the past and disunity is a sign of what has to be tackled in future. If this is the case then chorusing could be a social ploy to invite and ensure participation and to signal social inclusion.

Only in schools G and W did I see any attempts to work on the function of chorused statements, rather than the statements themselves. In schools K and P the statements appeared to be ends in themselves, rote-learning in order to reproduce statements, which, in the oral traditions, are not knowledge.

UNIVERSALITY

In constructing the classifications I was also asking "Is there anything specifically South African about these classroom interactions?" One obvious feature is that nearly all the pupils I saw were doing mathematics in their second language, English, their first being Xhosa or Afrikaans. Sometimes their first language would be used to elaborate meaning during exposition by the teacher or while doing exercises amongst themselves, but not in the chorusing episodes (Adler, 1998; Setati, 1998). Brodie (1989) has shown that this creates obstacles on at least three levels: decoding the problem, formulating concepts and transforming concepts into mathematical symbolism. However, the episodes were familiar to me from schools in many countries, so the language issue can be seen as additional rather than overarching. Most of the episodes appear to be using empty recall of phrases and the energy of social participation to mask a lack of cognitive stimulation and the loss of opportunities to encourage structuring of experience. This applies everywhere.

By investigating situations which have familiarities and unfamiliarities, a researcher's attention can be drawn to features which, though often present, might not have been noticed before. In Cape Town classrooms, the role of language in mathematics teaching is a dominant issue, hence the dislocation of words from mathematical meaning was easier for me to see than in a UK classroom. But the dislocation, once noticed, is certainly familiar and recognising it has enabled me to analyse differences in a way which may be helpful outside South Africa.

CAUTION

I do not intend, by this classification and commentary, to deny all uses of chorusing. There are some very powerful arguments for routinising mathematics, such as that of Mary Boole when writing of examinations

> theorists in education sometimes imagine that a good teacher should not allow the work of his class to become mechanical at all ... Education involves not only teaching, but also training. Training implies that work shall become mechanical; *teaching* involves preventing mechanicalness from reaching a degree fatal to progress. We must therefore allow much of the actual work to be done in a mechanical manner, without direct consciousness of its meaning; an intelligent teacher will occasionally rouse his pupils to full consciousness of what they are doing;... (1972, p.15)

Excellent examples of such practices, using chanting to routinise and disruptions of rhythm to arouse consciousness, are given in Brown (1995) and Jennings and Dunne (1997). Also, importantly, routinising allows pupils to move on to more complex activities without needing to think carefully about every stage.

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