

**What counts, who counts;
developing understandings of
numeracy teaching from
international and cross cultural
experiences**

ACAL Oct 2009




Perth, Australia

Dave Baker

London Institute of Education, UK

d.baker@ioe.ac.uk

Messages and outline

-  Current educational positions / concerns
-  Alternative position (parallel to literacy) aimed at greater equity. Extending perspectives – numeracy as social practice - ethnographic style approaches
-  Practical implications. Pedagogy and Curriculum? Illustrate from current work from LETTER projects and training programmes in South Asia, Ethiopia, Uganda, UK.

Time numeracy event, UK



Bus Departures		Stop	Time
Route	Destination		
7	Marina	B	due
14	Newhaven	D	at stop
7	Marina	B	7 min
27	Saltdean	B	12 min
7	Marina	B	13 min
37	Bristol Estate	A	19 min
27A	Saltdean	B	27 min
37B	Meadowview	D	34 min

Do we need to be able to read bus timetables?

Shopping numeracy event, UK



How is change often given?
How does this relate to subtraction in classroom numeracy practices?

1 There are major concerns – adult ed, numeracy, school maths in UK & abroad

Leitch (2006): in Britain 5mn adults cannot read. 15mn – almost $\frac{1}{2}$ the workforce – are not sufficiently numerate. 13 % of 18 year olds in England and Wales are NEET. Proportion remained fixed in Labour's period in office. Poor basic skills cost UK £10bn a year in welfare / productivity. Government aim to get rid of illiteracy / innumeracy in workforce by 2020; a “world leader in skills”

- Issues of diversity/equity in numeracy: long tail, social class and low attainment - best predictor, gender, age, ethnicity, disability etc.

Numeracy as gatekeeper. Complex and intractable.

- Access to powerful maths ideas - abstract, rational, culture & value free, boring, irrelevant (Smith 2006); proxy for intelligence. Seen as essentially powerful, hard, useful and important knowledge.

Raises Questions. Problems seem to be intractable under current models
Does it matter what we teach in maths; what counts? who teaches it; who counts? Are teachers aware of learners' backgrounds?

Views of current positions towards teaching numeracy

Numeracy largely seen as decontextualised autonomous formal body of knowledge, facts, skills, processes

Often taught in formal sessions as follows:

Content is chosen - telling the time or fractions. Teacher driven / chosen. Teacher explains the ideas or skills. Some dialogue. Worksheets of practice examples done individually or in groups. Drawn together.

Find out what learners can't do then teach it and practice. Deficit. Seen as linear, developmental. Transmission of skills or knowledge. Consolidation.

There are some variations. Use of puzzles, games, investigations, creativity, Sudoku.

Views of current ways of modifying teaching numeracy

Current research / policy in UK suggest 'best' teaching/ learning for adults through participation, doing, talking and discussing. (Standards Unit. NRDC) Must be purposeful. Diverse needs. Embed in contexts. Build on what learners know narrow sense. Cooperative small group work. Tasks rich accessible extendable.

Rolled out in the UK (NCETM). Resources for teacher training and classes. Available online. Some excellent, some teachers struggle, lacks purpose for students.

Numeracy still autonomous. Teacher still chooses. What students know is in terms of numeracy content.

Views from my research: positions on teaching maths & numeracy

- UK funds of knowledge research project on adult numeracy.
Metric units for older adult learners; Use of bus time tables and teachers' funds of knowledge; Students' knowledge of engines (capacity & volume)
- Leverhulme: Snakes and Ladders, Pigeon racing, Finger counting etc.
- Tanzanian classroom. Roman Numerals Std IV 2006
- Odds in Betting Shops in UK

Current approaches have considerable intractable problems. Some of this stems from social / culture free models. How extend?

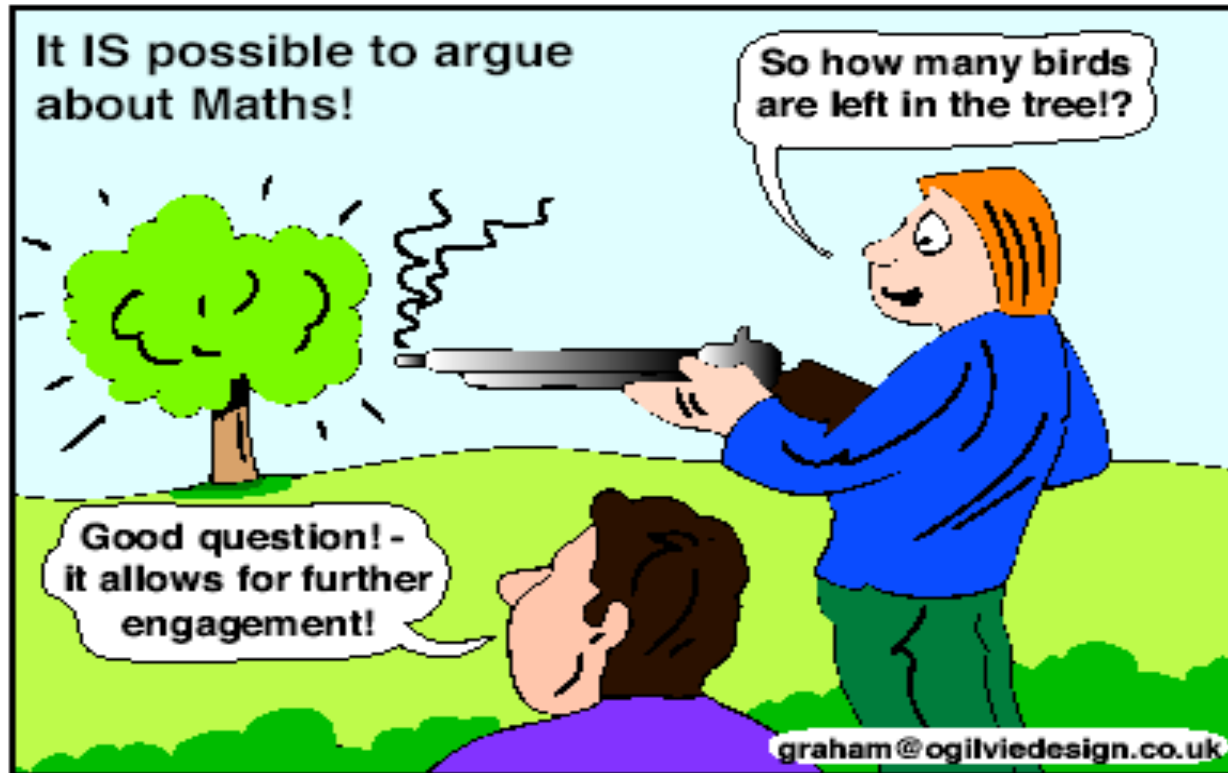
2 Extending from an alternative position – equity social practice

New approaches from an equity and social position and build on existing ones come from two basic tenets:

- Numeracy (literacy) as social practice
- Teachers as ethnographers. How find out what learners know in a broad sense, beyond autonomous skills; that is what are their funds of knowledge for numeracy? what are their cultural resources?

We see this approach as a way of facing the substantial issues of inequity and social injustice within adult education and education more generally.

Birds in a tree; numeracy as social



8 birds in a tree 2 get shot. How many left? Possible answers to this?

If you said 8 who might you be? learner in a class or a mathematician ($10-2=8$) or conservationist.

Other answers? What are possible contexts, values, social relations? Practices?

Numeracy as Social Practice

Viewing numeracy as social practice. What does this mean? What happens when we do?

According to this model, numeracies (like literacies) vary with social context; there are different uses and meanings associated with mathematics in contexts. It means that numeracy is always contextual even formal classroom numeracy is not autonomous.

- Practices always sited in contexts with values, beliefs, power relations.

We can move away from deficit. Constructivist: Build on what learners know in a broad sense towards their funds of knowledge for numeracy and their numeracy practices. It challenges what is numeracy; that is multiple practices – classroom numeracy practices, street numeracy practices, betting, financial, builders, domestic, shopping etc

What counts who counts? Formal numeracy practices count a lot and are different from others. E.g Brazilian Street Children

Numeracy as social practices - power



Avoiding deficit. Start with learners' 'funds of knowledge' – their resources

Moll states that: “funds of knowledge represents a positive and realistic view of households as containing ample cultural and cognitive resources with great potential for utility for classrooms” (page 134, Moll et al 1992). E.g bus times, formal numeracy practices, domestic, shopping, building practices, dispositions, attitudes, engagement or resistance.

Brazilian street children have numeracy practices. Try to observe the children's numeracy practices. What they actually do? Why & how? What is important to them – what counts? Who counts? Why can they do these yet struggle with formal numeracy practices?

What does this say about our own formal and informal numeracy practices?

Uses of non-formal numeracy practices

UK – odds - Numeracy events from a betting shop

Discourses / numeracy practices in betting shops or on line include values, ways of behaving, and power relations. There are gender and class issues etc.

These numeracy practices part of some people's everyday practices; these could be linked to formal numeracy practices and be a way of teaching formal practices: such as money, time, fractions, probability. Why are they not on the adult numeracy curriculum? Teachers' funds of knowledge do not include them. Is this an issue? Are there problems with values /morality in educational practices?

How to find out what students can do or know - ethnographic style

We can test them, interview them, observe them. Get them into focus groups. But these don't give us insights into students' broad funds of knowledge for numeracy

Training teachers to view 'real lives' from an ethnographic perspectives. Not ethnographic research. Observation, conversations sited in practice. Data collected in informal but systematic manner. Aims to be open and culturally sensitive, reflexive. Look later at using this in practice

Look at the story of the turtle and the fish.

The Turtle and the Fish

To illustrate problems of ethnocentrism (beyond our cultural backgrounds) I relate the story of the turtle and the fish.

There was once a turtle who lived in a lake with a group of fish. One day the turtle went for a walk on dry land. He was away from the lake for a few weeks. When he returned he met some of the fish. The fish asked him, "Mister turtle, hello! How are you? We have not seen you for a few weeks. Where have you been? The turtle said, "I was up on the land, I have been spending some time on dry land." The fish were a little puzzled and they said, "Up on dry land? What are you talking about? What is this dry land? Is it wet?" The turtle said "No, it is not," "Is it cool and refreshing?" "No it is not", "Does it have waves and ripples?" "No, it does not have waves and ripples." "Can you swim in it?" "No you can't" So the fish said, "it is not wet, it is not cool there are no waves, you cant swim in it. So this dry land of yours must be completely non-existent, just an imaginary thing, nothing real at all." The turtle said that "Well may be so" and he left the fish and went for another walk on dry land.

Who is the fish and who the turtle in teaching? Who counts what

Interpreting Turtle and Fish

Who is the fish and who is the turtle? Who counts? At times we are insiders and others outsiders; at times learners and at times teachers. Sometimes we try to teach things that lack purpose for learners. We don't know where they are coming from and they don't know where we are coming from. The fish as the learner could not understand the turtle's notion of the land. The turtle did not know how to make it available to the fish. At that point the turtle needed to be the learner.

Ethnography may help us to de-centre; to be sensitive to the other; to avoid deficits. An Ethnographic perspective shifts us out of our mind set and helps us 1) to 'imagine' things that do not exist in our own world and 2) to understand them positively in the others' terms rather than to see them, in our terms, just as 'deficits'.

3 Practically what can we do?

Examples from recent work

- LETTER South Asia 06 adult training trainers project
- LETTER Ethiopia 08 adult training trainers project
- The next LETTER project training teachers of rural poor in Uganda. Future: Pakistan, Sere Leone
- Others: Leverhulme Numeracy Research Project Navigating Numeracies (early years of schooling)

LETTER Projects

LETTER (Learning for Empowerment Through Training in Ethnographic Research) a project of Uppingham Seminars in Development (UK) - Alan Rogers, Brian Street, Dave Baker – with others both in the UK and abroad at Nirantar, ANFEAE, Makerere, KwaZulu Natal

Its about adult education (numeracy and literacy) and Ethnographic perspectives on local practices (from social practice perspective) to support learning and teaching

It aims to encourage trainers, teachers to be culturally, economically, socially sensitive to their learners.

And therefore LETTER envisages this approach as a way of tackling substantial issues of equity and social justice within adult education

E.g.1 A woman in Uttar Pradesh, India showing her barajja, a container for measuring her crops Jan 06



Through numeracy as social practice and ethnographic perspectives we are aware of the agricultural measuring practices and funds of knowledge for numeracy of these women. These could then be built on in classes.

E.G 2 Matale ‘illiterate innumerate’ woman from Konsosefer (E) shows the grain she uses to record loans: “A single grain represents 40 birr” Jan 08



Through social practices and ethnographic perspectives we are aware of the counting practices of rural women in Ethiopia. They count money & they ‘do’ count. The symbolic practices could then be built on towards developing written numeracy practices

Implications for practice: extending pedagogy challenging curriculum

The principle we have discussed today is to build on what we know about the funds of knowledge and numeracy practices of learners. That is extend classroom pedagogy:




- Always build on what learners know in a **broad sense**. Use ethnographic perspectives for teachers in training. Both what and how.
- Teach practices not skills, e.g. financial num practices, building num practices, journey num practices. Not 'topic maths' as 'practices' include power context values etc. Seek to work from everyday practices towards formal numeracy practices: Teach giving change /catching buses.
- Challenge curriculum. Why: abstract; long division; bus time tables; calculating fractions; analogue time. Why not odds; giving change; builders' num practices; domestic num practices.

Implications for practice: ethnographic perspective

Ethnographic perspective: Train teachers what to be aware of and how to be aware - formal numeracy practices just one of many numeracy / maths practices but it is the one with currency. Observe, interact,

- Teach explicitly how to switch between practices
- Policy. Teacher Education to include accounts of funds of knowledge of learners, concepts of numeracy practices and ethnographic style approaches to teaching
- Research? Evaluate impact of these concepts, policies and approaches. Disseminate to researchers policy makers, funders.

What we have done: Messages

-  Current educational positions / concerns
-  Alternative position (parallel to literacy) aimed at greater equity. Extending perspectives – maths as social practice - ethnographic style approaches
-  Practical implications. Pedagogy and Curriculum. Illustrated with current work from LETTER projects and training programmes in South Asia, Ethiopia, Uganda, UK.

References

NRDC *Reflect* Dec 05 London: NRDC

NCETM resources Maths4Life <http://www.ncetm.org.uk/resources/8848>

SWAIN, J. and SWAN, M., 2007. Thinking Through Mathematics: Research report. National Research and Development Centre for Adult Literacy and Numeracy, (978-1-905188-42-0).

Baker D A Street B V with Tomlin A 2006 "Navigating schooled numeracies: explanations from the UK for the low achievement in math of children from a low SES background" in *Special Issue of the International Journal of Mathematical Thinking and Learning on Parents' Perceptions of their Children's Mathematics Education: Considerations of Race, Class, Equity, and Social Justice*. English L (Ed), **8** (3) pp 287-307. Mahwah, NJ: Lawrence Erlbaum ISSN 1098-6065

Street B V, Baker D A, Tomlin A 2005 *Navigating Numeracies: Home/School Numeracy Practices* Dordrecht: Kluwer/Springer ISBN: 1-4020-3676-0

Feinstein, L. Feb 2003 "Early Cognitive Inequality in the 1970 Cohort" *Economica* 277 P 73 - 97

Baker D A 2005 "Numeracy and 'funds of knowledge'" in *Reflect Issue 3 June 2005*, pages 16,17 London: NRDC/Institute of Education

Solomon Y 2009 *Mathematical Literacy: Developing Identities of Inclusion*. London: Routledge

Gutstein E 2006 *Reading and Writing the World with Mathematics: Towards a pedagogy for Social Justice*. New York: Routledge

References 2

- Ginsberg H P Choi Y Em, Lopez S L, Netley R, Chao-Yuan C 1997 “Happy Birthday to you: Early Mathematical Thinking of Asian, South American and Us Children” in *Learning and Teaching Mathematics An International Perspective*. T Nunes P Bryant (Eds.) Hove UK: Psychology Press
- Nirantar (NGO) 2007 *Exploring the Everyday: Ethnographic Approaches to Literacy and Numeracy*. Nirantar (Ed) Delhi: Nirantar ASPBAE ISBN 81-278-0018-X
- Gebre A, Rogers A, Street B, Openjuru G 2009 *Everyday Literacies in Africa: Ethnographic studies of literacy and numeracy practices in Ethiopia* Kampala (Uganda): Fountain
- Baker D A (April 2008) “Using sand to count their number: developing teachers’ cultural and social sensitivities” presented at *Latin American Literacy Studies Seminar* with CREFAL (Regional Centre for Adult Education and Functional Literacy for Latin America) and DIE (El Departamento De Investigaciones Educativas) at Pátzcuaro, Michoacan, Mexico (ms available from author)
- Street B V Rogers A Baker D A 2006 “Adult Teachers as Researchers: Ethnographic Approaches to Numeracy and Literacy as Social Practices in South Asia”, *Convergence*, **XXXIX** (1) pp 31 - 44
Montevideo, Uruguay: Journal of the International Council for Adult Education/NIACE ISSN: 0010-8146
- Leitch Report 2006 “World Class Skills”
<http://www.dcsf.gov.uk/skillsstrategy/uploads/documents/World%20Class%20Skills%20FINAL.pdf>