

Ethnomathematics: a Political Plaything

BILL BARTON

Anyone with an interest in both mathematics and linguistics must grin with rueful fascination as they watch the way that the term ‘ethnomathematics’ is thrown about both in the public media and in the mathematics education literature. It is a versatile toy, fulfilling several functions in an on-going game of catch. Since the 1984 ICME address by Ubiratan D’Ambrosio (1985) – which is widely regarded as establishing the field in its contemporary form – this word has been used in the political games of curriculum development in many countries. It has also:

- become the founding philosophy of research institutions;
- been treated as another pawn in the US ‘math wars’ (which, like other conflicts originating in that country, seem to create casualties elsewhere);
- led to the establishment of many educational programmes amongst traditionally marginalised groups;
- generated a considerable body of academic literature.

Powell and Frankenstein’s edited collection *Ethnomathematics: Challenging Eurocentrism in Mathematics Education* [1] is one more toss, in the critical theory trajectory. More recently, the First International Congress on Ethnomathematics (ICEM-1) in Spain displayed several further developments in the game.

It would be impossible to codify and enforce the rules of the ethnomathematical game, even if this seemed to be a good thing to do. Fields of knowledge are extraordinarily resistant to prescription, and one which purports to acknowledge culturally diverse ways of knowing is liable to develop its own rules in every new situation. However, this does not mean that we should ignore the way in which our field is used, abused, criticised, co-opted, praised and changed. Indeed, the very tenet of ethnomathematics – trying to see the world from the point of view of others – demands that we take notice of such developments, learn from them, critique them, enjoy them.

The possessive (‘our’ field) was used deliberately. As a community of mathematicians, teachers, academics and others interested in ethnomathematics, we create and are responsible for this field. We do have a stake in the way the term is used, in the way the notion is understood by others who are not so involved and in the way the undertaking has a political and educational effect in society. Much of the theory which can be found in ethnomathematical writing is based on such self-reflection: hermeneutics, semiotics,

post-modernism, critical theory and the fields of sociology and anthropology in general contain reflexive characteristics. David Bloor expresses this succinctly in his description of a strong programme in the sociology of knowledge:

In principle its patterns of explanation would have to be applicable to sociology itself. [...] this is a response to the need to seek for general explanations. It is an obvious requirement of principle because otherwise sociology would be a standing refutation of its own theories. (1976, p. 7)

This commentary is written in such a spirit: it is an attempt to note three of the current directions in ethnomathematics. There are other well-established developments. The use of resources derived from other cultures in mathematics education has been on-going in many countries for a considerable number of years: Claudia Zaslavsky’s work is probably the most well-known (e.g. Zaslavsky, 1993). Paulus Gerdes’ magnificent research project associated with teacher education in Mozambique is also a paradigm of what can be achieved when a good idea is accompanied by total commitment and dedication (e.g. Gerdes and Bufalo, 1994). D’Ambrosio himself has written several articles in the developing field of humanistic mathematics (D’Ambrosio, 1993; ZDM, 1998). Another direction is the academic debate concerning the philosophy, legitimacy and relationships with other disciplines and theories which has been going on in *For the Learning of Mathematics* (e.g. issue 14(2), but also a number of other pieces) and in *Educational Studies in Mathematics* (e.g. Chevallard, 1990; Skovsmose, 1990; Barton, 1995; Vithal and Skovsmose, 1997). These, and other examples, could be usefully analysed for their motivation, contributions and practice. Here, I examine the critical mathematics direction represented by Powell and Frankenstein’s collection and the new inspiration provided by the First International Conference on Ethnomathematics (ICEM-1).

Ethnomathematics: Challenging Eurocentrism in Mathematics Education is a collection of key articles in the general area of mathematics in society and culture: most are well-known and some have been reprinted in other collections. Those that are not are all sourced in America (except for one from Australia). Although many have been revised for this book, the date of original publication is between 1982 and 1993, except for one from 1948. Only four of the eighteen papers are post-1990. The papers are organised into six sections with an overall introduction, and an introduction to each section, written by Powell and Frankenstein. It has a

Foreword by Ubiratan D'Ambrosio and concludes with an Afterword by Gloria Gilmer. The former is a general reflection from the 'father' of the field; the latter is an account of the work of the International Study Group on Ethnomathematics from the US perspective of its founding president. It would have been good also to have had a clear expression of Powell and Frankenstein's own views and experience: their work in a developed urban environment has shown many of us working in similar situations how critical theory can make a difference in mathematics education.

The first question which needs to be answered is whether the authors believe that nothing significant has been written in the field of ethnomathematics in the four years between 1993 and the date of publication? D'Ambrosio describes these as classic articles, and Powell and Frankenstein themselves refer to them as path-breaking, so they are aware that there have been subsequent developments. Why publish these older papers at this time? It must be acknowledged that it is extremely convenient to have the collection under one cover: few in the field have ready access to all the journals represented. Furthermore, Powell and Frankenstein's short introductions to each selection are useful in explaining why they are important, filling in some gaps, and adding to the references.

However, the political intent of the subtitle seems to be the main reason for the publication: they wish to harness various writings to strengthen their argument. This has dangers. Among other things, they imply that all the authors share their particular orientation and they tend to set up straw men in order to justify their position - e.g. mathematicians in general are presented as firmly Platonic in a way which is certainly not true any more, if it were ever so (e.g. see Thom (1992)). It is D'Ambrosio in his Foreword (and not the editors) who notes that the book is an expression of a "criticalmathematics perspective".

The reader is well warned because the second question raised by the book is whether all these contributions are to be labelled ethnomathematics? Given that the history of mathematics, the sociology of mathematics and the social psychology of mathematics are now all well-established, what is the purpose of including the articles by (for example) Joseph, Struik and Walkerdine? It could be that these are introduced in an attempt to broaden the views of the ethnomathematical community to related issues which might also be of interest, or perhaps the editors do believe them to be part of ethnomathematics. Or could it be that these views are also intended to be attacks on the same target which is in Powell and Frankenstein's sights?

The opening section, on ethnomathematical knowledge, uses descriptions by D'Ambrosio and the Aschers, both of whom focus on different ways of seeing the world. The motivation for being interested in these different ways may be political, but Munir Fasheh, one of the most political of writers in ethnomathematics, is quoted as claiming that the underlying project of ethnomathematics is:

working hard to understand the logic of other peoples, of other ways of thinking. (quoted on p 9)

Challenging Eurocentrism in mathematics might be a consequence of this, but it is not, fundamentally, what

ethnomathematics is about. George Joseph's work is a fascinating historical account and it shows that other ways of thinking have been part of the history of (Eurocentric) mathematics, with illustrative examples. But it is about the history, it is not about the other ways of thinking. It demonstrates the validity of the ethnomathematical point of view - but it is not ethnomathematics itself.

Dirk Struik's contribution is regarded as one of the first writings in the sociology of mathematics, linking mathematical ideas to the social background in which they arose. But it is about the mathematical thinking of one person, not a group, let alone a culturally defined one. It is curious that the one person so treated is a pre-eminent political figure on the left. In the third example, the contribution of Valerie Walkerdine, we have a deeply theoretical paper which seeks to understand the mechanisms by which some activities (and people) are legitimised as mathematical, and others are excluded. This important work is also not about ethnomathematics, but about the social consequences of other ways of thinking.

What is the function of including these works in a book entitled *Ethnomathematics*? It is, of course, to reinforce the subtitle, which is what the book is about. Joseph shows that conventional mathematics education is narrow in its scope; Struik's inclusion implies that mathematics is itself socio-political; Walkerdine shows that mathematics education is a matter of power. We are left in little doubt as to who the baddies are. Well, it all may be true - but it is not ethnomathematics by any definition given in the book, even by Powell and Frankenstein's own.

If the validity of co-opting too much into a critical perspective on ethnomathematics is questioned in the paragraphs above, the richness and diversity offered by the First International Conference on Ethnomathematics in Granada, Spain in August 1998 provides a perfect antidote. This is not to say that the conference was perfect. Like all conferences, it had its inappropriate contributions from academics flitting in to deliver an unrelated paper. And there was the irony of an English-language debate on why it is important not to marginalise particular groups effectively marginalising several Spanish-speaking contributors by going on too long and thereby excluding them from the simultaneous translation services.

But there also arose two themes which demonstrated the power which lies in the idea of cultural diversity in mathematics. The first was represented by the strong contingent from South America. D'Ambrosio's Brazilian perspective has always been recognised, of course, but this conference gave an opportunity for mathematics educators who have been working in many indigenous communities for a long time to make their work more widely known.

Perhaps such a comment only reflects this writer's English-speaking unawareness; however, it did seem as though Granada created a forum which had not existed in quite that way before. The recurrent theme which emerged, and which dominated the familiar themes from previous ICME Study Groups, was the confidence of voices from within these communities. Presentation after presentation described distinctive mathematics programmes developed within small communities. Here was ethnomathematics by

example, ethnomathematics in the present, ethnomathematics driven not so much by theory as by practice.

Not that political and theoretical issues were ignored. Far from it, but there was something of a reversal. Ethnomathematical ideas were emerging from the reality of the situation, and were supported by politico-theoretical stances, rather than theoretical origins developing into practical reality. Ethnomathematics described what was happening as much as it generated it – and the conference seemed to become a place where theory and practice came together mutually to inform each other. This seems to be a new role for ethnomathematics as a discipline.

It is not as simple as that, of course. Gelsa Knijnik has been developing her theory out of South American practice for some time. Her paper in Powell and Frankenstein's book represents her position seven years ago; the way in which she discussed ethnomathematics in the conference paper is substantially different (Knijnik, 1999). In 1992, the pedagogical work and its political impact was *part of* Knijnik's idea of ethnomathematics. In 1997, the pedagogical work was constructed from the convergence of the ethnomathematical perspective and the political environment of the Popular Education of Movimento Sem-Terra (the Landless Movement). The concern in this particular situation was that the ethnomathematical work was not:

limited strictly to the school space, [...] constituting [...] a perspective that would only reinforce the hegemonic ways of learning and teaching mathematics (Knijnik, 1999)

In the example described, the work took place within the community as part of the reality of a particular melon crop (not in school using the context of melon farming). Note that ethnomathematical work is seen as potentially politically useful *and* politically harmful – what determines the result was theorised as whether the work “exposes social engagement”.

The second theme from Granada was represented by the Southern African contingent. This region has a long history of educational developments driven by a sequence of differing ideologies: colonial (both intentionally imperialist and ostensibly benevolent), liberatory, developmental, critical, and so on. Many, many mathematics educators have spent time in the region attempting to establish successful programmes. The current educational initiatives in South Africa are some of the most consciously ideological (in liberatory mode) that have been seen.

So where does ethnomathematics fit in? At the conference, the members of the group from that region were extremely diverse in their work and in their outlook. And their presentations offered diverse interpretations of ethnomathematics and its role in mathematics education. And yet there was an impression of a strong unity of purpose: debate clearly rages in the region in a way that is both up front but also productive. Diversity in academic opinion is embraced as the way in which progress is made. Ethnomathematics is presented both as an idea which can inhibit mathematical advancement (in a traditional, but often valued, sense), and also as the basis for appropriate educational development. This use of ethnomathematics as a tool with which to debate

the realities of mathematics education is another example of ethnomathematics theory *following* exemplified mathematics and education.

These two themes turn upside down the direction of ethnomathematical literature over the last ten years. Both use the idea of ethnomathematics in an extremely open-ended way: in South America, as a vehicle to describe and then develop a practical reality; in Southern Africa, as a tool in a wider debate about educational values and practice. In both places, ‘ethnomathematics’ means, as it does in Wonderland, exactly what people want it to mean. And then the discussion starts. But isn’t this what Powell and Frankenstein are doing? Not necessarily. Not if they have clearly in mind a political focus and an educational ideology. Ethnomathematics is then being used to co-opt and evaluate within that circumscribed environment. Such an approach can close down discussion.

In the developments in South America and Southern Africa there is no confusion between ethnomathematics and the political objectives of those involved in mathematics education. Ethnomathematics is an idea concerning the cultural meanings and representations of concepts of quantity, relationships and space. It is conceived in different ways by different people. It is the process of resolving different views of ethnomathematics which is becoming increasingly valuable, both politically and educationally. Ethnomathematics is not a reality which proves a political point or demands a particular approach to education – this would be to make the same mistake that ethnomathematicians accuse mathematicians of making: concluding something about the way the world *really* is from an idea generated within a cultural context.

This use of ethnomathematics as a theoretical tool can be seen as a practical way of acknowledging the reflexivity of such a relativistic viewpoint: it is the differing conceptions of the field which make it a valuable tool in on-going political and educational debates. We acknowledge that our own conceptions are context-derived, but use that knowledge to continue our work.

I believe that there is another way in which ethnomathematical investigations can be used within mathematics to promote both mathematics itself and to challenge positions in the philosophy of mathematics. As an aside, let me say that it is important for us as ethnomathematicians not to demonise conventional mathematics – mathematicians should be our debating partners and protagonists, not alienated by our words into dismissal or silence.

In the latter half of this century, there has been an increasing internationalisation of the study of mathematics (and most other academic fields). This has brought with it increasing use of one language (usually English) as a means of practical communication. It is an assumption of ethnomathematics that thinking about quantity, relationships and/or space may vary between cultural groups, and there is general agreement that cognition is related to language. To the extent that these ideas have substance, the increasing monolingualism of mathematics as an academic field represents a restriction on the creative possibilities of that subject. There may be types of mathematical thinking, and alternative mathematical structures, which are more likely to be

developed by mathematicians working in a language other than English, especially a non-Indo-European one. Furthermore, the QRS systems ('meaning systems of quantity, relationships and space') being exposed by ethnomathematical work may provide a new creative impetus for some branches of mathematics.

This is a strong claim, but not a new one. The idea that monolingualism would lead to intellectual impoverishment and hence that there is a need for multilingual awareness was expressed by the linguist Benjamin Whorf in 1941:

but to restrict thinking to the patterns merely of English, and especially to those patterns which represent the acme of plainness in English, is to lose a power of thought which, once lost, can never be regained. It is the plainest English which contains the greatest number of unconscious assumptions about nature [.]

I believe that those who envision a future world speaking only one tongue, whether English, German, Russian, or any other, hold a misguided ideal and would do the evolution of the human mind the greatest disservice. Western culture has made, through language, a provisional analysis of reality and, without correctives, holds resolutely to that analysis as final. The only correctives lie in all those other tongues which by aeons of independent evolution have arrived at different, but equally logical, provisional analyses

[.] an important field for the working out of new order systems, akin to, yet not identical with, present mathematics, lies in more penetrating investigation than has yet been made of languages remote in type from our own (1956, pp 244-5)

The idea that different basic conceptual structures could give rise to new mathematics has been suggested by the mathematician Saunders Mac Lane:

The set-theoretic approach is by no means the only possible foundation for mathematics. Another approach is to formulate axioms not on set membership, but on the composition of functions [.] They probably give better insight into the conceptual form of mathematics than does set theory. There may well be other possible systematic foundations (1981, p. 469)

Such a claim is one for which it should be possible to gather evidence. Ethnomathematical work would need to be done alongside mathematics and issues of modern colonialism would certainly arise. Powell and Frankenstein might regard this as fraternising with the enemy - but another way of looking at it is to be comfortable with being mathematicians too and with contributing to mathematics in a different way, finding a way to retain cultural integrity while maintaining a belief that such contributions will come to change how mathematics is viewed in the long term

I acknowledge that I have slightly overstated the situation and dichotomised the approaches to make my point. Nevertheless, the issues are important. In Granada, there was a hint that ethnomathematics is beginning to have an impact on conventional, traditional, 'Eurocentred' mathematics.

This was indicated by the status of the conference, by the presence of some mathematicians and further by a couple of presentations by mathematicians trying to come to grips with cultural concepts in their work. I believe it is the open and creative use of the theoretical tool of ethnomathematics which will continue that process

Note

- [1] Powell, A and Frankenstein, M. (eds) (1997) *Ethnomathematics: Challenging Eurocentrism in Mathematics Education*, Albany, NY, SUNY Press. (ISBN: 0-7914-3351-X)

References

- Barton, B. (1995) 'Making sense of ethnomathematics: ethnomathematics is making sense', *Educational Studies in Mathematics* 31(1/2), 201-233.
 Bloor, D (1976) *Knowledge and Social Imagery*, London, Routledge and Kegan Paul.
 Chevallard, Y (1990) 'On mathematics education and culture: critical after-thoughts', *Educational Studies in Mathematics* 21(1), 3-28.
 D'Ambrosio, U. (1985) 'Socio-cultural bases for mathematics education', in Carss, M. (ed), *Proceedings of the Fifth International Congress on Mathematics Education*, Boston, MA, Birkhäuser, pp. 1-6.
 D'Ambrosio, U (1993) 'Mathematics and literature', in White, A (ed), *Essays in Humanistic Mathematics*, Washington, DC, The Mathematical Association of America, pp. 35-48.
 Gerdes, P and Bufalo, G (1994) *SIPATSI. Technology Art and Geometry in Inhambane*, Maputo, Mozambique, Instituto Superior Pedagógico Moçambique.
 Knijnik, G (to appear 1999) 'Ethnomathematics and the Brazilian Landless People's Movement's pedagogical principles', *Zentralblatt für Didaktik der Mathematik* 31(3).
 Mac Lane, S. (1981) 'Mathematical models: a sketch for the philosophy of mathematics', *American Mathematical Monthly* 88(7), 462-472.
 Skovsmose, O (1990) 'Mathematical education and democracy' *Educational Studies in Mathematics* 21(2), 109-128.
 Thom, R (1992) 'Leaving mathematics for philosophy', in Casacuberta, C. and Castellet, M (eds), *Mathematical Research Today and Tomorrow*, Lecture Notes in Mathematics 1525, Berlin, Springer-Verlag, pp 1-12
 Vithal, R and Skovsmose, O (1997) 'The end of innocence: a critique of "ethnomathematics"', *Educational Studies in Mathematics* 34(2), 131-157.
 Whorf, B. (1956) 'Languages and logic', in Carroll, J. (ed), *Language, Thought and Reality: Selected Writings by Benjamin Lee Whorf*, Cambridge, MA, MIT Press, pp. 233-245.
 Zaslavsky, C (1993) *Multicultural Mathematics. Interdisciplinary Cooperative Learning Activities*, Portland, OR, J Weston Walch.
 ZDM (1998) *Zentralblatt für Didaktik der Mathematik* 30(6)