

Ethnomathematics: Culture and Politics of Knowledge in Mathematics Education

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The purpose of this article is to look at issues related to the field of ethnomathematics that have been the subject of my studies over the last ten years. During this period, I have been working and researching with the Landless Movement (in Portuguese, *Movimento Sem Terra* – hence MST) of Brazil. The ethnomathematics discussed here comes from the south, with the signs of inequality and injustice that shape this world below the equator. There are also the signs of resistance of social movements in their rebellion against persistent misery, despite the immense natural resources of countries like Brazil.

Among these movements is the MST. Throughout its seventeen years of struggle for agrarian reform, in the country with the highest concentration of arable land in the world, this movement has achieved international recognition. This is due, among other factors, to the importance given by the movement to the educational dimension of the struggle itself, as well as to other multiple facets of education. One of these facets is mathematics education [1] which, like other fields of knowledge, has sought to articulate its specificity in relation to the principles of MST pedagogy (MST, 1996). [2] An ethnomathematics perspective, as I have shown elsewhere (Knijnik, 1996, 1999), provides the theoretical tools for this articulation.

The following sections of this article refer to two dimensions of the trajectory of the ethnomathematics work I have been developing with MST. The first section analyses methodological aspects of research on what I have called the ‘ethnomathematics approach’. The second section presents the central argument that has characterised the theoretical perspective of the work itself. [3]

Researching an ethnomathematics approach

The work that I have been developing with the Landless Movement (Knijnik, 1993, 1997a, 1998, 1999) can be summarised by what I have called the ethnomathematics approach. This consists of the investigation of the traditions, practices and mathematical concepts of a social group and the pedagogical work developed in order for the group to be able to:

- interpret and decode its knowledge;
- acquire the knowledge produced by academic mathematics;
- establish comparisons between its knowledge and academic knowledge, thus being able to analyse the power relations involved in the use of both these kinds of knowledge.

Guiding an educational process within this approach

means, necessarily, understanding research and pedagogical activity as articulated practices. This articulation is established through two dimensions. The first is related to the process of investigation of the traditions, practices and mathematical concepts of a social group and implies carrying out fieldwork, in which ethnographic techniques, such as participant observation, audio recording, field diaries and interviews are used. But this is not anthropological work, not an ethnography in the strictest sense of the word. Rather, in using elements of ethnographic techniques, inspired by anthropological knowledge, I have been watchful about contemporary questions asked in anthropology, an area strongly marked by its links with the colonial area, with the description of the “other”.

On the other hand, as clearly argued by Henrietta Lidchi:

asserting that ethnographic texts are not accurate descriptions made of one culture by another but by the *writing of one culture by another* would, today, be a starting point in an analysis of ethnographic work, rather than a radical statement (1997, p. 200)

Thus, in the description of practices, traditions and mathematics concepts of a social group, I do not delude myself that I am ‘discovering’ what ‘is there’. The act of *writing of one culture by another* implies, in fact:

constructing one culture for another. What is being produced therefore is not a reflection of the ‘truth’ of other cultures but a representation of them. (p. 200)

In this process of representation, I consider that my ethical and political position makes me take into account, as stated by Clifford Geertz (1983), that:

To us, science, art, ideology, law, religion, technology, mathematics, even nowadays ethics and epistemology, seem genuine enough genres of cultural expression to lead us to ask (and ask, and ask) to what degree other peoples possess them, and to the degree that they do possess them what form do they take, and given the form they take what light has that to shed on our own versions of them. (p. 127)

This is an ethically relevant question, which has led me to try to understand the practices, traditions and mathematical concepts deeply connected to the social world of which they are part. According to Rabinow (1977):

Culture is interpretation. The ‘facts’ of anthropology, the material which the anthropologist has gone to the field to find, are already themselves interpretation. The baseline data is already culturally mediated by the people whose culture we, as anthropologists, have

come to explore. Facts are made – the word comes from the Latin *factum*, “made” – and the facts we interpret are made and remade. Therefore, they cannot be collected as if they were rocks, picked up and put into cartons and shipped home to be analysed in the laboratory (p. 150)

This care not to treat the material collected in the fieldwork like ‘rocks’ has allowed it to provide information for the pedagogical process previously made explicit, giving permanent feedback. For educators to be able to implement this complex process which articulates the relativistic and legitimate perspectives of culture (Knijnik, 1997a), they must necessarily also be researchers.

In a second dimension, the ethnomathematics approach also connects pedagogical activity and research. This dimension concerns the follow-up of the pedagogical process. As regards my own ethnomathematics work, I am dedicated to writing and examining my own practice, establishing a conversation with theorisations in the field of ethnomathematics, thus seeking to discuss the limitations and potentials of the work I am doing. Here, I face the challenge of breaking the dichotomy between researcher and researched, since it is my own pedagogical practice that is taken as a subject for analysis.

This research perspective is one which, from a more conservative viewpoint, could be criticised as lacking in neutrality and objectivity. Currently, however, as we live in a time when such myths have been undone, it can produce other meanings for the act of researching, enabling a crossing of borders and a breaking of the dichotomies between ‘insider’ and ‘outsider’. This border-crossing, which had previously been outlined with such accuracy, involves the act of writing about one’s own research and presenting it at conferences, which means definitely the taking on, oneself, of the act of self-representation.

From this perspective, one can understand even more radically the position of the Landless Movement in establishing partnerships with Brazilian universities to create college-level education courses that prepare their participants in the field of education. These pre-service courses will provide Landless Movement educators with theoretical and methodological tools, thus also enabling them to become researchers. As a specific intellectual, in the sense given to it by Foucault, I have participated as a researcher and adviser in this work, being careful to keep problematic the asymmetrical power relations involved in my interaction with the Landless Movement.

Politicizing an ethnomathematics approach

As has been pointed out for a long time, the body of knowledge called *ethnomathematics* is constituted by a heterogeneous set of practices and approaches connected to different ways of signifying the times we live in and understanding how education, in particular mathematics education, is involved in building a less unequal world, one with more solidarity present. There are, therefore, different *Weltanschauungen*, different understandings of the role Western science has played in shaping this same world, associated with different ways of understanding the role

mathematics education can perform in the processes of social change.

The central argument that I wish to develop in this section directly concerns my position in relation to these issues. The argument can be summarised as follows: more than looking through the lenses of cultural relativism, one must look at the field of ethnomathematics with sociological lenses. This means that I am interested in examining mathematics education from its connections with cultural difference as a field shaped by power relations, i.e. a political field.

The first argument I present for my rationale concerns the understanding I am giving to culture, characterising it as something that people, that social groups produce, something which is not fixed or determined, enclosed in its meanings once and for all. Culture is not understood here as something consolidated, a finished, homogeneous product. This form of conceptualisation of culture implies comprehending it as a tense, conflicted terrain, in permanent dispute over the imposition of meanings.

Moreover, from an ethnomathematics perspective, the concept of culture moves away also from a conservative view that expresses culture as “a heritage of humankind”. Considering that this cultural heritage is a social production resulting from all our efforts, the expression thus supports the argument that humanity as a whole has the right to gain access to and use knowledge created by human beings. Nevertheless, the expression *the cultural heritage of humankind* is very often only identified with academic mathematics. It is precisely this identification that masks power relations that, in turn, legitimise one very specific way of producing meaning – the Western, white, male urban and heterosexual one – as the cultural heritage of humankind. By providing visibility to other mathematics besides the academic one, ethnomathematics discusses precisely this apparent ‘consensus’ as to what is to count as *the cultural heritage of humankind*. It is, in fact, part of a broad, heterogeneous production, precisely that part produced by hegemonic groups. What groups must also remain silenced and hidden, not represented in the school curriculum in the field of mathematics?

Asking questions like this establishes close ties between mathematics and culture, between mathematics and the ways people signify the world, trying to problematise what authors such as Ubiratan D’Ambrosio (1999) or Arthur Powell and Marilyn Frankenstein (1997) indicate as characteristics of school mathematics: its marks of Eurocentrism, whiteness, middle-classness, maleness and, I have stressed, urbanity. Who has remained hidden? Non-European, non-white peoples, women, gays, lesbians and bisexuals, peasants in rural areas, ... It is the cultural productions of these groups that have been systematically excluded, remaining left out of the school curricula (Knijnik, 2000).

The second argument that I present concerns cultural diversity. Here, following authors who have discussed multiculturalism (such as McLaren, 1997, and Silva, 2000), I argue that it is not enough to proclaim cultural diversity, to take a benevolent attitude towards this diversity, analysing it from an essentialist perspective. This position would agree

with a naïve relativistic perspective, which, above all, would celebrate differences and glorify cultural diversity.

Here, it is necessary to point out the approach of authors such as Claude Grignon (1992), when examining relativistic theories to which specific pedagogies correspond. According to these authors, the 'relativistic pedagogies' present themselves as less hostile to the subordinated groups, because they value otherness and the symbolic autonomy of their cultures and practices. However, when exacerbated, they become populist pedagogies, leading to fetishism, to glorification of these groups' culture, producing above all the effect of ghettoization. In a world marked by globalization processes, this effect reinforces social inequalities. As Canclini (1988) says :

[those relativistic theories] very sensitive to the specificity of each group tend to mark the difference without accounting for the inequality which confronts them and connects them to other sectors. (p. 71)

When power relations involved in cultural diversity are not examined, one ends up producing binarisms such as:

tolerant dominator and tolerated dominated subject, or that of hegemonic but benevolent identity and subaltern but 'respected' identity. (Silva, 2000, p. 98)

This would be the pedagogic strategy to approach the cultural diversity Silva calls "liberal". The author also describes another pedagogic strategy that would be located in an intermediary position between this liberal strategy and one that would have a 'therapeutic' connotation (that he would attribute to psychological factors any difficulties in accepting the difference). For Silva, this intermediate strategy:

consists in presenting a superficial and distant view of the different cultures to the student. Here the other appears under the heading of what is curious and exotic [...]. Generally, the presentation of the other, in these approaches, is always distant enough, both in space and in time, to not present any risk of confrontation and dissonance. (p. 99)

We are faced with a pedagogy that, in celebrating difference, does not question the power relations involved in it. Therefore it reinforces them. It is such arguments that contribute to making me consider the insufficiency of these lenses for looking at ethnomathematics.

What should then be said of sociological lenses? Looking at ethnomathematics through such lenses suggests many different issues. As Ubiratan D'Ambrosio indicated, since his early theorisations, from the perspective of ethnomathematics, what is emphasised is that mathematics, as we usually know it, marked by the Western view of the world, is one of the forms of mathematics. It is itself an ethnomathematics, since it is produced by a given social group, i.e. one formed by those people who are socially authorised to produce science, having their professional activity carried out in the Academy.

Therefore, to be more precise, we should say that what we traditionally call mathematics is academic mathematics. From the perspective of ethnomathematics, there are also

other ways of producing mathematical meanings, other forms that are equally ethnomathematics (D'Ambrosio 1985, Borba, 1990), since they are symbolic manifestations of cultural groups: for instance, the mathematics of the different indigenous nations, the mathematics of distinct professional groups and that practised by female and male peasants in their work-related activities.

Thus, ethnomathematics problematises the "great narrative" which modernity considers to be academic mathematics. Indeed, in a modernist view, academic mathematics is the language *par excellence* to describe the distant as well as the nearby universe. In problematising this meta-narrative, ethnomathematics introduced a discussion that had thus far been absent from debates about mathematics education. By legitimizing as mathematics more than just intellectual products of Academe, and by considering the forms of other, non-hegemonic ways of knowing and producing mathematics, ethnomathematics relativises the 'universality' of (academic) mathematics and, moreover, questions its very nature.

Walkerdine (1990) presents a significant argument when she asserts that:

The fantasies of poverty are wealth, the fantasies of mathematicians, according to Brian Rotman [1980], are of an ordered world. He calls mathematics "Reason's Dream", a dream in which "things once proved stay proved forever", a dream of order outside the confines of time and space. (p. 52)

It is this Dream of Reason that appears to be coming to an end at the beginning of this millennium. The 'promises' of a better life for most women and men on this planet, 'promises' promised by scientific advances, by the dominance of reason over the 'universe', have definitely disappeared, together with the hundreds of thousands of us who continue to be persecuted by hunger, poverty, disease, death. This is a time of the death of a failed modernity, because it did not fulfil what it had promised since the French Revolution: fraternity, equality, liberty. In these death throes, "science is part of the problem, not its solution" (Silva, 1996, p. 144).

In problematising academic mathematics, ethnomathematics emphasises not only that mathematics is a social construction but, more than this, that such construction takes place in a terrain shaped by the political dispute around what will be seen as mathematics, around which will be considered the legitimate way of reasoning, and therefore, around which groups are those that can legitimately produce science (Knijnik, 1996). Ethnomathematics displaces its focus of attention from eminently psychological issues that have traditionally been the object of study in mathematics education. It looks at this area with a new gaze, seeing it as a field of the curriculum which is also implicated in the construction of subjectivities, produced not in a neutral and disinterested terrain but, on the contrary, in a terrain where certain groups ultimately impose their way of reasoning, their mathematics, as the *only* possible form of thinking about the world. Other ways of dealing with social aspects end up being 'naturally' neglected, in an operation that hides the power relations involved in these delegitimization processes.

This sociological gaze emphasises that issues of power lie at the heart of ethnomathematics. As we have been discussing for a long time, in dealing with mathematics not in an abstract form, but as a cultural artefact, directly connected to traditions, to ways of living, feeling and producing meanings of different social groups, ethnomathematics refers to mathematics in the plural, with academic mathematics – the one we usually call *the* mathematics – being one of these different mathematics. One, but not just any one. Academic mathematics, precisely because it is produced by the socially legitimised group as what can/should/is able to produce ‘science’, is the most valuable from the social standpoint. Thus, it is not a matter of talking naïvely about different mathematics, but of considering that these mathematics are, in terms of power, unequally different.

This argument has been at the basis of the ethnomathematics approach I have been developing with the MST. This ethnomathematics approach articulates the relativistic and legitimistic positions (Grignon and Passeron, 1992), problematises the scientificity, neutrality and asepsis of academic mathematics and, at the same time, gives visibility to ‘other’ mathematics, usually silenced at school, as a cultural production of non-hegemonic groups. The key word here is *otherness*: ‘other’ mathematical knowledge than that produced in the Academe. This knowledge, impregnated by practice, tends to be devalued by the dominant groups, since it has closer ties to the local world where it is produced than to universal narratives.

In theorising these local mathematics, ethnomathematics gets into a dispute to define what counts as knowledge worthy of being characterised as science and, consequently, worthy of being recontextualised and transformed into school knowledge. This implies an opposition to more conservative pedagogical practices. As Grignon (1995) clearly indicates:

Elementary teaching of calculus, of Mathematics, of sciences and techniques is definitely part of the privileged instruments of the function of logical integration performed by school; these instruments vehiculate and lead to the internalisation of the idea of superiority of general and universal knowledge over the particular and local knowledge, of theory over practical culture, of abstract thinking over concrete experience (p. 181)

The ethnomathematics approach, as I conceptualised it previously, is interested in performing another role beyond that of reinforcing that hierarchizing dichotomy. It is committed to the idea that there is also a time in life to take another view of science, to redefine what after all can be called science, to think about its place in society, its destiny, which is in fact our own destiny as members of humankind.

Notes

[1] Regarding MST and the work developed in the field of education, see Caldart (2000), Kane (2001) and Knijnik (1997b, 1999).

[2] These principles are nowadays expressed by the following points: rela-

tionship between practice and theory; methodological combination between teaching processes and training; reality as a base of the production of knowledge; socially useful formative contents; education for work and by work; organic link between educational and political processes; organic link between educational and economic processes; organic link between education and culture; democratic administration; self-organization of the students; implementation of pedagogical collectives and continued teachers’ education; research attitude and skill; combination of collective and individual pedagogical processes.

[3] The ideas presented in the first section have been discussed in Knijnik (2000). Those of the second section I analysed at the *1st Brazilian Congress on Ethnomathematics* held at the Universidade de São Paulo, Brazil in November, 2000.

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