

Ethnomathematics and the Brazilian Landless People Education¹

Gelsa Knijnik, São Leopoldo (Brazil)

Abstract: The present study describes and analyses an investigation, which was developed at a settlement of the Brazilian Landless Movement, a social movement organised to achieve land reform in Brazil. The main purpose of the research consisted in preparing and implementing pedagogical work in the field of mathematics education, from an ethnomathematics perspective, at a public school connected to the Landless Movement, looking at its educational repercussions. They are discussed in this study with regard to the relationship between the pedagogical principles enunciated by the movement for its schools and the perspective of ethnomathematics. The research done showed the potential for this contribution, indicating the possibilities of a specific area of knowledge participating in the construction of an education connected to the interests of the social groups which, throughout history, have been marginalized and excluded.

Kurzreferat: *Ethnomathematik und die Erziehung der landlosen Bevölkerung in Brasilien.* Dieser Beitrag beschreibt und analysiert eine Untersuchung in einer Siedlung der Bewegung der landlosen Bevölkerung in Brasilien, eine soziale Bewegung mit dem Ziel, eine Bodenreform zu erreichen. Der Hauptzweck dieser Forschungsarbeit bestand darin, im Rahmen der Mathematikausbildung an einer öffentlichen Schule, die der Landlosenbewegung angeschlossen ist, aus einer ethnomathematischen Perspektive heraus pädagogisch tätig zu werden und dabei die pädagogischen Auswirkungen zu beobachten. Diese werden bezüglich der pädagogischen Prinzipien, die die Bewegung für ihre Schulen von einem ethnomathematischen Standpunkt her formuliert hat, diskutiert. Die Forschungsarbeiten haben das Potential und die Möglichkeiten aufgezeigt, wie ein spezifisches Wissensgebiet aus dem Interessensbereich sozialer Gruppen, die bisher in der Geschichte marginalisiert und ausgeschlossen worden sind, zur Bildung ebendieser Gruppen beitragen kann.

ZDM-Classification: A40, C60, D30

1. Introduction

The present paper is organised in two sections. In the first part I describe the empirical part of the investigation, in which I sought to compatibilise my work as co-ordinator of a pedagogical experience directly involved in the construction of the education process, with ethnographic techniques such as field diary, participant observation, interviews and life stories. The pedagogical work – centered on the main productive activity of the settlement: melon crops – was built with the settlement community. It had as its main objective supplying elements for the improved understanding of the productive process, which is the subject of analysis. Understanding this process made it possible to root the school more intensely in the life of the settlement, in the struggle of the social movement to which it is connected, contributing, from the perspective of mathematics education, to the construction of the popular education principles enunciated by the Landless Movement (in Portuguese, Movimento Sem-Terra – MST). The second part

of the text focuses on the theoretical analyses of the fieldwork performed. I argue that what was experienced and analysed in this study sought to contribute to the MST political struggle based on mathematics education.

2. The fieldwork

The fieldwork was performed from March to December 1996. During this time I advised and followed up pedagogical work in mathematics, from pre-school to the 8th grade, developed at the “Nova Sociedade” public school connected to MST. The pedagogical work focused on the follow up of melon production in the settlement, an activity which directly involved the teachers, the pupils, families that lived in the settlement and other melon farmers in the region whose children attended the school. In each grade work was performed with different characteristics. This was due less to levels of schooling than to the characteristics of each female teacher, such of: where they came from (whether they belonged to a settlement or not), their academic formation and their political involvement with MST. Intentionally, I tried to work carefully in order not to become the person who guided the pedagogical process, which developed in each grade. I discussed with each teacher separately, and also with all of them together, their proposals for the activity. The pedagogical work was expected to end in the beginning of December, when the settled families were going to sell their production in different ways. However, the event, which occurred in the late afternoon on Saturday, November 23, disturbed the settlement’s life, and consequently the work we were carrying out. A heavy hailstorm lasting 15 minutes destroyed most of the melon production in the settlement, estimated at approximately 300 tons. The desolation, which dominated the whole, was the hallmark of that difficult time for all of us. The young people of the more advanced classes refused to discuss the subject. As one of them said: “What has happened has happened, one cannot think about it!” They would not even analyze the size of the loss. As one of the girls said: “It was a total loss, this was greater than knowing how much the total was!” The significant presence at the school on that Monday was a woman from the settlement, a mother and grandmother of pupils. She brought to the scene a discussion, which I considered the “key” to carrying on pedagogical work: the question of agricultural insurance². This was a theme, which allowed one to take up the discussion on melon production again in the various classes, even though the assessment of the losses, which more directly involved mathematics, was impossible to perform having met with resistance on the part of pupils.

The pedagogical work which went on during that school term was interrupted by the hailstorm which definitively affected, much more than school life, the life in the settlement. There was great discouragement among those women and men who had worked for one whole year

¹A presentation to the First International Conference on Ethnomathematics, University of Granada, Spain, September 2–5, 1998

²The Agricultural Insurance Bill, proposed to the National Congress of Brazil by an MST Congressman, establishes financial guarantees for small farmers who have suffered losses in crop yields due to climate problems. The bill has been in Congress for several years and has met with difficulties in obtaining approval.

and now had to reorganize to survive with the losses, to plan new plantings under even shakier financial conditions, when, as the father of a pupil said, summing it all up “we have been left afoot to plant”. The desolation, which dominated the whole settlement, was the hallmark of that difficult time for all of us.

3. Theoretical analysis

In the follow up process which occurred from the time of tilling the soil until the (failed) sale of the fruit, pedagogical work was constructed from the perspective of ethnomathematics. In this work, melon crops were examined not as material from which the school subject could be exemplified. This means that the school knowledge was constructed at the heart of the follow up, examination and problematisation of the community’s productive activity, taking this activity not as a source of inspiration or exemplification, but, on the contrary, considering it the central objective of study. School mathematics knowledge was produced situatedly – in the sense given to this expression by Jean Lave – and furthermore, had as its main objective supplying elements for the improved understanding of the productive process which is the subject of analysis. This means that the perspective used goes against the idea that the “world outside” the school, in particular popular practices and knowledge of the socially subordinate groups, could serve as what Mellin-Olsen (1987) described as “intellectual material” as a point of departure for teaching school mathematics. As I have suggested (Knijnik, 1997a) the key expression to be problematised here is “point of departure”. If we say that we begin with practices and knowledge of the group with which we are working, their culture, their ways of living and signifying the world, we are considering that these are only the initial point of a rising trajectory which would lead from this lower point to another one which would represent surmounting it, to wit, learning other ways of signifying the world, ways which are produced by a rationality which originates and is impregnated by the Western academic mathematical knowledge, strongly marked by its eurocentrism, whiteness, heterosexuality and maleness (Walkerdine, 1988). In fact, what I sought to build with the settlement school community – here seen as the full group of female and male teachers, female and male students and their families – was pedagogical work which would center on the main productive activity of the community. Understanding this process made it possible to root the school more intensely in the life of the settlement, in the struggle of the social movement to which it is connected, contributing, based on mathematics education, to the construction of the Popular Education Proposal enunciated by MST. Such a proposal, which is being constructed for a social movement from inside out of the same movement, has contributed significantly from many perspectives to the trajectory of education of the socially subordinated groups in Brazil (Knijnik, 1997b, 1997c). The process by which the proposal is being made uses as assumptions a set of pedagogical principles, three of which in particular, are connected to the study performed: “Reality as a foundation of the production of knowledge”, “Organic link

between educational processes and economic processes” and “Organic link between education and culture”. In fact these principles point to convergence between the theories that have been developed in the field of ethnomathematics by authors such as Marilyn Frankenstein (1987), Munir Fasheh (1991), Arthur Powell (Powell & Frankenstein, 1994) and Ubiratan D’Ambrosio (1997), and enunciated in a still incipient fashion in my previous studies (Knijnik, 1997b), which gave rise to this work. Here, more intensively, I seek to problematise the convergences between this field of mathematics education and popular education performed by MST. Below, I discuss these convergences, taking as reference the empirical research which is the subject of this study.

A first convergence regards the relevance given by both educational perspectives (ethnomathematics and the popular education of MST) to the question of culture. For ethnomathematics it is, in fact, a central point, present in many different conceptions. However, or maybe precisely because of this, the meaning that has been attributed to the category of “culture” in international ethnomathematics thinking has been the object of intense questioning, as well shown in the recent article by Ole Skovsmose and Renuka Vithal (Skovsmose & Vithal, 1997). Among the criticisms formulated by the authors are the almost permanent absence of discussion on the relations between culture and power in the research developed by ethnomathematics and the consequent homogenization with which the culture of the groups studied by ethnomathematics has been analyzed by it. The emphasis by Skovsmose & Vithal, which I share, is on their concept that “culture does not necessarily express ‘harmony’, it also includes antagonisms and conflicts”. (Skovsmose & Vithal, 1997, p. 14). Paul Dowling (1993, p. 36) positions himself along this same line of discussion, when he considers that as a second manifestation of what he calls “the ideology of monoglossism”, in mathematics education it is plural monoglossism – of which, to him, ethnomathematics is the example. In this form of monoglossism, emphasis moves from the individual subject to the cultural subject; society is seen as composed of a plurality of cultural communities, since in it there is complete absence of monoglossism. Says the author, about this: “Plural monoglossism acknowledges a heteroglossal social domain, but constructs the community as an artificial unit, and the human subject as its unitary agent” (Dowling, 1993, p. 37)³. Summing up, in the field of ethnomathematics there is a centrality of the notion of culture, although the latter, from many aspects, must still be further problematized.

Culture is also centrally present in the Educational Project of MST. Here we face a perspective which moves away from traditional pedagogical views, among which is the one “advocating the independence of education in its relationship with the context, seeing it as the redoubt of ‘scientific’ thinking, necessarily disconnected from concrete social actions” (Caldart & Kolling, 1997, p. 157). These concrete social actions are produced by (and, in

³It is outside the scope of this paper to discuss these criticisms in further detail. In Knijnik 1996 I performed an initial analysis of them, which was recently continued (Knijnik, 1998).

turn, produce) culture. The value attributed to culture by the MST (clearly expressed as one of its pedagogical principles) has its roots in the traditions of Brazilian popular education, especially in the theorizations of Paulo Freire, whose work is a source of inspiration for what this social movement has been doing in the field of education (Caldart, 1997, p. 179). In fact, as regards the question of culture, there is consonance with the positions advocated by Freire since his first studies: the ways in which people produce meanings, understand the world and live their daily life are taken as important, even central elements in the process of education. However there is no exacerbated relativism, no naïve view of the potential of such popular knowledge in the pedagogical process. Here, the interrelations between popular and academic knowledge are qualified, allowing adults, youths and children who participate in the pedagogical process to concurrently understand their own culture more profoundly and have access to contemporary scientific and technological knowledge. In fact, it is in this tense process which involves dealing pedagogically with local and more general knowledge, using the popular methods and the more technologically sophisticated methods of production, that currently lies, perhaps, one of the greatest challenges today facing popular education. In the case of MST this becomes clearly explicit, insofar as what is at stake is a political project, one of whose bases is the evaluation of the productive experiences of the settled people. This evaluation is directly connected to the capacity of the settled women and men to have their conditions of subsistence guaranteed at the same time as they establish competitive production levels in order to satisfactorily carry out the marketing process. This necessarily implies the discussion of the limits and possibilities of access to different technologies which will qualify the productive processes. In this qualification, the education performed at the settlements has a role to play, as rendered explicit in one of the previously mentioned pedagogical principles of the movement.

The pedagogical work developed at the settlement provided important elements for the discussion of these questions. In following up the melon production, the process was pedagogically analyzed in order to problematise it in its multiple dimensions involving in the discussion students, teachers and the farmers who worked with that crop. The purpose of the work did not consist of the “celebration of daily and work practices whose meaning remains with the researchers and not with those who practice it” (Dowling, 1991, p. 103). The effective participation of the community in the pedagogical process (especially the melon producers), was constructed in order to qualify the ways of production, and not simply for the purpose of collecting “frozen” elements which would allow the study of mathematics. This qualification, however, occurred in a dynamics that paid attention to the traditional practices of the group which, when problematised, could be better understood by those who practiced them. This occurred, for instance with the measurement of the land to be cultivated. There were settled people who used the popular methods of land “cubação” (Knijnik, 1996); others delimited the hectare of land to be farmed using the square “100 by

100” (i.e. 100 meters by 100 meters). Two of the peasants used as parameter to determine the size of a surface the “tractor time used to hoe”. One of them explained to the pupils: “One places the tractor on the land. Working with it for 3 hours it makes exactly one hectare”. The question of measuring the land with time was analyzed jointly with the pupils and farmers. What initially, when pedagogical work began, appeared to be “inappropriate”, was then more clearly understood by the group as examples of linear distances expressed by measures of time were examined. Ever more intensely, today, in the city and the countryside, what is of interest is the time used for a given displacement, more than the effective distance traveled. For farming purposes, the hour of tractor use is more relevant data than the precision related to square meters of land. As a peasant said, “a few meters more, a few meters less, it doesn’t really matter too much”. Possibly this, in that reality of the melon field was really what happened. However, other elements which in fact could “make a difference” were present in the ways of production and sale practiced by some groups of peasants in the settlement. One of these elements was the lack of detailed notes on the costs involved in the whole process, which made it impossible to evaluate it. In this sense, the pedagogical work changed, to a certain extent “naturally”, the practices performed by the group. It was on the occasion of the preliminary discussions with one of the peasant of the settlement that he told that, for the first time ever, he was writing down what was being spent, what still would have to be spent in order to plant the melons. As he explained, showing the notes he had written down: “We have never had anything written down. I did this here only for us”. However, in doing it “for us” he, with his group, was able to optimize their production. This also happened to another peasant, after a discussion held at school with a 6th grade group about his melon production, when he realized that he had really not made an accounting of the costs and results of the fruit sales, “reckoning the melon and the cucumber together as one”. The point that appears to have become clear, not only to the pupils and teachers, but also to the peasants, is that in order to take decisions about what crop should be planted, and to define how much land should be used to plant on, a more detailed follow up of the process was required.

The repercussions of the pedagogical process “outside the school space” had a further dimension: greater interaction occurred inside the settlement and between the settlement community and the neighboring people, with positive repercussions on the basic relationship between the pupils from “outside” and “inside” MST, and also on the sphere of production.

An example of this was the episode that occurred during one of the stages of work, when Antonio, father of a very young student, offered to take the group of fifth grade and the teachers by truck to the plantation of Alonso, a non-settlement farmer, one of the pioneer melon planters in the region. During the visit Antonio took active part in the discussion, asking questions of Alonso, and also, in his words, “of the kids, to see whether they would notice the difference”, i.e., whether the students realized

the difference between what was done at the settlement, and what was practiced by Alonso. On the way back to school he commented on the experience in which he had participated:

“He (Alonso) talked about how long they have been planting, they grew up dealing with that. We have another type of education, we have come from the countryside, and we have just begun to learn how to plant other crops, and it is now that we are learning. I was telling Gorete, we have to bring Lalau, who is a member of my group, there, and grandpa too, so that they will learn, so that they will see how it is done.”

Bringing the other members of his group to talk things over with the most experienced peasant was a strategy which, having begun with the work developed at school, sought to cover, at least partly, the gaps produced by the lack of government extension activities which could effectively help to qualify the productive process. Episodes such as this one provided evidence that the pedagogical work from the ethnomathematics perspective allowed a double movement: of the community to the school (insofar as school knowledge was produced based on the life of the settlement) and a movement in the opposite direction (insofar as the work done at the school had repercussions on the settlement life)⁴. What was at stake, in carrying out this two-way movement was the construction of ethnomathematical work which would not be limited strictly to the school space, and would end up by constituting, above all, a perspective that would only reinforce the hegemonic ways of learning and teaching mathematics marked by the western, white, urban male culture (Knijnik, 1996).

The approach to pedagogical work developed in melon production was centered on problems of practical and material needs. These problems were not transmuted into symbolic control problems, indicating other possibilities within the field of ethnomathematics, especially mathematics education which is performed in social movements such as MST.

4. References

- Caldart, Roseli Salete: *Educação em movimento: formação de educadoras e educadores no MST*. – Petrópolis: Vozes, 1997
- Caldart, Roseli Salete; Kolling, Edgar: *O MST e a Educação*. – In: João Pedro Stedile, *O MST e a luta pela Reforma Agrária*. – Petrópolis: Vozes, 1997
- D’Ambrosio, Ubiratan: *Educação Matemática: da teoria à prática*. – São Paulo: Papirus, 1997
- Dowling, Paul: *The contextualizing of mathematics: towards a theoretical map*. – In: Mary Harris (Ed.), *Schools, Mathematics and Work*. Hampshire: The Falmer Press, 1991, p. 93–120
- Dowling, Paul: *Mathematics, theoretical “totems”: a sociological language for educational practice*. – In: Cyril Julie; Desi Angelis (Eds.), *Political dimensions of mathematics education 2: Curriculum reconstruction for society in transition*. Johannesburg: Maskew Miller Longman, 1993, p. 35–52
- Fasheh, Munir: *Mathematics in a social context: math within education as praxis versus math within education as hegemony*. – In: Mary Harris (Ed.), *Schools, Mathematics and Work*. Hampshire: The Falmer Press, 1991, p. 57–61
- Frankenstein, Marilyn: *Critical mathematics education: an application of Paulo Freire’s epistemology*. – In: Ira Shor (Ed.),

- Freire for the classroom*. Portsmouth: Boynton/Cook, 1987, p. 180–210
- Knijnik, Gelsa: *Exclusão e Resistência: Educação Matemática e Legitimidade Cultural*. – Porto Alegre: Artes Médicas, 1996
- Knijnik, Gelsa: *Popular Knowledge and academic knowledge in the Brazilian peasants’ struggle for land*. – In: *Educational Action Research Journal* 5(1997a)No. 3, p. 501–511
- Knijnik, Gelsa: *A contribuição do MST para a Educação Popular: o novo na luta pela terra*. – In: João Pedro Stedile, *O MST e a luta pela Reforma Agrária*. Petrópolis: Vozes, 1997b
- Knijnik, Gelsa: *Culture, Mathematics and the Landless of Southern Brazil*. – In: Arthur Powell; Marilyn Frankenstein, *Ethnomathematics: Challenging Eurocentrism in Mathematics Education*. New York: SUNY Press, 1997c, p. 403–410
- Knijnik, Gelsa: *Ethnomathematics and Political Struggles*. – In: *ZDM Zentralblatt für Didaktik der Mathematik* 30(1998)No. 6, p. 188–194
- Lave, Jean: *Cognition in practice: Mind, Mathematics and Culture in everyday life*. – New York: Cambridge University Press, 1988
- Mellin-Olsen, Stieg: *The Politics of Mathematics Education*. – Dordrecht: Reidel Publ., 1987
- Oliveira, Claudio José: *Matemática escolar e práticas sociais do cotidiano da Vila Fátima: um estudo etnomatemático*. – *Dissertação de Mestrado*. São Leopoldo: UNISINOS, 1998
- Powell, Arthur; Frankenstein, Marilyn: *Toward liberatory mathematics: Paulo Freire’s epistemology and ethnomathematics*. – In: Peter McLaren; Colin Lankshear (Eds.), *Politics of Liberation: Paths from Freire*. London: Routledge, 1994, p. 74–99
- Skovsmose, Ole; Vithal, Renuka: *The end of innocence: a critique of “ethnomathematics”*. – Copenhagen: The Royal Danish School of Educational Studies, Department of Mathematics, Physics, Chemistry and Informatics, 1997, p. 1–28
- Taylor, Nick: *Desire, repression and ethnomathematics*. – In: Cyril Julie; Desi Angelis (Eds.), *Political dimensions of mathematics education 2: Curriculum reconstruction for society in transition*. Johannesburg: Maskew Miller Longman, 1993, p. 130–137
- Walkerdine, Valerie: *The mastery of reason*. – London: Routledge, 1988

Author

Knijnik, Gelsa, Dr., Universidade do Vale do Rio dos Sinos, Av. Unisinos, 950, 93022-000 São Leopoldo, Brazil.
E-mail: gelsak@portoweb.com.br

⁴Studies such as those performed by Cláudio Oliveira (1998) analyzing pedagogical work which consisted of producing informative material for the consumption of a social group from urban outskirts indicate research in this same direction.