

Introduction

Ethnomathematics and its First International Congress

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Ubiratan D'Ambrosio, São Paulo (Brazil)

Abstract: The First International Congress of Ethnomathematics took place in Granada, Spain, from 2 to 5 September 1998, hosted by the University of Granada, with the support of several organizations. In this paper I make some considerations on the why's and when of ethnomathematics as an academic research field and report on the ISGEm/International Study Group on Ethnomathematics and its first international congress.

Kurzreferat: *Ethnomathematik und ihr erster internationaler Kongress.* Dieser Beitrag umfaßt einen Überblick über die Entwicklung der Ethnomathematik zu einem akademischen Forschungsbereich sowie einen Bericht über die International Study Group on Ethnomathematics (ISGEm) und ihren ersten internationalen Kongress, der 1998 mit Unterstützung verschiedener Organisationen in Granada (Spanien) stattgefunden hat.

ZDM-Classification: A30, A60

1. Ethnomathematics as a scholarly field

The First International Congress of Ethnomathematics, with the participation of 103 specialists from 23 countries, took place in Granada, Spain, from 2 to 5 September 1998.

The event was hosted by the University of Granada, with the support of several organizations. The chief organizer was Maria Luisa Oliveras, a professor in the Department of Didactics of Mathematics at the University of Granada and Vice-President of the International Study Group on Ethnomathematics (ISGEm).

It is agreed that a new academic field is established once it has considerable research production and publications, an organized community, a journal and regular courses, seminars, conferences and congresses.

The scientific output on ethnomathematics as a research field in history and philosophy of mathematics and its pedagogical implications has been increasing steadily. This was recognized when the Mathematical Subject Classifi-

cation compiled in 1991 by the Editorial Offices of both the *Mathematical Reviews* and *Zentralblatt für Mathematik*, included *Ethnomathematics* (01A07). Doctoral theses on ethnomathematics have been submitted with success in several universities of the world.

Ethnomathematicians are well organized as a community. The *International Study Group on Ethnomathematics (ISGEm)* was founded in 1985 and has membership in several countries and publishes, twice a year, a Newsletter. The North American Chapter of the ISGEm is affiliated to the National Council of Teachers of Mathematics/NCTM.

Courses, seminars, conferences, presentations in congresses, have given academic visibility to ethnomathematics. Now, the First International Congress on Ethnomathematics, brings this new research field to adulthood.

Essentially, what are the *main goals of ethnomathematics*? It is a very peculiar research field, in which new directions in historiography and interpretation represent, even more than the results, an important goal. This is the main reason which I like to call it the "Programme Ethnomathematics". It views history, particularly the history of sciences, with new lenses.

If we want to have an universal history of mathematics, there is need of a broader historiography. History of mathematics can hardly be distinguished from the broad history of human behavior in definite regional contexts, recognizing the dynamics of population exchanges. This is a way of identifying the origin of exclusion of populations and entire civilizations through denial of knowledge, which allows for the proposal of corrective measures. By looking into the bodies of knowledge which have been integrated in the syncretic evolution of mathematics, ethnomathematics allows for a better understanding of the cultural dynamics under which knowledge is generated. The proposed historiography can be seen as a transdisciplinary and transcultural approach to the history of mathematics.

The great navigation since the 15th century mutually exposed forms of scientific knowledge from different cultural environments. The several ethnosciences involved in the encounters, which obviously include European science, have been subjected to great changes as a result.

Much research is needed to understand the sciences of the encounter. This needs a new historiography, since names and facts, on which current history of science heav-

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ily rely, have not been a concern in the registry of these cultures, which have been mostly denied and even excluded in the colonial process. A history “from below”, which might throw some lights in the modes of explanation and of understanding reality in these cultures, have not been common in the history of science. The response to this need is the proposal of the “Programme Ethnoscience” and, particularly, of the “Programme Ethnomathematics”.

*Ethnoscience*s are corpora of knowledge established as systems of explanations and ways of doing which have been accumulated through generations in distinct cultural environments.

Ethnomathematics are these corpora of knowledge derived from quantitative and qualitative practices, such as counting, weighing and measuring, comparing, sorting and classifying.

The two have a symbiotic relation.

The process of denial and exclusion of the cultures of the periphery, so common in the colonial process, still prevails in modern society. Large sectors of the population are denied and even excluded from full citizenship.

In order to build up a civilization which rejects inequity, arrogance and bigotry, education must give special attention to the redemption of cultures that have been for a long time subordinated and to the empowerment of the excluded sectors of societies.

Ethnomathematics contributes for restoring cultural dignity and for offering the intellectual tools for the exercise of citizenship.

2. How do I see ethnomathematics and its objective

In this congress I learned from Claudia Zaslavsky that Otto Raum wrote, in a review of her book “Africa counts”, published in *African Studies* (1976): “(This Mathematics) might perhaps be most suitably called ethno-maths on the analogy of ethno-music, ethno-semantics, etc.” And Wilbur Mellerna, in a letter to Gloria Gilmer, published in the *Newsletter of the ISGEM* (Vol. 6, No. 1, November 1990), says that he had invented the word ethnomathematics in 1967 and that he gave a talk in 1971 using it. I did not see the word before I first used it. But my reading is limited. I am sure that a search in the literature, mainly in anthropology, may reveal other users of the word ethnomathematics. No surprise.

I was aware that the word ethnohistory had been introduced in the 1940s, as the history of non-literate people, and that in 1955, an International Society of Ethnomusicology was founded. Also I knew the field of ethnopsychiatry, focusing on “exotic societies”. When I lectured at the Linguistic Institute at SUNY at Buffalo, in the Summer of 1971, the word ethnolinguistics was current. Ethnopsychology, ethnobotany, ethnomedicine were also frequent to refer to the study of practices of different racial groups. And the sociologist Harold Garfinkel coined the word ethnomethodology in 1967 to express his interest in how social interactions and practices are related.

My use of the word ethnomathematics has a history of its own.

2.1 First moment: ICME 3 (1976), Karlsruhe

In ICME 3 (International Congress on Mathematical Education), in Karlsruhe, in 1976, I proposed, in the section

“Why Teach Mathematics”, a broader view of why mathematics should be in school curricula. I proposed that this should include a discussion of the nature of mathematical knowledge, with special attention given to history, philosophy and cognition in the broad sense, not specifically dealing with the philosophy and the history of mathematics and the theories about learning mathematics. Why this? Because much of the history and philosophy of mathematics, as well as mathematical cognition are redundant and biased. If we look for a transcultural perception of the nature of mathematical knowledge, we need to adopt a transdisciplinary view.

Thus, much to the maze of my colleagues, I proposed an unusual bibliography, including Nietzsche and Spengler. I also insisted on the fact that there are other ways of doing mathematics, proper to different cultures. And the reference to Claudia Zaslavsky’s “Africa Counts” was very important to my paper.

The expanded version of the paper became the first of a set of four small books which represent my basic thinking about science and mathematics education: *Overall Goals and Objectives for Mathematical Education*, UNICAMP, Campinas, 1976; *Socio-cultural bases for mathematics education*, UNICAMP, Campinas, 1985; *Etnomatemática. A Arte ou Técnica de Explicar e Conhecer*, Editora Atica, São Paulo, 1990 (translated as *Ethnomathematics: The Art or Technique of Explaining and Knowing* by Patrick B. Scott, ISGEM/NMSU, Las Cruces, 1998); *Several Dimensions of Science Education. A Latin American Perspective*, CIDE/REDUC, Santiago, 1991.

It did not occur to me then, in the congress of Karlsruhe, that ethnomathematics would be a good name for the mathematics of other cultural environments. I was familiar with ethnobotany, ethnomusicology, ethnopsychiatry, and other ethno-knowledge. It is easy to understand why the prefix “ethno” did not come to my mind in the first stages of my reflections about this. The work of botanists, musicians, psychiatrists and others are mainly an ethnographical approach. No doubt, this is important also in mathematics. We have to learn the mathematics of other cultural environments. Indeed, this has been very interesting and helpful in classrooms. But it can easily get into a folkloristic view of how other cultures do counting, measuring, etc. with total disrespect for the complexity of their cultural specificity. I still see as an equivocated way of doing ethnomathematics the reliance on curiosities and anecdotes, dealing with number and figures of other cultures. Unless properly situated in an ample cultural scenario, this approach to ethnomathematics is prone to reinforcing eurocentrism.

Much of the motivation behind the views expressed in my Karlsruhe paper derived from three major experiences: my work with minorities while graduate chairman of the Department of Mathematics at S.U.N.Y at Buffalo; my work in Mali, West Africa, in the UNESCO project called “CPS Bamako”; and by coordinating the interdisciplinary Multinational Project of Science Education of the Organization of the American States.

In all these socio-cultural environments, the Afro-Americans in the USA, Africa, and Latin America and

the Caribbean, I was strongly motivated to understand how knowledge, particularly mathematical knowledge, was generated, intellectually and socially organized, and diffused. This research program was basically interdisciplinary, relying mainly on studies of mind and cognition, anthropology, linguistics, history, epistemology, politics, education. In the mid-seventies I began to refer to ethnomathematics as the underlying framework behind architecture, calendric systems and measuring, particularly weighing, in the traditional cultures of sub-Saharan Africa, the Andean and the Amazonian native populations.

My interest was – and continues to be – understanding the nature of knowledge, in particular of mathematical knowledge. This was essential in my 1976 paper and I relied on the recognition that mathematics is part of broad cultural contexts, having everything to do with religion, the arts, economics, politics and the social organization of society. I had not yet fully formulated the research program focused on the generation, the intellectual and social organization, and the diffusion of knowledge, which became the backbone of the Ethnomathematics Program.

2.2 Second moment: AAAS (1978) and ICM 78, Helsinki

In February 1978, during the Annual Meeting of the AAAS (American Association for the Advancement of Science), Rayna Green organized a section on “Native American Science”. In my paper, which was never published, I used the word ethnomathematics, similarly to what other participants were doing with their other disciplines, to designate the mathematics of the native cultures. But the use of the word ethnomathematics was always focused on the description of the mathematics of other cultures, mainly those without writing and those marginalized by the colonial process.

In the same year, Bernhelm Booss and Mogens Niss organized a meeting on “Mathematics and the Real World”, followed soon after by a memorable satellite conference on “Mathematics and Society” preceding the ICM 78 (International Congress of Mathematicians), in Helsinki. Many requests to the IPC of the congress to include this conference as part of the program met with an incredulous reaction. The argument was, as obviously expected, that this theme had nothing to do with mathematics as such. But the concession of a space for the satellite conference and the large number of attendants to it were big achievements. This was important in drawing the interest of the mathematical establishment to broader societal issues. Soon after, Mohamed El-Tom organized an important meeting in Khartoum on “Developing Mathematics in Third World countries”.

In those days I was building-up my views on mathematical knowledge. Why did our species develop such a thing as mathematics? And how does mathematics evolve?

My interest in the history of the evolution of academic mathematics in Europe led into examining the cultural dynamics in the development of Mediterranean civilizations and in the expansion of Christianity. Particularly interesting is the role of paganism in this process.

In the visits to Denmark and Finland, I got very much impressed by the Pagan cultures of Scandinavia. The

Vikings, with their ship-building, their navigation instruments and their symbols were, and still are, intriguing. I was impressed by the long length of the days and by the fact that in the Northern part of the region, which I visited later, the days lasted six months!

How was the cosmology of these cultures? Considering that time and cosmography have such an important role in the development of mathematical ideas, how could these people make sense of their own experiences and of the cultural interactions during the almost thousand years of conquest of Southern Europe? The conqueror absorbed much of the culture of the conquered. This was a dual situation of what I had seen in the cultural dynamics which occurred in the Americas and in Africa during the conquest and colonial era.

The crux was to understand how individuals and cultural groups respond to the drives for survival (proper of every living structure) and for transcendence (specific of human beings), which are intrinsic of human nature. The response to these drives are ways, styles and techniques of doing, and the search of explanations, understanding and learning. Systems of knowledge are the complexes of the responses to the drives for survival and transcendence. Each culture has its own response to these drives.

Each culture developed its own ways, styles and techniques of doing, and responses to the search of explanations, understanding and learning. These are the systems of knowledge. All these systems use inference, quantification, comparison, classification, representation, measuring. Of course, Western mathematics is such a system of knowledge, as a broad view of its history shows. But other cultures developed, also, other systems of knowledge with the same aims. That is, other “mathematics”, using different ways of inferring, quantifying, comparing, classifying, representing, measuring. All these systems of knowledge might well be called ethnomathematics. They are “mathematics” of different natural and cultural environments, all motivated by the drives for survival and transcendence. Mathematics basically respond both to “How” and “Why”.

I had already used ethnomathematics in the narrower sense of representing real facts, counting, measuring, classifying, comparing, inferring, etc. in different cultural environments. But an understanding of the nature of these ethnomathematics was still a challenge for me. I began to look to the history of Western mathematics in the broader sense of responses to the needs of survival and transcendence, mainly the practical and mystic motivations in its development. I considered exploring the idea of systems of knowledge which respond to the drives for survival and transcendence of the right track to be followed. It was clear to me, examining several different cultures, that the word ethnomathematics, the result of an etymological playing, carried in it the synthesis of my research program: the generation, intellectual and social organization, and diffusion of knowledge.

2.3 Third moment: a research program

The Fifth International Congress on Mathematical Education, ICME-5, held in Adelaide, Australia, in 1984, was the necessary academic opportunity to establish ethno-

mathematics as a legitimate research field. The attention brought to it in the opening plenary lecture and the several papers and research reports presented during the congress brought recognition to this new area. The following year, the *International Study Group on Ethnomathematics* was founded during the Annual Meeting of the NCTM and Gloria Gilmer was its first President. Under her able leadership the ISGEm grew, received affiliated status with the NCTM and became a regular presence in most national and international meetings.

The research program asks for understanding and explaining the generation, intellectual and social organization, and diffusion of knowledge, which I understand in the broad sense of the ways human beings deal with their basic needs of survival and transcendence in their own environment.

One of the many subsidiary research programs refers to mathematical knowledge. Thus, it is natural to view ethnomathematics as a research program on the *History and Epistemology of Mathematics with Pedagogical Implications*. Indeed, this was the title of a short paper published in the *Notices of the American Mathematical Society*, December 1992, Vol. 39, No. 10; p. 1183–1185.

Another subsidiary research program refers specifically to the cultural dynamics of knowledge transfer, particularly of mathematical knowledge. This affects particularly the history of mathematics of countries that were subordinated to the colonial process. In other words, it leads to the study of the cultural dynamics of colonialism. This is synthesized in what I call the “basin metaphor”, presented in the First Summer School of History and Pedagogy of Mathematics in Montpellier, 1995 (History and Epistemology in Mathematics Education, Eds. F. Lalande, F. Jaboeuf, Y. Nouaze, IREM, Montpellier, 1995; p. 571–580).

Independence did not redeem the effects of the colonial era. About 80% of the human population, living both in the so-called developed and undeveloped countries, live in poverty, and fear and in undignified moral and material conditions. Of course, mathematics is not responsible for this. But mathematics is present in all the factors which are responsible for the *status quo*: economic maldistribution and irresponsible production, and destructive warfare. We cannot ignore this and we have to discuss this. With this in mind I look into the intimate relation between mathematics, peace and ethics.

The final and most comprehensive goal of our action must be to contribute for an ethical behavior and for achieving *peace* in its several dimensions: interior peace, social peace, environmental peace and military peace. I believe ethnomathematics contributes to this.

3. The First International Congress of Ethnomathematics

The First International Congress of Ethnomathematics was a good opportunity to exchange and enrich very different theoretical and practical actions with these major goals.

The talks were organized in three strands: theoretical, including history and philosophy, native cultures and classroom action.

The academic world faces several challenging questions,

as yet unexplained, about the generation, intellectual and social organization, and diffusion of knowledge. These can be approached with advantages from the ethnomathematical viewpoint, thanks to the richness of transcultural and transdisciplinary methodologies intrinsic to ethnomathematics.

From Basques to Maoris, passing by African and Native American cultures, we have most diverse cases supporting the epistemological proposals presented in the congress. Also school environments, from pre-school to adult education, covering both informal and formal educational systems, were presented.

The abstracts were all collected in a bilingual (Spanish and English) volume of *Proceedings of the ICEM I*. The full texts were published on CD-Rom. Both are available from

Prof^a. Maria Luisa Oliveras
Departamento de Didáctica de la Matemática
Facultad de Ciencias de la Educación
Universidad de Granada
Campus de Cartuja s/n
18071 Granada, Spain
E-mail: oliveras@platon.ugr.es

The *Newsletter of the ISGEm*, as well as the collected issues (since 1985) in English and Spanish and the book *Ethnomathematics*, by Ubiratan D’Ambrosio, translated by Patrick B. Scott from the Portuguese original (*Etnomatemática*, Editora Atica, São Paulo, 1990) are available from

Prof. Patrick B. Scott
College of Education
New Mexico State University
Las Cruces, NM 87131, USA
E-mail: pscott@nmsu.edu

The First International Congress on Ethnomathematics was a decisive event for the consolidation of ethnomathematics as a research field with important pedagogical implications.

For this and the following issue of ZDM we have selected a number of papers presented at the First International Congress of Ethnomathematics which touch different directions in which ethnomathematics is developing.

Author

D’Ambrosio, Ubiratan, Prof., Rua Peixoto Gomide 1772, ap. 83, 01409-002 São Paulo, Brazil. E-mail: ubi@usp.br