Teacher training through research in ethnomathematics

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Veronica Albanese[1] and María Elena Gavarrete[2]

1 Universidad de Granada, Facultad de Educación, Granada, Spain, very_alba@hotmail.it

2 Universidad Nacional, Heredia, Costa Rica, marielgavarrete@gmail.com

Two experiences in primary school teacher education are reported. Both of them are based on Ethnomathematics understood as a tool to reflect about the ways of doing mathematics of two cultural groups. Geometric figures are built in different way by the two cultural group analyzed: a group of folk dancers of Argentina and an indigenous people of Costa Rica.

Keywords: Ethnomathematics, teacher education, cultural practice, geometric figure.

INTRODUCTION

We report two experiences performed with primary school teachers respectively in Argentina and Costa Rica, where it was proposed to use Ethnomathematics as a tool to promote professional teacher development through a process of reflective inquiry about the ways of doing and understanding mathematics (ethnomathematics) of a cultural sign of the cultural groups involved: the guild of Argentine folk dancers and the Cabecares, an indigenous group of Costa Rica.

METHODOLOGY

Both works consist in organizing a course for the training of primary school teachers, where we propose the development of Ethnomathematical Microproject (Oliveras, 1996). These include the identification and characterization of ethnomathematics in a cultural sign of the group chosen, to develop contextualized teaching activities to be presented in the classroom of primary education. The objective was to engage teachers in a research about the ethnomathematics embedded in the cultural practices in each context and to identify its relationship with academic-formal mathematics.

In both countries we organized a course for teacher training, which promotes the research on the context through micro ethnographies realized by the participants of the courses. The data collected consists of the reports of the Micro-projects and the audiovisual recordings of the course session.

SOME RESULTS

The cultural signs studied were the folk dance *chacarera* (Argentina) and the traditional conical House of the *cabécar* culture (Costa Rica). We highlight here the participants' observations about the ethnomathematics found in the cultural signs and about the relations and differences with academic and formal mathematics.

In the dance *chacarera* the participants focus on the geometric figures that outline the choreography and they observed that the circumference is associated to the movement of steps that include a turn of the body on itself for folk dancers, while in school mathematics, it is defined by an equidistance of all points in relation to a center. In fact the same steps in the figure called *avance retroceso*, which does not involve a rotation of the body on itself, are represented by a diamond, while the figure called *giro*, where a rotation is involved, is represented by a circular line; this is the evidence that the teachers provide for the hypothesis that dancers resemble the circular line to the rotation of the dancer's body by a round shape without corners. Thus we conjecture that the circumference of the guild of the dancers is conceived as a regular polygon that tends to have no angles (Albanese and Perales, in press).

The *cabécar* traditional conical house is called *Ju-Tsini* and is itself a system of cosmological representation where elements of the cultural heritage and particular geometric concepts of the group –a specific logic

and a particular way of localizing- join together, since, in this ethnic group, the physical world serves as a system to represent the mythical world (Gavarrete, 2012). The participants identify the construction of the *Jú-tsiní* as a powerful and contextualized example to work with pupils concepts related to the solid corps, as symmetry (axis of symmetry and homologous points). The circle is drawn using a center pole, this means that here the conception of circle is associated to the distance from the central point. The space is represented by the union of a cone and an inverted cone, whose circular bases overlap and therefore have the same axial center, resulting in the model *Nopatkuö* which describes the three cosmic levels of the legendary tradition of the ethnic group. This specular model represents the dual opposition of elements. The principle of complementary opposition is equivalent in school mathematics to that of symmetry even if in this culture it has an added value of cosmological meanings.

CONCLUSIONS

In both countries, the research experience impacted the teachers training, as they reflected on the universality of mathematical knowledge and teaching applications, promoting teacher creativity to facilitate the developing of the mathematical curriculum in connection with the sociocultural environment.

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