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Faculty Of Education

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Journal Of Educational Research

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Ἔχεις μοι εἰπεῖν, ὦ Σώκρατες, ἆρα διδακτὸν ἡ ἀρετή; ἢ οὐ διδακτὸν ἀλλ' ἀσκητόν; ἢ οὔτε ἀσκητὸν οὔτε μαθητόν, ἀλλὰ φύσει παραγίγνεται τοῖς ἀνθρώποις ἢ ἄλλῳ τινὶ τρόπῳ

Florina, November 2013
Issue 2b

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Diversity in European school populations: A study in Portugal and Greece with particular attention to Romany cultures

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Abstract

The growing cultural diversity of school populations poses new challenges to schools and also to schooling equity. Schools (as well as minority and dominant group leaders) should avoid cultural closure and instead should involve recognition of different ways of knowing, in order to share cultural elements and to enable constructive interactions; these practices promote education for peace, respect for diversity and social justice. In this paper, we explore the contributions of Ethnomathematics to the understanding of school diversity in Portugal and Greece, focusing particularly on the Romany culture of these countries. We suggest ways to improve mathematics learning and enhancing the social role of mathematics education in general.

Keywords: *mathematics education, cultural diversity, Ethnomathematics, Romany education, informal cognition.*

Introduction

Mostly from the 70s on, a growing awareness of the social and cultural aspects of mathematics education started to be understood as being intrinsically connected to school success. In particular, Ethnomathematics appeared as an alternative theoretical framework for responding to concerns related to mathematical education in multicultural/ intercultural contexts. Domestic practices of numeracy as well as forms of legitimizing school knowledge of diverse populations have been receiving increased attention in the context of Ethnomathematics.

Globally, the results of research reveal that mathematical strategies used to solve everyday problems as well as the domestic practices of numeracy, though not being less valid or less interesting, are not included in the repertoire of school knowledge, and therefore children are unable to use them to succeed in school mathematics (Nobre, 1989a; Baker *et al*, 2000, Abreu, 2000; Marafon, 1996; Moreira, 2003; Oliveira, 1998).

Using a theoretical approach of Ethnomathematics we compare the results from our researches on both Romany culture and Romany students' education in Portugal and Greece, exploring their similarities and their differences. Our intention is not only to ascertain what happens in both countries but also to discuss how an ethnomathematical approach contributes to the improvement of students' mathematical education, and by extension to the empowerment of students' social role.

1. Theoretical points

Arthur Powell in MES3 (2002) referred to Ethnomathematics as a discipline that emerged from an engaged multicultural perspective on mathematics and mathematics education. Metaphorically using the Adamastor from Luís Vaz de Camões's epic poem, the 'Os Lusíadas' (The Sons of Lusus), Powell speaks about the fact that African people as well as other formerly colonized people in the past, were disempowered by the violent and avaricious European colonial process, something that still happens nowadays in the light of globalization. Because of this, there were certain consequences to their education and of course to their mathematics education. Ethnomathematical knowledge increases students' self-confidence and contribute to the development of critical insight and force within the process of liberation (Nteta, 1987; Powell, 2002,). Also, D' Ambrosio, when referring to the initial ideas of ethnomathematics, speaks about his involvement in research procedures that were carried out in the traditional indigenous cultures of Mali and Latin America (2006).

In general, at the initial development of ethnomathematics the emphasis was put on cultures outside Europe, since to a certain extent, ethnomathematics was determined in counterpoint with western mathematics. The book of Arthur Powell & Marilyn Frankenstein *Ethnomathematics: Challenging eurocentrism in mathematics education* (1997) is indicative of this perception. It is also indicative of the extent of the research that has been taken place outside Europe, something that can be ascertained by exploring the Ethnomathematics digital library (http://www.ethnomath.org).

That is, although most ethnomathematical research has been conducted by European scholars, it has taken place in cultures outside of Europe. In this way, we might say that Ethnomathematics is itself an example of colonialist practice, as cultures outside of Europe provide raw material for exploitation by European scholars, who use it to further their own careers (Appelbaum, 2008). According to Vital and Skovsmose (1997), an extremely small part of the research conducted in Europe was related to an anthropological strand, since part of the research concerns traditional groups such as indigenous people. In Europe, one might imagine that indigenous groups do not exist. However Europe is not characterized by a uniform culture. There are some groups that do not share the mainstream culture; they are victims of the Eurocentric perception of mathematics/mathematics education as much as formerly colonized peoples outside of Europe. So, issues related to the enforcement power of mathematics education are not limited to the non-European territory.

Among others, Romany is a traditional group of people that still lives on the margins across European countries. Marginalization of this group has obvious consequences in the education/ mathematics education of its students. The same problem also exists for the students of other marginalized groups; this is still an issue the research community is dealing with over the last years.

Such concern is associated with the changing multicultural landscape of school population. Today, the majority of the classrooms are multicultural; in the European educational community there is a growing awareness that non-mainstream students face discrimination, something that is also reflected in the mathematical achievements of these students.

Following the logic from D' Ambrosio's words "*share the dream of equity and dignity in the relation of every human being* " (2006: p----) we are making an effort through this

work to contribute to the improvement of students' mathematical education and by extension to the empowerment of their social role.
In the following discussion, our intention is to bring out the decisive role of an ethnomathematical approach, aiming not only to understand what happens but also to contribute to the improvement of both the mathematical education and the social justice for Romany students, as well as for the rest minority students.

2. Romany people in Portugal and Greece: a common origin

One of the oldest Portuguese minorities –the Romany— came to Portugal in the 16th century (Costa, 1996). Historical reports show that Roma have been excluded since then, and even more recent several incidents still continue to highlight how difficult is their inclusion in the Portuguese society.
Also, in Greece, Romany people (Stathopoulou & Kalabasis, 2007) constitute an old traditional group. They perceive themselves as members of the global Romany community despite the differences that still exist. Romany people have appeared in Greece since the 14th century; however there is still evidence that they might have appeared even earlier, perhaps as early as the 11th century.
From the moment Romany people arrived in both countries they have been living in the borderlands of their societies - though, at least at the physical level, there are some groups with stable residence. This fact has been revealed through the way they select places of registration: in those cases they live close to non-Romany districts, their residence is at the end of the mainstream settlements.
In both Portugal and Greece Romany people are self-defined as different from the rest of the society. The way they perceive education/ mathematics education is one of the points of differentiation. Formal education is not an activity integrated within the culture of Romany people. Many Romany people dispute the need for formal education. They value the cultural cognition acquired through interaction with other members of their community. They sometimes not only turn away from formal education, but also consider school as antagonistic to the family. Romany students who attend school do not offer so much to their families and their learning at school often conflicts with the values and knowledge of the community. Where parents appraise formal education, their ambitions are often different from the comparable perspective of the Portuguese and Greek society. Thus, though the school situation is changing and there are persons with a high level of school education, Romany people in general still maintain a low formal education level in general. Children's presence in schools is irregular; they still make frequent absences for long periods of time. In addition, there is a drop-out phenomenon, more frequent in girls. Thus, the situation in the schools of Romany children, both in Greece and in Portugal, constitutes a major concern for educators and administrators, either because of school failure or because the measures taken in order for the schools to acknowledge this minority have failed.
Apart from their attitude to the formal education two more cultural characteristics – the semi-nomadic way of life and the socio-economic organization – further complicate their formal education/mathematics education. The Romany *semi-nomadic way of life* has obvious consequences for formal schooling: for example, it often results in a delayed start to schooling, and creates inconsistent attendance. The *socio-economic organization,* in

turn, unfolds in such a way that businesses are usually organized within the framework of the family group. As a result, children are involved in their families' activities. Through these they are taught in a horizontal way. This teaching is in their first language, which is different from the Portuguese or Greek language used at schools, it takes place in contexts that make sense for the children. They are mostly interested in the cognition that is necessary for community survival (Moreira & Pires, 2012; Pires & Moreira, 2005; Stathopoulou, 2005).

In addition, schools have limited knowledge about Romany culture, namely: schedules and holidays are not adequate to the Roma way of life; there is no integration of children's informal knowledge in school activities; and the Romany culture is not represented in school materials.

In this scenario, in Portugal as well as in Greece, mathematics education presents some singularities; it is necessary to discuss them in relationship with the schooling process of Roma children in order to find out ways to avoid both school failure and drop-out consequences. In this paper we'll try to further explore differences and similarities regarding the way schools in both countries face Romany students and how far the culturally acquired cognition of Romany students has been developed in the formal education context.

3. Romany students in the Greek school context and informal cognition

What is presented here is based on an ethnographical research (Stathopoulou, 2005)[1]. The main part of the fieldwork was a first grade class of exclusively Romany children. During a school year (2000-2001) we conducted observations; we posed activities in addition to interviewing the students.

Through the observation it was made obvious that a classroom and the school in general, is a place that produces cultural conflicts for Romany students. The formalized arrangement in the classroom and in general the rigorous rules in the classroom are very different in comparison to their community where they feel a sense of freedom. The following instance is indicative of the cultural diversity Romany students experience in this context. There were two Romany boys, about ten years old, on their bicycles just outside the schoolyard. After a short discussion, I asked them 'why they did not come to school'. The two boys pointed to the enclosure with evident ridicule/dismissal/hatred, saying: "Don't you see how they are!!!". For them, school was an expression of a lack of freedom, an obvious cultural conflict. The fence was a physical symbol of the broader experience of entering school.

The fieldwork was not confined to the school context. We were interested in observing students' families, and particularly their experiences in the context of their family businesses, in order to examine the context in which students were developing informal mathematical knowledge. The parents of all Romany students deal with commerce. The majority of them are street greengrocers or sell household items on the street. One family apart from street commerce ran a small shop where even the young children were observed in money dealings. During the observation we were impressed by the fact that children as young as three years old were dealing successfully with money. Although they

[1] The title: "The Connection between Cultural Context and Teaching/Learning of Mathematics: An Ethnographic Study of a Class of Romany Students and of their Community of Origin".

didn't always know the value of coins they managed to carry out their purchases using several strategies.

Some activities that we conducted in the context of classroom show their abilities in mental calculations. The first two activities were given to 6-7 year old students during the first period of the research in October. They had a diagnostic form in order to explore the informal knowledge children had culturally acquired before coming to the school (Stathopoulou & Kalabasis, 2002).

a. *You have 5 hundred drachmas and you want to buy two cheese pies. If each cheese pie costs 2 hundred drachmas, would the money be enough?*
b. *Your father has given to your brother 1 thousand drachmas and to you five hundred drachmas, four hundred drachmas and two fifty drachmas coins. Has either of you got more money than the other? If so which of you?*

Twelve out of twenty-five students were selected as a sample representative in relation to age, gender and aptitude. The test was applied separately to each student at different moments of time and the students did not collaborate. With the exception of one girl who possibly got confused with the actual price of the cheese pie, all the rest answered both questions correctly, although in some cases they could not justify their answers. In response to the first question, the majority of them answered spontaneously. Almost all the answers were of this kind:

"Yes, I get one hundred drachmas change"
"Yes, and I keep one hundred drachmas"

Some of the answers to the second question were:

"*The same we get together, the same we get together"*
"Mine, becomes one thousand"
"one thousand are all of these"
"nine hundred and two fifty drachmas coin, 1000, the same"
"They will become the same, he gets as much as I get. ***We know them Miss****"*

The same activities were tested in a non-Romany[2] first-grade class, at the same school. Two students—one boy and one girl—with the best aptitude and two students—one boy, one girl—of low aptitude, according to their teacher's estimation, were selected.

All of their answers are quoted in order to show the differences of these two groups.

-*"No, I need 1 thousand",* (to buy two cheese pies)*.*
*"My sister" (*has got more money*)*
-*"Yes, the money is enough. I don't know how much change"*
"I get more than 1 thousand. I don't know how much"
-*"It is enough, I get 4 hundred change"*
"Fanis", he means his brother gets more money*.*
-*"No, the money is not enough"*
"To me"

The different ways that these two groups of students respond to the above activities is characteristic of their informal knowledge, the knowledge they culturally acquire through everyday experience. As noted above, Romany students are involved in their family's activities since their socio-economic organization is based on the family. Through this involvement they become adept at mental calculation. Also, the fact of their language's

[2] Non Romany community in this district is of the same socio-economical situation but culturally differentiated from the Romany community

orality[3] contributes to the development of their ability with mental calculation. During the observations I never saw any children or adults using paper and pencil to calculate anything. Very young children—3 to 6 years old—when they went for shopping at the small shop at which I conducted an observation -- memorized long lists of things, since they and their parents did not write down them. Furthermore, their ability of doing mental calculation is strongly connected with their identity: *"they will become the same, he gets as much as I get. We know them Miss".*

Romany students are considered of low aptitude in school. It is difficult for them to respond to the formal teaching of mathematics. The responsibility for this failure is imputed to the way the formal mathematics education is designed: an education for the mainstream students; an education that does not take into consideration cultural diversity.

In the following activity students were asked to provide an answer to a typical problem of subtraction, after having been taught the typical algorithm of addition and subtraction:

24 - 18 = ? .

This was also written in this way:

24
-18

to help them use the typical algorithm of subtraction.

All of them solved the problem without writing anything down, except for the result: 6.

When they were being asked about their way of working they provided the following answers:

Ch: we have *24, we take off 4 we have now 20. We take off the10 and we have 10, we take off 4 more and 6 remain*

Typical representation: [(24 - 4) - 10] – 4 = 6

S: *we put 2 more to 18 and they become 20, and then I have other 4 and they become 24.*

Typical representation: 18 + 6 = 18 + 2 + 4 = (18 + 2) + 4 = 24

G: look, we have *18 and 24. I take off 10 from 18 and also ten from 24.*

The rest of 18 are 8. From 8 to ten is 2, and 4 (he means from 14) they become 6.

Typical representation: 24 - 18 = (24 – 10) - (18 –10) = 14 – 8 = (10 + 4) – (10 – 2) = 4 + 2 = 6.

The way Romany students negotiated the above activity shows us that for them it is easy to use mental calculations to solve problems not only in the real life context but also in the classroom. The fact that they acquire mathematical cognition in context that produces meaning appears to make them able to transfer this cognition in other context as well, using common sense. Apart of knowledge transition in this instance the role of language orality is ascertained. In all of these procedures students did not write anything. They conducted all the calculations mentally and just for research purposes they were expressed formally by the researcher.

In the above instances students were effective in mathematical tasks since teaching was not rigorously formal. When they are called to face these kinds of tasks in a formal/ written way they cannot demonstrate the same level of skill and understanding. All the teachers of the school considered Romany students incapable of meeting school

[3] Romany language is a non written one.

expectations. They did not acknowledge the fact that formal teaching generates conflicts since in their everyday experience they are taught in different way—in an horizontal way. The criterion for a good solution outside of school is merely to be a working one, not a formally proper one.

We could say briefly that Romany children are very familiar with calculations—especially when dealing with money. Their language is an obstacle in one hand for their learning of mathematics in a school context and its orality a qualification in doing mental calculations. Their language orality is connected with their proficiency with mental calculations. The fact students don't respond effectively in school context is a result of the designed mathematics curriculum. The state, as represented by school practices, considers education and Romany people as incompatible things.

4. Mathematics education features of Romany children in Portugal.

The most prominent feature of the home-based educative process of Romany children is that children's education is a result of a collective action of the social group - it is in the heart of the community, which comprises three and four generations, that the socialization process unfolds in a coherent, cohesive, continuous and safe way. As Liegeois (2001, p.69) highlights in a Romany family "Children and adults work joined, live joined, suffer joined. The child learns through the immersion in the family, respecting the adult and being respected by him".

Learning is done especially by observation and reproduction of what they hear and see, while taking an active role and participating in the practices of their communities. Within familiar and effective contexts and throughout oral transmission, knowledge, practices and techniques are observed, experienced and imitated by children, who in this way learn and reproduce the knowledge of their social group. Actually, the education and socialization of Romany children are not only mostly developed inside their communities but significantly children go along with their parents to work, especially to markets and fairs (S. Roman, 1980; Fraser, 1992/1995; Okely, 1983/1993; Ferreira, 2003; Piers, 2005; Candeias, 2006; Moreira e Pires, 2012).

From the Roma's viewpoint schools do not understand their children, and their need for freedom, which is impossible to experience inside the space of a classroom. Therefore school is generally regarded by them in a minimalist perspective, the major interest in schooling being to provide children with some basic expertise in reading, counting and writing (Aires, 2004).

Used to an oral apprenticeship, transmitted informally, children feel and they are treated as estranged in a school system fundamentally based on the explicit transmission of the knowledge. Thus, frequently, schooling is felt as an anguished process in which children are compelled to be subjected to rigid rules, to change habits of life and models of behavior. As Cortesão argues "frequently school is the first place where the Romany children feel that they are different and internalize the negative stereotype of 'being a Roma" (2002: 368). Simultaneously, demonstrations of lack of interest in school are expressed by these children as a consequence of the disconnection from their everyday lives.

Although Romany communities undergo moments of change where school education emerges as having a role to perform, and both socio-political measures and efforts by

school communities gradually are open to multicultural education and to a implementation of a "politics of the difference ", we continue to think as Liégeois who avers that « Up to now, for the Gypsies, the school failure is a fault of the school, which could not welcome them, not even keep them, nor to provide them ways of adaptation to the modern world » (2001: 199).

In this frame, it is necessary to develop new ways to promote the school success of Romany children while making the process culturally significant.

Grounded in Ethnomathematics' theoretical framework several research studies were carried out in Portugal focused in the mathematical education of the Roma children (Ferreira, 2003; Moreira & Pires, 2012; Pires, 2005, Candeias, 2006).

The results highlight those Romany Portuguese children's contacts with commercial activities, namely, when accompanying their parents to the markets and taking active part in the sale of products, provided them an immersion in contexts of mathematical activity that helps them to develop an appreciable self-confidence in the performance of oral mathematics calculations.

The following dialogues were collected during fieldwork in an elementary school (Pires, 2005). They were recorded on the school playground and clarify how mathematical activities that are imprinted and performed in Romany daily practices are appropriated by children who use the same cultural strategies to solve mathematical tasks at school. These strategies do not include writing and are at the basis of how children used oral mental calculations (Knijinik, Wanderer & Oliveira, 2005)

Dialogue 1:

R: Do you use to go to the fairs with your parents?

C1- Yes. I do.

R: When you go to the fairs what do you do there?

C1- I help my mother ... To sell

R: What do you sell?

C1- Now we are selling fabrics, sweaters…Towels.

R: How do you help?

C1- I help to pay attention to the ladies, to give the materials to my mother and to receive money.

R: …is it you who make the calculations or is it your mother?

C1: I make the calculations and then I give the money to my mother.

Dialogue 2

R: Do you use to go to the markets with your parents?

C2: No.

R: So…

C2: I use to go with my mother, like… sometimes I sell near the houses with my mother..

R. So it is not in the markets that you sell. It is in the streets.

C2: …

R: And when you are with your mother what do you do?

C2: I stay with my mother, sometimes I help her to sell, sometimes I just stay speaking with the ladies that I already know.

R: And… when you are helping what do you do?

C2: Sometimes my mother say to take care of things sometimes she says to peak up

things ….like that
R: And to sell? Do you sell?
C2: Yes. Sometimes I sell glasses, sometimes clothes…
R: And don't you have trouble with money?
C2 : No

To understand how children did the selling calculations, a hypothetical situation of purchase was put to the child. The following dialogue (Pires, 2005: 118-119) once more demonstrates the child's skills with oral calculation:

R: -How much do you sell the glasses?
C2: - There are some at 15 euros, others 10?
R: - If I asked you how much are 5 glasses...
C2: - How much each?
R: - 15 euros.
C2: - 15? I shell multiply 5 to 15 isn't it?
R: - Yes…
C2: - 15 and 15 make 30, 30 e 30 …60
R: - 15 plus 15 … 30 and 30
C2: - 60…70…75.
R: - 75, very well, well done!

With these examples we intend to describe how mathematical activities are integrated and practiced in the domestic educative process and connected with the economic activity of the group. The above mathematical situation suggest that children posses alternative strategies for mathematical calculation, and reveal competencies for solving mathematical problems using their own methods. Thus, children use their cultural knowledge to solve mathematical problems in school. However, research also shows that the strategies used by these children are not recognized as acceptable in typical classes.

5. A discussion: Exploring similarities, differences

In these studies conducted in Greece and Portugal the similarities in the cultural process of mathematics education and the way schools in both countries face Romany students are profound. First of all, in both countries students face cultural conflicts in the school place as well as in the classroom that are connected to cognitive conflicts and affect their way of learning; school learning is very different from the learning in their community context.

Through the above examples, it is clear that Romany children's involvement in commercial activities immerses them in contexts of mathematical activity, resulting in knowledge and ability in doing mental calculations. The skill with mental calculations is promoted inside the family and is worked out in specific contexts related to the community economic organization.

However, how well is the culturally acquired mathematical knowledge and cognition of Romany students further developed in the formal education context? In fact, these examples also demonstrate that although children use their mathematical informal knowledge, schools neither legitimize it nor promote the mental calculation of Roma children.

The disconnection between the school mathematical curriculum and the students' daily

lives has been largely discussed inside the community of Mathematics Education. As D'Ambrosio (D'Ambrosio 1985, Gilmer 1988) notes, the mathematical competencies learned at home and that are lost in the first year of schooling are essential for everyday life and labor. "*The former spontaneous abilities have been downgraded, repressed, and forgotten, while the learned ones have not been assimilated. Thus, early education instills a sense of failure and dependency*". In case of cultural groups different form the mainstream, the non-integration of everyday cognition aggravates the consequences for minority students.

A consensus about the necessity of school mathematics contextualization demands that students actively participate in it, and that teachers, in a dialogical process, "*involve students in a permanent problematization about their existential situations*" (Freire, 1985, p. 56), in order to conduct the application of mathematics in the contexts of students' experiences and thinking.

In conclusion: it is necessary to leverage students' everyday social and cultural knowledge in order to improve domain-related understanding (François & Stathopoulou, 2012). The rich sources of knowledge that exist outside the classroom in the varied activities of cultural life could improve students' participation in classroom activity. A rich learning context that is taking the background knowledge of the learners into account, is taking issues of race, academic identities, and access seriously and give students the opportunities to gain increased authority to participate in mathematics in ways that validate their everyday practices and their identities, too.

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