

Different Mathematics Education Perspectives in a Multicultural Societies: A Preliminary Study in Kosovo's Institutions

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Abstract: Kosovo is a complicated multicultural reality in which we want to study the roles that culture and context plays in different mathematics classrooms. In this paper we focus in comparing practices in three different schools according the division created in this society. We analyze their textbooks and classrooms discourse to understand which mathematical practices can be closer than others to be aware for accepting real multiculturalism. A semiotic analysis reveals how monoculturalism is present in such a multicultural society, but some experiences are more fruitful than others in terms of participation and meaning production.

Key words: education, mathematics, multiculturalism

1. Introduction

Kosovo is not well known as multicultural society. In fact, with an apparent domination of 90% Albanian, five languages are spoken: Albanian, Serbian, Bosnian, Turkish, Croatian and Romany. Religion is another strand for differences, because just 8% is orthodox (Serbian, Montenegrin & Romanyes), 16% of Catholic are Albanians and Croats, and the 76% Moslem are Albanians, Turks and Bosnians. What an impressive landscape, in which language plays an important role for division! Even after 1999, Kosovo Curriculum coexists with Serbian Curriculum imposed for Serbian students, having separated schools. In such a framework, some Albanian experiences present students taught to value not only the traditions of their own family and community, but to be open to the history and culture of others in a multicultural perspective (Daxner, 2002), so called "multiethnic untrue dream" for some Serbian authors (Smucker, 1999).

Which is the role of culture and context in such a perspective in the case of mathematics education? We assume that culture, ethnicity and language are not only intertwined but also carry strong divisive and exclusive connotations.

Our position is that it's not only a problem of policy of doing what the community decides, but also a matter of scientific reflection by the math education community about the understanding of what mathematics is, and the role of language and multicultural perspectives for teachers. Our big conjecture is that the official interdisciplinary and open multicultural mathematics curricular perspective (Masht, 2012) is not a result of the real teacher beliefs and enacting in the different communities.

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Are the Kosovar teachers enough aware and prepared for accepting approaches to mathematics education that are sensitive to the contexts and lived experiences of all learners in a multiethnic classrooms?

Our main aim, founded by a socioconstructivistic approach (Lerman, 2001), is to recognize which is the specifically understanding of teachers on such a way they can improve the ability to implement an equitable, rigorous, and coherent mathematics multicultural agenda for the next expected multicultural classrooms. Therefore, this paper reports a part of ongoing study started on 2009, to understand how mathematical practices reveals different positions about the understanding of culture in such different three curricular experiences. And more specifically, how different teachers from three different school systems used cultural background or ideas, for improving mathematical meanings and connections.

More specifically, we ask now, which are the main cultural characteristics in each monolingualistic group when some mathematics classroom practices are observed? And, can we identify meaningful practices if the curricular materials and influences seem to be uniform, and there is a major belief that mathematics is a set of principles to be learned?

2. Theoretical Background

Our starting point is based upon three main principles: First, our thought that if student's social and cultural values are encouraged and supported in mathematics classroom becomes a closer representation of their "real world" experience and ultimately, their social, cultural, personal, "folk" or "ethno" mathematics will be given enhanced mathematical recognition in social setting (Boaler, 1993). The second is the need to acknowledge that the "cultural" solutions offered by students in the real world are also mathematical (Boaler, 1993). And third, the need to know that the status of cultural approaches to education in multicultural societies often assume that cultures are compatible and in harmony within themselves and with each other (Roestrier, 2005).

We assume that culture includes several aspects as semiotic, socio-political intentions, constructive aspects and technological aspects (Oliveras, 1996). But, we focus now on the analysis from semiotic perspectives in practices when students and teachers used representation registers as showing how they are influenced by different paradigms, with different social knowledge structures and perhaps different beliefs. In fact there is not a single register of a given kind: the nature of a register depends on the community of practice in question. And we also assume that to present Mathematics as a means with which to understand reality (Boaler, 1993) allows students to become involved with mathematics and to break down perceptions of a remote body of knowledge (Thaqi, 2009).

An epistemic-semiotic perspective on mathematical activity provides a way of conceptualising the teaching and learning of mathematics that transcends and encompasses both psychological perspectives focusing exclusively on mental structures and functions, and performance-focused perspectives concerned only with students' behaviours (Ernest, 2006).

The way in which a teacher gives meaning in practice to an approach that focuses on the cultural background of their students hinges on many things, one of which is the teacher's own understanding of the concept of culture and the reasons for focusing on learners' cultural backgrounds. The question of how these approaches are translated into practice within classrooms remains. Teacher not only have to access, understand and accept their students' social and cultural background knowledge, they need to be able to interpret these outside realities in terms of mathematics and transform them into curriculum experiences (Thaqi, 2009).

3. Aims and Methodology

For the analysis of classroom practices, we start by observing three Primary School teachers: one from Albanese school system (AT), one from Serbian school (ST) and one from Turkish school (TT). Interviews were conducted to 23 Albanian teachers, 3 Turkish and 6 Serbian teachers. But just three women accepted to participate in the study to observe their practices. They live at Gjilan (one of regional centre in Kosovo). Both trained in Faculty of Education (or/and Higher Pedagogical School), with at least 10 years of experience. Albanian and Turkish teachers share the same school space, but different period (morning-evening). It corresponds to the general situation in Kosovo. It was quite impossible to have teachers in the same level accepting being videotaped in their classrooms.

The teachers were interviewed, and observed in some classrooms. One of each is specially transcribed and analyzed in which it starts a new content. A semiotic analysis is conducted recognizing specific role of connections and meanings in classroom discourse.

We accept that classroom discourse provides the conditions through which cultural and social dimensions come to sight and are expressed. Discourse helps to construct the relationships between the participants in the classroom and their ways of acting and experiencing. Any exercise in either theorizing the notion of discourse, or interpreting classroom discourses, involves attention to social processes and practices that reflect cultural and social differences. However, all of the different theorizations of discourse emphasize particular features of these social processes and suggest some particular relationships among them. We did also a socio intentional analysis (Miller and Baker 2001), not explained in this paper.

We describe not only the use of symbols, meanings and expressions, as well as actions, gestures and students' speech voices during the classroom practice, but how it appears in the textbook. We identify some conceptual relations observed, and the opportunities given by the teachers for the students' interactions.

4. Results

Interviews showed us that most teachers in school focus only teaching students to reproduce knowledge and use it for solving typical problems. Teachers said that they are prepared for multiculturalism, but its interpretation is only the fact to speak different languages. Just some Albanian teachers are convinced that education should be contextualized and the context helps for ways of updating individual students' facilities, developing their skills and cultivating their socialibility.

From the analysis of videotapes, we recognize in the following table (Table 1) the main differences of three teachers according semiotic perspective.

According his textbook (Zejnnullahu, 2008) for Primary School in Albanian language, the Albanian teacher try to introduce mathematics in out-of-school contextual experience by using a poster similar as it is in the textbook (the situation of lunch with the whole family, discussion about traditional role of mother in preparing and in traditional habit of sister to surveying the food).

The actions means how to integrate previous knowledge from the student interactive discussions and negotiations of mathematical norms as effective and efficient frameworks are the key elements in building student's understanding.

Table 1 Semiotic Epistemic Perspective

	Albanian Teacher (AT)	Serbian Teacher (ST)	Turkish Teacher (TT)
Use of symbols, meanings and math expressions.	A regular familiar lunch situation is used to start. The teacher hides mother figure to emphasize the eight number of the family	Drawing a segment in the blackboard is used as a context for comparing segments.	A poster with 6 oranges and 3 dishes was presented to enter to a set of division problems
	Uses verbalisation of existent and missed elements as signified for creating many examples of a new number	Blackboard is used as the only common place for symbolizing the idea of comparison.	Distribution of oranges in different days is the proposal for division
	Connect different meanings for numbers	Questions are always “ <i>Do you know what ...is</i> ” Strip is just used to convince, not to relate knowledge.	Dishes were evoked as a way of representing both grouping and sharing. Just in some moment number line was used to interpret a division of the oranges into days.
	Uses always reasoning to prove and refute knowledge	Questions are almost dualist Comparison as action is overlapped to metric approach.	Emphasizing computation and insist in the subtraction method

Guided by the teacher, students develop their identification of abstract number with concrete objects. “Who prepare the food” is the contextual problem to be solved in learning and understanding of number concept.

Using models of repeated addition, such as $1, 1+1 = 2, 2+1 = 3$, etc. pupils apply mathematical tools to find the solution. And then the mathematical solution becomes when the pupils realize its rationale by comparing it to the context of the problem.

From the class discussion students are approaching to the observation of cardinality and inductive process of building natural numbers.

The following table (Table 2) shows how the actions of three teachers are also different.

Table 2 The Sociocultural Analysis

	Albanian Teacher (AT)	Serbian Teacher (ST)	Turkish Teacher (TT)
Actions Intensity of voice of students' speech & gestures.	The students spoke aloud when they were sure on their ideas. Teacher addressed to all students and they usually work in group. They feel free for content-free sentences. Everyone uses hands to help oral communication. Uniformity and formalism in pupil's mathematical strategies are not essential in this case.	Students did not communicate overly with others in the group. Every time teacher's voice was aloud and students' voice lower. The teacher usually addressed to one student. Students usually don't speak but just writes in the blackboard. The gestures were very inexpressive. The teacher just pointed to some written or drawn objects.	One-to-one communication. Always the voice of teacher was higher than that of students. If they did not know how to go on they made a pause waiting the teacher to continue. The teacher pointed the objects, Students are inexpressive.

Albanian teacher introduce the students what they know about the subject trying to identify previous mathematical knowledges. She tries to use participative sentences as it can see:

T- What do you learn till now in maths classroom? Come on?

St (majority) - Numbers.

T- What else?

St (majority) ... Equalities

T- Anything else?

3 Students- “The Minus “ (in Albanian language it means the symbol but also the difference as operation”)

T- What else?
 St – (two students) Plus
 T- But addition and plus have any relation among them?
 St- Putting together.
 T- Anything else? ... (Silence)
 T- So, which numbers does have been learned till now?
 St- (chorus) 1,2,3,4,5,6,7.
 T- Today we'll go further to learn another number, are you ready to begin the explanation of a new number?
 St- (chorus) Yes....

According to Romberg (1998), three aspects (model, language, and symbol) are involved in these activities. Modelling the process of distribution of food to 8 persons where one (the mother) is not present, using mathematical language of numbers, and writing mathematical symbol of the numbers, i.e., $7+1 = 8$, are the processes of understanding the new concept of number 8. After that, they understand the context, using their informal everyday language and formal language of mathematics.

They create the formal mathematical model of the context. When they try to solve the problem, they come up with ideas of understanding of concept of number 8 as successor of number 7 or, as new number bigger than 7 for one, etc.

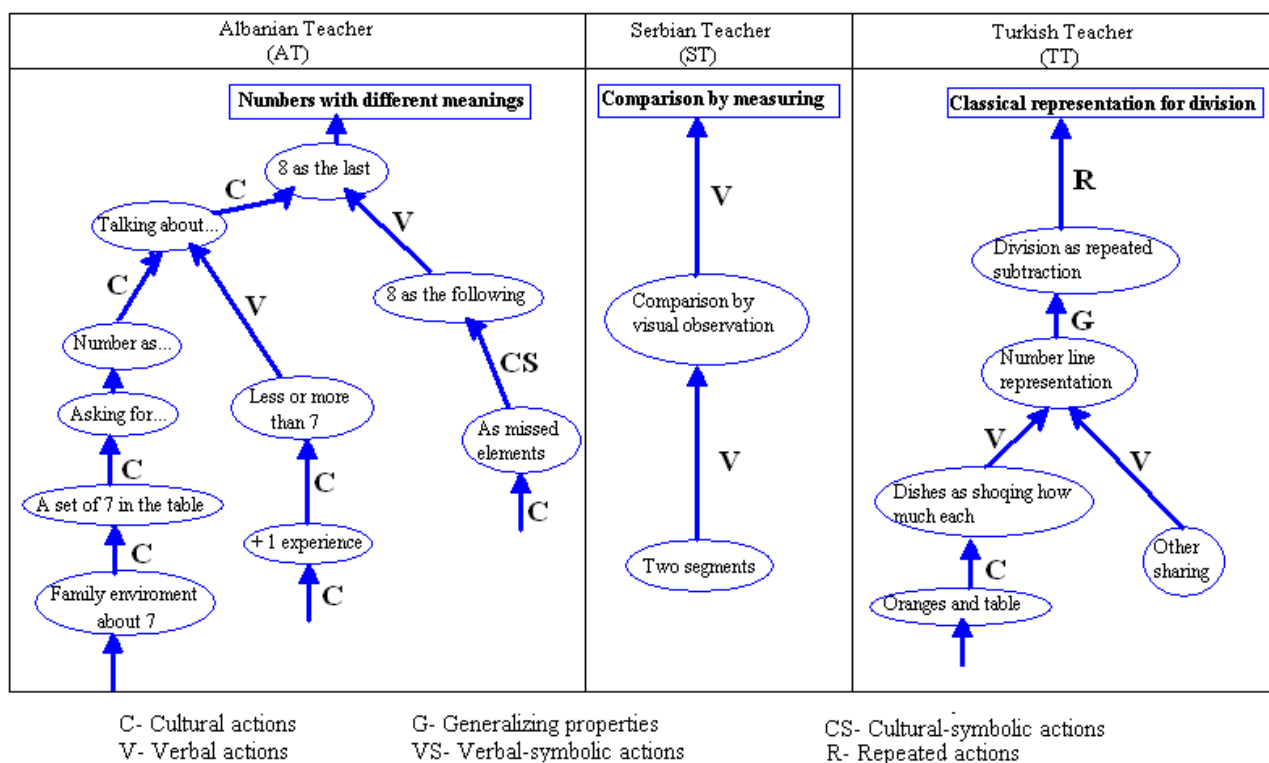


Figure 1 Schemes of Constructing Meanings

Turkish teacher starts without questioning, just “entitling”. She writes “operation of division” in the blackboard. Every student writes the sentence in their notebook. After some seconds they tell the teacher “I wrote it”. And the teacher starts talking about the designs in the blackboard. These sentences don’t have any question without asking anything about children’s knowledge background.

Serbian teacher starts also writing in blackboard “Segments and their comparison”. A student asks: “Is it the

same title as it's written in the book?" Teacher doesn't answer to him. Then after seconds, says: "*What a segment is?*", drawing a segment AB in the blackboard.

The observations show clearly how Albanian teacher tends to a constructivist position in which a set of connections is presented in an interrelated grid that is more complex than for the other teachers (Figure 1).

Serbian mathematics books in general (Sotirovic et al., 2004) are algorithmic in fact. For instance, length of segments is presented by theoretical comparison. In the Serbian language class of mathematics, Milan looking to measure the given segment, doesn't know how to answer to question given by teacher.

Turkish mathematics books (Taskin & Çarhoglu, 2005) explain the algorithmic way of teaching multiplication and division of multi-digit numbers using place value, mental algorithm, and standard (column) algorithm. Something similar appears in the case of TT. The pauses which appeared in many students' discussions were filled by watching "the world around" when the students expected that teacher take the initiative, or when the students having difficulties were thinking about how to continue or when the students gave up solving the situation as they were not sure how to continue.

In the case of teacher ST or TT, one can argue that the reason is the low qualification of teacher's knowledge of mathematics or a lack of teacher's pedagogical knowledge of teaching mathematics. But it also relates to teachers' beliefs. *In the Case TT* it seems that the students develop their understandings by utilizing their existing mathematics knowledge by interactive discussions and negotiations solving situated mathematical problems (i.e., dividing the set of 6 oranges for 3 persons). But mechanistic learning is the usual way of doing.

In the case ST, the pupils doesn't answer during the learning activity in many occasions, afraid of being different, hardly giving reasons on discussion, barely having different solution. In contrast, to promote full mathematical participation for all the pupils in the classroom, the teacher should be concerned to seek ways of developing approaches to mathematics education that are sensitive to the context and lived experiences of the pupils. By focusing on the experiences that each pupil brings to the classroom, (case AT) the various interpretations of the knowledge could be made explicit and negotiation would be possible. It's not important who is more reflective, but we emphasize more possibilities for enculturation in this case.

5. Some Conclusions

From the semiotic analysis of networks according to videotapes, and interviews we can see that Kosovo teachers observed relate mathematical experiences to their own beliefs and textbook experiences in different ways according to their school traditions making students dependent on the teachers' instructions and leads them to a uniform attitude.

Mathematics was not a subject that they were used to talking about. For these students, to do mathematics meant to fill out a worksheet and return it to the teacher for evaluation. The idea of discussing a problem, listening to different points of view and building on each other's ideas was just observed in the Albanian language example.

Moreover, even when learners are seen as sharing a particular cultural background, the experiences and mathematical knowledge acquired by different learners from the same cultural context varies. In our case of class TT on teaching division in Kosovo, it showed this to be the case in a context where children are engaging in the same social or cultural practice such as one student's speech for selling oranges and other speech for served oranges at home. The culture of any one group cannot be thought of as being uniform.

Such teachers observed seem not to be aware of the importance of cultural variables in building

mathematical meanings, identifying language monoculture gethos. In their talks, teachers justify monocultural positions as knowing other languages. The observations of our analysis present us a set of discriminated facts. Even using in some case regular out-of-school situations any reference to the other cultures is proposed.

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