PORTUGUESE IMMIGRANT CHILDREN AND MATHEMATICS EDUCATION

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Abstract

This paper begins by presenting a general overview of minority groups in Portugal and their relationship with immigration and education. Data regarding school enrolment and dropout are explored. Next, it focuses on minority children's language diversity, and on its effect on classrooms and mathematics teachers' strategies to deal with linguistic issues. Finally, it shows how language is needed to reach the aims and to develop the ideas of the Portuguese mathematical curriculum, concluding that there is a need for coordination between school, classrooms and community activities to support the language acquisition of children.

1. The Portuguese scenario

Until the 60's Portugal was considered a country of emigration. Since the 70´s, and especially after decolonization, Portugal became a country of destination for immigrants.

Combining people that come mostly from Brazil, Cape Verde, Angola and Guiné-Bissau, immigrant minorities in Portugal in 1999 reached a total of 190896 persons with resident permit visa (INE, 1998), and this is increased by an estimated 10000 to 40000 illegal people. The Portuguese society is, thus, a multi-ethic, multi-racial, multi-linguistic and multi-cultural society, and, as in other European countries, this scenario poses new problems related to the education of immigrant minorities children.

Such cultural diversity is usually found in the Portuguese classrooms, mainly in the Lisbon area, where one of the heaviest concentrations of people of immigrant minorities is located (47%). In the school year of 97/98, the total children from minority background enrolled in Portuguese schools was 7,09 %. In the areas of heaviest concentration there are schools with more than 50% immigrant students, mainly from an African background.

Linguistic diversity is also found in many schools, and most serve large groups of students for whom Portuguese is not the primary language spoken at home.[1] In fact, in the particular case of Portugal, as a result of the increasing number of immigrant children, the issue of language acquisition and development for these children is itself a new national problem in the educational field.

It has been largely reported that minority students' achievements in school are at the bottom of the ladder, especially in mathematics (Steen, 1990; Secada, 1995). In

[1] In Portugal, twelve schools have more than 50% minority children enrolled, twenty six have between 50% and 25%, and forty-five have between 15% and 25% (Entreculturas Data Base).

Portugal, although there is no data to show exactly what is happening, regarding mathematics, school achievement among minority groups has been always lower than the achievement of regular students taken overall. Although to fully understand school enrolment and dropout rates in each minority group and in each grade, it is necessary to contextualize the data by the flux of immigration, immigration policies and countries' historic-political conditions,[2] it already deserves considerable reflection.

Since schooling is for all, a problem of fairness and equity is underlying this situation. It is necessary to pay attention to diversity and culture in connection with education and equity. Since to fully participate in the increasing complexity of our highly developed technological society, mathematics education is required for all, and mathematical achievement is far from being satisfactory, this area of education becomes an even more delicate situation. Moreover, considering that language and culture are strongly intertwined and that classrooms are already multicultural settings, the low Portuguese proficiency of immigrant children is a problem that needs to be addressed in the context of multicultural education.

Speaking with teachers of mathematics, one becomes aware of both the heterogeneity of experiences related to minority children in their classrooms, and the different ways they meet the challenges raised by the low Portuguese proficiency of their students.

Every scenario is possible, from situations where teachers have classes with more than 50% foreign students, sometimes with the majority belonging to only one minority group, sometimes belonging to different ones, to situations where there is only one language minority student in the class.

Among all these possible scenarios, the specific situation of each student further increases the linguistic complexity of classrooms. For example, we may find classes with newly arrived children from East Europe and other parts of the world that do not speak a single word of Portuguese, classes composed of children who already speak a little Portuguese, and classes where children are bilingual.

The effects of such linguistic diversity are also varied, both in the ways teachers deal with it, and in children's mathematical achievement. Thus, there are Asiatic and ex-immigrant students that, when they arrived in Portugal, did not speak Portuguese but succeeded in mathematics, and some of them are now among the best students in mathematics. There are also students who succeeded in their Portuguese language skills, but not in mathematics. To explain success in mathematical achievement, teachers refer mostly three reasons: i) because students have good mathematical skills that help them to smooth the school differences and their ignorance of Portuguese; ii) because some mathematics teachers knew the students' natural language and found a pedagogical interaction relying on both languages; iii) because when there are students more knowledgeable of Portuguese language in the classrooms that speak

[2] For obvious reasons this analysis cannot be done in this paper.

the language of the new arrivals they are put together, thus, students facilitate each other in the translation of mathematical content.

It is also possible to find schools where teachers began to learn the native language of their students, (for example, Capeverdean Creole), to help, or to start additional classes to support them in the Portuguese language acquisition, thus creating, a school dynamic that includes the mathematics teachers in the planning of actions and activities to deal with the learning processes of minority children.

Another issue related to mathematics education of minorities and referred to by teachers as having immediate effect in classrooms is the dissimilarity between the mathematical content and methodological approaches of the Portuguese curriculum and that of the curriculum of the children's home countries. For example, repeated or omitted content may induce boredom or confusion in students.

In regard to families' involvement in supporting children's new language acquisition in relation to school processes, behaviours are also diverse. There are mothers who dedicate themselves to teaching reading, writing and counting to their young children in their native language, and simultaneously support them in the learning of Portuguese, while they teach themselves Portuguese also. Other families rely on their children to represent them in the new language. Others simply give up and just struggle to survive. Note the families that are struggling to support the difficult school situation of their children, and, at the same time, are trying to help them to keep their native language. Their native language is the language which they use to communicate, and to express affect to the family left in their home country.

In sum, there are schools where teachers and school boards, are already searching for solutions to the learning and teaching problems of their students who do not have Portuguese as their native language. This is considered an important task, where mathematics teachers are involved in searching for adequate actions to develop their classrooms. There are also schools where this kind of work has not yet been initiated.

While the issue of language and low Portuguese proficiency is one of the features that mathematics teachers refer to as being the most difficult and challenging, there is not a national educational program committed to surmounting the Portuguese language acquisition of minority children.[3] The responsibility for creating conditions to improve the school achievement with respect to the specific problems of a new language acquisition is left to school boards, teachers and families.

2. The literature on minority language education

Since the 70´s, there has been a proliferation of studies aimed at highlighting the different kinds of relationships among language, culture and discourse in the learning and teaching of mathematics, and showing the importance of these factors. The

[3] Some efforts are been taken by Entreculturas to create and lunch materials to support teachers training regarding the issue of language acquisition.

literature of mathematics education has identified a diversified set of variables. For example, the cultural and social organization of the school system, including pedagogical processes, materials, and curriculum; the cultural and linguistic background of the student, and their relation to teaching styles; the language of the student which can cause interference's problems particularly in the linguistic dimension of classroom life; the students and their social attitudes towards mathematics; and teachers' attitudes and training, all have been found to influence students' mathematical performance.

Research evidence is that limited language proficiency inhibits mathematical reasoning. The review of literature presented by Riley, Greeno & Heller (1983) regarding the different kinds of knowledge involved with problem-solving activities at the elementary level, pointed out that the syntactic and semantic characteristics of mathematical word problems were associated with difficulties in mathematics performance. In addition, language proficiency in both natural language and mathematical language was pointed out as a basic requirement to problem-solving (Cooking & Mestre, 1988). As Chipaman and Cocking noticed (1988:35) "performance differences are more likely to appear when either assessment or teaching occurs in the nondominant language for the bilingual learner".

In addition, studies have shown that it is necessary to consider the socio-cultural dimension of students, and of mathematics, to better understand and critically examine the increasing complexity of the pedagogical processes. Research has revealed that, through their corresponding process of socialization and language system, different cultural patterns lead to different perceptions and engagement in mathematical concepts and relations (Barton, 2001), as well as in socio-cultural practices to support school (Abreu, 2000). Other studies suggest that linguistic minority students do not receive appropriate language input in their mathematical instruction (Khisty, 1995).

More recently, mathematics education recognizes the role of classroom discourse in general as a context for apprehension and development of mathematical knowledge, stressing the centrality of the discourse's role to the display of mathematics' specific forms of knowing (NCTM, 1991). Within this frame, teachers emerge as key figures in the production of a classroom environment that encourages students to generate discourse. However, as Gorgorió and Planas pointed out (2000: 269) "(...) teachers feel that one of the biggest problems that they have to face in their classes is communication, because most of their immigrant students have difficulty with the language of the teaching".

The literature in mathematics education gathers several variables that influence the school's processes of learning and teaching mathematics in a different language from the native one, however the literature of bilingual education shows the complexity of the processes entailed in the acquisition of a second language, and the considerable amount of time that it requires. This includes acquiring speaking, listening, reading and writing skills, as well as applying these skills to different situations. In addition,

the academic setting demands a level of language proficiency, that goes far beyond the language used in informal face-to-face communication. As Cummins (1980) has pointed out, in order to deal with the language requirements of academic work, it is necessary to develop what he refers to as Cognitive Academic Language proficiency, or CALP. CALP is related to language used in context-reduced situations, and consequently students cannot employ situational cues to grasp meaning, as they would in face-to-face communication. As Cummins's research points out, a student whose academic life was lived only in a second language context, may take about seven years to fully develop his/her CALP skills. On the other hand, the Basic Interpersonal Communicative Skills, BICS, takes about two years to acquire (Ovando and Collier, 1985). Evidence exists, however, to suggest that CALP skills are transferable across languages (Hakuta, 1986). Thus if a student has developed CALP in his/her native language, she/he might transfer it to another language.

In fact, classrooms are examples of focused, directed, and complex language environments, sometimes much more demanding than most daily conversations. For example, if we consider the topic of Statistics within the Portuguese curriculum, it requires a domain of language that has to be capable of making sense of a large set of words related to this issue, for example: information, mean, sample, to organize, to collect, inquires, to register, to list, interview. In addition, the school mathematical programme aims include that children "read and interpret information", and "make conjectures from data interpretation". All these require huge language skills and implies the use of "If…then" phrases, conclusive phrases, interrogative and explicative phrases.

Besides this, within Statistics, the information to be collected, organized, interpreted and communicated may refer to subjects as diverse as: ice-cream flavours, number of inhabitants of European Union countries, sports, number of children in families etc. That is, the contexts from which the mathematical topics will be worked out come from very diversified subjects, and, most probably, students from different cultural backgrounds are socialized in these subjects in different ways. These represent further difficulties for the mathematical understanding of language minority students in schools. In fact, if an overall control over the linguistic structure and semantics is required in order to initiate the required mathematical reasoning, the pedagogical material requirements do not stop with linguistic features. In order to make mathematics a familiar and accessible subject matter, grounded in experience, and socio-culturally embedded, it is indispensable that students participate in mathematical accounts, and take their own realities as locus and leitmotif for mathematical representation. As a matter of fact, besides the nonexistent pedagogical bilingual materials, including the assessment ones, the general lack of curricular cultural references to the home countries of immigrant children are also mentioned as features that do not encourage the mathematics education of minority children (Moreira, 1994; Secada, et al. 1995; Gorgorió and Planas, 2000, 2001).

Research evidence already exists of native language interference in mathematics education among students who have their native language as the language of instruction. Examples are mathematical technical terms that use the same words as the native language but with different meanings, and similar expressions that are differently translated in mathematical and everyday language, and in syntactical structures that are used differently (Pimm, 1987; Spanos, Rhodes, Dale, & Crandall, 1988). So what are the interferences for students who are not taught in their native language? Furthermore, working in groups is an appropriate environment to practice general and mathematical features of verbal communication. How can they contribute to the participation of language minorities students, particularly if the proposed task involves negotiation of meanings? Secada (1992a) and Gorgorió and Planas (2001) call our attention to the students who may be outside of communication, because mathematical communication demands a high level of linguistic competence, and students with low language proficiency will get lost .

3. Final Considerations

The education of minority children, and the problems that it entails, particularly the language ones, are recent in Portugal. But the assumption cannot be made that students will learn Portuguese under whatever conditions, just because they are attending classes that are taught in Portuguese. If schools, teachers and families are independently developing actions with the intention of supporting children's acquisition of the Portuguese language, more training and coordination is needed regarding this issue. To deal with the specific learning and teaching problems of children who do not have their native language as the language of schooling, it is import to develop systematic and complementary activities at the level of the mathematics classroom, as well as at the school and communities level.

Students' knowledge of language must be very high to reach the aims and to develop the ideas of the Portuguese mathematical curriculum. As it was shown in the topic of Statistics, language skills require a deep knowledge of the diverse semantic fields involved in data collection, organization and discussion, and the syntactical structures required to express it. For that reason, teachers' linguistic support of students who do not have the language of instruction as their native language is complex and challenging. It demands systematic attention to students language development, requires new strategies to approach the mathematical issues and new ways of interaction in classrooms, as well as information about different mathematics curriculum, pedagogical materials, and bilingual educational materials.

In addition, despite allowing the use of native language for doing classroom assignments, schooling systems that do not support the use of students' native language in the teaching-learning of mathematics are creating disadvantages for their students compared to the monolingual students who are able to use their native language in school. Therefore, schools that are not yet developing ways to deal with

the specific problems of Portuguese language acquisition should be encouraged to do that, and more training should be available.

Further research among minority groups in the school population in Portugal is required. The mathematical learning of minority language students is an unexplored field of inquiry. More research needs to be done on the special features of this growing population in order to found out about the particular ways in which culture and language changes the interpretation of educational practices and influences learning processes, as well as to understand the specific role of Portuguese language in the context of mathematics education. What kind of interference occurs in linguistic thinking and what is its effect on mathematical language?

Finally, since families are also learning Portuguese and, simultaneously, helping their children to become bilingual and supporting them in the schools' processes, planning programs to sustain families in these situations in connection with their schools is desirable.

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