MULTICULTURALISM IN THEORY AND TEACHERS' PRACTICE

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Abstract

The paper presents interim results of an international research study focusing on the issue of multiculturalism in mathematics education. A questionnaire was developed and administered in six European countries with the goal of mapping teachers' experience with and opinions on teaching mathematics in multicultural classes. The paper presents analysis of answers in the six European countries and compares the differences in experience, opinions and needs of teachers in these countries.

1. Introduction

The world is becoming a global village. The rapid changes of the 20th and 21st century include increasingly multicultural face of all European countries. The number of immigrants is constantly growing which puts pressure also on school as the institution where part of the enculturation and socialization take place.

Undoubtedly meaning of the world is not culture-independent (e.g. Geertz 1973; Strauss and Quinn, 1997; Bourdieu, 1998). This of course means that pupils with different cultural background will find it more difficult to do well at schools, not only because of obstacles in language but also because of different cultural traditions and valuing. Although pupils are in verbal contact with the teacher and their classmates, when trying to master curricular content they must cope with it being culturally based. Also pupils may easily misinterpret the signals from the teacher or the teacher may misinterpret the signals the pupils send out. Despite all this, European countries have paid little attention to mathematics education in multicultural contexts. At the same time increased attention to communication in mathematics classes, careful and precise use of the language, multimodality in representations and better acknowledgment and valuation of cultural differences in multicultural classrooms, represent methodological changes which minority pupils and the whole class could benefit from.

It is generally accepted (e.g. Barton, Barwell and Setati, 2007; M. Bishop, 1988; César and Favilli, 2005; Favilli, Oliveras and César, 2003) that

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mathematics teachers feel the necessity for training and materials which reflect the needs of their classes in terms of linguistic and cultural differences. Their pupils from minority cultures and/or those with a migrant background encounter even more difficulties than their native classmates in acquiring fundamental mathematics skills. Learning a new language and culture at the same time as you learn mathematics places additional burden and challenges on immigrant pupils (Norén, 2010).

Are there difficulties that are specific to teaching mathematics in multicultural contexts? Although there was a relatively large amount of research relating to multiculturalism, most of it has covered teaching 'in general' without really making a distinction between subjects; some research centred on difficulties in relation to the teaching of a particular subject and, moreover, it mainly covered teaching of language or natural sciences (Mc Dermott, 1974, 1975, for example; McDermott & Varenne, 1995); research on mathematics teaching is rarer. Much of this research focuses on adjusting the curriculum to the cultural backgrounds of the pupils with a view to rendering teaching more effective. The following question is usually asked: Is the teaching of mathematics less sensitive to cultural differences? One recent exception shows a new approach to research on mathematics in multicultural classes (Norén, 2010).

This paper aims to identify teachers' approaches, experiences and beliefs about teaching in multicultural settings. Its focus is also on the methodological tools that teachers find suitable for facilitating the appreciation of the positive aspects of different cultures and creating favourable conditions for intercultural dialogue in the classroom, thus creating an inclusive educational setting.

2. Our research study

2.1. Research tool

The presented survey was carried out in six European countries (Austria, Czech Republic, France, Greece, Italy, Norway). A questionnaire was developed by the research team, based on data about multicultural backgrounds of students in the participating countries and about available resources for teaching in multicultural classrooms, and distributed among teachers at different school levels with different experiences and length of practice.

The questionnaire is divided into four parts. The purpose of the first part is to find out the basic information about the respondent. The second part asks for information about the school where the teacher is teaching and the social background. The third and fourth parts focus on the respondent's prior experiences and the support available for teachers working in multicultural settings. Attention is paid to the situations specific for working in such conditions as well as to support of any kind that such a teacher has and/or would like to have. The main questions (about prior experiences and available support)

are primarily yes/no-questions with an opportunity to elaborate on the answers in an open-ended format.

2.2. Research sample

The questionnaire was handed out to 154 in-service teachers in different parts of the countries. The analysis presented in this paper is based on a selection of 124 respondents who teach also students in the age range 6-14.

2.3. Data analyses and overview of findings

In all countries, teachers with a wide variety of teaching experience answered the questionnaires. Only very few of them received any training for teaching in multicultural classrooms in either their initial or their in-service teacher training. While some countries (France, Italy, Norway) have a significant number of schools with an official program for supporting migrant students, others have nearly none (Austria, Czech Republic, Greece).

Though the average percentage of students with a migration background varies in the participating countries, depending on school size, school location, socio-economic background etc., an overall majority of teachers have already encountered such students in their classrooms. Teachers named a variety of issues, both positive and negative, that they encountered while teaching maths in multicultural classrooms (e.g. cultural enrichment vs. language issues). They dealt with the situation in a number of ways, by discussing it with colleagues, looking for suitable materials in the internet or in textbooks, and rarely received support from school management. Some changed their teaching strategies by introducing additional materials or making more explicit and clear explanations. Though the details vary in the participating countries, many teachers claimed they would need either concrete didactic units with multicultural background, supporting pedagogical documents, or language related materials (e.g. mathematical dictionary). In some countries information about the cultural background of minority students has been named very frequently as a useful tool, while in others teachers did not see this as having high priority.

2.4. Detailed findings in the participating countries

The *Austrian* team received 36 responses.The analysis is based on 31 of the respondents who teach students aged 10-14. . The average teaching experience is 14 years. Only 2 teachers received any training about teaching in multicultural classrooms, by attending professional development courses specialising in this area. On average, the percentage of students with a migration background in the classes of these teachers is 12%, with a wide range between 0% and 45%. About 83% of the teachers taught mathematics to migrant students at some point. Almost none of their schools (only 1 case) offer a special programme for pupils with a migration background. Typical issues that have been reported by teachers were difficulties of such students in understanding complex word problems (9

teachers) and in expressing mathematical connections with a satisfying degree of exactness (7 teachers). Advantages seen by teachers were addition of multicultural contexts (8 teachers), other calculation methods (5 teachers), and the need for teachers to express things in several different ways and by that also helping non-migrant students understanding things better (5 teachers). 3 teachers reported finding suitable materials on the internet. Only 1 teacher asked colleagues for support, and 2 cooperated with school management (and were subsequently sent to the professional development courses mentioned above).

The majority of teachers with migrant students (18 teachers) wished for concrete didactic units from various cultural backgrounds. 8 teachers asked for a pedagogical support, mainly in expressing mathematical content in a suitable verbal and non-verbal way, so that non-L1-learners have better opportunities to understand explanations. Only 2 considered additional background information about students' cultures as a suitable tool.

The answers from 14 *Czech* in-service teachers, two primary school teachers (teaching 6-11 year old pupils) and twelve lower secondary school teachers of mathematics (teaching 11-15 year old pupils) came from different parts of the Czech Republic and their teaching experience varied considerably. The percentage of immigrant and minority pupils in classes seems to depend on the size of the population of the place. While village and small town teachers claim to have no immigrants in their classes, in towns with population higher than 5000 the average percentage of immigrant and minority pupils was 1.5% and in towns and cities with population higher than 10 000, this proportion was 6.7% on average. As the Czech Republic is not a significantly multicultural country yet, it does not have a long tradition of integrating pupils with different cultural backgrounds into schools. Only one respondent states to have attended a course focusing on teaching in multicultural classrooms. Considering that 12 out of the 14 respondents have some experience with presence of a child of different culture in their class, it is necessary to introduce courses in multicultural and cross cultural issues into pre-service but also in-service training.

The analysis of the questionnaires suggests that teachers with shorter teaching practice, i.e. probably younger teachers, seem to have more experience with teaching in multicultural classes, have been forced to deal with the situation, to think of materials they could use and also of benefits of the situation. Only two respondents speak of support from their school management and 1 respondent speaks of being offered by school management the chance to attend in-service training for work with minority pupils. The benefit of having a child with different cultural background in the class is that all pupils get to know other cultures and learn about differences between people (3 teachers). With respect to teaching strategies there was more use of individual work (1 teacher), more control of the class (one teacher) and very clear instructions (1 teacher). Among the materials they would find really useful and supportive they most often

mentioned a dictionary of mathematics terminology in the pupil's language. One teacher also mentioned the benefits of having pictures and one believed support of an assistant in the class would be very helpful.

In *France*, the answers came from 19 in-service teachers in lower secondary school of the region of Creteil. Their pupils are 10-17 years old and all of the respondents teach pupils younger than 12. Among the respondents, there were teachers with very short teaching practice as well as very experienced professionals. 7% of the respondents teach in a school with a particular structure to help pupils newly arrived to France: The average percentage of pupils newly arrived to France in the classes of the respondents is 4%,varying between 0%and 15%. 58% of the respondents have experience of teaching the newly arrived. One of them has taught in a special class for pupils newly arrived to France (UPE2A), another has taught FLE (French as a foreign language). Only one of the respondents has received an initial training about multicultural classes. The 10 other teachers have not received any training. Only two of them have found some suitable materials. The 10 teachers have searched for special materials on Internet and in textbooks, and almost all of them discussed with their colleagues, sometimes with colleagues teaching FLE. In general teachers receive no help from school management. Only two of them did, in one case to move a pupil to a special class, in the other case to call together different professionals to do the best for the pupils

All the respondents call for resources to teach in multicultural classes, e.g. supporting pedagogical documents, information about cultural backgrounds of minority groups, about geopolitical reasons for their migration, and concrete didactic units from various cultural backgrounds. 6 teachers see advantages of having pupils newly arrived to France in the classroom: cultural exchange, opening up to mathematics teaching in other countries, motivation of foreign pupils, motivation of pupils to help the newly arrived pupils even if they have themselves some difficulties, exchanges about material conditions in schools and about school systems. In other cases, the respondents believe a special classroom to be better for these pupils in the first transitional phase.

In *Greece* the answers came from 27 in-service teachers. 16 of these teachers have experience of teaching children younger than 12. Most of them (70%) work in large cities, and their teaching experience is on average 20 years. Only one teacher states that he has attended a course about teaching in multicultural classes during his undergraduate studies (he has 9 years' experience), and two teachers got some training through attending seminars-workshops respectively. The average percentage of migrant students in the classes taught by the respondents is about 10% and only one teacher states that he has no immigrant pupils at all.

Two teachers mention an official program for supporting migrant students in their school but not focusing on mathematics education. One third of the

teachers have met problems while teaching migrant pupils. In order to deal with these problems, two teachers gave students extra worksheets with simpler exercises and five teachers used software and tactile material in case of geometry. The majority of teachers (about 90%) have discussed these problems with colleagues. Only two teachers gave positive answer about school management support. One mentions the management's initiative in order to offer migrant students some extra teaching in mathematics and the other the initiative to implement a cross-disciplinary teaching approach (including mathematics). The majority of respondents claim to consider the presence of migrant students in their classroom positive, though just one teacher answered that he/she used more problems of students' everyday experience. Two other mentioned simplification of the content and terminology. The majority (75%) consider that they need some kind of the suggested materials (supporting pedagogical documents, information about the cultural background of minority groups, concrete didactic units from various cultural backgrounds). Two teachers consider that a seminar/workshop could be also useful and one teacher mentions a dictionary of mathematics terminology in the pupil's language.

In *Italy* the questionnaire was answered by 44 in-service teachers of mathematics (teaching 11-14 year old pupils). Respondents were teachers with very short teaching practice as well as very experienced practitioners. The average percentage of minority pupils in the respondents' schools is 14%, ranging from 1% to 40%, but the answers to a questionnaire item clearly show that for mathematics very little has been done in Italy. Only in the last decade, the initial secondary teacher training courses had a module on intercultural education with a pedagogical perspective. The questionnaire analysis showed that very few other training opportunities were available. Only 5 out of the 44 teachers benefited from these opportunities. The recent in-service training referred to by 4 respondents was in fact attendance to meetings and two training courses on mathematics education in multicultural classrooms. Prior in-service training activities were mentioned by 8 teachers. The impact of the training is variously referred to: The individual enrichment and position towards the different educational context is clearly and frequently outlined. Changes in the way the lessons and the material are prepared and organised are also mentioned by three respondents.

A vast majority (about 70%) of the respondents' schools have an official programme for supporting minority pupil educational inclusion, whereas about 60% of the teachers already experienced a multicultural classroom. The educational context and the difficulties met by the teachers (48%) were tackled in different ways, e.g. looking for adequate materials (27%), searching for collaboration from other teachers (41%), asking for support from the school management (30%), and identifying advantages from the educational context (43%).About half of the respondents (21 out of 44) claimed that a

methodological change was necessary, e.g. simple, clear and basic language; rare use of words and definitions, large use of icons, schemes, examples…; slow speech, capital letters; group and workshop activities, cooperative learning, concepts mapping, etc. The need of supporting pedagogical documents was identified by 70% of the teachers, information about the cultural backgrounds of minority groups by 82% and concrete didactic units from various cultural backgrounds by 75% of the respondents. In addition, 34% of the teachers claimed to need also a reduced number of pupils in the classroom; language support materials and L2 courses; ICTs; easily readable and generally accessible textbooks; information about the different cultural and educational contexts.

In *Norway* the analysis is based on 12responses of primary or lower secondary teachersteaching pupils up to age 12. Their teaching experience is on average about 21 years. None of them have any education or training in teaching in multicultural classes. The average percentage of immigrant students in the classes of these teachers is 6%, but more than every second teacher have no immigrant pupils at all. Around 35% of the teachers work in schools which have a special programme for immigrant pupils. 60% of the teachers have taught immigrant pupils at some stage. Every other teacher claims they met some problems while teaching immigrant pupils, e.g. language problems or cultural differences. Many of the pupils are weak in both language and subject and then it is hard to teach them as they are often far behind the other pupils in the class. Teachers emphasise that it can be hard to know if the pupils lack conceptual knowledge from earlier studies or if it is about linguistic problems. It is hard to find teaching materials that do not demand good knowledge of Norwegian. Some teachers claim that language becomes a barrier. To overcome the problems teachers sought literature and concrete teaching material. Some say they try to be more distinct and clear and use a slower pace. Some try to make more clear explanations, use pictures and use more of repetition. Such actions can of course be helpful for all pupils. Many teachers found it helpful to talk to colleagues about the problems they experienced in multicultural classes. Few teachers got any kind of support from the school management.

3. Concluding remarks

The presented research aims to collect information about the working conditions and teaching materials for mathematics in multicultural contexts. It is a part of a European project whose objective is to produce teaching materials that take into consideration specific local factors such as the cultural and linguistic context of the classroom, the social environment outside the school, the school system and tradition, the majority culture of the country in question as well as several minority cultures present in the European schools, etc.

Although multiculturalism in schools is a widespread phenomenon in all European countries, much still needs to be done to identify teaching strategies which enable different disciplines to be taught effectively to pupils from

minority cultures as well as to the rest of the class. To see what immigrant pupils can add to the resources in the classroom is one way to create changes (Norén, 2008). What teachers suggest as actions for immigrant pupils seem to be of value also for the native pupils. It is of vital necessity to define and experiment teaching materials which do not discriminate against pupils from different cultures and languages. This is particularly true for mathematics, a subject which – according to comparison results of several international studies – proves by far more difficult to learn than any other.

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