

## **MATHEMATICS TEACHING AND LEARNING OF IMMIGRANT STUDENTS: AN OVERVIEW OF THE RESEARCH FIELD ACROSS MULTIPLE SETTINGS**

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This chapter is based on a paper I presented at the 11th International Congress on Mathematical Education as part of *Survey Team 5: Mathematics education in multicultural and multilingual environments*, chaired by Alan Bishop. Our team ended up dividing the survey team theme into four topics and I was in charge of surveying research related to the mathematics teaching and learning of immigrant students. The other topics were: Multicultural teacher education, particularly with indigenous teachers (Maria do Carmo Domite); A review of research on multilingualism in mathematics education in Africa, 2000–2007 (Mamokgethi Setati); Cultural conflicts, ethnomathematical developments, and marginalized learners (Alan Bishop). To address my topic, I drew on proceedings of recent international conferences that I knew had presentations related to mathematics education and immigrant students. Much of this research takes place in Europe. I also received information from various researchers who responded to the Survey Team’s call for contributions. Some of these researchers sent a summary of their most relevant work; others addressed the following two questions (suggested by Alan Bishop):

- A. How do you think the situation has changed/improved/deteriorated etc. in your research/development work in the last few years?
- B. What problems/challenges do you see in the next few years?

Finally, I looked at other publications with a particular emphasis on research in the mathematics education of Latino/a students in the United States, and more specifically students of Mexican origin, since that is the largest group of immigrant students in the USA.

In this chapter I focus on the main themes that emerged from going through all these sources. Although I have organized this chapter in themes, I want to point out that there is considerable overlap across the different themes.

The premise guiding this chapter is that the mathematics teaching and learning of immigrant students is of utmost importance. As Gates (2006) writes:

In many parts of the world, teachers – mathematics teachers – are facing the challenges of teaching in multiethnic and multilingual classrooms containing

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immigrant, indigenous, migrant, and refugee children, and if research is to be useful it has to address and help us understand such challenges. (p. 391)

A detailed description of the patterns of immigration is beyond the scope of this chapter. King, Black, Collyer, Fielding, and Skeldon (2010) provide an insightful account of the many faces of migration in the world, paying particular attention to contemporary migration. In their introduction they write:

The rhetoric of migration exaggerates its scale. We are told, in newspapers, by politicians, and even by academics who should know better, that “massive” numbers of people are on the move in the world today, that there is a “global migration crisis”, and that migration is leading to a “clash of civilizations.” This hype does enormous disservice to migrants, who, already poor in many cases, are further vilified for their poverty and for trying to improve their lives through hard work in an unwelcoming environment, where, furthermore, they are often scapegoated for the ills of the society they have joined. (p. 13)

In this excerpt, the authors point to a view of immigration as a problem rather than a resource, a view that is quite prominent in schooling contexts, as the studies I reviewed will show. In 2010, the total number of international migrants was 214 million; this number represents 3% of the total population of the world. Each year from 2005 to 2010, 2.7 million people emigrated from poor to rich countries (King et al., 2010). Of interest for this chapter are the changes in patterns of migration in countries such as Greece, Italy, Portugal, and Spain. Between the 50s and 70s these countries experienced emigration to Northwest Europe for economic reasons. Yet, since the 80s, these same countries are experiencing immigration from countries in Africa, Latin America, South and East Asia, and, more recently East Europe (King et al., 2010). Several of the studies I found on my topic for this Survey Team were actually located in these Southern European countries, which have changed over the years from sending to receiving communities. Also of interest to the work I present in this chapter are these authors’ observations on the concepts of assimilation and multiculturalism as two models of integration. While some countries in Europe may have had multiculturalism as a model, in recent years “a swing back to assimilation has occurred, with greater demands on immigrants to learn the host-country language and subscribe to core national values” (p. 92). The educational policy implications of views of immigration as a problem, and of the need for immigrants to assimilate, directly impact the mathematics teaching and learning of immigrant students, as this chapter shows.

## DIFFERENT FORMS OF MATHEMATICS

Several studies address issues related to everyday mathematics, critical mathematics, community mathematics, school mathematics, and so on. For example, researchers in Greece have been looking at Gypsy / Romany students’ use of mathematics in everyday contexts, in particular computation grounded in children’s experiences with their involvement in their families’ businesses (Chronaki, 2005, 2009; Stathopoulou & Kalabasis, 2007). (Moreira (2007) reports on a study along the same lines but with Portuguese Gypsy children). Some

aspects of this research remind us of the work with street vendors in Brazil described in Nunes, Schliemann, and Carraher (1993). However, particularly relevant to our theme is the observation by the researchers in Greece that schools and teachers seem to show little interest in what knowledge minority students (in this case Gypsy) bring with them and, thus, in how to build on this knowledge for classroom teaching. It may be due to little interest on the part of the teachers, or it may be due to a lack of awareness on how to build on this knowledge. Stathopoulou and Kalabasis (2007) argue for the need for schools to recognize and build on the oral tradition and experiences with mental arithmetic that Romany children have from their participation in their community's everyday activities. Chronaki's (2005, 2009) research with Greek Roma children uses the concepts of learning identities and Roma funds of knowledge as resources for instruction to gain a better understanding of Gypsy children as mathematical learners.

The topic of bridging in-school mathematics and out-of-school mathematics has received quite a deal of attention in research in recent years (e.g., Abreu, Bishop, & Presmeg, 2002; Civil, 2007; Nasir, Hand, & Taylor, 2008). My work, and that of my colleagues, building on the concept of Funds of Knowledge, provide important insights into the development of modules and teaching approaches in mathematics that are based on students' and families' knowledge and experiences. The pedagogical transformation of the findings from the household visits into mathematical learning modules for the classroom is quite challenging (Civil, 2007; Civil & Andrade, 2002; González, Andrade, Civil, & Moll, 2001). Some of these challenges have to do with time, support, and, most relevant to this discussion, the notion of what counts as mathematics. As we consider different forms of mathematics and whose mathematics to bring to the foreground, issues of power and valorisation of knowledge become prominent. Abreu has written extensively on the concept of valorisation of knowledge (Abreu, 1995; Abreu & Cline, 2007). Another body of research that is relevant here is that dealing with mathematics education and indigenous students. It seems that there is much that we could learn for the mathematics teaching and learning of immigrant students from the ethnomathematics projects that develop curriculum and teaching approaches with indigenous communities. Meaney (2004) writes about issues of power and whose knowledge gets recognized, in the context of her work within a Maori community. Zevenbergen (2008) brings up several dilemmas in relation to the mathematics education of indigenous students that seem relevant to the education of immigrant students:

How relevant are particular forms of knowing mathematics, what forms or aspects of the mathematics curriculum are needed or should be included in curriculum for the students, or should the expectation be one where they are exposed to the same curriculum as their urban counterparts. (p. 5)

#### TEACHER EDUCATION

Much of the research I reviewed for this topic addressed teachers' attitudes towards, and knowledge of, immigrant students. This body of research presents a

rather grim picture and thus opens the door to several possibilities for further research. Reports on a European project that is looking at the teaching of mathematics in multicultural contexts in three countries, Italy, Portugal, and Spain, point out that teachers feel unprepared to work with immigrant students (Favilli & Tintori, 2002). César and Favilli (2005) report that teachers in this study underscore the issue of language as being a problem and do not seem to recognize the potential for richer learning grounded in different problem-solving approaches and experiences that immigrant students may bring with them. They also note that teachers seem to have different perceptions of immigrant students based on the students' countries of origin. Overall, my reading of these reports points to a deficit view by teachers of their immigrant students.

Abreu (2005) reports that most teachers in the studies she examined tended to "play down cultural differences", arguing for general notions of ability and equity, as in "treating everybody the same". Accordingly, she points out the need for teacher preparation programs to pay more attention to the cultural nature of learning. Gorgorió and Planas (2005) discuss the role of social representations in teachers' images and expectations towards different students. In particular, they write, "unfortunately, too often, 'students' individual possibilities' do not refer to a cognitive reality but to a social construction. Teachers construct each student's possibilities on the basis of certain social representations established by the macro-context" (p. 1180). The influence of the macro-context, and, more specifically, the public discourse around immigration as being a source of problems rather than a resource for learning, is a common theme in this review. Researchers are critical of this discourse (e.g., Alrø, Skovsmose, & Valero, 2005), as it is counterproductive to the education of immigrant children. Unfortunately, as Gorgorió and Planas (2005) point out, some teachers use this public perception as their orientation to assess immigrant students in their classrooms, rather than a direct knowledge and understanding of their individual students and their families.

My colleagues and I have addressed the need for teachers to gain a better understanding of their students and their families. Our work points to the potential of teachers engaging in action research in multicultural contexts in terms of teachers developing curriculum and approaches that build on students' knowledge and experiences (Civil, 2002, 2007; Civil & Andrade, 2002; Kahn & Civil, 2001). In Civil and Andrade (2002), we describe the impact of ethnographic household visits on teachers' views of their students. Teachers gain an understanding of their students' context; they also learn about the different activities, networks, and resources that their students and families draw on. This may be a promising direction for teachers to learn first-hand about their students' contexts, instead of relying on public discourse about them. In Civil and Bernier (2006), we highlight some of the challenges in having teachers and parents (Latino/a parents in this case) work together to present mathematics workshops to the school community. Issues of power, and of whose knowledge is valued, are very present. In Quintos, Bratton, and Civil (2005) we bring up the need for parents and teachers to value the different approaches to doing mathematics that are likely to be present in

multicultural settings. We point out that often teachers do not recognize parents'/ home approaches as a valuable mathematical contribution.

There is a clear need for teachers to understand other ways of doing and representing mathematics (Abreu & Gorgorió, 2007; Civil & Planas, 2010; Moreira, 2007). As Gorgorió and Abreu (2009) write, in relation to a teacher's reaction to differences between representations of division in Ecuador and in Spain, "the important issue ... is not whether there are or are not differences in the way the division algorithms look, but the reaction of the teacher to this difference" (p. 72). Related to the need for teachers to know about others' ways of doing mathematics is a need for an expanded view of what mathematics is. Teachers tend to view mathematics knowledge as culture-free and universal (César & Favilli, 2005; Gorgorió & Abreu, 2009). This point relates directly to the previous section where I discuss different forms of mathematics. It seems that teacher preparation programs and professional development experiences should address this view of mathematics as being culture-free. Moreira (2007) brings up the need for teacher education programs to prepare teachers to research "local" forms of mathematics (e.g. everyday uses of mathematics). In referring to the mental computation strategies used by Portuguese Gypsy children, Moreira writes:

If teachers are not aware of children's mental calculation processes and do not use them to know more about the role of local mathematics in mathematical knowledge in contemporary society, a good opportunity to educate the citizens of the world is lost. (p. 1594)

Furthermore, by seeing mathematics in a universal and culture-free way, teachers tend to believe that the only issue that immigrant students have when learning mathematics is learning the language of instruction (Gorgorió & Abreu, 2009). For a contrasting example of a teacher's effective use of the home language as a resource for the teaching and learning of mathematics see Khisty and Chval (2002).

#### ISSUES RELATED TO EDUCATIONAL POLICY

Researchers from different countries are critical of educational policies that push towards assimilation of immigrant students. These policies convey a deficit view on immigrants' language and culture, instead of promoting diversity as a resource for learning.

Anastasiadou (2008) writes:

The de facto multiculturalism (...) which now describes the Greek society, ... [which] continues to function with the logic of assimilation (...). In the field of education the adoption of the policy of assimilation means that it continues to have a monolingual and monocultural approach in order that every pupil is helped to acquire competence in the dominant language and the dominant culture. (p. 2)

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The work of Alrø et al. (2005) is particularly relevant here as these authors take a socio-political approach to the discussion of the teaching and learning of mathematics with immigrant students. The influence of public discourse and, in particular, of the view of immigration as a problem rather than a resource is well captured in what these authors write:

In Denmark, the sameness discourse has spread into a variety of discourses, which highlight that diversity causes problems – it is not seen as a resource for learning. And this idea brings about a well-defined strategy: Diversity has to be eliminated. (p. 1147)

Then, as researchers in other parts of the world have also noted, these authors point to the emphasis in educational policy on students' acquisition of the Danish language as the priority. Alrø, Skovsmose, and Valero (2007) argue for the need to look at the complexity of the situation, rather than at just one aspect (e.g., language). In their study with 8<sup>th</sup> graders at a school with a considerable number of immigrant students, the authors note that students did not seem to pay much attention to the topic of multicultural diversity: “diversity is not used as any resource for teaching and learning” (p. 1571). They report that:

The students are well aware of cultural differences, but they seem to agree that to take specific notice is not important... This indicates that they represent the “sameness” approach in the Danish public discourse about integration, which implies making “them” just like “us”. (p. 1571)

The idea that mathematics education is political is particularly true when studying the mathematics education of immigrant students. An implication from the research that looks at the macro-context, and in particular the influence of public discourse and educational policy on the education of immigrant students, is the need for interdisciplinary research teams, where in addition to the expected expertise in mathematics education, there is expertise on the political and policy scene (social, educational, language, in particular with respect to immigrant students) in the context (country, region) of research.

## LANGUAGE, MATHEMATICS, AND IMMIGRANT STUDENTS

In the eyes of educational policy-makers and many teachers, not knowing the language of instruction is seen as a major (and, in most cases, the main) obstacle to the teaching and learning of mathematics of immigrant students. Hence, the push is for these students to learn the language(s) of instruction as quickly as possible. As Alrø et al. (2005) point out, the emphasis on learning the language of the receiving country may occur at the expense of these students' learning of mathematics. Gorgorió and Planas (2001) have documented a similar situation in Catalonia. In 2008, there was ongoing debate in Catalonia around the proposed education policy for immigrant students that would keep them in separate school buildings apart from the local students (or from those who already know the language of instruction) with the aim that they learn the language of instruction. As Planas writes:

There are still “reception classrooms” though we are in a transition time and the length of stay in these classrooms varies from half a year to one year. Right now these reception classrooms are in regular schools, but the talk is about creating separate spaces [different buildings], thus increasing the segregation of immigrant students. It is very controversial and it is not clear that they will be able to do it. (N. Planas, personal communication, May 22, 2008)

In my local context (the U.S.) there is a long history of changes in language policy for education, with some states now having banned or severely limited bilingual education, including the one I was in until recently, Arizona. In 2000, Proposition 203 was passed in Arizona. This proposition severely limits bilingual education. In 2006, further legislation in language policy was passed. The result was that, in 2008, schools in Arizona started implementing a state-mandated program towards the education of English Language Learners (ELLs) that essentially segregates ELLs for 4 hours a day to learn English (and in some cases, particularly in elementary schools, this segregation is for the whole day as students are placed in designated English Language Development classrooms). This 4-hour English block has serious consequences for the learning of other subjects and limits the opportunities for ELLs to be with English-speaking peers who could serve as supports for their learning of this language. In Civil (2011) I discuss the case of the implementation of a program very similar to the 4-hour block in a middle school by focusing on a mathematics classroom composed of ELLs, most of them recent immigrants from Mexico.

Language policy in many countries reflects the push for assimilation that often characterizes their policies towards immigration. Macedo, Dendrinos, and Gounari (2003) capture this when they write, “American monolingualism is part and parcel of an assimilationist ideology that decimated the American indigenous languages as well as the many languages brought to this shore by various waves of immigrants” (p. 23). These authors write about the inhumanity of language policies such as English-only that devalue other languages, and, in particular, the home languages of many immigrant students in the USA (and I will add, the same applies in other parts of the world that have repressive language policies). Although their writing is not about mathematics education, their insights into issues of power associated with the dominance of one language (English, in this case) have implications for the education of immigrant children, including their mathematics education. The parents of immigrant children are (or should be!) an important voice in the issue of language policy in schools. I turn my attention to them next.

What are immigrant parents’ views on issues of language policy and mathematics education? An interesting theme emerging from our research with immigrant parents is that, for many of them, language also seems to be the main obstacle to their children’s learning of mathematics (this parallels what teachers think, as we have illustrated earlier). This pattern is the case in our research with mostly Mexican parents (Civil, 2006, 2008) but is also the case with immigrant parents in Barcelona (Civil, Planas, & Quintos, 2005). The reason why I think this is an important topic to pursue is that as immigrant parents focus on the language

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as being the main obstacle, we wonder whether they are aware of the actual mathematics education that their children are receiving. In particular, I am referring to issues of placement. Are the students placed in the appropriate mathematics classroom (based on their knowledge and understanding) or are schools basing their placement on their level of proficiency in the language of instruction? In Civil (2006, 2008, 2011) I present the case of Emilia, a mother who seems satisfied with the fact that her son is mostly “learning” content that he already knew from Mexico because, as she says:

That is, for them it’s perfect what they are teaching them because in this way it’s going to help them grasp it, to get to the level, because for them, with the lack in English that they have, and if to that we were to add, ... Right now, what he is learning, what I see is that it’s things that he had already seen, but if he gets stuck, it’s because of the language, but he doesn’t get stuck because of lack of knowledge. (Emilia, interview #1, March 2006)

I wonder about the thinking behind these placement policies. Not only are parents not aware of the implications of this policy for their children’s learning (or not) of mathematics, but also teachers often are not either, as Anhalt, Ondrus, and Horak (2007) show. In their article, they describe the reactions of a group of middle school mathematics teachers after they played the role of students in a mathematics class taught in Chinese. As the teachers reflected on this experience in relation to their own work with English Language Learners (ELLs), they realized that in some cases they had not paid any attention to the Chinese language and had focused on the mathematics that they already knew. Hence, they wondered about a placement policy that places ELLs in lower level mathematics with the idea that it will help them learn English. Teachers questioned whether, through this practice, students would learn either English or mathematics. Experiences such as this one can be quite powerful in addressing some of the beliefs that teachers seem to have about language and the teaching and learning of mathematics.

## RESEARCH WITH IMMIGRANT PARENTS

In general terms, research on parents and mathematics education is rather limited. In the U.S., for example, there has been some research on parents’ views of reform mathematics. For this review, however, our goal is to focus on research with immigrant parents and their views of mathematics education. Most of the research I found on this topic was done by Abreu and her colleagues in the United Kingdom (Abreu & Cline, 2005; O’Toole & Abreu, 2005) and by my colleagues and myself in the USA (Civil & Andrade, 2003; Civil & Bernier, 2006; Civil & Menéndez, 2011; Civil & Planas, 2010; Civil & Quintos, 2009; Quintos et al., 2005). In Civil et al. (2005) we look into immigrant parents’ perceptions about the teaching and learning of mathematics in two different geographic contexts, Barcelona, Spain, and Tucson, USA.



Besides these studies in the UK, USA, and the study with immigrant parents in Barcelona and in Tucson, I found one study with immigrant parents in Germany. Hawighorst (2005) presented a study on parents' conceptions and attitudes towards mathematics. She focused on three groups of parents: German parents, resettler parents of German descent (from the former Soviet Union), and Turkish parents. Her interviews covered topics also addressed in the research by Abreu and her team, and by my team, namely, the importance and uses of mathematics in their everyday life, parents' experiences with their own learning of mathematics, as well as parents' views on their children's mathematics instruction.

There are three (related) themes that emerged and that cut across all immigrant parents in these studies. Overall, immigrants in the four geographic contexts shared a concern for a lack of emphasis on the "basics" (e.g., learning of the multiplication facts) in the receiving country, a perception that the level of mathematics teaching was higher in their country of origin, and a feeling that schools are less strict in their "new" country. There is something quite remarkable in reading some of the quotes from the parents in that while they are coming from very different countries (e.g., Pakistan, Mexico, Morocco, Turkey), what they say is almost identical, when sharing their perceptions about their children's mathematics education in their "new" country.

Abreu and colleagues, as well as my colleagues and I, have looked at these themes in some depth, thus providing an analysis related to issues of differences in approaches, issues of valorisation of knowledge, and potential conflict as children are caught between their parents' way and the school's way. As we write in Quintos et al., (2005), "the knowledge that working class and minoritized parents possess is not given the same value as that which middle-class parents possess" (p. 1184). We go on to address this topic of valorisation when it opposes home and school knowledge:

Alternative approaches are often not treated equally.... In this context, the parents' or home method is not given the same value as the teacher's or textbook method. Historical relations of power at the schools can not only be reproduced but also exacerbated through mathematics education. (p. 1189)

The research with immigrant parents and their perceptions of the teaching and learning of mathematics underscores the need for schools to establish deeper and more meaningful communication with parents. Parents tend to bring with them different ways to do mathematics that are often not acknowledged by the schools, and conversely, parents do not always see the point in some of the school approaches to teaching mathematics. Although this may be the case with all parents (e.g., in the case of reform vs. traditional mathematics), the situation seems more complex when those involved are immigrant parents and their children. As our research shows, differences in schooling (different approaches to doing mathematics), and in language, influence parents' perceptions of, and reactions to, practices related to their children's mathematics education. In particular, there is evidence that when English is the only language of instruction

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(e.g., in the case of our local context in the U.S.), there are cognitive and affective implications.

#### LIMITATIONS AND IMPLICATIONS FOR FURTHER RESEARCH

Very likely, this survey of research has many gaps. I had to find a way to organize how I was going to conduct the survey, and in so doing I made choices that put some contributions in and left some out. To begin with, I focused primarily on articles and papers that explicitly talked about mathematics education and immigrant students. This means that many articles that present important research on issues of diversity, or papers addressing theoretical or methodological approaches that should be relevant to this topic of study, may have been left out. I did try to include some of those, but my emphasis was on empirical work done with immigrant students, immigrant parents, or teachers of immigrant students.

Most of my focus was on research with immigrant students in Europe, hence, many other parts of the world are not represented (indeed, many parts of Europe are not represented!). I relied on proceedings from recent conferences and on contributions from researchers on this topic. I know I missed many. For the work in the USA, I focused only on the research with Latino/a students, as this is the largest group of immigrants at the moment. Even there, I most likely missed research studies that should have been mentioned. There is certainly a need to address the mathematics education of less talked about immigrant groups in the USA, such as the Hmong students or the Somalis. Susan Staats (University of Minnesota) reflects on one of the trends in mathematics education that argues that using students' home language can help them in their learning of mathematics. She wonders what happens when students do not really know their home language, as is the case of the Somali students with whom she works. She writes:

With the educational history of Somalis they do not know their math vocabulary. It is a point of sadness, in fact, for many young people that they feel they do not know any language well, they might know parts of Somali, Swahili, Arabic, Italian, or English but feel insecure speaking any of these. (S. Staats, personal communication, June 8, 2008)

She adds, "I think the Somali situation highlights the need for different kinds of interventions for different students." (S. Staats, personal communication, June 8, 2008). (See Staats (2009) for more on her work in mathematics education with Somali students). Her comment points to the need to not view all immigrant students as "the same". In thinking of immigrant students, there is a risk of essentialising these students, as we often essentialise students within other groups, such as Latinos/as, when it is well known that there are vast differences among the various groups of Latinos/as. Or, as Swapna Mukhopadhyay (Portland State University) writes about Asian immigrants in the USA, we need to:

Critically examine the myth that all Asians excel in school math. Is class (and social capital) an integral part of what makes the Asian kids do well? (Also,

what role does complacent/highly adaptive behavior play in attributing their “success”?) Asian-Americans signify a very large group of people from highly diverse cultural and economic backgrounds. Is there a difference between the blue-collar/transient Asians versus the affluent middle and upper middle class professional? For example, how do the children of taxi drivers do versus that of the doctors? I have a feeling that the achievement/school performance is bounded by class, privilege and access. (S. Mukhopadhyay, personal communication, June 8, 2008).

My hope is that through this review, we will hear from other researchers who are working in mathematics education with immigrant students and that we will be able to elaborate further on this work, which I consider a work in progress. Having said that, however, there are several implications that this review points to and that I want to briefly mention here.

Abreu, César, Gorgorió, and Valero (2005) raise two important questions that should frame, I think, further research in this field. They ask “why research on teaching and learning in multiethnic classrooms is not a bigger priority” and “why issues of teaching in multicultural settings are not central in teacher training” (p. 1128).

Based on the research reviewed, there seems to be a clear need for action-research projects with teachers of immigrant students engaging as researchers of their own practice to counteract what appears to be a well-engrained deficit view of these students and their families. Through a deeper understanding of their students’ communities and families (e.g., their funds of knowledge), maybe teachers can work towards using different forms of doing mathematics as resources for learning instead of the current trend that seems to view diversity as an obstacle to learning (there are of course exceptions to this view and I have addressed those in the review). Related to this idea of understanding immigrant students’ communities, there is very little research looking at the sending communities. That is, what do we know about the teaching and learning of mathematics in the countries/communities that these immigrant students came from? (For a recent publication that addresses some aspects of this issue, see Kitchen & Civil, 2011).

There is also a need to analyse the learning conditions in schools with large numbers of immigrant students. What Nasir et al. (2008) write in reference to African American and Latino and poor students is likely to be the case with immigrant students in many countries:

African American and Latino students, and poor students, consistently have less access to a wide range of resources for learning mathematics, including qualified teachers, advanced courses, safe and functional schools, textbooks and materials, and a curriculum that reflects their experiences and communities. (p. 205)

Issues of valorisation of knowledge and different forms of mathematics need to continue to be explored, as there are still many open questions. Related to this issue is the idea of non-immigrant students’ views of immigrant students. This topic has

received very little attention (a notable exception is the work of Planas (Planas, 2007; Planas & Civil, 2008)), yet it seems like it would be important to understand how all the students see and understand the experience of being in a multicultural classroom (Alrø et al. (2007) address this topic to a certain extent).

Another area that needs further research is that of immigrant parents' perceptions about the teaching and learning of mathematics. It is certainly interesting to note the similarities in these perceptions across very different contexts of immigration. "What now?" is my question. Furthermore, an important and under-researched area is that of interactions between immigrant parents and teachers, and perceptions of each other, in terms of the children's mathematics education. Civil and Bernier (2006) address this to a certain extent, but much more work is needed, especially given the need for a holistic approach to the education of immigrant students that really includes multiple voices, and the different participants in this education (parents, teachers, school administrators, community representatives, and the students themselves).

Language is a prominent theme in the research with immigrant students and mathematics education. More research is needed that focuses on multiple languages as resources for the teaching and learning of mathematics, once again to counteract the deficit perspective, particularly in the public discourse that sees the presence of other languages and not knowing the language of instruction as obstacles to the mathematics education of immigrant children. Issues of placement based on language proficiency, and the impact that these decisions have on students' learning of mathematics, also need to be studied further.

In reflecting on what needs to happen next, Philip Clarkson (Australian Catholic University) writes:

We know quite a lot about multilingual kids' learning. But we have not been very good at looking at the varying multilingual contexts in which that learning takes place. Are we making too many assumptions there? In the last 10–15 years we are moving to look at teaching, but much more needs to be done with this. What models are there available that teachers can use as guides? Are they sorted according to the multilingual context of the classroom? What do we need to do now? What do we think would be good places to search that we think will move us forward to greater insight? (P. Clarkson, personal communication, May 27, 2008) (see Clarkson (2009) for more on teaching models for multilingual classrooms).

Finally, a clear implication from the research reviewed on this topic is the need for interdisciplinary teams with expertise in different areas, including mathematics education, immigration policy, linguistics, socio-cultural theories, anthropology, just to name a few. There is a clear need for this interdisciplinary expertise, as well as for the development (or refinement) of theoretical and methodological approaches.

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