Changing Immigration Patterns and Teacher Perceptions of Responses in Mathematics Classroom Education in the Last Fifty Years

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Research indicates that appropriate mathematics teaching is connected to an understanding of and an interactive relationship with the cultural environment in which it takes place. The cultural environment of Australia's mathematics classrooms has changed dramatically in the last fifty years due largely to an influx of migrant students of diverse origins. This paper investigates the changing patterns of migration over this period and their links with mathematics classroom environments through documentation of the perceptions of a group of Victorian mathematics teachers. Also investigated were perceptions of any responses through the provision of migrant related resources by mathematics educators and of their own roles in generating responses to the migrant presence in their classrooms.

As part of a wider study of the response of Australian mathematics educators to the arrival of students of diverse ethnic origins in mathematics classrooms, this paper provides some details of the patterns of migration to Australia over the last fifty years. The consequent effects of these patterns on the composition of the mathematics classroom together with the nature of any responses related to classroom mathematics teaching emanating from mathematics educators and from mathematics teachers themselves as perceived by classroom mathematics teachers, has been investigated.

Theoretical Framework

A national overview of the ethnic and birthplace composition of Australia's population as revealed by the 1991 Census and published in the Atlas of Australian people (Hugo and Maher, 1995) indicated that, out of the population, current at that time, which numbered 17.3 million, some 26% of Australia's population were born outside Australia , placing it second only to Israel in the significance of immigration to the population. A further 30% were the first generation Australian born of one or both immigrant parents and many more had varying degrees of lineage traceable to ethnic backgrounds.

Recent research has negated the notion that mathematics education is a universal and culture free entity and its findings have moved to the notion that appropriate mathematics education requires an interactive relationship with its cultural environment (Abraham & Bibby, 1998; Bishop, 1994; Bishop, Brew, Leder, & Pearn, 1997; Brent, 1978; Clements, 1989;Ernest, 1991; Tanner & Trown, 1979, Thomas, 1997). In Australia, as a result of significant immigration to its shores beginning directly after the end of World War 2 , the cultural environment of the mathematics classroom changed substantially; initially through the changed ethnic origins of its students, and later through the changed ethnic origins of a significant number of its teachers. This paper is part of a study of the extent to which mathematics educators recognized and responded to these changes in the classroom.

Immigration Statistics

Where did these migrants settle in Australia? According to the results of studies of regional population growth in Australia from 1986 to 1991 during which time the national population grew from just over 16 million to 17.3 million the locations of migrants were unevenly

distributed. Settlement took place in just a few locations, predominantly within two states, Victoria and New South Wales. In 1993 these two states accommodated 73 per cent of all immigrants, considerably more than the 60 per cent of the national population who lived in them. The Australian Bureau of Statistics (ABS) estimated that more than 80 per cent of immigrants to Australia have settled in the five largest cities and that 60 per cent have located in Sydney or Melbourne. Migrant students therefore are concentrated largely in relatively small surface areas which are urban and densely populated (Maher & Stimson, 1994). Access to migrant students could not have presented difficulties in terms of educational resources.

Post World War 2 Australia accepted in excess of five million immigrants but this has varied considerably on an annual basis as is demonstrated in Table 1 (Easson, 1990). It can be seen that there were peaks in intake in the early 1950s, around 1970 and to a lesser extent in the early 1990s. These peaks were followed by troughs, most markedly in the mid-1970s, and 1992, 1993 (the latter years not recorded in Table 1) Were there also fluctuations in the origins of migrants?

Table 1

*Immigration Trends 1948/49 – 1988/89**

Year of intake	Troughs	Peaks
1947/48	40 000–60 000	
1948/49		180 000–200 000
1953/54	80 000–100 000	
1955 /56		120 000–140 000
1961/62	60 000-80 000	
1969/70		160 000–180 000
1975/76	40 000–60 000	
1981/2		100 000–120 000
1983/84	60 000–80 000	
1989/90		120 000–140 000

*Australian Immigration Consolidated Statistics.

The peak between 1948 and 1952 was made up primarily of European born immigrants the largest contingents coming from Great Britain, Greece, Italy and Yugoslavia. While the first Immigration Minister, Mr Arthur Calwell, pledged his support of the white homogeneity of the White Australia policy, immigration became less linked with population politics and was seen as a way of removing labour market shortfalls. The next big peak between 1963 and 1974 was connected with the liberalisation of entry requirements by the then Minister Mr Harold Holt and with it the last vestiges of the White Australia policy began to disappear in favour of an explicit policy aimed at the provision of a reservoir of labour of a more technological nature in manufacturing.

During later immigrant expansions, the composition of intake changed considerably. In 1966 there were few Asian countries listed in the top ten sourced countries of new settlers in Australia. Ten years later Malaysia and the Philippines ranked fifth and sixth among the top ten sourced countries. By 1986 the majority of the top ten sourced countries were Asian with the highest numbers coming from the Philippines, Vietnam, Malaysia, Hong Kong and China. (Easson, 1990)

Table 2

Top Ten Sourced Countries of Birth Listed in Order from Highest to Lowest Intake

196–67	1976-77	1988-89
UK and Ireland, Italy, Greece, Yugoslavia, Germany, New Zealand, USA, Netherlands, Lebanon, India, other countries combined.	Other countries combined, UK and Ireland, Lebanon, New Zealand, Cyprus, Malaysia, Philippines, Yugoslavia, Greece, Italy, USA	Other countries combined, UK and Ireland, New Zealand, Philippines, Vietnam, Malaysia, Hong Kong, China, India, South Africa, Sri Lanka

Teacher Perceptions

Twent-eight Victorian teachers completed questionnaires relating to their experiences during the period studied. These questionnaires, and an advertisement, were included in the June, 1998 edition of the Mathematics Association of Victoria publication "The Common Denominator". Questionnaires with their responses were returned by interested teachers to the researcher.

Definitions and Perceptions of the Descriptor "Migrant"

The wording of the advertisement and questionnaire was constrained by considerations of space. The complex question of the meaning of the term "migrant" was therefore not defined on the questionnaire document. In the personal interview extension of the project, however, migrant students were defined by the researcher as those students born outside Australia or born in Australia of at least one overseas-born parent. To qualify, these students must have attended Australian schools or were in the process of being educated in Australian schools for a period of at least one year. It became apparent that the definition did not resonate with the mathematics teachers taking part in the project. Their concept of the term "migrant student" was more elusive and concerned ethnic and cultural connections. The use of the term "migrant students" used by most teachers in the project had more to do with a hegemonic viewpoint and could be described more accurately as those students who qualified in terms of the definition but who were representatives of those ethnic minorities in the population who came from countries outside Great Britain and Ireland.

Teacher Experiences and Backgrounds

Twenty-four secondary teachers and four primary teachers responded to the questionnaire and their combined mathematics teaching experiences covered all levels of these divisions. Twenty-two teachers had worked in Government schools, four in Catholic schools and five in Independent schools. Of these schools 27 were in the metropolitan area of Melbourne and three were in country Victoria (totals were higher than 28 because some teachers had experiences in different sectors and locations).

Teachers were asked to signify their periods of teaching in 10-year intervals. No teacher in the period 1940-1949 responded. Responses were received from two retired teachers with experience in the period 1950-1959; seven teachers with experience in the period 1960-69 responded; and for each of the periods, 1970-1979, 1980-1989 and 1990-2000, an average of 24 teachers responded.

Questions relating to first school education and language background revealed that 20 teachers first attended school in Australia and of these, 17 listed English as their first language. Of these 17 cases, 10 had no other language and seven listed varying levels of second languages which included French(6), Italian(3), German (1), Swedish (1), Mandarin (1)and Latin (1). Three teachers whose first schooling was in Australia listed languages other than English as their first language and these included Italian (2) and Maltese (1). In all three cases English was listed as a second language.

Eight teachers first attended school overseas and the countries of their education included Malta, New Guinea, Fiji, Greece, UK (2), Hong Kong and Ireland. First languages listed by this group included English (4), Maltese (1), Hindi (1), Greek (1) and Chinese (1). Second languages listed by this group included English (4), Gujrati, Fijian, Greek, Vietnamese, French(2), Gaelic (1) and Hindi (1).

Migrant Student Numbers and Origins

The migrant student numbers and their origins in the various schools are shown in Table 3 below.

Table 3

Percentage of Migrant Students in the Mathematics Classroom, Nationalities and Sectors

Perceived percentage of migrants in the classrooms, with sector and school locations	Most common nationality
<10 per cent Independent/Metropolitan 4	Russian, Israeli, Hong Kong, Malaysian, Singaporean, Chinese, Indonesian, Japanese
10-30 per cent Government/Metropolitan 3	Vietnamese, British, Greek
31-50 per cent Government/Metropolitan 6 Catholic/Metropolitan 1	Greek, Italian, Asian, Lithuanian, Yugoslavian, Polish, Seychelloise, Mauritian, Indian, Sri Lankan, Lebanese, Chilean, Columbian, German, Dutch, Vietnamese, Asian, Arabic, Somalian, Croatian, Philippino, South American, Iraqi, Iranian
51-70 per cent Government/Metropolitan 4 Independent/Metropolitan 1 Catholic/Country 1 Catholic/Metropolitan 2	Italian, Greek, Russian, Chinese, Lebanese, Sri Lankan, Ethiopian, Indian, Indonesian, Slovenian, Yugoslavian, Fijian, Turkish, Cambodian, Croatian, Macedonian, Albanian, Vietnamese, South American
>70 per cent Government/metropolitan 6 Independent/Metropolitan 1	Greek, Italian, Turkish, Lebanese, Vietnamese, Chinese, Macedonian, Maltese, Albanian, Korean

Migrant-Directed Resources

These included resources contributed by the school or through agencies outside the school which were provided specifically for the needs of migrant and those strategies devised by the teachers themselves to assist migrants in their mathematics learning.

Table 4
*Migrant-Directed Resources Contributed by Agencies outside the Classroom**

1. Opportunities to attend courses or information sessions outside the school	11
2. Provision of documentation from expert sources	6
3. Withdrawal of students from the classroom for specific help	12
4. Employment of migrant language aides in the classroom	7
5. Employment of English speaking aides in the classroom	4
6. Meetings/information nights arranged with parents	8
Other comments:	
Generally little or no help was available.	5
Students attended intensive language school before they attended secondary school	1
Years seven and eight students of non-English speaking backgrounds (NESB) were grouped together for teaching mathematics.	1
Although some migrant students are withdrawn from Maths for specific help, the school tends to leave migrant students in Maths, withdrawing them in other subjects.	1
Diagnostic tests administered by school places students. Sometimes students move between levels in Maths as English ability changes.	1

Note. * Numbers 1-6 were tick box responses, other comments were interpreted and grouped by the researcher.

Personal Strategies Generated by Teachers to Assist Migrant Students

The perceptions of most teachers were that migrant students needed mathematical help although five teachers perceived that migrant students did not need help in mathematics. Most teachers described at least one personal strategy which they had devised to address migrant disadvantage and their comments were collated and listed in Table 5.

Table 5
Perceptions of Teachers about their Migrant-Related Resources they Generated

No special provisions were made at all. Migrant students did not need extra assistance.	5
Care was taken with the wording of examination questions	1
Newer migrant students were seated together with migrant students more conversant with English	1
Very tight specific formal instructions focussed on a few points,	2
Migrant students were closely supervised and constant feedback was used	1
Students worked together in groups speaking their own language after teacher explained work to be done. Students permitted to use language translation calculators (electronic pocket dictionaries which translate words) or to translate for each other. Maths material was taped in seven languages.	4
Simple language patterns and vocabulary were used when possible and emphasis was given to any new topic-specific vocabulary. Simplified notes and textbooks were used.	6
Extra assistance was given by the teacher in and out of classroom time including help with language and expression	2
1 to 1 instruction with teacher or student peer-mentor was used .	7
Revision sheets were provided that went back to basics and cumulative sheets added skills on a weekly basis	1
Survey was done, where possible, of books used and work covered in previous countries of migrant students, when introducing new topics.	2
Repeat explanations were sometimes given	1
Migrants were excused from tests in mathematics until their grasp of English was reasonable. Test results were not counted until teacher was sure they reflected maths performance rather than language inability. Reporting was modified.	5
More questioning was used to establish that understanding has been achieved and students were asked to write their own maths questions to improve language skills.	2
Greater use of hands-on, concrete aids and activity based approaches. School's Task Centre used for years seven and 8. RIME materials were used.	4
Several mathematics lessons were taught by a visiting French maths teacher in French, and maths posters were made in Junior secondary classes were displayed in French, German and Japanese .	1
Liaison was formed with English/ESL department for language difficulties experienced in maths problems – used particularly for prepositions in VCE maths problems.	1
Mathematical games and individual learning material and programs were used	2
Co-operative group work with reporting back of students to the class as a whole gave ideal opportunities for students to pick up maths language, display their expertise and develop support networks within the classroom.	2
Students made aware of language at all the times through discussion.	1
Students were made aware that teacher came from overseas and spoke other languages.	1
Teacher undertook professional development eg ESL in the Mainstream to develop strategies to help not only ESL students but all students in the maths classroom.	1

Summary of Results

Over 90 percent of responses came from teachers working in metropolitan schools which was probably a reflection of the settlement patterns described in the immigration statistics section of this paper. Most responding teachers came from the secondary division of the government sector but this may have been a reflection of the circulation and readership of the MAV publication. While 20 out of the 28 teachers first attended school in Australia, three of this number did not state English as their first language. Of the eight teachers not attending their first school in Australia, four stated English as their first language. The total therefore using English as a first language was 21 out of 28 (75%) and this total did not reflect their countries of origin. The complexity therefore of defining migrant status applied in both student and teacher contexts. The range of languages used by teachers was very wide and included examples of European, Asian and Pacific Island languages thus conforming to the elements of both major booms of immigration described in the migration statistics.

The migrant numbers and origins of students covered an astonishing number of nationalities. This was most apparent in the classrooms of teachers where at least 30% of students were listed as migrants. The precision with which teachers noted these in the small space provided on the questionnaire sheet indicated the importance which they attached to these different migrant origins. Words such as Asian and European were rarely used. Teacher awareness of and sensitivity to the national identities of their students perhaps reflected the individualism of Australian educational methodology. The number of migrant students in the classrooms of the majority of responding teachers were very high and did not reflect the one in four ratio of migrants to national population as described in the migrant statistics.

A minority of teachers made use of or had access to each of the migrant related resources provided by sources outside the classroom as described in Table 5. Apart from single comments about school structures no other use of outside resources was noted. The highest number of participants (12) used availability in their schools for withdrawal of students from their mathematics classrooms for specific help. Only one teacher took part in professional development to assist in language aspects of mathematics teaching However most teachers had developed personal strategies to assist migrant students which they perceived as necessary and these were diverse. Few teachers used the same strategies but most perceived the need for them and had put their particular preferences into practice in their teaching. A small minority of teachers (5) perceived that migrant students did not need assistance. No teacher perceived advantage in migrant abilities and devised strategies to enhance this or to use these abilities to assist non-migrant students although different mathematical methods in other countries were shared by an even smaller minority (2) of teachers.

Conclusion

Most of the 28 Victorian teachers who responded to the questionnaire teachers taught mathematics in classrooms where the ratio of migrant students to non-migrant students of students within the mathematics classroom exceeded that of the national population and the majority of them described teaching experiences which occurred in the last three decades of the twentieth century. Two major peaks of immigration had occurred before to this time so that elements of both the European labour force wave and the Asian manufacturing force wave had combined to create highly diverse classrooms and some diversity in the origins of teachers. While a formal definition of migrant status was problematic most teachers did not seem to

have difficulty in identifying migrant students in their classroom and they had detailed knowledge of migrant student origins. An implicit belief in the connections between mathematics learning and culture perhaps stimulated most teachers to devise personal strategies which they considered appropriate for the migrant students in their own classrooms. Under 50% of teachers made use of or were aware of each of the systemic responses contributed by mathematics educators outside the classroom. Migrant disadvantage was the main perception which drove most teachers to use personal strategies directed to the teaching of migrant students. A minority of teachers perceived that migrant students did not need help. The perception that migrants may have been advantaged and that they could have been considered as one of the resources available in the design of personal strategies did not emerge.

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