Crossing cultural borders: The negotiation of value conflicts
by migrant teachers of mathematics in Australia

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Migrant teachers’ negotiation of cultural value differences and conflicts during their respective professional socialisation experiences is explored from a social constructivist perspective in this paper, based on Bishop's classification of approaches to cultural conflicts. Successful negotiation of these conflicts contributes towards increased teacher efficacy, and thus promotes students’ cognitive, affective and behavioural developments. On the other hand, education involves teachers’ inevitable portrayal of values related to the curriculum subject and its pedagogy, in addition to other more general values. This applies too to school mathematics; after all, mathematics and mathematics pedagogy are socio-culturally referenced. This paper examines two migrant teachers of mathematics, being part of an ongoing, larger study which investigates the nature of value conflicts and the range of teacher responsive strategies in the secondary mathematics classroom. A qualitative case study methodology which gathered data from document analyses, lesson observations and interviews has been adopted. The different negotiation strategies adopted by the teachers implied the operation of these strategies as a function of teacher-perceived educational context compatibility, and highlighted the role of overriding values. Implications for teacher practice are outlined.

Introduction

Like many other countries in the world, Australia is experiencing a shortage of teachers in general, and teachers of mathematics in particular (the actual problem for school mathematics may be greater, given that principals may arrange for teachers to teach beyond their own subject areas). This problem is being alleviated to a certain extent by migrants who arrived in Australia with mathematics teaching experience. In the state of Victoria, for example, in which this discussion is posited, we found that out of the 1 133 teachers of mathematics in 109 randomly-selected state, Catholic and independent secondary schools in Victoria in 2000, 72 of them (6.4%) were migrants from 28 different countries. This percentage is rather similar to a national figure: 5.1% of the 10 019 primary and secondary teachers surveyed in 1999 in state and non-state schools across Australia had been teacher
trained overseas. Santoro, Reid and Kamler contacted 120 overseas-born, overseas-educated, non-native English-speaking teachers of LOTE (Languages Other Than English) and found that out of the 44.1% who had teaching experience prior to migrating to Australia, a large majority (87.5%) were also teaching mathematics in the Victoria classrooms.

These migrant teachers brought with them cultural baggage of attitudes, beliefs and values which may be different from the corresponding dominant attitudes, beliefs and values in Australia, even if they had arrived from ethnically-similar sources of migration in Australia, e.g. Britain and New Zealand. In particular, these teachers (like all other teachers) subscribe to certain attitudes, beliefs and values with regards to school mathematics as a discipline and to the ways in which it is best taught and learnt. Naturally, value differences and conflicts are encountered by these migrant teachers when they step into the Australian classroom. Further, this paper highlights the subject of mathematics to illustrate that it is not spared from such value differences and conflicts as well, in the context that school mathematics has traditionally been seen to be culture- and value-free. Afterall, the ways in which it is presented and taught in schools are value-laden practices!

"Value conflicts almost certainly lead to painful dissonance that negatively affects one's ability to assimilate new experiences". An unfortunate result of this is when a migrant teacher is unable to reconcile with these dissonance, so that the only option open for him/her would be to leave the educational system. This is certainly undesirable in the context of one's passion for teaching, in the prevailing context of teacher supply shortage, as well as in the context of society's efficient utilisation of available workforce and talent. There are also implications for the continued supply of ethnic minority teachers in an educational system which provides for a multicultural society such as in Australia. Su, Goldstein, Suzuki and Kim, for example, identified the "lack of role models - minority faculty and staff in K-12 schools and higher education, including their professional education - as a significant deterrent" (p. 289) for Asian Americans to enter teaching after their school years. The role modelling contribution by ethnic minority teachers has also been discussed by Asam and Cooper, Bascia, and Chinn and Wong.

Also, a migrant teacher's successful negotiation of value conflicts would imply a more consistent values portrayal in the classroom. Bishop reminded teachers that "whatever decisions you make depend on your values, and through the choices you make, you are implicitly shaping the values of your students" (p. 346). In fact, "the act of teaching is saturated with values, both explicit and implicit, because teaching involves ... essential qualities in values". "Students spend many hours observing their teachers, and to some degree, learn and internalize some of the values and beliefs of their teachers". "As discerning and insightful observers, students picked up on explicit and implicit messages that were conveyed by their teachers". A greater empowerment of - and explicit awareness by - migrant teachers in the areas of values conflict negotiation and subsequent values portrayal is thus crucial in ensuring that students do not become confused by conflicting value signals conveyed by their teachers. Successful negotiation experiences also contribute towards increased teacher efficacy, which promotes students' cognitive, affective and behavioural developments.

In this context, this paper reports part of a larger, ongoing study which investigates the nature of culturally-based epistemological and pedagogical value differences and conflicts experienced by migrant teachers of mathematics in Victorian secondary school classrooms, and the ways in which these teachers negotiate about them in the process of socialising into the local teaching profession.
Socio-cultural aspects of mathematics education

The discussion thus far is meaningful to the extent that mathematics and mathematics education are socio-culturally referenced, that values pertaining to mathematics and mathematics pedagogy are influential constructs, and that teacher socialisation is a significant process for migrant teachers. It may be reasonable to propose that the ways through which school mathematics is taught differ from place to place, and that these differences (the mathematics topics that need to be taught, the grade level(s) particular topics should be introduced, how each of these should be taught, consideration of the prior experiences of students in different schools, etc) are socio-culturally based, associated with differing attitudes, beliefs and values. Even the discipline of mathematics itself, for too long misconceived as being culture-free, is actually socialised knowledge developed as a response to human needs for the purpose of "encoding, interpreting and organising the patterns and relationships emerging from the human experience of physical and social phenomena". While the ethnomathematical movement beginning in the mid-1980s has highlighted the efficient and sophisticated mathematical systems serving different national-tribal societies around the world, Arthur Powell and Marilyn Frankenstein have also reminded that 'ethno' here covers any "cultural group defined by a philosophical and ideological perspective" (p. 173). Even the canonical, 'Western' mathematics which is commonly found in mathematics curricula of many countries today represents contributions from the Arabic, Chinese, Egyptian, Greek and Indian cultures as well, and the way the image of school mathematics is conveyed to students in these cultures may highlight ethnocentric or multicultural aspects unique to these cultures respectively.

Similarly, how different cultures perceive their students' optimal learning of school mathematics, and how the respective mathematics curricula are structured accordingly, mean that mathematics pedagogy is also responsive to socio-cultural differences. "School mathematics is mathematics as it is conceptualised, represented, structured, and sequenced to share with the next generation through the formal schooling experience". In the local context, Horwood traced the (ongoing) evolution of Victoria's mathematics 'Curriculum and Standards Framework' curriculum statement from the colonial 1800s.

In fact, the same teaching materials may be used to achieve different mathematics educational aims. In their comparative study of Asian and American sixth-graders, Brenner, Herman, Ho and Zimmer quoted studies in the 1990s which illustrated that while manipulatives were used in concrete contexts in American classrooms, the use of the same materials in Asian classrooms was aimed at establishing student linkages with abstractions.

Thus, "all formal mathematics education is a process of cultural interaction, and that every child experiences some degree of cultural conflict in that process". In response, 'local' teacher approaches to these cultural conflicts in mathematics classrooms with 'ethnic' students may be one of culture-blind, assimilation, accommodation, amalgamation or appropriation. These responsive approaches were adapted in this current study taking into consideration that it is concerned with 'ethnic' teachers operating with largely 'local' students, and is shown in Table 1 (next page).

Values regarding mathematics education

Certainly, looking at mathematics as socialised knowledge and the socio-culturally referenced ways of perceiving mathematics teaching and learning in schools mean that attitudes, beliefs and values regarding mathematics and mathematics education can vary from place to place. Instead of focussing on migrant teachers' attitudes or beliefs, the study within which this paper is posited has chosen to dedicate research attention to these teachers' values regarding mathematics and mathematics education. The motivating
reason for this is a belief that values underlie the core of cultures, and thus they are less varied, more stable, and more characteristic of particular cultures compared to beliefs and attitudes. After all, culture may be perceived as "an organised system of values which are transmitted to its members both formally and informally". Another reason to focus on values, and perhaps as a consequence of their being characteristic of cultures, is that values have been found to better account for teachers' pedagogical actions and responsive strategies in the classroom.

The number of values is small compared to the range of possible attitudes and beliefs. Krathwohl, Bloom and Masia's 'taxonomy of educational objectives (affective domain)' looks at values development as a process involving the internalisation of different affective objectives such as beliefs. The valuing process proposed by Raths, Harmin and Simon lists seven criteria all of which value indicators such as attitudes and beliefs must satisfy in order to 'become' values. The result of this is that values are transcendental (across objects and situations), and they are "broadest with respect both to the phenomena covered and to the range of behavior which they comprise". In observable terms, values are decontextualised labels best represented by terms such as rationalism or mental computation, whereas the related beliefs and attitudes are meaningful in specific contexts, such as 'mathematics learning trains students to think and reason logically', and 'students in the middle years of schooling need to rely less on mental computation and learn to harness technological aids efficiently'. Indeed, it is relatively easier to produce another example of an attitude or belief associated with the value of rationalism or mental computation; herein lies another reason why there are less values than there are attitudes and beliefs.

Table 1

Approaches by migrant teachers to value differences/conflicts in mathematics education

<table>
<thead>
<tr>
<th>Approaches to value difference/conflict</th>
<th>Assumption</th>
<th>Teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Culture-blind</td>
<td>There is no culture conflict</td>
<td>I teach mathematics in the same way I did in my home culture.</td>
</tr>
<tr>
<td>Traditional view</td>
<td>The Australian culture should influence the surface characteristics of my mathematics teaching.</td>
<td>I include the Australian cultural contexts in my teaching, such as in examples and problem sums.</td>
</tr>
<tr>
<td>Assimilation</td>
<td>The Australian culture should be espoused.</td>
<td>Planning and classroom decisions are affected by the Australian culture.</td>
</tr>
<tr>
<td>Accommodation</td>
<td>The essence of my home culture and the Australian culture should guide mathematics teaching.</td>
<td>My teaching reflects a synthesis of teaching styles from my home culture and from Australia.</td>
</tr>
<tr>
<td>Appropriation</td>
<td>My home cultural values should contribute to a</td>
<td>I have developed a different, consistent</td>
</tr>
</tbody>
</table>
Values are more stable compared to the other value indicators too, partly because the former represents greater levels of internalisation and internal control over the ownership of affective objectives. It is not difficult to imagine an individual's change in attitudes or beliefs, but often we find that the same person's values do not undergo significant changes in his/her lifetime once these values were inculcated in his/her younger years. However, significant life experiences such as migration can exert more pressures on a person's personal values. As a result, McLeod's discussion of increasing levels of response stability from emotions to attitudes to beliefs may be extrapolated to values as well. Perhaps, this explains the several research findings pointing to the inconsistency between teacher beliefs and teacher actions! In this way, if attitudes and beliefs are internally processed amidst an individual's socio-cultural context, and the values thus resulted are stable constructs in the individual's 'cognitive-affective system', it is more readily acceptable to talk about cultural values than it is to discuss cultural attitudes or cultural beliefs.

Values regarding mathematics education, then, represent an individual's internalisation, 'cognitisation' and decontextualisation of affective variables (such as beliefs and attitudes) in the individual's socio-cultural context. They are inculcated through the nature of mathematics and through the individual's experience in the socio-cultural environment and in the mathematics classroom. These values form part of the individual's ongoing developing personal value system, which equips the individual with a pair of cognitive and affective lenses to shape and modify his/her way of perceiving and interpreting the world, and to guide his/her choice of course of action. They also influence the development of the individual's other beliefs and needs related to mathematics education, and more widely, in life.

Values encountered in the mathematics classroom may be categorised as mathematical, mathematics educational, and general educational, relating to the nature of mathematics, mathematics pedagogy and character-building aims of education respectively. Their relationships amongst one another, and with the socio-cultural environment, is best summarised in Figure 1, the structure of which had been drawn from Billett's levels of knowledge genesis.

Figure 1

*Relationship of values encountered in the mathematics classroom.*
It is thus worthwhile to focus our researching lenses on the values which migrant teachers hold with regards to mathematics and to mathematics pedagogy. Being characteristic of the migrant teachers' respective home cultures, these values would be unique to their professional identities. Values are also deeply-held constructs which affect these teachers' decisions and actions in the face of value conflicts. In fact, it may be proposed that any attempt at empowering these teachers with effective negotiation strategies and at effecting a change in their corresponding attitudes and beliefs can be best brought about by examining and fine-tuning the values they subscribe to.

Teacher socialisation

Professional socialisation is the "process by which neophytes come to acquire, in patterned and selective fashion, the beliefs, attitudes, values, skills, knowledge, and ways of life established in the professional culture". Teacher socialisation is the process through which a teacher becomes a participating member of the teaching profession. It is reasonable to imagine that more than the 'local' teachers, migrant teachers' socialisation experience is a significant factor of their professional well-being in their host country. Even with the requisite pedagogical content knowledge and prior teaching experience in their respective home countries, migrant teachers just do not enter a classroom in Australia and teach away as though it is just another working day 'back home'. In fact, as highlighted by many of the teacher participants in the study we are conducting, the initial teaching months in Australia represent a 'make-or-break' phase in their professional lives. As described by Hofstede, migrants are "marginal people between two worlds [that of their home and host countries] and they alternate daily between one and the other" (p. 222).

Any current literature search for educational research studies on migrant teachers is likely to end up with only a handful of work in this area of research. On the other hand, comparatively more research had been carried out on 'ethnic' teachers. In general, these educational research studies with 'ethnic' teachers illustrate a range of issues related to teaching practice as well as teacher relationships and communications with students, colleagues and supervisors. They reflect the three levels of workplace factors involved in teacher socialisation as proposed by Pollard, i.e. interactive, institutional, and cultural. More importantly, the problems encountered by migrant and 'ethnic' teachers in all the above studies may have their roots in cultural value differences. For example, the Asian American student teachers interviewed by Su, Goldstein, Suzuki, and Kim reported the lack of respect for teachers, and this may be best understood in the context of these teachers' own cultural values, of which respect (for elders, leaders, etc) is a significant value. On the other hand, in the Western culture, respect is not readily accorded to an individual's teacher based automatically on hierarchical order; respect from others has to be 'earned'. In Meacham's study, a primary survival strategies of the two African American teacher participants involved the refinement of their respective value system. Clearly, for this to take place, value differences or conflicts must have been causing the dissonance experienced by the 'ethnic' teachers in the first place.

In Leon Festinger's 'theory of cognitive dissonance', 'cognition' refers to "any knowledge, opinion, or belief about the environment, about oneself, or about one's behavior" (p. 3). The central ideas of the theory have been that inconsistent knowledge, opinion or belief about one's self, behaviour and environment leads to psychological discomfort, and that there is an internal drive within the individual to reduce or eliminate the cognitive dissonance in a variety of ways. In the light that different individuals subscribe to different values regarding the socialised knowledge of mathematics and the pedagogies of teaching mathematics, and that these values may well underlie socio-cultural differences and conflicts experienced by migrant teachers in the Australian classroom, we seek to investigate what some of the value
differences/conflicts are, and to learn about the responsive strategies adopted by these teachers to negotiate about these differences/conflicts.

**Methodology**

The two teacher participants in this paper are part of a larger group of migrant teachers who participated in the ongoing study outlined in the last paragraph. This study involves understanding, describing, discovering, and hypothesis/theory generating, characteristic of qualitative research. The migrant teachers’ narratives also demonstrated the absence of any single, objective reality, and acknowledged the world as a function of one’s interpretation and perception, another characteristic of qualitative research. After all, the qualitative methodology is best suited to study affective issues.

The teacher participants, Carla and Manoj, were identified through their respective subject co-ordinators in a survey of all migrant teachers of mathematics in Victoria. Thereafter, both of them accepted an invitation to participate in the research study. A 45-item (consisting of open- and closed-ended questions and statements), self-administered questionnaire surveyed their background professional information as well as their opinions on value differences/conflicts. The questionnaire data provided discussion points during an initial, ‘getting-to-know-you’ conversation meeting between the researcher and each of the two teachers. Carla and Manoj each also participated in three cycles of field data collection (each comprising of a lesson observation followed by a post-lesson interview), constructed a concept-map illustrating the relationships amongst value differences/conflicts experienced, and submitted a set of marked student assignments. The interviews (not the initial conversation) were audio-recorded, and the lessons video-taped, to facilitate transcription and interpretation of data.

Data analysis began upon receipt of the teacher questionnaire and proceeded recursively throughout the data collection exercise. The approach adopted was socio-anthropological, involving the use of multiple data sources to condense data, and expressed a concern with the construction and refinement of grounded theory. A list of home cultural values subscribed to by Carla (and another for Manoj) was constructed and used for reference during the data collection and analysis exercise, while being regularly updated and refined with the attainment of new insights gained through new data and analysis. Written transcripts of interview and observation data were open-coded, whereas data from the questionnaire, concept-map and teacher marking were latent-coded. Axial coding was applied after open coding and latent coding to examine themes, relationships, explanations/justifications and emerging theories regarding value differences/conflicts and the associated negotiation strategies. These theories were recursively modified with each subsequent set of collected data.

A preliminary report on two of the teacher participants in the larger study will be presented here to provide a sense of value differences/conflicts experienced in their respective mathematics classroom in Australia, and how each confronted these sources of dissonance.

**Migrant teacher from Romania ¾ Carla**

**Background**

Carla was an engineer before joining the teaching profession in Romania. She migrated to Australia 6 years ago, took up a teacher education course, and has been teaching at the secondary level in the last 5 years. When she worked with us in this study, she had just joined the state secondary college in metropolitan Melbourne a few months before, having taught in country Victoria prior to that. The student population at the secondary college was
highly multicultural: the 400 students represented over 50 different countries! This is partly accounted for by the establishment of an English Language Centre within the campus, which provided English language tuition programs for secondary aged students, and whose students might make their respective transitions to mainstream schooling by remaining in the school itself. According to the prospectus brochure, the school "values the harmonious diversity of cultures within the College", and maintained an overseas student exchange program as well as an active relationship with overseas sister schools. The class observed was a Year 12 Further Mathematics class. Although the students' cultural makeup mirrored the school's diverse student population, none of the students in the class observed shared the similar home culture as Carla.

In her previous school in a country Victorian town, Carla was regularly reminded by her principal to teach mathematics 'in the Australian way', although he was not able to describe what this teaching 'style' entails. To Carla,

I strongly believe that Mathematics is Mathematics in any culture. I teach Mathematics my own way, with a great passion and commitment to the students I teach.

Reflecting this was her questionnaire response, in which she strongly disagreed with the statement that 'depending on the country I am teaching in, my mathematics lessons portray different underlying values or messages to my pupils'.

This belief of Carla's has been continually reinforced by students and their parents:

parents and students have always been very supportive. Students love the fact that they 'can do Maths' following my explanations and instructions.

Parents love the fact that their children become (more) confident in themselves.

Conceptual or procedural knowledge?

One of the value differences/conflicts experienced by Carla related to the promotion of conceptual or procedural knowledge in the different cultures. Carla felt that with its emphasis on student understanding of mathematical ideas, the mathematics curriculum in Australia promoted conceptual knowledge. On the other hand, in Romania, there had been more of an emphasis on student ability to do mathematics, to acquire procedural knowledge. In a way, this value difference is also reflected in the relative differences in the type of, and the relative importance Australia and Romania place on, assessment given to students. A student's performance in examinations in Australia does not generally affect his/her prospect of moving on to the next grade level in school the following year. In Romania, however, a student is expected to demonstrate sufficient knowledge and ability during assessment exercise for eligibility to proceed to the next grade level. As a result, examinations are a relatively more significant event in a Romanian student's school year.

Need for proficiency in 'how to'

In negotiating about the perceived value difference in emphasis between conceptual and procedural knowledge, Carla's actions reflected her questionnaire response that values in mathematics are independent of cultural context, and that she should thus continue to teach mathematics in her own way. This corresponds to the 'culture-blind' responsive strategy as outlined in Table 1.
As such, in the midst of demonstrating the relationship between the trigonometric ratios tangent and sine/cosine, Carla initiated a detailed explanation of dividing two algebraic fractions.

As she summarised in the post-lesson interview,

you have two fractions, a over b equals c over d. Let's suppose I want to find out this one when I know these ones, alright? The easiest way to go is times this, and divide by that.

In her opinion,

that's the basic thing, you know. But I did go through them, because they need it at some stage.

However,

it's not taught here [in Australia]. It is not taught, how do you work this one if it is not taught? You look in the syllabus, it is not there! .... This is what I taught them a couple of days ago, you know, a equals bc over d, that's it .... And they [the students] just like it .... They said to me, "but nobody has [sic] taught this". I said, "I know, it's not there". And it isn't, you know? I mean, how do you want students to understand half the things when something like that is not taught?

During the researcher's visits to her class, it was noted that Carla regularly paused to ask students what the next step in the solution would be. The step/strategy (e.g. 'make x the subject', 'simplify the algebraic fraction') was then written on the whyteboard, before Carla proceeded with the solution (utilising the strategy). Here, Carla was demonstrating once again her valuing of student procedural knowledge involved in solving mathematics questions. The general steps/strategies put on the board thus resembled the steps one expects in recipes. In fact, for examples that followed which made use of the same solution strategies, Carla was observed encouraging students on by reminding them that the same steps were to be used.

Teacher-centred or student-centred question posing?

In a student-centred learning environment, students' prior knowledge is acknowledged. There is a focus on directing student motivation, interest and energy towards the lesson at hand. This was embraced by Carla in her questioning style in Romania, even though students "will put their hands up, and the teacher will say you, or you, or you". In Carla's words,

in Romania, there is talking all the time between the teacher and the class. There is asking questions all the time, because you don't want to give them all the knowledge. You just want to get something from them, so they help themselves.

That desire to lead the students to help themselves in (co-)constructing knowledge is indeed a characteristic of a student-centred learning situation.

Amongst her Australian classroom experiences, Carla described as the most significant difference in the teaching of school mathematics (between Australia and Romania), the teaching and learning of basic mathematical knowledge. In Romania,
the teaching of mathematics is more structured and the basic skills are drilled and practised until learnt .... At primary school levels mathematics is taught by specialised mathematics teachers.

While this had naturally enabled her to perceive Romanian students as knowledge-laden learners extending their mathematical knowledge and making meanings in class, Carla had found it difficult to treat students similarly in Australia, where they did not appear to be equipped with basic computational skills to begin with. Does this impose a pressure on Carla to adopt a more teacher-centred stance when posing questions, where the teacher's role is the guru who expounds, and the student's role is the ignorant who learns?

Making the switch

During the lessons visited, the researcher observed that Carla's questions were all directed at the class rather than at any one student. In fact, any student in the class could offer his/her response to the posed question from his/her seat without asking for Carla's permission to speak (e.g. by raising their hands). Carla was conscious of her questioning style and accepting of the students' responding style, however. The main reason why she had not picked particular students to answer questions in class was because some students don't feel comfortable to answer questions [in public] .... So, you know, I didn't want to embarrass anyone.

Interviewer: Normally, would you _

Carla: Yeah, I would, yeah, I would. Sometimes I would. I do [embarrass students] sometimes. I ask a question and they don't know, and I said, what I come to realise is that it doesn't matter whether they have the answer or not, or if the answer is wrong or right, because it's all a learning process .... If they come with the wrong answer, I tend to say, "doesn't matter, we all make mistakes. So what's the big deal? You know, I mean, you have attempted this".

Interviewer: On what basis would you pick the students to answer questions?

Carla: I tend to ask questions, to ask students who are the quietest, who don't answer questions usually .... There are some [students] who just want to sit there and I tend to ask the ones who never say anything because I want to know what they know, or if they get the understanding or not.

Thus, even when Carla allowed students to freely answer her questions from their seats without raising their hands, she was making a note of those who remained quiet, so that she would at other times direct questions specifically to these students to help her assess the level of their knowledge and/or understanding. Note again that the purpose of getting students to answer questions was to allow Carla "to know what they know, or if they get the understanding or not", which has an assessing flavour and which reflects the teacher-centred teaching style (as opposed to posing questions to elicit student reasoning or opinions or to extend students' thinking).

Quite clearly, what Carla was demonstrating here was a conscious effort on her part to be sensitive to students' self-image and thus to pose questions to the class in general rather than directing them to particular students. At the same time, however, Carla remained on the lookout for students who were not very participative, and at other times she would find herself asking these quieter students to answer her questions, ending up embarrassing them sometimes. In this context, her follow-up explanation to students (that making mistakes is
part of the learning process) would thus be attempts to protect the particular students from feeling/experiencing embarrassment in the presence of their peers, even though she would much prefer the students concerned to be able to supply her with the right answers.

Carla's sensitivity to students' self-image has affected her questioning style in that she no longer expects students to raise their hands to answer questions. In making the switch to a teacher-centred questioning approach, however, there has been a need for her to identify particular students at times for on-the-spot individual assessment purposes. In this situation, the value difference was related to differences in the way the teaching of mathematics has been carried out in the two different cultures (as mentioned above), and the teacher (Carla) was faced with a conflict because what appeared to be sensible pedagogical responses in one culture represented very different teaching orientations and perception of teacher and student roles in another culture. Nevertheless, as in the previous situation, Carla still has the choice of responsive strategies in the context of Australian students lacking in basic mathematical skills. One may argue that another teacher would have elected to continue to adopt the student-centred strategy as a stimulation to his/her students in Australia. But Carla had chosen to accommodate her professional practice in the context of her perception of the Australian students: her planning and classroom practices with regards to asking students questions were clearly affected by the realities of the mathematics classroom in Australia.

Migrant teacher from Fiji ¾ Manoj

Background

Manoj is ethnically Fiji Indian. He was educated, teacher-trained and he taught in Fiji before migrating to Australia twenty-seven years ago. At the time of his participating in this study, he was teaching in a state secondary college in metropolitan Melbourne, whose 550 students were mainly from middle-class families, many of which were single-parent households. Most of Manoj's students were ethnically different from him. The class observed was a Year 8 mathematics class.

Manoj's professional worldview was one which stressed education for life. To him, educating a student goes beyond preparing him/her for examinations. Thus, Manoj felt that teachers should teach the necessary knowledge and skills which students would find useful in their future lives. In a way, this also reflects his valuing the applicability of school subjects, including mathematics. Related to this is also Manoj's subscription to the mathematics educational value of relevance: he believed that it is important that students understand the relevance of mathematical knowledge and skills in daily life, even if a student "becomes a bum".

Manoj also stressed the value of (student) discipline to desire to learn. This value was related to motivation, and he felt that a disciplined student would be able to achieve beyond perceived cognitive or environmental limitations.

Drills or problem-solving?

A value difference/conflict which recurred in the lessons observed related to a difference in emphasis in Fiji of drills/rote learning, and in Australia of problem-solving. In Manoj's memory, mathematics teaching and learning in Fiji required students to remember facts and procedures, and to practise applying them repetitively. This does not mean, though, that student understanding was not being facilitated. In Australia, however, it would be difficult to imagine students practising on 30 mathematics questions on a daily basis. To Manoj, school mathematics in Australia emphasises student ability to apply basic mathematical knowledge
or concepts to novel mathematical contexts. For a teacher who values *practice*, the problem would be to accept that students might be able to go straight into problem-solving activities.

**Drills, then problem-solving**

In negotiating between these different values, Manoj acknowledged the usefulness both in students acquiring the basic mathematical skills, and in their learning to apply these skills in real-world situations. He believed that basic skills were best learned through rote and repetitive practice, but with understanding:

> [with the basic concepts] you do need to obtain the necessary answer by rote learning. You can’t get away from it. But at the same time, you need to understand what you are doing.

Thus, during the lessons observed, Manoj often explicitly asked his students to remember the necessary, important points. One example is his frequent reminder to the students to remember (not just understand) the order of the coordinates in an ordered pair.

At the same time, Manoj’s personal value of *relevance* (of school mathematics to daily life) meant that he also agreed with the Australian emphasis of applying mathematical knowledge and skills in life:

> That’s the sort of thing about rote learning. I mean, there are situations that are meant to test your skills which you are expected to pick up in school. For example, at the supermarket, you have ten dollars and you bought an item for three fifty. You should know readily how much change you should get. The cashier may key in the price at the register, that’s fine. But sometimes they key in the wrong thing! I went the other day, and I think something wasn’t working; she couldn’t work out my change … But mathematics is also logical. It also teaches us how to plan and what to do.

The last two sentences also indicate the complementarity with the nature of mathematics (the mathematical value of *rationalism*) in Manoj’s portrayal of *relevance*. Thus, Manoj had put together the rote learning and drills activities typically held in his home culture and problem-solving activities in Australia such that the former effectively facilitates the latter.

Although his school textbook arranged student open-ended investigative activities before exposition of concepts and formulae, in expressing his negotiation between concept learning and applications, Manoj would present these sections in reverse order, a demonstration of his resolving the tension between drills and problem-solving.

The drill exercises Manoj presented as class work or homework did not simply involve repetitive skills application either. The questions chosen for his classwork and in the student assignment collected reflected Manoj’s systematic presentation of questions in increasing levels of difficulty and increasingly specific question conditions, illustrative of Manoj’s ‘drills-to-promote-understanding’ approach.

**Teacher-centred or student-centred learning?**

Another significant value difference/conflict confronting Manoj was related to teacher-centred versus student-centred learning. Manoj had expressed in his questionnaire response that knowledge was imparted only by teachers in the Fijian classroom, whereas education was not as teacher-orientated in Australia.
Teacher-centred learning: the way to go in reality

As in the previous situation, Manoj’s actions in response to this value difference were the result of careful consideration of the two opposing learning (and teaching) modes. While Manoj acknowledged the potential pedagogical strength of student-centred teaching and activities, and that students may be taught the necessary skills to learn on their own and with one another, he was not convinced (over the years) that in reality, students were able to engage purposefully on the task at hand:

Interviewer: There’s a group of people who believe that students can learn by discussing with one another. What are your views on this?

Manoj: I have yet to find this happening (chuckled). Look, I know what discussions are all about. You see, when you hold discussions, they get out of hand. That’s what I find from my own experience. And you find that somebody would say something from there, and then somebody else say something else from elsewhere, and so on. Nobody is listening. Everybody is just throwing things around. So, I don’t know, to me, I want to be focussed, to impart the things that I have to teach. I mean, discussions are all very relevant in other subjects, such as English.

As such, teacher exposition and teacher chalk-and-talk were strong features of the lessons observed. In addition, Manoj frequently emphasised student attention to what he was saying, especially when he was explaining key concepts. He might be introducing the Cartesian plane as the juxtaposition of a pair of perpendicular number lines, for example, and he would break into reminders such as the following to focus student attention:

Part of the problem with some of you is that you don’t pay attention when I’m explaining something which is basic and relevant. When it is basic, you should understand what we’re doing before we go on and start doing the actual work [of applying the basic concepts to problem sums].

However, Manoj acknowledged that he has made some concessions to his personal values in his teaching experience in Australia in this regard:

[here in Australia] I understand that it’s not possible for them to do that, to concentrate all the time. And, so, this is why I break the monotony of the subject by what I did …. [For example] I got them to get up to do questions on the board, so that they are not sitting all the time. Then I give them the last 25 minutes or so to do their tasks.

The emphasis which Manoj placed on teacher-centred learning was also reflected in his conduct of the classwork/homework activities. Thus, while students were working on them in class, he explicitly reminded them to work individually and quietly. Students who had difficulties with answering the questions were reminded to direct their respective queries to Manoj only, and not to their peers. Otherwise,

once they start looking for somebody else, they are causing commotion …. They come asking you, and then you are not doing your work, you are telling and explaining to him.

Manoj’s decision to continue with teacher-centred teaching styles was made amidst his awareness of his perception of the relative differences in teaching styles between Fiji and Australia. He had not automatically continued to teach in Australia in the same way he did in Fiji without giving a thought to the possibility of shifting responsibility of learning away to the
students. He could sense a cultural value difference, and he weighed the two options before concluding that a teacher-centred teaching style is the answer for his mathematics class in Australia. This is not a culture-blind response from Manoj: he was aware of the cultural value differences in the two countries' mathematics classrooms, and he had also made some changes in his teacher-centred approach (by giving the students in Australia breaks in between concentrating on his teaching). What has been developed, then, was a teaching style reflecting (again) the appropriation response, one which Manoj felt was customised and optimal for mathematics teaching and learning in Australia.

Discussion

The teachers' perception of relative value differences/conflicts

As far as their professional practice within their respective classrooms is concerned, Carla and Manoj have obviously negotiated about perceived cultural value differences/conflicts and remained in the Australia teaching profession, relatively 'at peace' with it. In discussing their experiences and their respective ways of dealing with value differences, it is perhaps important to explain at the onset our use of the terms 'relative' and 'perceived' (and the associated forms) with regards to the value differences encountered by the two teacher participants in their respective mathematics classrooms in Australia.

Value differences related to pedagogical activities and to mathematics are understood in a relative context. Thus, we see in this paper that in Carla's case, the Australian mathematics classroom embraces a relatively teacher-centred approach compared to the Romanian mathematics classroom, whereas in Manoj's case, the Australian mathematics classroom's approach is relatively more student-centred when compared to the Fijian mathematics classroom. This perspective is of course not novel, and an example here would be to refer to Hofstede's five cultural value dimensions, in each of which he represented each of the more than 50 countries' scores as points along a line: they indicated rank order, and the score difference did not imply strength of the difference (incidentally, the findings of our current study complement the five value dimensions. For a preliminary discussion, see Seah and Bishop).

Value differences and conflicts mentioned in this paper are as they were perceived by the two teacher participants. The extent to which they exist in the different cultures and if they do, the extent to which the differences were as perceived is not as important as the extent to which these were perceived by Carla and Manoj to exist. Here we are acknowledging the sensitivities which migrant teachers bring with them to their respective professional socialisation processes, and it is through their cultural lenses with which they have to make sense of the cultural value differences and conflicts they perceived and encountered in their respective transitions to the Australian educational system. In that sense, it may also be reasonable to say that even Carla would present a different negotiation experience than Manoj if she were to be allocated Manoj's mathematics class in Manoj's school.

Nature of value differences/conflicts

Carla and Manoj's experiences provide us with a glimpse into the nature of value differences/conflicts which migrant teachers may encounter in the mathematics classroom in Australia. Although only four value differences/conflicts were introduced in this paper, it is clear that the context in which these occurred in the two classrooms permeated most, if not all, aspects of teachers' professional lives.

At the intended curriculum level, Carla was aware of differences in the expected student learning outcomes for similar topics in Australia and Romania. In particular, she noticed that
student skills in manipulating algebraic fractions was 'not in the syllabus'. As for Manoj, his preference to promote student understanding through drills has resulted in his teaching to reflect a re-arrangement of the order in which the school-prescribed textbook presented the activities, expository text and practice questions.

There were also examples of value differences/conflicts affecting other facets of the teachers' respective implemented curricula. Carla's perception of a difference in emphasis between conceptual and procedural knowledge, for example, had potential consequences towards her lesson presentation in front of her students in Australia. Similarly, Manoj's emphasis on drills at the beginning of topics led to his regularly reminding students to remember key concepts and conventions. His chalk-and-board teaching style was also attributed to his management of the value difference/conflict related to teacher-centred versus student-centred pedagogical theories. In Australia, this same value difference/conflict had also meant that Carla had to alter the ways in which verbal questions were posed to her students.

At the attained curriculum level, Carla also had to take into account how the relative emphasis on conceptual knowledge (against procedural knowledge) in Australia had affected the ways mathematics assessment was viewed differently in both countries. Manoj's decision to emphasise drills first in the early stage of introducing a particular mathematics topic had also affected the ways in which his classwork and homework questions were selected.

Clearly, the value differences/conflicts had also influenced the nature of relationship between Carla/Manoj with her/his students in Australia. Carla's accommodating to a more teacher-centred teaching strategy in Australia, for example, had meant that her questions posed in class were structured to assess students' attainment/understanding of the relevant skills/concepts, rather than to make use of questions to stimulate student creative or reasoning skills. In another school, we saw how Manoj's embrace of teacher-centred pedagogical practices resulted in his regularly reminding students to pay attention "when I'm explaining something which is basic and relevant", and to direct their own queries to him (and not to their peers).

*The role of overriding values*

While both Carla and Manoj employed different strategies in response to the value differences/conflicts each encountered in their own mathematics classroom, they were generally consistent with each teacher's personal, more general values pertaining to mathematics education. Carla, who valued mathematics and mathematics education as essentially independent of culture, generally adopted the culture-blind approach as her negotiation strategy amongst the value differences/conflicts she had come across. On the other hand, Manoj held the view that there were aspects in both the Australian and Fijian mathematics education traditions which could be used to reinforce one another, and through the years he believed that he had developed a teaching approach which was different from his teaching style in Fiji, but which was also different from a 'typical' Australian teacher's approach (if that exists), one which he believed was optimal in facilitating mathematics teaching and learning in Australia. This appropriation approach was consistently reflected in his response to cultural value differences/conflicts.

Of course, this is not to say that having these more general values, Carla and Manoj were not actually faced with value differences/conflicts. For example, when Manoj became aware of the greater emphasis in Australia of problem-solving (and a correspondingly lesser emphasis of drills), harnessing the strengths inherent in both drills and problem-solving did not come about automatically. His value of education for life contributed to his belief that
there were features related to problem-solving in the Australian mathematics education system which were worth ‘importing’ to his pedagogical repertoire.

Thus, while values related to two differing teaching activities may be in conflict, it appears that some other more pervasive, internalised values in the teacher participants' respective affective-cognitive systems (e.g. Carla's value of mathematics being culture-free) were in operation, guiding Carla and Manoj through the negotiation processes. As discussed in Seah, Bishop, FitzSimons and Clarkson (2001), these overriding values represent the apex in the taxonomy of educational objectives (affective domain) (see Krathwohl, Bloom, & Masia, 1964), and characterise an individual and his/her actions. At this level, the individual "responds very consistently to value-laden situations with an interrelated set of values" (Krathwohl, Bloom, & Masia, 1964, p. 35), overriding other values whose respective degree of internalisation may correspond to lower levels of the internalisation continuum (such as valuing and organising). In other words, a knowledge and an understanding of what these overriding values are for particular migrant teachers may help customise professional development programs to socialise these teachers in more positive and proactive ways.

*Responsive strategies as a function of educational context compatibility*

In this paper, we have chosen to demonstrate Carla's rather different approach in her switch from a student-centred questioning style in Romania to a teacher-centred questioning style in Australia. The accommodation strategy was rather uncharacteristic of her general values and associated beliefs regarding mathematics and mathematics education, and in fact represented a 'giving-in' situation on her part. A point of interest is what accounted for the un-Carla 'phenomenon' in this particular instance. The four value differences outlined in this paper (two for each of the two teacher participants) are quantitatively sufficient upon which we will propose our explanation, even though it is grounded in the wider set of data collected in the larger study mentioned.

Carla's encounter between conceptual or procedural knowledge pedagogical emphases was located in the context of assumed broad similarities in mathematics curricula in Australia and Romania, such that it was possible for her to select either emphasis for her students in Australia. That there exist differences in the two countries' mathematics curricula (which Carla was explicitly conscious of at the same time) does not, in practice, prevent any teacher from continuing to teach 'the Romanian way' in Australia! Of course, how receptive the students, parents and colleagues would be, and the extent to which Carla's culture-blind approach led to the students fulfilling the learning outcomes specified in the state's current Curriculum and Standards Framework, would regularly exert pressures on Carla to re-examine her teaching approach. The fact that the approach has remained the same is significant from both the research and practice points of view, and this will be taken up towards the end of this paper.

Similarly, Manoj's decision to appropriate the values associated with drills and problem-solving teaching activities was made in the context of an assumed constant, i.e. his view of the role of school mathematics in a student's future life. When he had to make a choice between teacher-centred and student-centred teaching, there was another assumed constant in operation, i.e. that students anywhere (in Australia, Fiji, etc) learn best in a teacher-centred learning environment.

However, when Carla found herself in the Australian classroom, she sensed the difference in the academic prior knowledge (and thus, perhaps, interest and motivation) between students in the Australian mathematics classroom and their peers in Romania. It was in the knowledge that students in Romania were equipped with the necessary basic mathematical skills and were relatively more motivated that she was able to adopt a student-centred
teaching approach associated with the value of personal knowledge construction in Romania. Carla, however, had not been able to establish this feature of Romanian students as an assumed constant in the context of her Australian teaching experience, and thus she had to accommodate. That said, she had not compromised on her general values (and associated beliefs) relating to mathematics teaching and learning. In fact, we may also propose an additional overriding value of individuality, associated with the belief that effective teaching involves treating students as individuals with individual talents and needs, situated against different socio-cultural backgrounds, and designing teaching strategies to cater to these differences.

Implications for practice

Both Carla and Manoj have been happily settled in their respective Australian mathematics classrooms at the interactive level of their professional lives. As observed in the classroom visits, both Carla and Manoj still encounter value differences/conflicts (and indeed, these incidents are unlikely to go away in time). The important difference arising from their socialisation, though, is that they may no longer cause psychological discomfort to either teacher. Rather, both Carla and Manoj were engaged in interacting (see Bishop, in press) with these incidents in ways which they feel in control and professionally fulfilling. These teacher participants illustrated that "rather than seeking resolution of the cultural conflict by eliminating difference, one can imagine instead the possibility of engaging ... in cultural interaction, which will involve an alternating and reciprocating development of conflict and consensus" (Bishop, in press, p. 198).

Nevertheless, Carla and Manoj's experiences, briefly outlined in this paper, revealed the extent to which value differences/conflicts may affect different aspects of teachers' pedagogical intentions, planning, activities and interactions. Importantly, their experiences demonstrated that migrant teachers could contribute fruitfully and fulfillingly in the Australian mathematics classroom using a range of different strategies to negotiate about the inevitable cultural value differences/conflicts, without necessarily forgoing values of their home cultures embedded in teaching practices. In fact, especially in the case of the appropriation approach, migrant teachers' cultural pedagogical knowledge has the potential to enrich and further fine-tune existing local pedagogical ideas and practices. This knowledge can be professionally empowering to migrant teachers, and indeed to any teacher who crosses cultural borders as he/she moves from an inner-city to a countryside school, moves interstate, or moves from a state to an independent school, for examples.

While national/state mathematics curricula identify the culture-specific aims, purposes and roles of school mathematics education, and thus also the 'what' of teaching, the 'how' of teaching and of achieving these targets remain a teacher's craft. There may always exist the question of how best to teach particular topics to particular students in particular cultures, and this may account for the fact that the 'how' dominates the 'what' in mathematics educational research and professional development courses. In some ways, then, the migrant teachers' professional practice and their experiences in negotiating about value differences/conflicts in facilitating an effective mathematics education experience for students may well be enriching lessons for all their colleagues as well.

At the institutional level, Manoj had been 'fortunate' in that he had been working with principals who appreciated the contribution to professional practice he brought along in his cultural baggage. Carla's experience, however, highlights the potential difficulties associated with peers and supervisors' acceptance and open-mindedness at this level of professional socialisation. It is interesting to note that despite regularly urging Carla to teach mathematics 'in the Australian way', her previous principal had not been able to respond to her query as to what constitute(s) this form of teaching. Perhaps, ironically, Carla and Manoj's respective
experiences in their crossings of cultural borders as outlined in this paper will help define an even more effective mathematics teaching 'in the Australian way' in a country such as Australia which cannot isolate herself from an era in which the concept of geo-politico national borders is fast being redefined, if not becoming obsolete.

References