

More Perspectives on the Impact of Globalisation on Mathematics Education in Higher Education in Australasia

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We have argued elsewhere that global collaboration is essential for moving the discipline forward in this globalised world - at the same time avoiding the colonialism of the past - and allowing the discipline to play its role in bridging the ever-increasing gap between countries (Atweh & Clarkson, 2001b). This issue of global collaboration sets the tone for this paper. In this study we conjecture that for those who have had and continue to have an active set of international contacts and/or experiences, their appreciation of the impact of the processes of globalisation would be heightened. To gain some insight into this issue a survey was developed and distributed to Australian and New Zealand mathematics education researchers. Although we found a divergence of views that our colleagues hold across a range of issues, there does seem to be a trend for colleagues who have experienced at some depth non western cultures to appreciate more deeply some of the issues thrown into relief by the notions of globalisation. We believe that more discussion on the notions of globalisation and how it is impacting on mathematics education will challenge us all and give more depth to our thinking and practice. This in turn will position each of us to be better able to deal critically with fundamental issues in the globalised world in which our students and we now live.

Robitaille and Travers (1992) have claimed that mathematics education is one of the most internationalised areas of higher education. This is evidenced in the number of international conferences and research activities that occur each year, as well as the number of international journals published, each of which reflect great similarity of topics and methodologies across many countries. A question then arises as to whether such a state of affairs is a reflection of the process of globalisation on mathematics education. Few research studies have problematised this issue. The detailed thinking behind the particular project, of which the study reported in this paper is part, has been argued in Atweh and Clarkson (2001a), and developed more recently in Atweh, Clarkson and Nebres (in press). The project as a whole has focussed on the impact of globalisation in mathematics education in higher education. The particular agenda for the project has been laid out in detail in various papers including Clarkson and Atweh (2002).

When dealing with notions such as globalisation we are aware of the difficulties of definition. In a review of an edited comparative education book, the framework used centred on "The problem of how the global affects the local ... one of the most important areas of research interest within global studies". Yet the editor commented that "nowhere in the book is there an accepted definition of globalisation or any common analysis of its relationship to education" (Woock, 2000, pp.163–164). We have found Waters' (1995) definition helpful: "a social process in which the constraints of geography on social and cultural arrangements recede and in which people become increasingly aware that they are receding" (p.3). McGinn (1995) notes that "There is some evidence ... that the processes of globalisation are compelling rather than invitational, and therefore require careful scrutiny" (p. 78). And yet this social process is not necessarily negative, as some in the media would have us believe, but rather is a process that we need to be careful of. Hence this process

needs to be researched is all human activity, including the cultural one of mathematics education. In passing we would comment briefly on something that Woock hints at above. Even though globalisation is framed as a powerful, all encompassing process, in its turn, perhaps because of its very nature, it seems to spark or induce social processes at local levels that may be quite contrary to the globalising process, and hence effective sights of resistance come into being. Therefore there seems to be always limits to this powerful process.

Elsewhere we have raised the issue of a "global curriculum vs. global collaboration" in mathematics education (Atweh & Clarkson, 2001b). We have argued that global collaboration is essential for moving the discipline forward in this globalised world - at the same time avoiding the colonialism of the past - and allowing the discipline to play its role in bridging the ever-increasing gap between countries. This issue of global collaboration sets the tone for this paper. So far in this project, a series of studies are progressing in which data has been collected from focus groups in Columbia, Brazil, Mexico and, in particular for this paper, from Australian and New Zealand colleagues at an earlier MERGA conference. Each focus group was composed of colleagues who had participated regularly in international activities of one type or another (see Atweh & Clarkson, 2002a, 2002b, 2002c).

From the focus group data there have been a number of consistent topics that participants have discussed. These include issues that have their origins in the economic/political debates on globalisation, but which have been reflected on in terms of mathematics education practice in higher education. An example that has emerged consistently as an issue is the impact of technology, and in particular email contact with peers in other countries. A political issue has been the influence of aid or research projects funded by such bodies as UNESCO or the World Bank. It has been noted that such projects often assume that western theories of education and western forms of curriculum, including assessment practices and their results, must be useful, important or indicate appropriate change in all countries. Another issue to emerge, more aligned to education, has been the nature of mathematics and whether it is a type of universal language, or whether Western Mathematics is a cultural tool being used, albeit unwittingly but often, as a hegemonic, globalisation form of disempowering local mathematics and/or mathematical practice. As a counter to this, one group spoke of the rise of ethnomathematics, which in some way arose as a local disruptive force to the all embracing push of western mathematics. In turn ethnomathematics itself has spread beyond its original local environ.

In this present study, we conjecture that for those who have had and continue to have an active set of international contacts and/or experiences, their appreciation of the impact of the process of globalisation would be heightened. To gain some insight into these issues, a survey was developed and distributed to mathematics education researchers.

Methodology

The particular group targeted for this study were mathematics education academics, who were members of the Mathematics Education Research Group of Australasia (MERGA) that were working in some capacity at a university. This meant omitting some MERGA members. It seemed to us that in universities there is a clear expectation that staff

will be very aware of the research in their field, both generated locally as well as internationally. The same expectation is not always as well defined for MERGA members working in other institutions. The other restriction on the sample was that respondents were to complete 50% or more of their professional time engaged in the researching and/or teaching of mathematics education. The last point to make is the restriction to MERGA membership. There are some university colleagues who teach mathematics education at universities in Australia or New Zealand who are not members of MERGA. However our estimate is they as a group would represent less than 5% of the mathematics education community.

There were two methods used to obtain respondents for the survey. During the 2002 annual conference of MERGA, an appeal was made to colleagues who felt they fitted the above criteria to complete the survey that we distributed at the conference. Subsequently Australian or New Zealand members, who were employed at a university, were emailed a copy of the survey with a similar request. The total number of MERGA members contacted was 110.

We turn now to the construction of the survey itself. Although it is not an absolute necessary condition, it is probable that academics with some experiences of other cultures are able to appreciate more deeply issues surrounding the notions of globalisation and internationalisation. To this end a number of items asked respondents to indicate their place of birth, in which country they were presently working, the country in which their qualifications were obtained, the languages they can communicate in, and whether they had worked, studied or conducted research in another country for more than two months. An opportunity was also given for respondents to elaborate on any influences on their own thinking that working on international research projects and/or programs may have had. Another way that might give insight into a respondent's appreciation of other cultures is the personal contacts they have with colleagues from overseas. To this end an item inquired as to the frequency of personal contact these academics had with colleagues from other countries via email. Another item asked respondents whether they had personally had a chance to meet a mathematics educator from a different country to their own in the last five years, and the frequency of ongoing contact that had been maintained.

The second area of inquiry concerned the resources the respondents choose to use. Two items focussed on their use of mathematics education research journals and conferences. We deliberately excluded more general research and teacher conferences or journals. These items asked the respondents to not only name the resources but indicate how often they used ideas from them in their own research, teaching and professional development with teachers. An opportunity was given for respondents to elaborate on what they found most valuable about the conferences and journals listed.

The final aim was to investigate what our colleagues thought about:

- The supposed universality of mathematics viewed as a universal language, and
- What benefits, may be dangers, and/or limitations if any, are there to be had from international contacts.

Results

Of the 26 returns received, after applying the filtering processes noted in the previous section, 24 remained in the sample. What percentage it is of the total MERGA membership that fall within the selection criteria is hard to estimate. We would suggest that the results of this survey are at least indicative of what many in the mathematics education research community in Australia and New Zealand feel about the issues canvassed.

Four of our 24 colleagues were not born in Australia or New Zealand, but only one in a country where English was not an official *lingua franca*. Seven respondents said they were highly proficient in at least two of speaking, listening, writing or reading modes of at least one non English language. All of the respondents indicated that they had completed their education research degree work in an English speaking country. On the other hand 14 of our colleagues had spent at least two months or more working, studying or conducting research in another country other than where they were now working, with virtually all of these having worked in more than one such country. Of these, nine at least had one of these experiences in a predominantly non English speaking country.

While most of our 14 colleagues who had worked, studied or researched overseas understood these experiences as extremely informing in their professional lives, a few saw them as tangential experiences at the best. There seemed to be a tendency for colleagues who had only worked in English speaking countries to reflect on the similarities of the problems and issues in the overseas country and in their home country. In contrast to this, colleagues working in non western countries reflected in the main on the differences to their home country, and they experienced a challenge to holding a western view of the world of mathematics education. Two of these colleagues went further questioning the validity and motivation for aid programs labelling them as "examples of cultural imperialism" with "elitist curricula and inappropriate examination structures developed or confirmed in the recipient country".

Another type of experience through which one becomes aware of other cultures is by having personal experiences with peers from overseas countries either through direct contact with visitors, or via email. Clearly there may well be some overlap in the following data which reports on direct and email contact. All but four of our colleagues reported that they had had some direct contact with visitors from other countries, as well as some email contact. Only one colleague indicated only email contact with overseas peers. In detail, 11 of the respondents indicated that they had continued to have frequent contact with at least one overseas visitor, with six of these visitors being from a predominantly non English speaking country. Four colleagues reported that they had frequent contact with three or more visitors. The majority of visitors were from English speaking countries. As for email contact, 16 of our colleagues reported that they had frequent email contact with three or more such contacts. In contrast with the visitors, 17 of the overseas peers with whom our colleagues had frequent email contact were from non English speaking countries. These data confirms the earlier data from focus group discussions. Many colleagues are utilising email as an effective communication device to discuss mainly research, with some additional teaching ideas, with overseas peers.

In collecting data on which journals our colleagues read, Table 1 sets out those that were included by at least 3 respondents, how many respondents read them, and how many

respondents contributed regularly or often as authors (first three rows). An indication had been asked for in the survey as to whether ideas found in each journal were used by the individual in their research, teaching and/or professional work with teachers either sometimes, often or on a regular basis by using 1, 2 or 3 respectively. By totalling these across all three activities and dividing by the number of respondents listing the journal, a measure of impact of each journal was calculated with 0 indicating no impact and 9 a high impact on professional life.

Apart from the three journals listed in Table 1, three colleagues indicated they made use of the SAME Papers, Journal of Mathematical Behaviour and Journal for Mathematics Teacher Education. There were six other journals listed by respondents. Interestingly all 12 journals used English, and all were sourced in western countries. Clearly the regional journal MERJ is used and contributed to most by colleagues. There seems to be little difference in the impact of the three most used journals on our colleagues' professional work. Also of interest is the omission from the above list of some easily accessible journals within the Australasian region that use English, but report studies mainly from our Asian neighbourhood; for example the Journal of Science and Mathematics Education in Southeast Asia.

Table 1
Journals Read by Respondents and Conferences Attended

Name of journal/ conference	Range aimed for	Language used	No. of readers/ conferees	No. who were authors/ presenters	Total impact of journal/ conference
MERJ	regional	English	19	14	5.0
JRME	international	English	17	7	4.9
ESM	international	English	12	7	5.0
MERGA	regional	English	24	14	6.4
PME	international	English	13	6	6.9
ICMI	international	English	7	2	4.1

There was also opportunity for some extended answers as to why particular journals were felt to be valuable. The majority of respondents noted that MERJ gave a good regional perspective, whereas they gained a broader international perspective from JRME and/or ESM. Only one respondent then noted the USA bias of JRME, and that respondent with one other commented on ESM as being mainly concerned with Europe. These views have been noted elsewhere in the literature (eg. Kilpatrick, 1992; Silver & Kilpatrick, 1994). Hence it could be argued that at least some of our colleagues may be equating 'international' with 'USA' research, or to a lesser degree 'USA plus European' research.

Another important resource for an academic are the research conferences that they attend. Table 1 sets out the results of the survey (bottom three rows). As well as the three frequently attended conferences listed in Table 1, respondents listed eight other conferences, but only two colleagues listed two of these. It is clear from the data that all conferences attended by respondents were in English, which is to be expected. All

respondents attended the local regional research conference MERGA. Three respondents noted that they attended two regional Asian conferences. Both of these conferences use similar formats to MERGA. Although English is the designated conference language for each, clearly many regional languages are used during discussion. One colleague noted attending CIEAME, a European conference that designates English and French as the twin languages of the conference, but unlike other conferences noted here, actively plans for and sanctions all languages that conferees may wish to use for general discussion. For all of the three most attended conferences there is reportage of research undertaken in non English speaking countries, and non western countries. However we also note data from our earlier focus groups that this reportage is constrained by the similar formats of these conferences. Such a format is not always a welcoming feature for peers from non western cultures.

There was also opportunity for some extended answers as to why particular conferences were felt to be valuable. Most respondents commented on the high international quality and content of research presented at MERGA and PME, and how they found this useful for their own research and teaching. All conferences were used for networking and many noted that PME especially, but MERGA as well, provided opportunities for international links to be established. It seems to be taken for granted that being able to use the tag 'international' is important. No doubt part of this comes from government's emphasis on regarding 'international' research as more worthy. Only one respondent also commented explicitly on the importance of having such links. For them they lead to having a different cultural perspective on their way of doing research and in interpreting research results, which for them is of great value.

Our colleagues had a range of opinions when it came to some particular issues we canvassed with them. Some were clear that it is "Certainly true" that mathematics is a universal language and hence there will be a "common set of issues and research questions" no matter what language students speak. Others were inclined to agree but noted such regional issues as "differences in notation, differential emphases on topics, varied traditions", and "while there are clearly commonalities and even a goal of universality, there are also identifiable differences in methods and emphasis between countries". There was no doubt where some others stood: "Nonsense. This is a very Western view" and "No ... 'maths' is part of a western partitioning of knowledge".

Turning to the issue of whether there was much benefit to be had with peer contacts from other countries, the comments from our colleagues made it clear that there was. They thought that these were "critical in gaining insight into different contexts", they "open horizons", and there was "learning both ways, potential for validation of good practice, understanding of 'other'". A number spoke of the challenges such associations brought to their way of thinking. Interestingly there were few colleagues who noted any dangers or limitations when entering into dialogue with peers from overseas, "Don't know of any", and "What?". But some were more cautious. One colleague noted there was a "potential for domination and misinterpretation of 'other'" without specifying whom the 'other' was. The 'other' could be us, as noted by another colleague; "we have a tendency to 'follow trends' with little questioning". Different comments gave other cautions. Interactions "can subtly change (your's and/or their) values" another suggested. This can happen when "bandwagons" are jumped on "without considering cultural differences and (the) contextual

fabric of situations". One warning was "Don't presume English! Avoid colonial attitudes which are more common than we admit". One colleague seemed to try and have it both ways by suggesting one should not try and "impose schemes from one culture onto another" but went on to add "without an appreciation and making allowances for the different cultural layers". However another response was we should in such contacts "Avoid being Anglo centric", which is almost impossible if that is your culture. However this sentiment may be better expressed by other comments such as "Regarding Asian and Western (contacts. Both sets of) ideas should be acknowledged and vice versa", and "really get to know the local knowledge, systems, and agendas. And be prepared to listen ... even if what is said is something you find hard to accept". Limitations to ongoing contacts were often curtailed by the lack of time and money. The use of email was a boon for most, although others acknowledged the lack of email in some countries was a handicap. Difficulties with ethics clearances when joint overseas projects were planned were raised. But the principal impediment appeared to be language. The deep understanding of cultural and language practices of collaborators are always difficulties which are underestimated at one's peril, was the advice of two other colleagues.

Looking across the comments on these issues, there seemed to be a tendency for colleagues to be reasonably consistent in their views. Some tended to cluster around seeing mathematics as a universal language as not being problematic, as well as seeing few if any dangers or limitations when working with mathematics educators from other countries. Others tended to contest the view of the universality of mathematics as a language, as well as viewing ongoing contacts with overseas peers more cautiously. We are choosing not to assign numbers to these two clusters, since we readily admit that the boundaries of the clusters are fuzzy. However there also is a trend for colleagues in each cluster to fall within two other categories. One category was composed of colleagues who seemed to have no or little experience of non western cultures or languages. These colleagues seemed not to contest the universality of mathematics as a language, etc. On the other hand colleagues who reported in the survey that they had worked and/or researched in non western countries or had frequent contact with colleagues from such places, did seem to find the universality of mathematics as a language problematic. Further these people were the ones who suggested that some caution was needed when dealing with peers from overseas. There was a third category that seemed to sit between these two. These were colleagues who had frequent contact with overseas peers from other Anglo based cultures, or who had worked in such countries.

Summary

Bishop (1992), referring to research in mathematics education, argued that similarity is a feature of many research traditions evolving in different countries around the globe. Hence research questions, methods, practices and publications are becoming more standardized. He noted that these similarities should not be taken to mean that there is a universal acceptance of particular research methods or paradigms. We concur with this advice.

It is to be expected that in mainly English speaking Anglo western cultures, such as those found in Australia or New Zealand, that most resources used by our colleagues would be from within this cultural basis. Clearly the focus of much of our research and

teaching is within our own culture. However it is a different thing if we uncritically view, for whatever reason, that what we practice and believe is, or indeed must be, universal or perhaps the best possible option, no matter what the cultural context. In this study we have found a divergence of views that our colleagues hold across a range of issues. However there does seem to be a trend for colleagues who have experienced at some depth non western cultures to appreciate more deeply some of the issues thrown into relief by the notions of globalisation. There also seems to be a wish for global collaboration, as has been noted in the focus group data. We believe that more discussion on the notions of globalisation and how it is impacting on mathematics education will challenge us all and give more depth to our thinking and practice. This in turn will position each of us to be better able to deal critically with fundamental issues in the globalised world in which our students and we now live.

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