Conceptions and Tensions in Globalisation and Their Effects on Mathematics Educators

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The effects of the increasing international academic contacts and the globalisations of research and curriculum in mathematics education are wide spread and their impacts are experienced differently in many countries around the world. This paper reports on data from three focus groups conducted with mathematics educators from universities in Australia and New Zealand, The Philippines and Colombia. It discusses some tensions raised by these academics in coming to grips with the globalisation of their discipline.

We commenced our conceptualisation of globalisation and internationalisation of mathematics education in Atweh and Clarkson (2001) that was developed further in Atweh, Clarkson and Nebres (2003). In previous MERGA conferences, we presented partial results of our study on the topic and discussed a case study of two countries to illustrate problematics in international collaborations (Atweh & Clarkson, 2002), discussed the results of the survey we conducted in different countries (Clarkson & Atweh, 2003), and proposed a model of social justice in cross cultural collaboration arising from the project (Atweh, 2004). In this paper, we are interested in discussing how mathematics education colleagues in various countries experience aspects of globalisation of their discipline. Here, we are not interested in a mere comparative study of the different countries; rather in a wide representation of the problems identified by colleagues. However, we acknowledge that the different experiences of globalisation are necessarily functions of the particular historical, social, economic, language and political contexts in which it is experienced.

In studying the varying impacts of globalisation on mathematics education, we also recognise that there are both positive and negative outcomes from the processes of globalisation. However we are also aware that which of these value judgment is made for any particular activity or practice may well vary depending on the context of the observer. Further, in a complex phenomenon such as globalisation, both positive and negative outcomes may arise from any single activity. Hence we present this paper as a series of tensions arising within the different countries rather than merely as positive or negative outcomes. In this paper, we will discuss three case studies from our investigation: Colombia, The Philippines and Australia/New Zealand. The first section of the paper discusses briefly the different socio-historic context of these countries. This is followed by different views, expectations and experiences of globalisation by academics in them. The main sources of the data discussed here are three focus groups conducted in these regions in 2001 to 2003 with mathematics educators who knew the situation in their country.

The Three Case Studies

The decision to select these particular three contexts is based on the range of their interaction that these mathematics communities have in the worldwide community. Australia/New Zealand have for many years been very active players on the world scene, both in terms of cutting edge contributions to research conferences and journals, and in

holding recognised positions in organisations and on research journal editorial boards - arguably a contribution at variance with the size of our populations. In contrast Columbia is virtually absent from the world mathematics education community, although that mathematics education in the country include some very innovative solutions to deep rooted contextual problems that might be of great benefit to other educators in less industrialised countries (Atweh, Clarkson & Nebres, 2003). Lastly, mathematics educators from The Philippines are increasingly represented in regional and international collaborative activities and are recipients of a significant amount of Australian aid projects. However, their participation in global collaborations is not without its own tensions.

First we note that there are contrasts, and some similarities, in the colonial history of the three countries. Australia's white settlement began in the late 1700s and spread rapidly, displacing the indigenous population and forcing them to the less attractive parts of the continent. The colonists came from Great Britain in the main and the Anglo-Saxon culture has been dominant ever since. Australia became an independent federation in 1900, and yet curiously still has the monarch of England as its Head of State. Although Australia is a multi lingual country with a multitude of languages spoken particularly in the large cities by different immigrant groups, by far the dominant language is English. New Zealand's colonial history has paralleled that of Australia's in many ways. The most significant difference that is important here is the far more significant impact the Maori culture has had on New Zealand society as a whole. Columbia sits in the northwest corner of the vast continental South America. Sections of this tropical country had been part of various empires at different times. Subsequently, beginning in the 1500s, the Spanish colonized the region. Although many of the indigenous peoples were killed or dispossessed, others were pressed into menial jobs. However over the centuries a hybrid culture grew although dominated by Spanish culture. Independence came to the now republic of Columbia in 1819. Spanish is the country's official language. Similarly, the Spanish first colonized coastal areas of the major islands of the Philippines in 1521. This country consists of thousand of islands (most are subject to tidal variations) spread out in an ark sweeping around the southeast edge of the Asian continent. At the end of the Spanish American wars, the Philippines fell to the United States of America, and became a colony of the USA for the next 50 years, finally gaining independence as a republic in 1946. The country is rich in cultural diversity, which in many cases has lead to political unrest as widely reported in the international media, particularly in the poor south with it concentration of Muslim population compared to the Catholic heritage of much of the rest of the country. The official language is English.

Second, the three countries differ in their economic status. In 2001, the population of the Philippines was 77 million with a GDP of AUD$130 billion (World Bank, 2002b). Around the same period Colombia had a population of just under 43 million where in 1998 the GDP was AUS$205b (United Nations Statistical Division, 2002). In contrast, in 2001, Australia had a population of 19.5 million (roughly one quarter that of the Philippines, and one half of Colombia) with a GDP index of AUD$745 billion in 1998 (roughly 6 times The Philippines and 4 times that of Colombia) (United Nations Statistical Division, 2002). In a World Bank report (World Bank, 2002), it is noted that Columbia is experiencing its worst economic performance in over 60 years, and this has been compounded by ongoing internal conflicts. Currently, The Philippines enjoys relative political stability leading to an improved economic performance. The economy has enjoyed relatively robust performance during the first half of 2002 with GDP growing at 4.1 annually. As is the situation in many

developing countries, the Philippines economy is burdened with a huge foreign debt. At the turn of the millennium, the national debt stood at US$52 billion.

Colombia: Globalisation vs. Colonialisation

The focus of the interpretation of the term globalisation as understood by the nine Colombian educators seemed to be related to the standing of the country with others with respect to the value placed on education, the international competitiveness of their graduands, and the development of their own local theories and research knowledge. The overall judgement of the group on each of these criteria was that the country was "not ready yet" for globalisation. In general, these academics have not rejected globalisation as a desirable state. They just lamented that they have not been able to participate in it. There was a sober awareness by the participants in the focus group that international contacts are beneficial and unavoidable. One educator argued "this international participation is necessary, because we cannot be here, just isolated and to close the door to the world outside. … We need to look at what is outside to understand what we have".

For many of these educators, a prerequisite for participating in globalisation is the sense of internal independence for making informed judgements about the relevance of certain trends from abroad and sense of autonomy to make local changes. He added, "if we don't have this ability to assess, we do not exchange information, we just receive, appropriate or copy the information. Although copy is different from appropriate. To copy information from others means to do it without assessing it thoroughly. …. I think that is what has happened here and also all over the Latin American countries, but completely different from what has happened in developed countries". Another participant concluded, "I believe that what we have done is to consume without assessing what has been produced in schools from other countries." Such "copying" was exacerbated by the different forms of assistance that the country has received during the last 30 years. Several countries, including Germany, France and the USA have implemented aid projects that assisted the government in educational 'reform'. Often such projects involved curriculum or textbook writing and some professional development of teachers. These aid programs have assisted in the standardisation of the Columbian curriculum with the incorporation of overseas content and methodologies as found in the overseas donor countries. Government officials did not see this process as internationalisation and globalisation. One participant described the experience of the mathematics education community when the focus on Competency Base Education was introduced into the country as a result of one of those aid projects.

> When they told us that we have to use this in mathematics, it was a shock. We passed from one paradigm to another one without evaluating it. This new way of assessing things arrived all of the sudden, and we, the teachers, the academic community or even the Ministry of Education, didn't have an alternative proposal. We didn't have time to mature this Competency Based Evaluation, to evaluate it, to contribute to its development [as it applied in this country].

While many Colombian universities have developed policies expecting their lecturers to be involved in research as well as teaching, the reality is that resources at universities are extremely limited for the conduct of research. With the country in economic crisis, spending on higher education has not matched the policy focus on the importance of education for social and economic development. In turn, with declining funding, the universities do not dedicate sufficient resources for research. The extended teaching hours for staff allow little time for conduct of research and publications. Research and publications are not seen by the academics as institutionally rewarding when it comes to

employment and promotion opportunities. Research activities are often the initiative of individual researchers who, in most cases, use their own private resources to conduct research. Of the nine lecturers involved in the focus group, there was a single doctorate holder. In the 1990s, a few academics from the country were successful in obtaining scholarships to undertake doctoral programs at overseas universities. Colombian educators have been highly innovative to develop research training in their country in the midst of austere situation. In the mid 1990s, as a result of collaboration between five private and public universities in the capital Bogotá and some regional cities, a national doctoral program in science and mathematics education was commenced in the country. By the end of the decade, such a program was seen to be too expensive for the universities involved and was put under review putting its future under threat (Cardenas, 2001, personal communication). Private universities in the country tend to be more entrepreneurial and they raise some of their own funds for research. Obviously in countries such as Colombia this is not an easy task, to say the least. When asked what their expectations were from international contacts, the participants in the focus group were very direct and candid in their reply. They aspired for more internationally financed research or at least co-financed research projects. One academic gave an example of a research project between Argentina and Mexico and Colombia. The project was planned and financed from outside and the data was gathered from the three countries. Not only did it provide funds for the conduct of the research but also it provided some professional development in research for the Colombian educators involved in the project.

The Philippines: Globalisation vs. Localisation

Many of the participants in the Manila focus groups have participated in international conferences, read international journals and examined international documents on curriculum and reform in mathematics education. They viewed mathematics education as having "an edge over other subjects in their universities because [it is] not parochial in its approach". However, this level of internationalisation and globalisation was a point of concern for a few of the participants. Some have seen it as "too much" influence from abroad. One of the participants commented that it seemed that "whatever the trend is outside, [it] is adopted here". Another participant talked about mathematics education in the Philippines being "very trendy". She commented that a look at the mathematics education courses reveals an array of topics and issues that are only of concern to the country because of the international literature used by the educators. These trends are "not [adopted in the Philippines] because we feel that they are culturally dictated. … We are not sure if we're doing justice to our fellow Filipinos".

The participants provided several examples where international trends may not serve the local needs of researchers and their students. First, there are some pedagogical limitations to globalisation trends from the outside. Perhaps, one of the most controversial and divisive issues in Filipino education circles is the language of instruction. In 1979, the government adopted a policy that all mathematics and science should be taught in English. This, of course, has some benefits in the eyes of the focus group participants. It allows the adoption of the many available English textbooks and ease of access to international Internet resources by university students and staff. Similarly, it has allowed some universities in the country to develop sandwich degrees where students can take some of their courses at English speaking overseas universities. However, there are certain limitations in the use of English in mathematics classrooms. For instance, teachers find it

very hard to be consistent in their use of English at all levels of teaching. Students' levels of English prevent them from understanding some of the more basic concepts in mathematics without a reference to their natural language register. The effect of these practices can be seen at higher levels of education where Filipino students even at university level often cannot explain their thinking and solutions to problems because of language deficiency in English. Similarly, the facility in English of many teachers is rather limited. Hence, in practice, a mixture of languages is used by teachers and students in many classrooms in the country. A further pedagogical limitation relates to the focus on constructive teaching practices predominant in the 90s. One discussant commented, "The Filipino family is very paternalistic. If an authority says it, they take it. So in the simple rules of mental operations, rather than build it up inductively and get the students to participate in the possession and creation of meaning, [many teachers think] it's faster to just tell them". Also, in Filipino schools, classes sometimes have 50-70 students. In the majority of classrooms there is a lack of resources, with 1 textbook for every 6 students. Hence, for example, constructivist ideas of small group interaction and individually constructed algorithms do not match the classroom reality and cultural expectations of students and teachers.

Second, another participant questioned whether the level of international activity and globalisation of the curriculum and research has been able to deal with the issue of the socio/political context of the country. Often research questions and curriculum innovations promoted by Filipino educators match those of academics from abroad. Many researchers are "very much influenced by what they see in [international] journals". At times, the research questions are not judged by their contribution to improving the practice of teaching in the local context. Some, indeed, were seen as researching "trivial topics". Other trends may be seen as not only as irrelevant, but also detrimental to the welfare of the country. One participant gave the example of the focus on technology in mathematics education. She added her concern whether this focus in a country like The Philippines might contribute to "widening the gap between the rich and the poor".

> For example, technology cannot be separated from the issue of internationalisation and globalisation. And yet if we look at the countryside development, and how very young it is outside the city or in the rural centres … [one can ask] may it not have widened more the gap between the rich and poor in terms of [accessibility] to resources and the opportunity for better teachers, because good teachers are in the cities. … Globalisation might … only serve a small portion of the total population.

Third, globalisation of mathematics education might lead to hidden and heavy costs to mathematics education at the local level. A further issue of concern to mathematics educators and systems in the Philippines relates to the brain drain from the country. While the phenomenon of transition from university staff to overseas destinations is perhaps not new (UNESCO, 1998), the Philippines is experiencing the steady loss of schoolteachers to overseas schools. While there are no concrete statistics on the loss of qualified and experienced teachers who are moving overseas, one participant talked about at least twenty of one cohort of her students requesting early transcripts because they wanted to move overseas. On one hand, this gave these educators a sense of pride that the level of teaching is globally competitive. On the other hand, they pointed to the huge economic and academic loss for the country particularly since it is often the "best" and most experienced teachers who are lost to the local education system. However, considering the low socio-

economic conditions in the country, such movement of qualified and experienced teachers for overseas destinations is very attractive to the individual teachers.

Australia: Globalisation vs. Exploitation

Australian academics work in a context where educational export in 2004 has exceeded $5 billion to be come the third largest export after tourism and individual transport and seventh largest national export of all goods and services (IPD, 2005). At present there are about 303,000 overseas students enrolled in all sectors of Australian's education system, of which some $6 billion (Andrews, 2005) is earned from about 186,400 students enrolled in the tertiary sector (Department of Education Science and Training, 2005). This sector has continued to increase over the last 5 years or more by approximately 10 per cent or more. With the continuing decline in percentage public funding to higher education, most Australian universities have to rely on raising their own funds to meet the ever-increasing cost of higher education. Internationalisation, including international students and participation in foreign aid projects usually funded by the World Bank or the Australian government, is one of the major sources of income to many Australian universities.

While, it is true to say that financial considerations are not the sole motivation of the involvement of many Australian academics in internationalisation of education, they are well aware of the imperatives of such involvement and of some of the potential conflicts between their own educational and social justice values and the financial reality of their organisations. During the focus group conducted with 23 leading mathematics eductors in Australia and New Zealand with extensive international experience, one participant raised the pointed question "why do our universities want overseas students" to which another participant replied very quickly "the money of course". The tensions were obvious as one participant commented, "that's part of the way the world's going and you need to go their to survive and do it" to which the comment came, "Only if you haven't got a conscience." There was a clear realization that as mathematics educators in the Australian tertiary sector we are part of the globalisation process whether we like it or not. However, for this group of participants, this reality is not without it tensions.

First, there was a question as to the effect of foreign aid project on local conditions and local academics. A colleague who had developed a set of textbooks based on the New Zealand curriculum but sold in Fiji gave one pertinent example. When it was time for reprinting the textbooks, the question was posed as to whether they should be rewritten or adapted by Fiji educators to better suit their own context. This was rejected by the Fijians educators themselves who perhaps felt they were not experienced enough to contribute to the project. This participant, who has benefited from the project financially, lamented that though this project was designed to aid, it may have lead to "disempowerment" and silencing of the local voices. Another participant who had significant contribution to the international community through the publications of books and editing an international research journal outlined the priority she gives to soliciting publications from different countries around the world in order "to show that different countries do have very important significant issues" that they can contribute to our collective knowledge base in mathematics education. She also outlined her social justice concerns about obtaining contributions from "new researchers, … to encourage researchers from many under-represented countries, … and non-English speaking" authors. She discussed many ways in which she can provide assistance for them to reach the international "standard" for publication. Another participant raised the question whether the dominance of English in

publications and the insistence on certain forms of research communication might be a form of "subtle colonialisation" that is imposed on academics from other cultures.

Second, there was a question of our role in sharing our knowledge and expertise with people from other cultures. Many individuals decide to come to Australia for study and many countries approach Australia for aid because of their impressions of the expertise and reputation developed in this country. Arguably some see our economic development and standard of living as a sign of the success of our education system and curriculum. According to one participant "these people are buying or wanting to buy into particular views of curriculum, because they see it as that's the way to get out of the poverty traps they're in or that their third world status or developing status or whatever those things are in inverted commas, and that's the way they're going to get out of their in a sense oppressed state.... by [adopting] the [Australian] curriculum". Undoubtedly, Australia has developed a strong record in research and curriculum development in mathematics education. Many educators feel a sense of responsibility towards sharing our knowledge with others with fewer resources. However, this raised some tensions for many of the participants. One participant raised the question of international students coming to Australia for training and only encountering focus on Australian curriculum and school conditions. She raised the dilemma of trying to adapt our programs to the curriculum in the foreign countries with no knowledge of these curricula with the added difficulty of having many students from many countries in the same class. Another participant reflected critically on a multinational foreign aid team working with academics in Laos to develop their school curricula. She pointed out the tendency of some team members (both Australian and others from elsewhere) to share their experiences in a way that is blind to the local conditions and history. Unprepared to simply tell her Laotian colleagues what they should be doing, she felt compelled to "go and live with them and work with them and learn a bit of their language" before she can claim to provide any advice with any authority. She resisted the temptation "to think that we have any better knowledge of what is good for people in a different context and different culture". In a later part of the interview she commented "I've been pleased that... at my University is not asked to make a profit out of these programs".

Conclusions

Atweh, Clarkson and Nebres (2003) argued that for many people globalisation is often associated with evil forces and trends in society. They bring to mind a competitive world dominated by big multi-national corporations, where certain cultural forms become standards around the world; a world where inequality is ever increasing between East and West and between North and South. We do not construct globalisation as a singular discourse or suggest that globalisation is essentially good or bad. Certain globalisation processes may be good while others may be less desirable, and disastrous in the extreme. Hence, globalisation processes should be carefully scrutinised and contested. Because of its power and the extent to which it has permeated aspects of our social, cultural and economic worlds, it is important to be able to critically evaluate its effect on individuals and cultures. We make the following observations about globalisation in the context of mathematics education, drawing on the three focus group discussions reported here.

First, not all countries have been able to equally participate and benefit from international contacts. The feeling of isolation and disempowerment expressed by our Colombian colleagues is echoed by the majority of countries around the world. Their lack

of resources to conduct research, develop curriculum and provide for professional development is prohibitive for the development mathematics education that meets the needs of their population in a competitive and changing world. Further, financial limitations and language of communication in many international activities prohibit many of them from sharing their problems and creative solutions on the international scene. It is a shared responsibility of mathematics educators around the world to share our knowledge and resources whenever possible towards the betterment of the discipline worldwide.

Second, good intentions of sharing knowledge and resources are not without their own problems. The frustration of the Filipino colleagues about making their global collaborations in mathematics education relevant to their local conditions are also not unique. Knowledge is not a commodity that can be transferred intact from teacher to student, from academic to teacher, nor from one context to another. In order to be useful, knowledge has to be developed locally within certain historic and cultural context. Hence international aid should not be based on transference of know-how but on capacity building of local educators to empower them to generate their own knowledge and expertise in developing areas of research and curriculum development for their own conditions.

Thirdly, countries with more developed resources and traditions of research and curriculum development should not only take responsibility to work with colleagues around the world, but also be very self critical and aware of the multiple agendas giving rise to the such collaboration and of the outcomes of such collaboration whether it is intended or otherwise. The concerns expressed by the Australian/New Zealand colleagues are to be heeded in any international collaboration.

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