ATW03689

International Aid Activities in Mathematics Education in Developing Countries: A Call for Further Research

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Elsewhere (Atweh, Clarkson & Nebres, in press), I have argued how Australia's stance on education and international relations has changed considerably during the last 50 years of the 20th century. In the 1950s and perhaps 1960s, most international students were on Australian government scholarships of one type or another. One prominent source of scholarships was the Colombo Plan for Cooperative Development in South and South East Asia (now extended to the Pacific). This role included the sponsorship by the Australian government of international students to study at Australian universities. As the number of both sponsored and private international students studying in Australia increased, the government introduced a fee for international private students. This commenced at a rate of 10% of the cost of the tuition, and gradually escalated to reach about 55% of the cost of tuition by the late 1980s. However, in the mid-1980s there was an increased emphasis on the role of higher education as an income generator for Australia. Back, Davis and Olsen (1996) described this as a shift from "educational aid" to "educational trade" (p. 7). By 1990, the educational subsidies had all but ceased. Currently, there is an ever-increasing dependency in many Australian universities on international full-fee paying students and overseas consultancies as important contributors to their revenue.

However, the Australian government has maintained a limited commitment to aid to some Asian countries administered by AusAID. In a policy statement issued by the Minister for Foreign affairs (AusAID, 1996), Australian foreign aid will have an "increased emphasis on the development of the education sector in partner countries, particularly in the area of basic education and vocational and technical education" (p. 3). The policy acknowledges that: "[e]qual access to primary education is a fundamental human right" (p. 8) and that "primary education is a sound economic investment in both the interests of the individual and the nation" (p. 8).

Of interest here is that often these sometimes multimillion dollar projects have an internal component for their evaluation. However, very little academic research is conducted on this aspect and reported in the international literature. This perhaps illustrates the practice and discourse in many universities in Australia of separating research, as a means for generating theory and knowledge, and consultancies, mainly for generating income or as redistribution of knowledge.

Here I argue that, given the ever-increasing international collaborations and widening phenomena of globalisations (Atweh & Clarkson, 2001) of many areas in mathematics education, it is essential that these programs are critically reflected upon and are put under the critical gaze of research. Further, they should be analysed in conjunction with the views, expectations and values of the local mathematics educators if such collaborations are to avoid becoming another form of cultural imperialism that do not contribute to the capacity building of the recipient countries.

This paper discusses findings of the conduct of a study in the Philippines during the early months of 2003. It discusses some views and reflections by a group of leading mathematics educators in the Philippines about the patterns and effects of international and global activities in mathematics education in their country. It also discusses two types of international collaborations between the Philippines and overseas countries. It is not the intention here to evaluate the two projects, but to use them to raise some questions for further research.

Methodology

There are two sources of data used in this paper[1]. The first consisted of the conduct of focus groups (Morgan, 1997; Vaughn, Schumm, & Sinagub, 1996). Local organizers of the focus groups were requested to invite leading mathematics educators of their countries with substantive international contacts and experiences to participate in the discussion. The focus group discussions lasted one and a half hours each and comprised of eight educators. Prior to the focus groups, the participants received a short summary consisting of some definitions of terms used and some issues that they may want to address. A major characteristic of focus groups is that they allow participants to raise issues that are important to them, rather than address the questions posited by the researchers. From time to time, the researchers asked some clarifying questions and directed the discussion to move on to other topics.

Secondly, the focus group discussions identified two significant large scale projects conducted in the Philippines in collaborations with overseas countries. These projects formed the case studies discussed here. Documents from these projects were examined and some published literature on them was reviewed. Further, the author took part in the first project and has conducted in-depth interviews with key personnel in the second project.

Key Findings from the Study

The Filipino context

In 2001, the population of the Philippines was 77 million with a GDP of AUD$130 billion (World Bank, 2002b). In contrast, in 2001, Australia had a population of 19.5 million (roughly one quarter that of the Philippines) with a GDP index of AUD$745 billion in 1998 (roughly 6 times the Philippines) (United Nations Statistical Division, 2002). 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 (World Bank 2002a). 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 (World Bank 2002b).

However, as is the case in many developing countries, economic benefits are not equally enjoyed by the different segments of the population. One of the main problems facing the Philippines is the wide prevalence of poverty. In 2002, it was reported that 26% of the population fell below the poverty line, a percentage falling

[1] This study was part of a larger two year ARC project on internationalisation and globalisation in mathematics education.

from 34% in the early nineties (World Bank, 2002b). The efforts to reduce poverty in the Philippines during the past two decades have produced mixed results. While the overall incidence of poverty declined between 1985 and 1995, the Philippines was the only large country in East Asia where the absolute number of people living on less than US$1 a day did not decline and the inequality between the rich and the poor rose quite sharply (World Bank, 1999).

Education System: The Philippines has long been a leader in the Southeast Asian region with respect to achievements in education. By 1970, the Philippines had achieved universal primary enrolment. By 1995, it was ranked one of the most-schooled nations in Asia, after Brunei and Korea. These successes, however, mask a long-term deterioration in access and quality, and the national figures obscure wide regional differences. Nationally, two-thirds of children fail to complete primary school, but this varies widely from region to region. In Manila, close to 100 percent of students finish primary school, whereas in Mindanao and Eastern Visayas less than 30 percent of students finish (World Bank, 1999). For many years, the Philippines failed to capture the benefits of education – productivity growth, poverty reduction, and social development. Slow-growth and import-substitution policies failed to generate jobs, and 4 million Filipinos went abroad. The new emphasis on export-led growth, however, has increased the demand for skilled labour, and exposed the deteriorating quality of education.

Education in the Philippines is a high priority both for the government and for individuals and families. The country spends about 15% of its budget on education (Ballestamon, et al., 2000). However, such funds are still limited to meeting the demands of comprehensive education, resulting in concentrating resources in primary education – leaving private institutions to cater to 63% of secondary students and 85% of tertiary students (Evangelista & Evangelista, 1991). Private education in the Philippines is dominated by Catholic schools and universities.

Views of Mathematics Educators

The participants in the focus groups are well aware of the internationalisation and globalisation occurring in their country. Whenever possible, educators from the country have participated in international conferences, have read international journals and have examined international documents on curriculum and reform in mathematics education. Further, their students in undergraduate and postgraduate courses are often encouraged to refer to the international literature in writing their assignments and projects. They viewed mathematics education as having "an edge over other subjects in their universities because [it is] not parochial in its approach" (Philippines Focus Group, p. 1). The participants noted that mathematics education has been most influenced by trends and the literature from the United States; however, some input was attributed to the United Kingdom and Australia (see the discussion below on the Australian aid programs). There was a general feeling among the participants that the mathematics education courses at their universities have been successful in "preparing professionals for an international market" (p. 1).

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" (p. 1). 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" (p. 7). This participant went further to say:

> *I think like in any globalisation, many of us are torn between engaging in the global activities and at the same time trying to preserve whatever Filipino culture we can identify ourselves. … For example, we do not have a Filipino mathematics. We cannot identify a mathematics that is native to our culture.* (p. 5)

There are some obvious dangers from the intense globalisation and internationalisation identified by these participants.

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. Because of some evidence that early concepts are better introduced in the mother tongue, for the first two years of the education system teachers are encouraged to teach in the first language of the student, shifting to English by the third grade. This, of course, has some benefits in the eyes of the focus group participants. Firstly, it allows the adoption of the many available English textbooks and ease of access to international Internet resources by university students and staff. Secondly, it has allowed some universities in the country to develop sandwich degrees where students can take some of their courses at 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 (p. 6). 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 (p. 2).

Another participant questioned whether the level of international activity and globalisation of the curriculum has been able to deal with the issue of the socio/political context of the country and whether it has contributed to "widening the gap between the rich and the poor" (p. 3).

> *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.* (p. 3).

A further issue of concern relating to the trends of globalisation in mathematics education is 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 (p. 5). However, considering the low socio-economic conditions in the country, such movement is very attractive to the individual teachers.

How can local research inform local practice?

On one hand, the trends of research in mathematics education in the Philippines mathematics education community are not very different from similar trends around the world. The country currently is experiencing a shift from a dominance of quantitative to qualitative methodologies such as that experienced in many countries in the West during the past two decades (p. 10). Many researchers are "very much influenced by what they see in [international] journals" (p. 10). 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" (p. 10).

There is a strong focus in the Philippines on encouraging action research by the teachers themselves. At the time of this interview, the mathematics education community was holding a highly successful conference on the use of action research in mathematics education attended by a cross section of academics, education department authorities, and postgraduate students, with the majority of participants being schoolteachers. Collaboration between teachers and university researchers is a double-edged sword that benefits both parties. One participant commented "our involvement as university personnel with teachers is very important to them for giving them a value to their work, and it also is important to us because it makes us see and feel the real problems that teachers are facing" (p. 11). This focus on action research has been supported by the education authorities who have supplied special funds to encourage teachers' action research in the schools. However, they have realised that teachers need a lot of support to develop research proposals as well as in the conduct of, and reporting on, their research (p. 10).

Australian Aid Programs

The Philippines-Australian Science and Mathematics Education Project (PASMEP) was a recent bilateral AUD$20 million project between the two governments conducted between 1989 and 1993. A second and more ambitious project was the Philippines-Australia Project in Basic Education (PROBE), a bilateral partnership between the two governments to support the education of Filipino elementary and secondary school students in English, mathematics, and science. PROBE involved 600 teacher trainers and educational specialists, some 8500 teachers, and about one million children in 880 schools (AusAID, 1996).

Most of the AUD$45 million (half of which supplied by an Australian Government grant) for the PROBE project invested over the period 1996–2001 was designed be spent on supporting the professional development of the facilitators and their regional teachers. Very few funds were spent on equipment and facilities per se with the project following the "train the trainers" model. Beasley (1999) noted "the PROBE designers believe that high-quality training is delivered close to the teachers' work situation; is seen by them as meeting their needs; and is characterized by follow-up support and effective monitoring. The [in-service facilitators] ISFs will operate both reactively to teachers' requests and proactively through regular visits to the

schools to discuss the concerns and needs of the teachers and to provide on-site advice and assistance." (p. 151).

The overall design of the project can be conceptualized as interlinking cycles of the classical action research model. At each of the three levels, the design can be described in terms of a challenge or need or research question to be met through the continuous cycle of action research: Planning, Acting, Observing and Reflecting. In the "planning" phase, a team of Australian consultants undertook a training-needs-analysis in five regions of the country which formed the basis for the ISFs training in Australia. In the "acting" phase, teams of in-service providers at the University of Queensland ran four, two-month training sessions for 500 Filipino principals and teachers. The "observing" phase was undertaken by Australian long-term advisers in the Philippines over three years. The subsequent process of "reflecting" was undertaken by Australian advisers, local subject supervisors, and divisional superintendents.

Each of the 150 leading schools with trained ISFs worked with their own teachers and those of six satellite schools. Each leading school was granted a Teacher Support Unit (TSU), a resource centre where a variety of in-service initiatives are available including video replay equipment, an overhead projector, a video camera, and a mimeographic copier. They also house reference texts, science demonstration equipment, and training videos recommended by the PROBE lecturers and the Australian advisers who undertook the original needs analysis. Each TSU operates as a stand-alone resource that can be accessed independently by district teachers.

As indicated above, there has been very little existing published research on the outcomes of these projects. In reflecting on aspects of the first collaborative project, Kerrison (1992) noted the difficulties in transferring learning from the PASMEP project to the classroom in which teachers work. For example, considering the dominance of testing in the education system in the Philippines, he noted, "even PASMEP's innovative influence must be doubted if the examination system in the Philippines continues to exert the influence it currently has" (p. 253). He also argued that the social factors in the Philippines such as overcrowding and lack of equipment have to be taken into account. Not having seen the modelling in those special conditions within their own country, the teachers involved in the project may regard these innovations as "nothing more than a theoretical consideration covered in the course" (p. 253).

The Netherlands Project

In the period from 1995 to 2003, the San Carlos University (SCU) in the Philippines participated in *The Netherlands' Joint Financing Programme in Higher Education (MHO Program)* funded and administered by the Netherlands Organization for International Cooperation in Higher Education (NUFFIC). The MHO program included collaboration between the SCU and several Dutch universities and consisted of collaboration in areas as diverse as education, engineering, environment, information technology, and management. One of these projects was the *Science and Mathematics Teacher Education Project Southern Philippines* (STEPS), a collaboration between the SCU and the Free University (Vrije Universiteit) in Amsterdam (University of San Carlos website, undated)

With a total budget of approximately US$10 million, the major functions of the STEPS project were:

- *Capacity building of staff from the University*. Several staff from the university's departments of mathematics, science and education were recruited

to the project and given partial or total assistance to complete their masters and doctoral degrees at various universities in the Philippines and overseas. These subsidies achieved two purposes: the development of staff expertise as well as meeting the aims of the project, in that the majority of their research projects have been in areas of direct relevance to the STEPS aims and the working of the Faculty of Education at USC. In addition, staff involved in the project have been assisted to attend international conferences in their relevant areas of expertise. Finally, the project made possible visits to USC by leading educators from around the world to give special workshops and/or conduct appropriate research and evaluations of the project's activities.

- *Academic Course Development*. This part of the project aimed at strengthening and standardising the course design and its implementation across the whole university. The main purpose was to improve science and mathematics teaching to non-science major students. The project provided for the part-time staff of many departments within the university to work on some large units. The process of course design included an intensive 3-5 weeks of training, development of a course manual, implementation of the course by the designers themselves usually working in pairs, and evaluation, modification, and wider implementation by other staff within the particular department.
- *Development of special pre-service training programs in mathematics and science education*. The project developed specialisation subjects in mathematics and science education within the USC undergraduate course. Although somewhat integrated with the normal undergraduate course within the university, these subjects were developed outside the normal bureaucracy of the university. Further, the project was able to provide significant scholarships for potential students to attract high quality students in mathematics and science into education. These students were supervised by the project staff in the teaching practice component of their studies to ensure that they were able to implement innovative teaching practices. They also were involved in a transition program from the university into the workforce to ensure their survival in the first few years.

Perhaps, aspects of the operation of the project are worth highlighting. First, the staff involved in the project attribute its success to the long-term involvement of the USC with its overseas partners. They believe that one-off, short-term projects are not as effective in changing the culture of the university and in the development of long term sustainable programs. The project supplied a long-term consultant for advice to the local educators. A great part of the success of the project was attributed by the staff to the particular person who carried out the role for six years. He enjoyed the trust of the local educators and was seen to be sensitive to the local culture in which the project was located. Similarly, the location of the program totally within the university and the country implied that the local context was necessarily taken into account at all stages of planing and implementation. On the other hand, working with international consultants implied that the normal bureaucratic hindrances of the university were able to be broken and demonstrated to the staff and the university that other ways of operating were possible.

Secondly, there were a few issues pointed out by the staff with regard to the management of the project. The initial design of the project resulted from a needs-analysis conducted across the Philippines and the USC. It was a result of negotiation between representatives of the Dutch and the Filipino universities. It was the intention

from the start of the project that Filipino educators would conduct the day-to-day management of the project. Since the majority of the local educators in the first few years of the project were involved in higher degree studies, the Dutch consultant assumed the role of the manager of the project. Most day-to-day decisions were done in staff meetings, although naturally, major projects and initiatives had to be negotiated with the liaison people in both collaborating universities. During the later stages of the project, the local educators assumed the day-to-day management of the project and the role of the consultant was reduced to giving advice when needed. The staff were aware that local expertise for leading such major projects had to be gradually developed.

Thirdly, while the main focus of the project was on the capacity building and infrastructure for self-reliance and improvement of local educators, there was an awareness that developing countries require physical infrastructure to support the improvement of education. Some of the funds of the project were used to construct a building to house its activities, a library and resource centre, some multimedia facilities, and a computer laboratory. The funds for the physical infrastructure were shared between the project and the SCU.

Discussion and Conclusions

The rapid growth during the past century of the number of regional and international conferences around the world, in addition to the number of high profile journals of research, has increased the exchange of ideas between mathematics educators from different regions of the world. While one can argue that international contacts and exchanges in mathematics and mathematics education have existed since the early developments of both disciplines, undoubtedly they have increased in the new age of globalisation and will continue to exponentially increase in the future with further developments in technology, ease of travel, and population movements. Similarly, as argued above, international contacts have changed in nature during the second part of the twentieth century with the increased marketisation of education, privatisation and international competitiveness.

It would be naïve indeed to argue that different countries have had the same access to these international contacts and have benefited from them to the same degree. However, I do not construct international contacts and globalisation of aspects of mathematics education as necessarily either good or bad in absolute terms. My own research of these issues is based on the need to scrutinise the effects of such interactions on the different players. This can only be achieved through deliberate and targeted research, reflection and debate. Further, I argue that such actions need to be done in collaboration between mathematics educators from around the world. The lack of research on this particular phenomenon is a concern in mathematics education.

In the analysis in this paper, a group of educators from a developing country, the Philippines, has expressed significant ability to identify both the patterns of globalisation in mathematics education in their community as well as to identify some concerns about such patterns. While international contacts have given them a sense of belonging within a wider community, they were concerned that this might have happened as a result of loss of local relevance to at least certain segments of their population. They also realised that joining the global market implies, at times, losses as well as gains.

Further, this paper presented two exemplars of international aid projects in the Philippines. The two programs differ in several aspects. While the PROBE project has

involved dealing with school teachers and their supporting trainers, the STEPS project involved capacity building of local university staff both in obtaining higher degrees and in the design of university degrees. Secondly, the PROBE project included a significant component of the training in Australian universities and schools, while the STEPS project was almost completely situated in the Philippines. Thirdly, arguably, there has been some difference between the roles of the external collaborators in each project. While the external staff in the PROBE project were "training providers", the STEPS project utilised "external consultants". Naturally, I am not in a position here, based on the limited description of the two projects, to judge whether the two roles as actualised were significantly different. Suffice to say that they are based on alternative philosophies of the role of the external collaborators. Lastly, while the management and coordination of the STEPS program was intended to be in local hands, the PROBE project was managed by Australian staff residing in the Philippines.

No research literature was found on the relative achievements of either project. While their short-term gains may be easy to access, their long-term effects on empowering the local educators toward self-sufficiency are harder issues to tackle. Based on the above discussion, the following questions for further research and discussion in mathematics education can be suggested.

- What are the main assumptions behind the design of international projects between developed and developing countries, and how are these assumptions reflected in the actual implementation of the projects? Are these aid/ trade or genuine collaborative programs?
- What are the short and long terms achievements and effects of these projects and what are the relevant effects of the project design on these achievements?
- How can these projects be designed to maximise the contribution by local mathematics educators and to support them in taken leadership in future development of their discipline?

Finally, I repeat the concern that without critical research such as this, mathematics education international contacts can fall into the danger of contributing to Western neo-imperialism and potentially increase the gap between developing and developed countries.

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