

Action Research for Contexts of Change and Inequality¹

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Undoubtedly, the past half-century has witnessed an escalation of changes in the social, political, economic and educational structures in many societies around the world. Some have seen change as a challenge and hope while, for many others, it is a source of concern and worry. Some have adopted change with gusto while for many it is something to be resisted. Some say we live in a world and times with an increasing awareness that “times are changing” while for some “the more things change the more they stay the same”. Interestingly, both sets of views are defensible. Often, attempts to introduce rapid changes into a particular society or practice fail to take into account resistance by participants to the proposed change, whether based on proven successful practices of the past or on contradictory values that the change represents. Hopkins and Levin (2000) warned against jumping on the bandwagon of the rising “industry specialising in telling us how dramatically different the future will be” (p. 15-16). Rapid change has often proven to be a fad that no sooner had been promoted and adopted, it as quickly disappeared. In educational planning and priority setting, discernment in differentiating between *fads* and *sustainable changes* is a virtue. The authors went on to argue that slow, long trends are often more worthy of attention than some more rapid changes.

For us here, perhaps the most significant aspect of change is that it is not equally experienced, participated in, and profited from by all people and all nations. Many people have benefited from the rapid changes while many others were left behind. Similarly, the disparity between rich and poor nations is increasing at an alarming rate. One of the major protagonists for global change, the World Bank (2000), acknowledged that the gap between the Gross Domestic Product (GDP) of the world’s twenty richest and twenty poorest countries has doubled over the past forty years. Many of the poorest countries are being completely excluded from the benefits of globalised trade, while absolute poverty is increasing. A primary feature of the world is the extent of poverty and inequality. Consider the following facts about the world today.

- Half the world - nearly three billion people - live on less than two dollars a day.
- Nearly a billion people entered the 21st century unable to read a book or sign their names.
- The GDP (Gross Domestic Product) of the poorest 48 nations (i.e., a quarter of the world's countries) is less than the wealth of the world's three richest *people* combined.

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- The wealthiest nation on Earth has the widest gap between rich and poor of any industrialized nation.
- 20% of the population in developed nations consumes 86% of the world's goods.

(Poverty Facts and Stats: <http://www.globalissues.org/>)

The first purpose of this chapter is to discuss research in mathematics education within the international context of change and inequality. In an earlier chapter, Atweh and Arias (2001) discussed action research in mathematics education both as an appropriate research methodology and as a means of professional development of teachers. Similarly, Atweh (2004) posited action research as a methodology consistent with sociocultural approaches in mathematics education. That chapter discussed arguments for the use of action research in the discipline and outlined some of its characteristics. The discussion presented in those chapters, however, did not contextualise their arguments within the international context of countries experiencing rapid changes, nor with regard to countries where poverty and lack of resources are major hindrances for developing research programs in the field. This contextualisation is the second purpose of this current chapter. The next section of this chapter identifies three major current trends in global society and education that impact on the work of researchers in the field. The following section discusses the role of action research within the trends identified in the first section.

Through this theoretical overview, then, participatory action research can be perceived as not only a tool to support grass-roots international collaborations, but as a methodology that in itself has developed through a global-local dialectic. Our aim, then, is to contextualise the development of participatory action research, particularly as it relates to mathematics education. Other writers provide deep analysis of examples of such developments (see, for example, Malcolm, Gopal, Keane & Kyle in this volume).

I. Some Long Term Trends in the Context of Research in Mathematics Education

Any effective reflection on mathematics education research must necessarily locate it within changes in the wider contexts of society which give rise to it as well as those of the school which it aims to serve. Here, we will discuss some challenges that the phenomenon of globalisation raises for mathematics education researchers, the patterns of widening gaps between countries that raise questions as to the participation of many countries in the research process, and the role of mathematics education in school reform that many countries around the world are experiencing.

I.I Contradictory patterns of globalisation

The conclusion of World War II and the de-colonisation of Africa and Asia by the middle of the last century presented new threats for the “victorious” nations and saw the rise of the United States as a super power. Intensive aid programs, such as the Marshall Plan, were aimed at rebuilding the defeated countries and financing the industrialisation of many countries around the world as a way to avert threats of

further conflicts and the fall of newly developed states under the communist umbrella. Social scientists of the day developed social theories to study these nations and the desired process of *modernisation* (Shackman, Liu, & Wang, 2001). Such theories posited social change as unidirectional – where each culture moves, albeit at different rates and along different paths, from “primitive” societies to “modern” ones. Further, such progress is always seen as desirable, irresistible, and is best accomplished as a process of “evolution” rather than “revolution”. Moreover, in order to be successful, modernisation should be seen as a “transformative” activity in that not only structures and practices need to change to accommodate it, but people should reject traditional ways of thinking and adopt modern ways. Perhaps inevitably, since Western Europe and the United States were seen as the ultimate “modernised” societies, not only were finances and expertise provided to aid the modernisation of others, but they also provided the models of social structures and practices for others to follow, leading to an increase in the homogenisation of cultures. It is worth stressing in this context that, even though social and political modernisations were targeted, at the heart of this project was economic development. Reflecting on such theories, Latham (2000) demonstrated that, like all human theories, they have their roots in specific cultural and social practices, i.e., of Anglo-European societies, rather than in international, objective laws and models that can/should apply universally.

Arguably, such international interactions, accompanied by later stages of capitalist economics, have contributed to the rise of what we call today *globalisation*. However, in previous publications (Atweh & Clarkson, 2001; Atweh, Clarkson & Nebres, 2003), the first author and his colleagues have argued that globalisation is not a unitary construct. Often, the debate about globalisation stems from the multiplicity of its discourses as well as alternative values placed on the different phenomena it covers. In particular, we have used the differentiation made by Falk (1993 in Taylor, Rizvi, Lingard & Henry, 1997) between “globalisation from above” and “globalisation from below” to argue that globalisation often leads to contradictory patterns and value judgements. There we have argued that the protagonists at World Trade meetings in Seattle, Geneva, and Melbourne were not anti- and pro-globalisation but protagonists of different forms of globalisation. Likewise, we have posited how globalisation leads to new relationships between simple dichotomies such as *homogenisation* and *fragmentation*, and the *local* and the *global*. Nash (2000) suggested that “a global culture is inevitably fragmented and pluralist since it is not a world culture” (p. 71). The author argued that if we perceive “global culture as postmodern” there will be “a greater openness and ‘responsibility toward Otherness’ as cultural differences are seen as valid rather than suppressed or destroyed” (p. 71). Similarly, environmental threats and the spread of AIDS have given local actions global significance. At the same time, local destruction of the environment cannot be fully explained without resorting to consideration of the global structures of power and privilege that impact on local practices. Perhaps the dictum of Green politics to “act locally and think globally” reflects a similar sentiment to the coining of the term “glocal” consisting of the combination of the two terms “global” and “local”.

These alternative discourses of globalisations are reflected in the fields of mathematics education and research in mathematics education. Globalisation from above can be illustrated in the ways that recent curriculum reforms in mathematics education around the world are influenced by reforms based on outcomes and assessment commencing in the United States and the United Kingdom (Hargreaves & Evans, 1997). International organisations such as the World Bank, as well as a proliferation of international professional organisations and publications, have

contributed to the popularisation of certain discourses over others. At the same time, globalisation from below can be evidenced by the wide spread of alternative discourses of ethnomathematics and critical mathematics into global movements with contributions to their theory and research by education practitioners from around the world.

Similarly, the convergence of research questions and methodologies used by mathematics education researchers around the world and the lack of ability to characterise the research within a particular nation (Bishop, 1992) can be given as examples of homogenisation in the discipline. Yet, as an example of fragmentation and diversity, mathematics education research has a greater variety of research methodologies and perspectives reflected in the literature than ever before (Atweh, Forgaz & Nebres, 2001; Kelly & Lesh 2000).

Finally, traditional dichotomies do not help us understand the complex interactions between the global and local. Globally inspired innovations have often failed to achieve their purposes in particular cultures because they may not have been well attuned to local concerns which should always dominate the way a concept is transmitted from one location to another. A mathematics educator colleague from a developed nation tells of an incident when, trying to explain his experiences regarding constructivist teaching with a group of teachers from a less industrialised country, he was caught unaware when asked how these teaching methods would apply to classes with seventy students. Needless to say, he did not have a ready answer. However, local solutions to problems can very well have global implications. Fals Borda and Mora-Osejo (2003) have demonstrated how externally imported theories from the social and natural sciences were not useful in understanding problems experienced by Colombian society. However, they go on to add that knowledge developed from the South can contribute to “convergent systems” (p. 36) that can be of wider benefit to all. This is parallel to the distinction between “generalisation” and “transferability” often made by qualitative researchers (Denzin & Lincoln, 2000).

I.II Problematics of poverty and inequality

During the past five decades, there has been a significant shift towards democracy and political participation in many countries around the world (Giddens, 1999). Naturally, the concept of democracy is a contested construct. In current political debates, it might imply a limited view of a political system based on free elections and freedom of speech and affiliation. It may not imply an ability of individuals and groups to control aspects of their lives. Likewise, democratic participation does not imply majority rule - in a pluralistic society, democracy has to take into considerations the rights of minorities, and alternative views and lifestyles.

In this context, we are interested in the issue of equal participation, or lack of it, by people from different cultural groups both within a particular nation state and between states. Participation in the civic, cultural, and economic world remains in many countries dependent on gender, social class, race, and sexuality. Similarly, participation in international activities remains dependent on the level of their development based on access to scientific knowledge and technology and political power often associated with military might. Arguably, in both cases the greatest limitation to such participation is economic.

Poverty around the world is regional. According to a special feature on poverty conducted by the British Broadcasting Service (BBC, 2001) after the global protests

at the G8 summit in Genoa, South Asia has half of the poor of the world whilst Africa has the highest proportion of poor people. Inequality distribution within a country is also high in Latin America, with the largest gap in Brazil (UNESCO, 2001). Patterns of poverty are changing around the world: while China's open economy has resulted in lowering the percentage of the poor, it has been rising in Africa, South Asia and in Eastern Europe where poverty has skyrocketed after the collapse of the communist regimes. On education, the report says "[i]nvestment in education is seen as the key to improving human capital and building the capacity for future economic development. But in many poor countries, only half of the children of secondary school age are enrolled in education, and many have functional illiteracy rates of nearly one-third" (BBC, 2001).

Questions on how poverty is defined and whether poverty and inequality are decreasing or increasing in the context of globalisation remain contested. Shackman, Liu and Wang (2001) pointed out that several researchers had come up with contradictory conclusions in counting world poverty and inequality numbers, rates and trends. These differences were due to measurement issues of how poverty is defined and the use of absolute versus relative measures of poverty. Defining poverty in absolute terms (e.g., the same purchasing power in all countries) results in finding larger declines in world poverty; defining inequality in absolute terms (absolute differences in levels of living, compared to relative differences) results in finding larger increases in inequality.

The impact of increasing "poverty in the midst of plenty" (World Bank, 2000, p. 9) extends much further than a decrease in living standards as measured by access to material goods. Suicide rates, for instance, are reportedly on the increase among the dispossessed workers of India, Pakistan and Sri Lanka; there is an escalating trend in human kidney sales; and millions of children are being driven out of school (New Internationalist, 2004). Further, the diaspora of workers from poor countries is depriving the neediest people of their most skilled workers, such as nurses and teachers. "Nurse poaching" (Nelson, 2004), for example, follows a pecking order leading to the poorest nations being least able to find new help. Not only are their entire health care systems compromised, but families are torn apart as absent parents attempt to earn sufficient money in the West whilst their children skip school and console themselves with substance abuse (Seabrook, 2004). Similarly, the "brain drain" of the most experienced mathematics teachers has led to a shortage of qualified teachers, such as in the Philippines, exacerbating problems arising from the lack of resources and large class sizes.

The lack of democratic participation is not only due to an economic gap but also a knowledge gap (Crossley & Holmes, 2001) which, rather than being reduced by the technological revolution, may actually be exacerbated by it (Persaud, 2001). This problem is the "digital divide" (World Bank, 2000) in which many of us have come to rely on the tools of globalisation such as the Internet and email, whilst, on the other hand, about 50% of people have never made even one phone call and Internet use is currently limited to a mere 2.4% of the world's population.

I.III Fragmentation of nexus between policy, practice and research

Reforms in education, and in mathematics education in particular, have also experienced a significant escalation in the second half of the last century. Movements such as the New Math, commenced in the United States in the 1950s, soon spread to

most countries around the world. More recent reform movements, based on outcomes and assessment (Hargreaves & Evans, 1997) and modelled on the National Curriculum in the UK and the National Council of Teachers of Mathematics' Standards in the USA, also spread to many countries by the middle 1990s (Jacobsen, 1996).

A few observations can be made on these reforms. First, their focus was the curriculum itself (Sheller, 2001) and often only paid lip service to professional development of teachers or the specific concerns of classroom practices themselves. This led to the "Predictable Failure of School Reform" as the title of a book by Sarason (1990) proclaimed. These large-scale reforms are often contrasted with more recent theories of reform that target the whole school organisation as their focus for change. The complexity of school change has led to functional models to study change and the use of cross-functional teams (Fullan, 1998) and learning communities. These changes focused the attention on personnel in the schools who ultimately are responsible for leading and implementing change. In particular, the focus on school as a learning organisation both for teachers and students brought to the forefront again the role of the teacher (Hargreaves, 1994).

However, these new agendas should be treated critically. Seddon (2001) noted that these concepts have been developed within the (system) functionalist traditions and neo-liberal agendas. The author commended the fact that these agendas have brought to the forefront the importance of learning for change. However, the marketisation of education and the focus on outcomes is not always consistent with agendas of social justice and equity. Seddon demonstrated how teachers in the schools are committed to change and the principles of service to their students. Faced with these conflicting concerns, teachers reveal contradictory stances of resistance and compliance as they re-define their own new roles and practices.

What is the role of research in these reforms? In many countries around the world there is what Crossley and Holmes (2001) described as a "crisis of confidence" (p. 395) in the faith that traditional educational research could contribute to the solution to many educational problems and inform policy. Several researchers have identified a gap between research concerns and the concerns of teachers (Atweh, 2004; Hargreaves & Evans, 1997; Sprinthall, Reiman & Thies-Sprinthall, 1996). In Australia, in two consecutive years, the keynote presentations at the regional conference of the Mathematics Education Research Group of Australasia have addressed the gap between "theory" and "practice" in mathematics education. Malone (2000) argued that this gap has its roots in the technical rationality or the positive epistemology that dominated early research in mathematics education. Malone went on to critique the demarcation between theory generation and theory application and called for a new research paradigm involving the teachers themselves. On the other hand, Sowder (2001), maintaining the traditional paradigms, called for changes in research in mathematics education, to make it more effective. First, she argued that research has to be more authoritative and persuasive. She also argued for research that is relevant to practice and communicated in a manner accessible to teachers.

The reasons for this failure of research to inform and change practice and policy are varied. At times, some government policy, which might be guided by economic constraints, is at times contradictory to research knowledge (Hopkins & Levin, 2000). Similarly, Hargreaves (1994) argued that the failure of many school reform endeavours is the lack of consideration of power relationships in the school and society. He offered the challenge "that restructuring efforts do seriously try to disestablish the traditional structures of schooling; and do re-define relationships

between teachers, students, principals and parents in fundamental ways” (p. 243). Elsewhere, the first author argued (Atweh, 2004) that there is an increasing separation between knowledge generation and knowledge application in mathematics education. This separation is in time - generate knowledge now and apply it later; in personnel involved - academics vs. practising teachers; and in language utilised - theoretical vs. applied. Research in mathematics education is mainly conducted by academic staff at universities and is published in journals mainly read by other researchers. This separation often leads to a break in communication and work on similar agendas between the teachers and the academic researchers.

II. Contribution of Action Research in the Context of Change and Poverty

In the previous section we have identified three major contextual factors that impact upon the work of educational researchers in mathematics education. In this section we will discuss issues in action research that relate to these factors.

II.I Action Research in the context of globalisation

It is safe to say that action research is a global movement with alternative constructions and foci evolving in different countries and in different areas of professional and social practice. Wadsworth (2002) identified up to forty different traditions and models of action research and Selener (1997) identified several areas of application such as community development, organisational development, education, the medical profession and agriculture. As with most global movements, there are probably different constructions of its history. McTaggart (1991) provided one such detailed history of the development of action research in its different schools of thought and applications. Traditionally, the foundation of action research is attributed to the work of Kurt Lewin in the 1930's. Several theoretical stances have informed the different traditions of action research. In a previous context, the first author (Atweh, 2004) identified sources from Stenhouse in the UK, Freire in Brazil, the Frankfurt School of critical theory and its more recent development by Habermas in Germany, Schön's work on reflective practice from USA, and Fals Borda in Colombia.

Hughes, Ndonko, Ouedraogo, Ngum and Popp (2004) located the different traditions of action research into three main types. Technical action research relates to projects constructed mainly as problem solving with the aim of increasing the efficiency and/or the productivity of a particular practice. Typically, this is carried out by external experts who operate from perspectives consistent with the traditional positivist research methodologies. Practical action research puts more emphasis on the collaboration with insider professionals to solve problems arising within the practice. Through efforts to find solutions to the specific problem, it aims to develop knowledge and understanding of actions by the participants so that their knowledge can contribute to their improvement of their practice. Some practical action research projects are often informed by system functional theories mentioned in the previous section. Finally, emancipatory action research projects, sometimes referred to as participatory action research, are more attuned with a critical and empowerment perspective to deal with social change. Typically, they aim to improve a practice

through the development of the participants' understanding and theorising of the practice. However, they also aim at developing a sense of agency and autonomy in the participants that give them certain independence to posit their own questions and find their own solutions. Atweh (2004) discussed the characteristics of such an approach as conceptualised by Stephen Kemmis and his colleagues at Deakin University in Australia.

Perhaps the different theoretical contributions and types of action research illustrate the homogenisation and diversification characteristic of most globalised movements in the social sciences. It is impossible to say that action research is characteristic of a particular country or a particular school of thought. It is relevant however, to point out that the theoretical contribution to and the implantations of action research in many countries are functions of historical factors. Suffice here to point out that critical interpretations of action research have arisen out of adverse contexts of Germany post-WWII and from South America facing huge levels of poverty, inequality and oppression. The works of Freire in literacy movements in Latin America and the work of Fals Borda with the farmers in Colombia are perhaps internationally known. However, there are many more examples where action research theory and practice have evolved in countries facing rapid change and inequality. Atweh and Arias (2001) discussed a network of action research projects in Mexican state schools working in collaboration with university staff. Here we will consider one more example of an action research project in South Africa.

Robinson and Meerkotter (2003) outlined the development of an action research Master of Education program at a South African university in the mid 1980s. In response to the conditions of the dominant regime of apartheid, the program was embedded within the principle of emancipatory education. A basic premise of the program was that emancipatory researchers should self-reflect on their own practices and whether they are contributing to the oppression of their research subjects. They "understand that it is essential for human beings to guard against taking part in their own oppression" (p. 448) and that oppression does not relieve the oppressed "from working towards the ideal of emancipation".

The university in which the project was based, The University of Western Cape, was established in 1960 as a "coloured" university, arguably to "protect the historically-white universities from becoming increasingly multiethnic" (p. 452). The university became a centre for dissent in the country against racial segregation thus attracting significant critique from the government of the day and threats to cut its public funding. In the late 1980s, teaching and research programs were commenced in line with the vision of the university in building democracy in the country. Such programs were based on the writing of international critical educators such as Habermas, Grundy, Carr, Kemmis, Elliott, Coenen, Eisner and Fullan. Central to the philosophy of the course was the "transformative intellectual" (Giroux, 1988, in Robinson & Meerkotter, 2003). Most of the educators in the course were involved in political action in political organisations supporting the democratisation of South Africa thus bridging the gap between academic and political work.

Other programs/projects within the university and the Faculty of Education were also based on action research. The Teacher Action Research Project was designed to meet the needs of school teachers to improve their practice based on the principles of emancipatory education. Likewise, the Material Development Project worked with school teachers themselves to develop their own classroom material in the context of poverty and lack of resources. More recently the two projects were combined into one

Teacher Inservice Project aiming to “build schools as learning organisations, using strategies drawn from action research and organisational development” (p. 458).

The post-apartheid era has brought significant changes to the educational situation in South Africa. However, the progressive agenda is facing new challenges and roles for emancipatory education. The arising discourses of outcome-based education are not seen as fully compatible with the aims of progressive education. Similarly, significant inequalities remain in South Africa. Hence, the need for critical and emancipatory action research has not subsided.

It is worth mentioning that, while initial activities of action research in these projects were applications of overseas writers on action research, later local models resulted from learnings about action research in the country (Hughes, Ndonko, Ouedraogo, Ngum & Popp, 2004). In describing their own model, the authors claimed that it “is an outcome of international cooperation between action researchers from three continents. The model was developed in Africa, for Africans and draws heavily on already existing African ways of doing action research” (p. 17).

For us here, this project demonstrates how knowledge *about* and knowledge *from* action research are results of interaction between global and local knowledge. Global knowledge can be useful in a local context only if contextualised. Further, contextualising research can only be achieved by the involvement of the insiders themselves. Similarly, local knowledge does have the potential of benefiting others in different contexts. Using the traditional distinctions we can say that the power of action research lies not in its generalised learning but in its transference from one context to another.

II.II Action Research in the context of inequality and poverty

In discussing issues of research in mathematics education and poverty, two possible constructions of the focus are possible. The first construction relates to *researching poverty in the context of mathematics education*. Such a construction deals with poverty as a factor that affects participation and achievement in mathematics. While strong evidence exists that poverty is the most predictive factor impacting on students’ success in mathematics learning, little direct research has been carried out on that factor. Undoubtedly, more research is needed on the hindrances that poverty presents for the students’ development of mathematical knowledge and how such hindrances can be alleviated. However, such questions fall outside the aims of this chapter. This chapter focuses on *researching mathematics education in the context of poverty*. Suffice to point out one hazardous side effect of conducting research from traditional stances on the factor of poverty. Narayan (2000) pointed out that, although poverty is context specific, varying within communities depending on such factors as age and gender, there are certain shared characteristics that researchers must recognise. In particular, powerlessness, voicelessness and low self-confidence limit the choices of the poor and their control over their own lives as well as the quality of their interactions with institutions and their recourse to social justice. Traditional research that posits poverty and the poor as *objects* for research might reinforce the traditional hegemonies of the “experts”, representing the better-off, on the poor. Narayan called for a change in the mindset of professional researchers; rather than assume they know best, they must strive to understand the realities of the poor in considering development action. Rahman (2004) went further and argued that more urgent than seeing poverty itself as the problem to be solved, the ideological

“human capital” approach to planning that treats the poor as “livestock” and sees their worth in terms of “market productivity rather than social capability” (Chatterji, 2001, p. 2) needs to be challenged. Traditional approaches to researching poverty as a factor is a kind of “colonial carry-over” (Wakeford & Pimbert, 2004) that might create barriers to enabling the poor to take control of the processes of knowledge generation and social change. Further, conventional research methodologies may accord priority to Western, and middle class concerns about schedules and targets (Brydon-Miller, Greenwood & Maguire, 2003) that may not correspond to the reality of the less affluent communities. Various models of participatory research, however, provide opportunities to emphasise the priorities that are of more concern to underdeveloped communities.

We turn now to the issue of *researching mathematics education in the context of poverty*, and the role of action research from that perspective. Here, we raise two questions. Is action research possible in the context of poverty? And, what are the benefits gained from conducting such research?

Many less industrialised countries are recipients of multi-million dollar developmental aid programs from industrialised and more affluent Anglo-European countries as well as developmental loans from organisations such as the World Bank and its regional equivalents. Atweh (2003) pointed out that although these aid activities often contain an internal evaluation component, they are not subjected to external research themselves to ascertain their direct or indirect effects on the recipient countries. More relevant to our purposes here is that, more often than not, these aid programs involve curriculum and resource development rather than capacity building of local people to conduct their own development programs and research activities. Arguably, foreign aid that is built around collaborative research projects provides the less industrialised countries with such research capacities. However, effective action research projects and networks in poor countries and countries with poor communities have often arisen without international aid. Atweh and Arias (2001) discussed one such project in Mexico. Likewise, the previous section outlines another project in black communities in South Africa and reference was made above to Fals Borda’s work with the poor farmers in Colombia.

Pimbert and Wakeford (2003, and Wakeford & Pimbert 2004) discussed another project with farmers in India. It is worth discussing this latter project in a little more detail here since it represents a good example of a shift of control from the expert to the insider of a practice. In attempting to equalise power among all the stakeholders, the co-inquirers of this project used action research to reverse some of the normally dominant colonialist processes. This project sought responses to a development program proposal for the Indian region of Andhra Pradesh that had not originally consulted with the poor and other marginalised rural groups. The original proposal would have seen millions of rural workers become displaced as GM crops and contract farming methods were introduced to the area. The expertise of UK-based professional researchers was requested by grass roots community groups and a project called “Prajateerpu” (people’s verdict) was initiated. Technical expertise in action research processes was combined with the local expertise and knowledge of affected communities to develop citizens’ juries to examine the expert proposals. In a reversal of standard practice, meetings were held on farms. These “safe spaces”, controlled by the affected farmers and rural workers, required the bureaucrats and technical experts to travel and to step out of their comfort zones. Also, the normally male-dominated processes were disrupted with women’s essential knowledge and participation confirmed by their majority in the project.

The post-colonial call for such new collectivities is echoed by researchers in many parts of the world as a way of overcoming hegemonic agendas of expert researchers. In Chile, for instance, the “Voices Project” (Prieto, 2004), aimed at assisting democratic renewal, achieved the creation of a community of equals – a “radical collegiality” - that included local students, university lecturers and an international consultant. These collectivities, or “convergent systems” (Fals Borda & Mora-Osejo, 2003), can be most effective when they start from and respond realistically to differences rather than naively assuming equality (Crossley & Holmes, 2001). They do, however, require a “parity of esteem”, with different collaborators contributing according to their capacity (Grundy, 1998) as a basic requirement of the partnership. Genuine mutual respect and the ability to learn from each other are fundamental for the success of such participatory and collaborative research activities.

We turn to the second question posed above as to the benefit gained from conducting action research in collaboration with less affluent communities. Various educational action research projects, for example, have noted that the conditions for teachers in many poor communities are far from ideal, with many of the teachers themselves being inadequately trained and prepared. “Facing over 50 pupils, with a debilitating lack of confidence in subject knowledge” was not uncommon for teachers in black South African schools (Adler, 1997, p. 94) and this was compounded by low teacher wages, inadequate facilities and resources and a lack of basics such as electricity in many classrooms. The legacies of colonialism and apartheid also meant that teachers were locked out of curriculum development and regarded simply as classroom technicians. Similarly, an action research project with Ghanaian teachers noted that they were a “beleaguered and dispirited force” (Asimeng-Boahene, 2004, p. 279) in a “profession of last resort”. Poverty was forcing these teachers to supplement their incomes through taking on other paid work while dealing with a scarcity of educational materials. Such conditions leave little time for, or interest in, engaging in additional professional development activities. Obviously, research in mathematics education cannot ignore such conditions as “experimental error” or “nuisance variables” and remain relevant to the educational systems in such countries. In action research projects, such factors are brought to the foreground as essential components of the context.

Further, action research projects do not construct teachers and educational systems in poorer communities in the deficit model but build upon their current knowledge and expertise. Adler (1997) commenting on the Ghanaian project, noted that teachers may not recognise that they are engaged in research every day, albeit in an unplanned and unsystematic way. This kind of informal research was seen as a positive aspect of an action research project carried out in South Africa. Disregarding the usual insistence on structured timelines, the project, encouraging the concept of mathematics teachers as researchers, valued different contributions and individual growth “over time” (p. 99). The gradual building of capacity thus supported and empowered participants along a continuum of development.

Finally, we note that research alone cannot overcome poverty and create equality; it is also essential to provide services to feed the body (Narayan, 2000), to improve health and education and remove social barriers to participation (World Bank, 2000). Action research, though, has the potential to promote and encourage development even where poverty has created extremely unfavourable conditions. Such endeavours blur the divide between the action researcher as an educator and as an activist (Fals Borda, 2002). The concerns of conventional researchers about objectivity and controls are replaced in action research by concerns of “relevance,

social change, and validity tested in action by the most at-risk stakeholders” (Brydon-Miller et al., 2003, p. 25). Through its empowering cycles of reflection and action and the establishment of convergent systems, action research can combine the best of local and global knowledge, giving voice to the previously marginalised. When it comes to gathering information, community members can be “equally expert as conventional scientists” regardless of their level of formal education (Corburn, 2002).

II.III Action Research in context of the fragmentation of educational reform

A common theme behind many action research projects is the praxis between theory and practice. The weak interpretation of praxis implies the duty of research to directly address and inform classroom or social practice. This relates to the issue of accountability or research requiring significant amounts of social and individual investment and, hence, should demonstrate the returns of such investment, not only to the benefit to the researchers and the funding bodies but also to the subjects of the research themselves. Action research aims explicitly at change in practice. Brydon-Miller et al. (2003) asserted that action researchers can adopt several theoretical perspectives such as feminism, postcolonialism, critical race theories, and Indigenous knowledges. However, their focus is the investigation on their applications to change special conditions or practices. However, the strong meaning of praxis refers to an epistemological stance about how knowledge evolves. Fals Borda (1979) asserted that action research aims to help people investigate reality in order to change it. Kemmis and Wilkinson (1998) added that it also aims to help people to change reality in order to understand it. Hence, understanding and changing form a dialectical relationship where one informs the other. Theory does not only inform practice; practice also informs theory. Hence, the separation of theory production and theory application, which characterises most other research activities, is not tenable in action research. This central component of action research is illustrated in the spiral models often used to explain it. However, as the first author (Atweh, 2004) argued, it also leads to a limited understanding of the other, equally important characteristics of participatory action research. This nexus of research and practice relates to a) establishing the aims of the research, b) its focus and methodology, and c) the validation of the results. We will discuss each of these in turn.

Educational and social practice in countries experiencing rapid change and severe poverty and inequality highlight the role of social conditions and constraints in determining the form of the practice. Further, they present new challenges to the role of reformer of the practice. It is not the case that these factors are less important in countries with established traditions in research and relatively more resources. It is that researchers in the more affluent countries take these conditions as given and not as a direct focus of research. This is like researching students from non-dominant cultures bringing to the foreground hidden and taken for granted assumptions behind the actions and values within the dominant culture. The discussion below will address learning from researching through action research within the context of rapid change and inequality.

The aims of the research: traditionally, in countries with established traditions of research, research aims at either generating knowledge or applying that knowledge to solving some practical problem. Action research aims at both. As argued above, action research aims to change practice through understanding it. To use a more mundane analogy, the theory and improvement of practice are two sides of the same

coin. In the experience of action researchers in the context of countries facing oppression and poverty, reform of practice has taken a wider interpretation than is usual in more affluent countries. Gibbons (1994) asserted that new paradigms of research are more holistic and interdisciplinary where the research is not to be judged by its contribution to theory in a particular discipline but in its relation to other disciplines and practices. From the lessons learnt from action research in countries of adverse conditions, this necessarily includes considerations of broader social justice and political action. Fals Borda (2002) discussed the shifts in roles implied in action research from researcher as generator of knowledge about practice, to researcher as mediator between knowledge and society.

The focus and methodology: Traditional research is based on controlling variables in order to study their interactions and effects, or on controlling conditions to test if a particular intervention is effective. These models as they apply to education have been criticised for their lack of consideration of the complexity of classroom agendas and conditions. Likewise, many new qualitative paradigms, which might have led to a deeper understanding of the context of the classroom, have often failed to provide knowledge of the informants of research and knowledge for improving the social practice. Kemmis and Wilkinson (1998) presented a matrix to classify the different approaches to study practice. On one dimension of the matrix is the objective-subjective classification. Some traditions of research assert that a practice could be better studied from an objective external view. From this perspective the subjectivity of practitioners is a limitation to be avoided. Other paradigms of research assert that without the internal subjective view, the external researcher cannot come to terms with the complexity of the factors involved in understanding the practice. The rise of qualitative research has shifted the focus to the subjectivity of the participants – both the practitioners and the researchers. On the other dimension of the matrix is the social-individual classification. Some traditions to study practice focus only on the outward actions and perhaps the attitudes of the individual participants (i.e., students or teachers) irrespective of the social conditions in which these actions or attitudes arise. Other studies may focus on the social interactions and relationships of power between the participants with no reference to the agency of the participants involved in the interactions. The two dimensions to study practice are crossed to yield four approaches: individual-objective, social-objective, individual-subjective and social-subjective.

Kemmis and Wilkinson went on to discuss a fifth approach which they termed a dialectic-reflexive approach which is based on the interactions between the social and the individual, on one hand, and the interaction between the subjective and objective on the other hand. They constructed each of these pairs not as polar opposites but as mutual constructions. Dialectically, the individual and the social cannot be studied separately; one informs the other and constitutes the other. The authors asserted “people are made by actions in the world; and that they also make action and history” (p. 32). Similarly, the objective and subjective viewpoints can contribute dialectically to each other. The authors asserted that “changing the objective conditions changes the way in which a situation is interpretively understood, which in turn changes how people act on the ‘external’ ‘objective world’” (p.31).

The validation of results: An important task of a researcher is to demonstrate the validity of their results. The construct of validity is a value judgement applied on the research methods, the data collection techniques, and/or the research findings. Such value judgements are inevitably related to cultural norms and values and they are dependent on the paradigm of research (Lomawaima & McCarty, 2002). Action

research that is based on the participation of insiders in the practice is often questioned regarding its validity to generate sound knowledge and theories. As in any research project, action researchers should demonstrate and argue for the value of their results – albeit using appropriate criteria that suit the claims made in the project.

Brydon-Miller et al. (2003) argued that action research “is much more able to produce ‘valid’ results than ordinary or conventional social science” (p. 25) reflecting a valid representation of a practice because of the participation of the people from inside the practice at all stages of the research. Denzin (1986) noted, “the researcher who has not yet penetrated the world of the individuals studied is in no firm position to begin developing predictions, explanations and theories about that world” (p. 39). Action research should critically demonstrate the contribution to and the learning from the project of the participants themselves. Wakeford and Pimbert (2004) discussed how feedback mechanisms between the various levels of the project best guarantee that the claims made by each group are scrutinised – in this case, farmers, experts, academics and funding authorities. Likewise critical reflection on learning is more likely to yield valid truth. The question of validity is based on the belief that “democratically constructing a pluralistic set of truths and subjectivities is far more likely to produce robust knowledge than a positivist’s search for a singularly objective standpoint or observer-independent truth” (p. 30).

III. Concluding Remarks

In this chapter we have discussed three factors in the international context of research in mathematics education that impact upon the work of practitioners in the field. The rapid changes that most societies are experiencing are exuberated by technological advances and phenomena of globalisation have raised questions with respect to homogenisation and differentiation and of local and global knowledge. We have constructed these not as dichotomies but rather as simultaneous features of the new times. An accompanying phenomenon is the ever-increasing gap in access to resources and wealth within many countries and between countries around the world. Whether or not this phenomenon is a result of economic and business globalisation is beyond the scope of this chapter. Suffice to say that this increasing level of poverty and disadvantage could not be neglected in international interactions between mathematics educators. Arguably, these two phenomena have fallen outside the mainstream concerns of many researchers and the literature in mathematics education. However, the literature in mathematics education has reflected an increasing disquiet about the gap between the theory and knowledge generated by worldwide research in the field on one hand, and the practice and policy of mathematics teaching in schools on the other hand.

Further, this chapter discussed the use of action research as an appropriate research methodology in mathematics education within the international contexts identified above. We have demonstrated how action research itself has developed as a global methodology of theory and practice. The contribution to its development has crossed the traditional boundaries of the North and the South, the East and the West, as well as rich and the poor nations. As a global movement, it reveals a diversity of traditions and sources of influence and has been interpreted differently in different localities. Further, we argued that if action research is done collaboratively between external and internal researchers it has the potential to not only bridge the gap between the local and the global by raising questions of local interest, but also of

contributing to the empowerment of local researchers and practitioners. Similarly, we discussed how action research has been implemented in many countries and communities around the world where poverty and limited resources exist. If action research aligns itself to the social justice agenda, as many of its traditions have done, it presents an alternative research methodology that challenges the traditional hegemony by the haves over the have-nots. It does not disengage itself from action to improving the conditions, and knowledge, of the powerless from the inside. Lastly, by the construction of its research questions and following the participatory principle, action research re-connects knowledge and theory generation with improving practice, thus avoiding the irrelevance of much of research knowledge to practices of the classroom.

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