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**Scaffolding the Beginning Teacher: The EMSTAR Project**

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Many components of teaching are problematic for numerous primary school teachers but early career experiences may act as either inhibitors or catalysts for an enduring commitment to and enthusiasm for effective mathematics and science teaching. This paper describes the conduct of an action research project designed to promote effective mathematics and science teaching among a group of beginning women teachers. The paper outlines the historical development and organisational features of the Enhancing the immersion of beginning women teachers into Mathematics and Science Teaching through a participatory Action Research network (EMSTAR) project, in particular the formation of action research cells comprised of subgroups of the participating teachers whose foci were particular aspects of teaching mathematics and science, e.g. assessment, catering for the gifted and talented, and making mathematics more inclusive. The overall findings from the project as experienced by the university researchers are presented as our story in this paper. Teachers' voices are related in other papers presented in the symposium.

## Introduction

The teaching of mathematics and science in primary schools in Australia has been the focus of intense analysis and review over the past decade (Australian Academy of Science, 1994; Australian Science Technology & Engineering Council, 1997; Curriculum Corporation, 1991, 1994; Department of Employment Education & Training, 1989). Consequently, mathematics and science teaching has undergone continuous change over this period with increasing demands being made on teachers.

A recurring issue raised by the various reviews and reports is that the teaching of mathematics and science, discipline areas with close interrelationships, is for many primary teachers an area of major concern (Curriculum Corporation, 1994; de Laat & Watters, 1995). Among the reasons for the concern are inappropriate teaching and learning practices that teachers have themselves experienced in their own schooling and preservice courses. In addition, preservice primary teachers have limited content backgrounds in mathematics and science and showed little interest or confidence to teach the subjects (Atweh, Kyle, & Burnett, 1996; Atweh & Burnett, 1997; Watters, Ginns, Enochs, & Asoko, 1995).

The accumulated problems described above are more prevalent among women teachers who dominate the teaching profession in the primary and early childhood school years thus making the teaching of mathematics and science problematic in many classrooms. Historically, the lack of content background in mathematics and science among women teachers may be accounted for by the age old perception of women as nurturers, and thus more suited to primary and early childhood teaching and subjects such as English, home economics and biology. This perception has been detrimental to women wishing to enter such fields as the physical sciences and mathematics. Although policies for change have been initiated (e.g., Clark, 1990; Kenway & Willis, 1993), and despite encouraging indications that females have moved into mathematics and the sciences (Willis, 1989), reports (e.g., Cobbin, 1995) continue to

note that many women preservice teachers remain weak in mathematics and science, and have little interest in teaching the subjects. If the teaching of mathematics and science in many primary and early childhood classrooms remains problematic because of these factors we will continue to fail to address deficiencies in girls' education and access to nontraditional subjects.

Further, the early classroom experiences of beginning teachers may either inhibit or catalyse a lasting commitment to effective mathematics and science teaching hence the first year of teaching is an important phase in any teacher's professional development. Successful early experiences may contribute to a positive sense of self-efficacy and hence instil confidence to undertake stress inducing tasks such as the teaching of mathematics and science. Experiencing success in the induction year may be extremely difficult because of the lack of support given to teachers in many areas, least of all in mathematics and science (Ginns & Watters, 1996). Therefore, it is a crucial aspect of teacher professional development that we seek ways of fostering the professional growth of beginning women teachers so that they can acquire the confidence to be effective teachers of mathematics and science in the long term.

Several broad issues associated with the induction of beginning women teachers into the profession will be discussed in the following sections to provide a platform for our consideration of scaffolding for the beginning teacher in mathematics and science.

## Problems encountered by first year teachers

First year teachers enter the teaching profession with varying levels of skills, content knowledge, and pedagogical knowledge. Because of the lack of employment opportunities, many apply for, or are posted to isolated or difficult schools. While first year teachers are attempting to overcome difficulties faced in the new school environment, Veenman (1984) suggested that these teachers "need both pedagogical assistance and psychological support." Katz (1972) described four stages of pre-school teacher development: survival, consolidation, renewal and maturity. It was suggested that the first two stages characterise the first two or three years of teaching. The survival stage is distinguished by self interest and self concern, for instance, getting through the day and planning for a short period of time. In the consolidation stage, concerns move beyond self, and towards children.

Fuller (1969) described three major phases in teacher development: pre-teaching, non concerns phase; early teaching phase characterised by concerns for self; and a late teaching phase, characterised by concerns for pupils. This model was revised by Fuller and Bown (1975) to three stages of concerns of an inservice teacher's development. The stages are characterised by concerns for survival, the teaching situation (e.g., content, methods, materials), and pupils (e.g., students' learning and emotional needs). Other models have been reported in the

literature, for example, Vonk (1983) and Burden (1980). Common to all of these models is the initial survival stage.

Analysis of research studies from the United States, Europe, Australia, and Canada identified problems facing beginning teachers (Veenman, 1984). They included classroom discipline, motivating students, dealing with individual differences, assessing students' work, relations with parents, organisation of class work and insufficient materials and supplies, dealing with problems of individual students, and a heavy teaching load resulting in insufficient preparation time.

In 1979 and 1980, the Board of Teacher Education (1981) conducted a survey to gauge beginning teachers' suggestions of the most important topics to be included in induction programs. These topics dealt with learning problems, planning curriculum programs, handling behaviour problems, and methods of teaching in curriculum areas.

The Board of Teacher Registration, Queensland (1991) noted that many beginning teachers started "out with idealistic attitudes towards democratic classroom management, but ..(have) to abandon these in favour of the more custodial approach." Sullivan and Leder (1992) also reported beginning teachers tended towards authoritarian classroom control, and over directing classroom activities, including drill and practice activities. Further, there were many factors influencing beginning teachers' beliefs and behaviour. These included their own schooling and family background, preservice education, the transition process from preservice to inservice, the school and its induction

programs, and the classroom itself (Sullivan & Leder, 1992). In their study of the influences affecting novice teachers' instruction, Sullivan and Leder found that a very significant factor was the students, themselves. Among recommendations for change in preservice courses to address this issue, one proposal for future research, suggested by Sullivan and Leder, was to look at the ability of teachers to reflect on their practice, with the view that reflection may influence the direction of their teaching.

#### Induction and support programs

Common induction programs for beginning teachers in the United States, United Kingdom, Australia and New Zealand, reported by Veenman (1984), include provision of printed materials about employment conditions and school regulations; orientation visits to schools before taking up duty; release time; group meetings among beginning teachers for emotional support; consultations with experienced teachers; and team teaching. However, in the 1970s in Australia, and even the 1980s (Davis, 1988) few beginning teachers (fewer than half) had participated in induction programs and many of the recommended forms of assistance were not being offered (Board of Teacher Education, 1981). Beginning teachers reported advice from other classroom teachers, consulting textbooks, and advice from the school principal as being the most useful forms of assistance.

The James Report in England (1972) recommended an induction program of

teacher- tutors where both beginning teacher and tutor would have reduced teaching loads. The teacher-tutor would arrange inservice and provide professional help for beginning teachers. Costs for such a program were exorbitant, and beginning teachers felt strongly about their professional status while having reduced teaching loads.

The teacher-tutor model is similar to mentor programs that have been initiated in many countries, for instance, Indiana Mentor Internship Program, California Mentor Teacher Program, Mentor Teacher Internship Program, Kansas Internship Program. In the mentor model, beginning teachers are assigned to "expert" teachers who provide support and advice (professionally or emotionally, or both), and organise professional development. Inherent in the mentor model is that experienced teachers who are chosen as mentors possess many qualities, including the ability to provide information, ideas, assistance and support. Eight categories of mentoring roles were discussed by Wildman, Magliaro, Niles, and Niles (1992) ranging from mediator, to offering direct support, to encouraging reflection.

A related mentor model , a "buddy system" was trialled in Idaho (Klug, 1988), where mentors provided assistance on request. This was compared with another model, "Induction Team", where a team, comprising an administrator, a staff member from a higher education institution, and a mentor worked with a beginning teacher. It was found that the participants preferred the more structured approach.

Other induction programs have included university input, where university staff provided expertise, support and advice, and ran inservice courses (e.g., Cheney, Krajewski, & Combs, 1992; Dianda & Quartz, 1995; Reiman, McNair, McGee, & Hines, 1988). Some of these partnership programs associated with universities have incorporated reflective practice or action research at both preservice (e.g., McLaughlin & Hanifin, 1994) and inservice levels. Bartell (1990) asserted that "beginning teachers need to develop not only the capacity for seeking out ideas and resources but a framework for making decisions about what is or what is not useful or effective in their own practice." The advantage of such practice is that the participants seek knowledge and make decisions for their own settings, thus empowering them.

#### Aims of the study

This study was a collaborative partnership among a group of first year women teachers and university academics designed to explore and establish supportive structures for induction into teaching.

Specifically, the aim of the study was to develop, trial and evaluate an action research professional development model for assisting first year women primary school teachers in their transition into the teaching profession.

This paper represents our voices and our views of the project and is, therefore not a full description of the project. For a full description

of the project, this paper should be read in conjunction with the other papers in the symposium which represent the voices of the beginning women teachers.

Methodology and design of the project

### Overall Methodology

The methodology adopted in this project was participatory action research (PAR). The project was a collaborative research study involving a group of beginning women teachers and university staff aimed at investigating and improving the transition of these teachers from university study into the profession. Kemmis (1995) discussed the following characteristics of action research. First it is a social activity in that "it deliberately explores the relationship between the realms of the individual and the social." It recognises that "no individuation is possible without socialization, and no socialization is possible without individuation" (Habermas, 1992, p. 26), and that the processes of individuation and socialisation continue to shape individuals and social relationships in all the settings in which we find ourselves. PAR is also participatory in that "it engages people in examining their knowledge (understandings, skills and values) and interpretive categories (the ways they interpret themselves and their action in the social and material world)." It is also participatory in the sense that people can only do action research "on" themselves - individually or collectively. It is not research done "on" others.

PAR is also collaborative in that "[a]ction researchers aim to work together in reconstructing their social interactions by reconstructing the acts that constitute them. It is a research done 'with' others.

PAR is emancipatory in that "it aims to help people recover, and unshackle themselves from, the constraints of irrational, unproductive, unjust, and unsatisfying social structures which limit their self-development and self-determination. It is a process in which people explore the ways in which their practices are shaped and constrained by wider social (cultural, economic and political) structures, and consider whether they can intervene to release themselves from these constraints - or, if they can't release themselves from these constraints, how best to work within and around them to minimise the extent to which they contribute to irrationality, unproductivity (inefficiency), injustice, and dissatisfactions (alienation) as people whose work and lives contribute to the structuring of a shared social life." PAR is also critical in that "[i]t is a process in which people deliberately set out to contest and to reconstitute irrational, unproductive (or inefficient), unjust, and/or unsatisfying (alienating) ways of interpreting and describing their world (language/discourses), ways of working (work), and ways of relating to others (power)." Finally PAR is recursive (reflexive, dialectical) in that "it aims to help people to investigate reality in order to change it (Fals Borda, 1979), and to change reality in order to investigate it - in particular by changing their practices through a spiral of cycles of critical and self-critical action and reflection, as a deliberate social process designed to help them learn more about

(and theorise) their practices, their knowledge of their practices, the social structures which constrain their practices, and the social media in which their practices are expressed and realised. It is a process of learning by doing - and learning with others by changing the ways they interact in a shared social world."

## Participants

Initially, thirteen beginning teachers expressed interest in the project, however, four dropped out before commencing teaching because of their concerns related to overall work commitments at the start of the teaching year. The participants remaining in the study were eight beginning women school teachers and one participant yet to begin her teaching career. All were recent graduates from a four year BEd (Primary) course at QUT. During their course, these teachers had participated in the Women Trainee Teachers in Mathematics study (Atweh, Kyle, & Burnett, 1996; Atweh & Burnett, 1997) or worked as mentors in the Peer Assisted Study Sessions (PASS) program for students enrolled in a core unit called Science Foundations (Watters & Ginns, 1997). The participants represented a range of abilities in mathematics and science. They joined the project in the belief that it might benefit their teaching and that the findings would also help with the planning and implementation of the preservice primary teacher education program. The participants were invited to commit themselves to collaborative work with each other and with staff from the university in action research projects within their schools. Five of the beginning teachers

were located in Queensland schools and three worked interstate - two in the Northern Territory and one in New South Wales.

All participants formed a network of people and projects. Within the network, action research cells were formed based on issues of interest of the participants. Each action research cell was associated with one member of the university research team as a liaison person. From time to time the expertise of more experienced people were called upon to assist in the discussions of the action research cells.

#### Data collection procedures

**Network meetings:** Network meetings were conducted face-to-face, by telephone conferencing, or a combination of both. Notes from network meetings formed a highly useful source of data in this project and the whole group meetings were also audiotaped. The meetings allowed the action research cells to plan the overall conduct of the study and to report on their individual action research projects. The initial meeting was held prior to the commencement of teaching for the participants; the second meeting was held one month after the start of teaching; and the third after the completion of the first term of teaching. One last meeting is planned to be held during the fourth term of teaching for reporting, documentation and evaluation purposes.

**Action research cell meetings:** Regular meetings of the action research cells were conducted face-to-face, by telephone conferencing, or other

forms of communication. These meetings were audiotaped and summarised by the subgroup liaison person. The subgroup meetings provided opportunities for the participants to share their experiences and ideas and report on their actions.

Telecommunications: It was intended that all participants should be provided with electronic email facility thus providing efficient one to one and one to many channels of communication. Where email links were established all correspondences were archived for documentation of the study.

Individual journals: Participants in the study were encouraged to maintain a weekly diary of their experiences in their first year of teaching. The participants were asked to record general comments on their teaching with specific attention given to the targeted problem/issue identified by the respective action research cells. The keeping of the diaries electronically and submission of these for archival purposes, at regular intervals during the year, were encouraged.

## Procedures

Being an action research study, the exact procedures used in the study emerged from the various discussions at network and action research cell meetings, and classroom and school issues that teachers faced. The first network meeting allowed participants to identify their personal aims and negotiate the general operation of the study, and

acquire some experience in using email. Principles of action research were elaborated upon at the first network and subsequent action research cell meetings. The second network meeting provided teachers with an opportunity to discuss and share their early experiences in their new schools as well as consider and reflect on their initial plans for action research in their own classrooms. Areas of common interest continued to emerge. The principles of action research were reiterated at this meeting.

The fundamental aspect of this study was the formation of a network among the beginning teachers, staff from University and some more experienced teachers. Various action research cells emerged from the network. It was intended that the nature and membership of these subgroups remain fluid during the conduct of the study depending on the wishes and needs of the individual teachers. The university staff acted as facilitators for connecting teachers with similar needs and interests. During the third network meeting three groups of common interest were established. Three teachers decided that they were interested in working on catering for the needs of the gifted and talented; another three teachers were interested in aspects of assessment; the last three teachers shared an interest in making mathematics more relevant and inclusive to a wide cross section of students.

The last network meeting of the year, planned for later this year, is a mini-conference where the various subgroups/individuals will present

short papers about their experiences and learnings. This meeting will include a focus group interview to evaluate the study.

### Data analysis

Two types of analysis were conducted on the study data. The first analysis focused on the individual learning of the participating teachers in their action research cells. The source of this analysis involved the individual journals of the participants and their reflections on the project as well as their teaching during the first year of their career. Such an analysis was conducted mainly by the teachers themselves and is contained in separate papers to be presented at this symposium developed with some assistance from the university team.

At the second level of analysis, the experiences from this study enabled the researchers to evaluate the use of action research methods as a means of inducting teachers into the teaching profession, as well as to identify the common needs of these teachers. The analysis has taken into account the data from the network meetings, meetings of the action research cells and the reflections of the university team on their experiences as they participated in the project. The analysis of the data was done by the university research team using qualitative techniques based on the approach of Strauss and Corbin (1990).

### Findings

The findings are described under three headings: benefits to participating teachers; benefits to the university researchers; and difficulties encountered.

#### Benefits to participating teachers

The other papers in this symposium present the voices of the women teachers enabling them to elaborate on the benefits to themselves. Further information about the benefits to the teachers will be obtained in the focus group interview to be conducted at the third network meeting. However, from our observations of the meetings and negotiations with the teachers, we can identify some aspects of benefit to the teachers themselves.

There were times when the project did not seem to us to be going as we envisaged. Teachers were not sending information or fulfilling the agreed action from the meetings. We often wondered if they saw this project as a not-so-useful activity that they are engaged in for our purposes only. However, all nine teachers that remained in the project after the end of the first term of school, have remained in the project for the rest of the year. They all had the opportunity of leaving the project, especially after seeing some of their colleagues doing so early on. They have not done so. Obviously they were receiving some benefit from the project.

From our observations, the discussions at the network as well as action research cell meetings provided a feeling of mutual care and support. At the early stages of the project the participants were asking each other about their placements and plans. Later, some of them volunteered suggestions and ideas for each other's considerations. The project has developed a sense of community between the teachers. Two of the teachers were placed in isolated communities in the Northern Territory and this sense of community was particularly important for them. We believe that teachers had a chance to reflect on the major problems that they encountered in their teaching and many have found this aspect useful to increase their self awareness about their practice. Similarly the sharing of their stories with each other has assisted them to compare their practice with others. More importantly, they were confident that they could share their main concern in a supportive and non-judgmental atmosphere. In one of the action research cells the participants had a chance to share with one another a situational analysis of their school and in a special meeting they had an opportunity to comment and make suggestions on issues arising from the situational analyses. Many of these comments were accepted gracefully by the participants.

Naturally the question whether the practice of those teachers and the understanding of their practice has actually changed as a result of their involvement in this project, we can not answer in this context. The remaining papers in this symposium would undoubtedly address these concerns.

## Benefits to the university researchers

As university researchers we had to negotiate our roles with the participants. We were careful not to let our agenda and interests dictate the action research in which each beginning teacher would get involved. Between us we had a wide interest in topics and areas that cover both mathematics, science education, and gifted and talented children. As participants in the first two meetings of the network, we declared our interests just like any other member of the group. We also indicated several areas in which each one of us had some interest. Each participating teacher did the same as well. The three action research cells that were formed using this process were based on the patterns of interest demonstrated by each participant. The degree that our interests have determined the outcome of the groups is not clear. However, we are confident that each member of the action research cells was pleased with her selection. What was pleasing to us was that the action research cells have been selected in areas that we are very interested in as well.

As university researchers we have a range of interests, commitment to, and understanding of action research. In our planning meetings we debated our practices and plans for our groups. Ultimately we worked independently within our action research cells. Our actions within these cells was determined as much by our values and beliefs as by the needs of the participating teachers. How the particular groups

functioned is once again illustrated in the papers presented at this symposium. One thing we are confident of, is that we are more committed to the process of action research as a means of professional development of teachers at the end of this process than we were at the beginning. None of us has been involved in an action research project where the participants were at a distance from us and where we were unable to meet them face to face on a regular basis. This was a learning experience for all of us.

This project has increased our understanding of the isolation and the problems that first year teachers face. This knowledge, also documented in the individual papers at the symposium, was more real to us than a widely circulated survey or review of the literature because it arose from talking face to face with teachers as they experienced these problems.

### Difficulties Encountered

By the nature and scope of the project some learnings evolved out of dilemmas and difficulties we encountered which resulted in several compromises. The first type of difficulty encountered arose due to the geographical distance separating the participants. In one action research cell all the members of the group were interstate. Hence the only contact possible was electronically. Other groups also had difficulty arranging face to face meetings. Undoubtedly this created

serious difficulties for the usual meetings of action research cells.

Although it did not take participants very long to get used to teleconferences, the nature of such meetings prohibited important aspects of communications. It had a tendency of making the meetings more structured and formal. This may increase the efficiency of meetings, but also it places artificial constraints on the interactions among participants. There are protocols of politeness in talking on the phone and these may prevent some participants from debating issues. Further, teleconferencing is an expensive way to meet. Even though the project has received a grant for that aspect, we were very careful not to exceed the time limits in our meetings. Communication problems with some teachers was not restricted to telephone. One teacher in an isolated area received mail only once a week! Another teacher did not like receiving faxes from the other participants because of lack of privacy at the school.

At the planning stages of the project we expected that every participant would be connected through email. In spite of accounting for that service in our budget, this aspect of the project did not work at all. Those who had email facilities often had to share them with many other teachers in the schools. Others did not have the software or hardware to connect to the internet. Access to email is only part of the problem. An email culture needs to develop before people use email confidently for regular communication and sharing of learnings and problem solving. The culture of the school has not incorporated email communication as a normal means of communication.

Lastly, being at a distance has created limitations on how much we as facilitators can really understand the context of the teachers without having visited it. This difficulty was shared by teachers from the various schools as well. This is an inherent limitation of action research groups such as these.

The second dilemma we faced related to the competing demands on teachers' time. First year teachers are always under pressure to meet commitments and satisfy the demands of their classes and schools. In certain ways a decision to be part of an action research project is a commitment to carry the burden of additional responsibilities and activities. These additional responsibilities may take teachers attention away from more immediate and urgent tasks. The literature on beginning teachers indicate that the first year is a survival year.

Are we being unfair to add to those responsibilities concerns about the gifted and talented, varied assessment and inclusive curriculum? Is the involvement in this project justified? Is it good value for money? Once again, the persistence of the teachers in the project is a partial answer to these questions. The stories reported in the other papers in the symposium also may shed some light on these concerns.

The last type of dilemma we faced was related to the different understandings of the nature of the project by the various participants. On several occasions the participants would ask the university researchers about what was the next stage in the process.

Even though it appears some of the teachers have taken responsibility for reflecting on their own practice, none of them have taken charge of the process. Guidance was left to the university staff. In one sense the teachers have not owned completely the process of collaboration as a means of improving practice. The project, even though it might have been seen as useful and enjoyable, was also peripheral to the main concerns of those teachers. Similarly, where our concerns may have been on emancipatory aspects of action research and a critical understanding of practice, it seemed to us at times that the needs of the teachers were more technical and practical. Perhaps in our naivety we underestimated the pressure for survival that these teachers are under. Perhaps that is all they need as new teachers.

#### The use of action research with beginning teachers

In reflecting upon the feasibility of using action research as a professional development tool to assist in the transition of beginning mathematics and science teachers from initial training into the profession, we shall use the characteristics of participatory action research as argued by Kemmis (1995) and discussed previously, as a framework for our reflections.

Kemmis argues that PAR is participatory in that the people affected by the research findings should participate in its design, conduct and analysis. This project was planned to allow the teachers the greatest input in determining the issues pursued as well as the methodology of

its conduct thus allowing them to feel that they owned the project.

However, this participation by the teachers had its limitations.

Firstly, the participation of the different players was not necessary equal. The university researchers, as holders of the grant to conduct the research and as more experienced action researchers, had outlined the general structure of the project at the early stages of its implementation. Although the plans were not adhered to rigorously, they have determined to a large extent the structure of the project.

Secondly, prior to this project the teachers were not experienced in participating in research projects in which they have chosen the issues to research and the conduct of the research. The principles of action research were discussed at length during the first few meetings with the teachers. At times, the teachers felt some unease because they did not know clearly what the project was supposed to investigate and what was the expectation of them. However, by the time the action research cells were formed, the teachers did feel comfortable in taking responsibilities for the planning of the project.

These difficulties in obtaining true participation, we argue, are not unique to this project. It is a potential problem of all funded action research planned with the assistance of external facilitators. Also, these observations do not imply that genuine action research work among partners with different experience is not possible. In discussing the problems of participation in research with the profession, Grundy (In Press) discusses the issue of "parity of esteem" where the different expertise of the different participants is brought to bear in the

design and conduct of the project. All participants should be aware of these limitations to equal participation and should negotiate the roles and expectations very early in the project. Clear distinction should be made as to the variants and constraints of the project and to the roles of the different partners and their expectations of each other.

Kemmis (1995) also agrees that PAR is collaborative in that different players are involved in the practice, and work together to develop individual and collective understanding and improvement of the practice. The question that the project designers had to face was who are the different players in the practice of transition of teachers? Naturally, the problems associated with the transition and their solutions are dependent on people in addition to the beginning teachers themselves. The crucial roles of the school administration, other staff and other members of the school community can not be overemphasised. Should they be participants in the project as well? It is conceivable that the action research cells could have been formed around the individual schools with the participation of the school administrators and other more experienced teachers. We are confident that such an organisation would have been useful as well. However, in this project, we decided to work with the teachers from the same cohort and leave the nurturing of the contact with other players to the teachers themselves. There are a few advantages of the organisation as adopted here. Firstly, the beginning teachers have been able to develop a sense of rapport with each other being from the same cohort of a teacher education course. Mostly they knew each other. Even in

cases where they did not, it was easy to establish the sense of common interest because of the similar background. Similarly, when the need arose for the teachers to provide some advice to each other, the common knowledge of resources and context covered in their course was helpful. Secondly, the formation of support groups from outside the individual schools implied the teacher could be open about the problems experienced without fear of reprisal. Thirdly, talking to teachers from other schools and knowing what is available or possible in other contexts implied that the teachers could be more critical about what is happening at their own schools. Beginning teachers often do not have much experience with other contexts. Working with teachers from other contexts has given them the opportunity to explain their context to others. This experience has allowed the teachers to widen their understanding of their own context.

Another issue related to true collaboration is the issue of power. The new teachers' experience with the university staff has changed from a student-teacher relationship to a co-researcher relationship within a short period of time. This inevitably leads to the questioning of claims of equal collaboration. Arguably the initial expectation of some of the teachers in joining the project was that they would get continual support from some of their lecturers in teaching mathematics and science. Some may have expected us to act as experts. This was openly discussed very early in the project. The principles of action research stressed that reflection on practice rather than expert advice was the tool to use for improving practice. In our deliberations with

the small groups we were careful not to provide advice about teaching practice, and when we did it was done in the context of the different players attempting to negotiate a problem and our advice was given among other advice from the other participants. While the viewing of the university staff as being a higher authority and a source of learning about the practice of these teachers may have been averted, it was not avoided completely as it related to knowledge of action research principles and the conduct of the project. Often, the teachers left the calls for meetings and documentation of the project

to the university staff.

The further characteristic of action research as identified by Kemmis is that it is a social activity. Firstly, in participating in this project many of the teachers indicated that they were interested in the knowledge to be generated toward assisting the university in improving their training and in assisting teachers in the process of transition.

Needless to say, they were also looking for, and encouraged to do so, what benefit they, individually, could gain from the exercise.

However, they had a social dimension to their participation. Secondly, this project allowed the teachers a deeper awareness of the social context of their teaching. At least in one action research cell, the participating teachers decided to write a situational analysis of their respective context to share with each other. Their writings showed a deep insight and knowledge of the social background of their students

and the ethos of the school, and other limitations to their practice.

Further, through the discussion with each other, they learnt how to identify the practical difficulties that could more easily be changed.

The fourth and fifth characteristics of PAR as identified by Kemmis are critical and emancipatory, in that the practice in which the participants were involved is seen as a part of a system that, at times, acts and is structured contrary to the interests of the beginning teachers, and it attempts to empower teachers to improve their own practice. Some aspects of these were experienced in the project. The individual reports of the action research cells presented in this symposium illustrate that. However, we felt that, in general, these aspects of action research were not highly successful in the three action research cells. The teachers tended to be more concerned with day to day problems of how to conduct and manage classes, how to conduct appropriate and manageable assessment, and so on. Most of the teachers' concerns at this stage were technical problems. We argue that this is not unexpected, considering the need of beginning teachers to bridge the theory that they have learnt at university to the practice of the classroom. Technical needs may have priority over practical and even emancipatory needs.

Finally, Kemmis argues that PAR is reflexive and recursive.

As argued above, the project was designed to maximise the input of the teachers themselves in understanding and improving their practice.

The teachers have adapted to this change in philosophy from their

teacher training days, where the lecturers were often considered as authority, to the more participatory action research project.

This project was very much researching with the teachers rather than on the teachers. Whether the practices of action and reflection would be entrenched in the professional life of the teachers in future years remains to me seen. Yet we believe that the teachers have taken a step in that direction.

### Recommendations

Based on the above analysis, we can make the following tentative recommendations:

We are committed to the model of action research as a model for professional development of first year teachers. Other options for induction of teacher into the profession are often based on transmission of expertise and top down power relationships. We believe that teachers working collaboratively with each other is much more empowering for them and more effective in addressing the concerns of the teachers themselves. Further, the traditional induction methods tend to reproduce the profession, rather than use critical reflection thus leading to change and progress.

We acknowledge that, at times, such activities should start small and may address everyday life, the practical and even technical concerns of teachers. Once teachers have developed confidence in their profession and have developed some collaborative and reflective skills, it is

possible to advance their action research into more emancipatory concerns.

We are confident that the place to start developing an action research culture is in the pre-service training. Final year preservice projects, in particular, have a role in developing the culture of action research with teacher trainees. A place must be found in preservice courses to develop collaborative planning, acting and reflecting cycles through action research.

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