# TOWARDS A PROFESSIONAL DEVELOPMENT ETHOS

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## INTRODUCTION

Professional development for teachers of mathematics has assumed increasing importance over the past decade, for it is recognised that teaching practices will not change substantially without vastly improving the quality of pre-service and in-service education. As pointed out in *A National Statement on Mathematics for Australian Schools* (1990), teachers will have to be engaged in professional development throughout their careers in order to keep abreast of ongoing developments in mathematics education. In the past few years, a great deal of time and money has been invested in professional development programs for mathematics teachers, so it seems timely to consider their long term effectiveness.

This paper reports on the general impact which professional development has had on mathematics teachers in Victoria, gauged from evaluations into the effectiveness of three different models of staff development. It is argued that professional development programs should aim to foster in teachers a professional development ethos which is ultimately self-sustaining and empowering.

## RESEARCH ON PROFESSIONAL DEVELOPMENT

During the past 20 years, there has been an accumulation of research literature on in-service education, leading to increased knowledge about the art of teaching and the problems associated with change in schools. Indeed, Gage (1984) maintains that we now know enough about teaching practices to make it possible to change them in ways which make an educationally important difference. He asserts that "we need approaches to teacher education that walk the path between unacceptable regimentation and unacceptable anarchy" (p. 91). The work of Doyle and Ponder (1977/78), Joyce and Showers (1980), Fullan (1982), Huberman and Miles (1984) and others has clearly indicated that there are a number of factors influencing teacher change which had not previously been taken into account by those pressing for reform. These factors relate to the nature of teachers as people, schools as organisations and change processes themselves, including the many variables which facilitate or constrain change. In an important study of four change projects located in schools, Pinks (1989) identified twelve barriers to innovation effectiveness. Such knowledge has led to the development of in-service models which take these factors into account.

Much more is known also about the relative effectiveness of particular staff development models. Stalling's research, for instance (cited in Fullan, 1990) identified a number of critical factors which facilitate the success of a program. Meta-analyses of research in this area (see Showers, Joyce and Bennett 1987, Wade, 1985) reflect a high degree of consensus about what constitutes effective professional development practices. Sparks and Loucks-Horsley (1990, 13.1) have summarised these practices as follows:

(a)     programs conducted in school settings and linked to school-wide efforts;

(b)     teachers participating as helpers to each other and as planners, with administrators, of in-service activities;

(c)     emphasis on self instruction, with differentiated training opportunities;

(d)     teachers in active roles, choosing goals and activities for themselves;

(e)     emphasis on demonstration, supervised trials and feedback: training that is concrete and on-going over time; and

(f)     on-going assistance and support available on request.

As Ingvarson (1987) and Sparks and Loucks-Horsley (1990) detail, there are a number of ways in which teachers can engage in professional development and a number of models to choose from. These range from structured training models to school-based, teacher-controlled programs. Of course, not all teachers learn in the same way and not all schools have the same needs as far as staff development is concerned. In fact, Robinson (1989, p.274) asserts that there is no prescription for "exemplary practice which fits all teachers in all situations, (so) any model of change that relies on determining ends, then devising means will be inadequate, including all those within the management paradigm".

Although there are now some models for professional development which reflect this thinking and have provided teachers with the opportunity to empower themselves with regard to change, they are not necessarily able to do so. Despite extensive investment in professional development, there are still problems associated with the fact that teachers' attitudes to and beliefs about professional development begin to form long before they are confronted with the complexities of teaching in classrooms. Their own schooling, initial teacher training and subsequent in-service education has tended to be prescriptive and spasmodic in nature, leaving them with a perception of themselves as technicians. There has been a belief that if educational reformers can prescribe what it is that teachers should do and then have them do it, change will necessarily follow. This process, over a long period of time, has deskilled teachers in the sense that it has not encouraged them to think and act in self-directed, empowered, collaborative ways.

## PROFESSIONAL DEVELOPMENT FOR MATHEMATICS TEACHERS

This situation is particularly pertinent as far as the teaching of mathematics is concerned. Changing teaching practices in mathematics is compounded by the fact that many otherwise able teachers lack confidence and competence in this aspect of their teaching. As Good and Grouws (1987, p.778) assert, there are "critical weaknesses in the way teachers teach mathematics" because of their "misunderstandings of basic mathematical concepts and their misconceptions about which skills need to be emphasised".

Because of this and because of the need to inform teachers of new approaches in mathematics, professional development for teachers of mathematics has received unparalled attention in the last decade. A number of initiatives have been taken to assist teachers to improve their mathematics teaching. For example, the activities developed for the Reality in Mathematics Education (RIME) project and the Mathematics Curriculum and Teaching

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Project (MCTP) reflected quite a different approach to teaching mathematics. They were designed to be exemplary activity-based lessons which teachers could use as springboards for new ideas. According to Stephens, Lovitt, Clarke and Romberg (1989, 229) they "represent snap shot images of quality learning environments" which "can serve as vehicles which illustrate new understandings and reshaped practice". The publication of The *Mathematics Framework* and *A National Statement on Mathematics for Australian Schools* provides curriculum frameworks on which teachers can base their classroom programs.

Some of the existing models of professional development for mathematics teachers have arisen out of the Basic Learning in Primary Schools (BLIPS) program which was a project funded by the federal government in 1984. Its aim was to increase the literacy and numeracy skills of children in infant grades by raising the confidence, competence and interest levels of teachers. The most popular programs are the school-based models where teachers are encouraged to increase their understanding of the processes of teaching and learning through reading and discussion groups and by researching their own practice in collaboration with their colleagues. Two such models are EMIC (Exploring Mathematics in Classrooms) and Key Group. Teachers involved in EMIC attend ten weekly after-school sessions where they learn and discuss new ideas to trial in their classrooms. Key Group is somewhat more involved for participants, as they attend a three day live-in conference where they plan a course of action for change which takes account of up-to-date research findings, then return to their schools to implement their action plan. For further details about each of these models, see Robinson (1987) and (1989).

## OUTCOMES OF EVALUATIONS

Different models of professional development may have different objectives or emphases, but the over-riding aim is to improve teaching practices in ways which result in more effective learning environments for students. The three forms of professional development discussed in this paper are Exploring Mathematics in Classrooms (EMIC), Key Group and involvement in a Deakin course, ECT413 - Mathematics Curricula. All three reflect the effective practices outlined earlier. They are school-based and encourage teachers to take responsibility for their own professional development. Support and advice is provided by tutors or consultants as teachers reflect on their practice, trial new ideas and generally explore processes of change. In the course of evaluating these three approaches, I have interviewed 52 teachers about their professional development and the extent to which their practice had changed as a direct result of their involvement in a program. Detailed results of each of the formal evaluations are reported in Rice and Mousley (1989), Charlton and Holmes-Smith (1987), Rice (1990) and the Barwon - South Western Region EMIC Evaluation Report (1990-91). Whilst some outcomes are applicable to individual models, there are a number of common outcomes and generalisable trends which have emerged and which are outlined below.

### Impact on teachers

By and large, teachers' perceptions of the respective programs were very positive. They appreciated the fact that they were treated as professional people capable of identifying and improving aspects of their mathematics programs which needed to be changed. From a philosophical point of view, teachers were accepting of new ideas. As a result of their involvement in one of the professional development programs, a majority of teachers reported the following:

- perceptions of the nature of mathematics have been broadened
- they know more about how children learn mathematics
- they are more confident about trialling new ideas in their classrooms
- they have a broader range of teaching/learning strategies to use in the classroom
- understandings of the process of change have increased
- there is much more sharing of ideas and collaborative planning with colleagues
- interaction with teachers from other schools is more common

## Impact on classrooms

Teachers' responses indicate that since their involvement in professional development, classroom environments have changed in the following ways:

- programs are more flexible and for some, more integrated
- there is more use of concrete materials
- there is more child-directed, discovery learning and problem solving
- children talk and write more about their own mathematical strategies
- children record mathematics in a variety of ways
- there is more interaction between children and more group work
- children enjoy mathematics more and are more willing to take risks.

At the classroom level, a number of teachers experienced difficulties when trying to implement new teaching strategies. The most frequently mentioned concerns were:

- lack of time to trial and reflect on so many new ideas
- difficulties with classroom organisation and management
- competing priorities in other curriculum areas

It appears that many teachers tried to incorporate new ideas and strategies into existing programs, rather than reformulate their program. When questioned about changes in children's learning, a majority of teachers referred to attitudinal and affective rather than cognitive factors.

## Impact at the wider school level

It is evident that there are still a number of problems associated with changing mathematics at the whole school level. Many teachers reported that their involvement in professional development had made no difference to the way other teachers in the school were teaching mathematics. The most frequently mentioned concerns were:

- inflexible school wide programs
- traditional attitudes and beliefs of other staff at the school
- a lack of support from the principal and other senior staff
- parental and community expectations

However, there were some positive outcomes reported by some teachers at some schools:

- an increase in collaborative activity between teachers
- information sessions were held for parents
- an increase in the level of resources at the school

- a minority of teachers had been able to instigate or contribute to a review of their school mathematics policy.

## Major trends

Overall, it is clear that as a result of recent initiatives in mathematics education, including involvement in professional development programs which reflect practices known to be effective, the following can be stated with some efficacy:

- many more teachers are *aware* of recent trends and desirable practices in mathematics education
- more classroom environments *are* changing to varying extents and in various ways, as teachers endeavour to implement new ways of working.
- some individual teachers have developed a strong, self-directed professional development ethos
- implementation and institutionalisation of change at the whole school level are still extremely difficult to effect.

Fullan (1990) argues that for staff development to be more effective, it must be carried out in conjunction with institutional development, that is whole school improvement. Working with individual teachers or small groups of teachers may be effective in the short term, but as Fullan (1989, p.13) asserts, "small groups of teachers working together ... represent only a small subpart of the total culture of the school". In the long term, "the culture of the school is much too strong to be influenced for any length of time by single passing projects".

Despite these continuing problems, involvement in professional development programs can be a catalyst for new professional directions for a significant number of teachers. In evaluating these different models it has become clear that, providing there is the opportunity for teachers to exercise some control over the momentum and directions for change, the crucial factor is not the model, but how teachers respond to it. In other words, irrespective of the form of staff development undertaken, and notwithstanding the culture of schools, the professional lives of some teachers are significantly changed whilst others remain largely unchanged.

Teachers involve themselves in change processes to varying degrees: some will invest a great deal of time and energy into improving classroom practices, whilst others do little more than 'dabble at the edges'. In a recent study of curricular change in mathematics, Wilson (1989) isolated three critical variables that correlate with the success of a change project but which are *not dependent* on a particular situation. These are the extent of self investment by the teacher, the level of support offered by the school and an on-going commitment to nurture, evaluate and revise. Success was linked with the presence of one or more of the variables while lack of one or more of the variables correlated with lack of success.

According to Doyle and Ponder (1977/78), in responding to a change proposal, most teachers are guided by the 'practicality ethic', the three central components of which are:

*instrumentality* - clarity of the procedures, depicting classroom contingencies.

*congruence* - how closely it matches teachers' personal preferences and existing classroom situation.

*cost* - teachers weigh up the effort required to implement the change against the potential outcome

## PROMOTING A PROFESSIONAL DEVELOPMENT ETHOS

Notwithstanding the problems associated with school cultures, it is crucial that teacher education aim to foster an ethos which is self-sustaining and empowering and which regards the act of teaching as a dynamic, ever changing phenomenon. I believe there are three identifiable behaviours which are most likely to be associated with the development of such an ethos. These are *introspection, reflection and self-direction*.

*Introspection* is a way of thinking which involves an examination of one's own beliefs, thoughts and feelings, a process which leads to a greater awareness of the self in relation to others in the social context. Teachers who are able to situate themselves in a cultural milieu are more likely to be able to recognise possibilities and constraints. This is an important consideration in terms of implementing change in schools.

*Reflection* provides constant review of thought and action. It enhances understanding of a situation, promotes self-confidence and enables more efficient learning and problem solving to occur. There is already a well established body of literature on the importance of reflection in the teaching situation. As Schon (1971) has asserted, practitioners who neglect opportunities to reflect on what they are doing and why, can only attend selectively to phenomena which shape their practice. This idea is still valid today.

*Self-direction*. The notion of self-direction has been studied over a long period of time, from philosophical, educational and psychological perspectives. According to Candy (1990, p.15), 'central to the notion of 'self-direction' is the learner's sense of personal control, which is defined as the learner's belief that he or she is responsible for, and capable of, directing his or her own learning'.

I am suggesting that teachers who continually engage in introspection and reflection and who are confident in self-direction are most likely to adopt an enquiry approach to teaching which helps build a professional development ethos in a school. The characteristics of such an ethos are that teachers perceive themselves as professional teacher researchers, capable of researching, instigating and controlling the directions and momentum for change which is designed to enhance the welfare of their students.

The implications of this are that professional development programs need to fundamentally change teachers' perceptions of themselves as technicians who follow the lead of others. Professional development programs should be starting points which aim to provide support for teachers to become skilled in each of the abovementioned behaviors which in turn will assist them in the struggle to control their own professional destinies. As Fullan (1990, p.22) points out, the agenda for professional development is "to work continuously on the spirit and practice of life-long learning for all teachers". Such learning in his view has four related components, reflective practice, an enquiry approach to teaching, collaboration and the mastery of technical skills. It is important that "teachers come to internalise these ways of being, to the point where it becomes second nature to be a perpetual learner". I

contend that the qualities of introspection, reflection and self-direction would enable teachers to do just that, though clearly, there is a need for more extensive research in this area.

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