Professional Development in Mathematics for Primary Teachers

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Abstract

The purpose of this study was to describe teachers and principal perceptions about professional development in primary schools, and in particular mathematics professional development. A survey of primary teachers examined teachers' recent professional development experiences and related issues of access, needs assessment, effective and sustainable professional development, and accountability. These issues were further explored in relation to four case study schools in which both teachers and principals were interviewed.

The study identified that there are a number of issues to confront when developing professional development programmes if individual and school needs are to be addressed. In particular, the need to obtain a balance between individual needs and school needs, the ideal and the reality, short-term and long-term needs, and curriculum demands and subject needs of individual teachers was an ever present challenge. The questionnaire results showed that mathematics professional development was not accessed regularly by all teachers, and in a few cases teachers reported purposely avoiding mathematics professional development because of a lack of confidence or entrenched beliefs. Issues of time for professional development and competing curriculum demands for primary teachers was a common concern of both principals and teachers.

Professional development should be valued as an integral part of teaching and learning. In the case of mathematics this integration could well include the need to address teacher attitudes and beliefs about mathematics. Case studies suggest that school culture impacts on the value and integration of professional development and that the success or otherwise of any professional development initiatives is strongly related to the leadership and support structures within a school.

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Chapter One: Introduction

1.1 Background to the Study

Since 1993 primary teachers in New Zealand have experienced a significant amount of change across a range of curricula. Curriculum reviews during the 1990s concluded that there was a "need for a curriculum framework to provide a more coherent and integrated structure, for a school curriculum designed in consultation with all interested parties, and for assessment procedures which focused on improving the quality of learning" (Ministry of Education, 1993, p. 27). The result was the publication of *The New Zealand Curriculum Framework* (Ministry of Education, 1993), followed by new curriculum documents in seven essential learning areas, the first of which was the *Mathematics in the New Zealand Curriculum* (1992).

The New Zealand Curriculum Framework divided curricula into seven essential learning areas and identified eight essential skills. For primary school teachers this has meant that they have been required to up-skill themselves in all of the essential learning areas over the last ten years. To support these changes the Ministry of Education offered both primary and secondary teachers professional development opportunities aligned with the successive introduction of curriculum documents. These professional development programmes were designed to assist the initial implementation of curricula, addressing both content change, and in some subject areas to support pedagogical change. However, the initial professional development for mathematics "did not provide them [teachers] with pedagogical content knowledge as this was not an explicit focus of the contracts" (Education Review Office, 2000, p. 36). Other factors that affected the implementation of the mathematics curriculum included schools choosing to participate, or not, in the professional development, as well as choosing which staff were to be trained. Consequently some teachers were not involved in the early initiatives for mathematics (Education Review Office, 2000).

In New Zealand the professional development of mathematics teachers to teach mathematics effectively has received considerable attention since the Third International Mathematics and Sciences Study (Garden, 1996; Thomas, 1998), in which New Zealand students' lower than expected mathematics performance "was significantly below international means" (Ministry of Education, 1997, p. 2). As part of the ongoing concerns with achievement identified by the Third International Mathematics and Sciences Study, and in accord with the international focus on numeracy, New Zealand primary teachers are currently involved in a large scale numeracy initiative funded by the Ministry of Education. The nature of this professional development initiative is directly aligned with recommendations from the 1997 Mathematics and Science Taskforce which noted that "professional support needs to be school-based and provided over a period of time" (p. 11).

School-based professional development programmes are funded in a number of ways. Since New Zealand schools have had autonomy through Boards of Trustees under Tomorrow's Schools, professional development has been funded directly to schools through the operations grants. However, as schools are expected to identify areas of need themselves this funding is not tagged to any specific professional development. Additionally, the Crown through the Ministry of Education purchases in-service training centrally through contracts with providers (Education Review Office, 2000).

Despite substantial amounts of money being invested in professional development programmes in New Zealand little is "known about the effectiveness of any particular training initiative" (Education Review Office, 2000, p. 13). Furthermore, the Education Review Office identified that education systems they have studied have not provided "comprehensive information on the quality or effectiveness of attempts to improve what happens in classrooms as a consequence of in-service teacher education" (p. 37).

In line with the recommendations of the Mathematics and Science Taskforce (1997) a longitudinal research programme (Higgins, 2001, 2002; Thomas & Ward, 2001, 2002) has been funded by the Ministry of Education to investigate the numeracy development and associated components of the professional development.

While these initiatives provide substantial feedback about the nature of professional development and the effectiveness of the current numeracy initiatives, in terms of student achievement, there is little research that examines professional development opportunities and experiences from primary teachers' perspectives. Specifically, issues related to teachers' perception of needs for professional development, perceptions of effective professional development and views on issues relating to the accessibility of professional development are needed to provide a more holistic overview. Information relating to the range and effectiveness of professional development needs sourced from the teachers themselves would inform about future professional development initiatives.

1.2 Research Questions

The aim of this study is to explore teachers' and principals' perceptions of current professional development opportunities in general and specifically in mathematics. The study is designed to gather information based on perceptions of practicing primary teachers' and principals' professional development experiences to answer the following questions:

- What professional development have teachers recently been involved in?
- What are the perceived professional development needs of teachers?
- How are professional development needs of teachers established?
- What do teachers believe to be the nature of effective mathematics professional development programmes?

Answers to these questions will help to identify key aspects of effective professional development practices. In identifying good practices there is an expectation that discussions will also reveal those factors which affect professional development in mathematics—including both positive and negative factors concerning issues of access to, attitudes towards and suitability of professional development opportunities. This data will collectively provide an overview of how well teachers perceive their current professional development needs are currently being addressed.

At present, in New Zealand, while there is an increased focus on evaluation of professional development approaches and mathematics programmes (for example the Numeracy Project reports), there is a limited amount of research and data concerning teacher perceptions of their professional development needs in mathematics. It is intended that this study will provide an insight into the way professional development needs of primary teachers are identified and allocated. Furthermore, principals may consider the findings of this study when planning their school professional development programmes.

1.3 Definition of Terms and Policy Requirements

When conducting research it is important that the terms are clearly defined. Professional development in education is a term that is used often and may have varying meanings for different audiences and in different contexts. Within the education context the term professional development is often interchanged with terms such as: in-service training, staff or teacher development, teacher education, or school-based professional development, to name a few. For the purpose of this study the following definition for professional development, as provided by the Education Review Office (2000), is used:

> *Professional development* signifies any activity that develops an individual's skills, knowledge, expertise and other characteristics as a teacher. These include personal study and reflection as well as formal courses. (p. 3)

Policy documents within the New Zealand education system establish a clear expectation that teachers engage in professional development throughout their careers. The National Educational Goals and the National Administration Guidelines (Ministry of Education, 2000) provide school boards of trustees and teachers with clear directives for strategic planning:

> *"Each Board of Trustees with the principal and teaching staff is required to:*
> *(i) develop a strategic plan which documents how they are giving effect to the national Education Guidelines through their policies, plans and programmes, including those for curriculum, assessment and* ***staff professional development.***" (National Administration Guideline 2)

In my role as a principal, and in conversations with other principals, balancing the needs of all staff with school-wide developmental needs is a challenging task. This task is confounded by the need to be responsive to government priorities and the availability of programmes, which at times, do not always match the school or staff strategic priorities or needs. The research questions will go some way to exploring if these personal experiences are more widely shared and provide some insights into how other principals and their staff address their professional development needs in relation to mathematics.

1.4 Overview

Chapter 2 reviews the literature in the field of professional development and provides a background to mathematics professional development programmes within the recent New Zealand context from which this project can be viewed. The chapter provides a reference for the study, including a summary of the approaches to and types of professional development, the current opportunities available to teachers, and issues relating to the effectiveness of professional development.

The third chapter discusses the methodology. It overviews the data collection instruments and the project schedule. Chapter 4 provides an analysis of the

results from the information collected by the questionnaire administered to teachers.

Chapters 5 to 8 analyse the data from interviews conducted with principals and teachers in four case study schools. The principal and teacher interviews are then discussed within the context of each school and conclusions are drawn.

The final chapter, Chapter 9, discusses common themes from the questionnaire and case study interviews and conclusions are drawn within the context of the study. Implications for future professional development in mathematics are presented and further areas of research are suggested.