Policy to Practice in Reception Class Mathematics

By

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Abreviations

CGFS: Curriculum Guidance for the Foundation Stage

DOCLs: Desirable Outcomes for Children's Learning on Entering Compulsory Education

DCSF: Department for Children, Schools and Families

DfES: Department for Education and Skills

ECEC: Early Childhood Education and Care

EPPE: Effective Provision of Pre-school Education

EYFS: Early Years Foundation Stage

FS: Foundation Stage

KS: Key Stage

LA: Local Authorities (or Local Educational Authorities)

MAFS/R: Mathematical Activities for the Foundation Stage/Reception

NC: National Curriculum

NCfM: The National Curriculum for Mathematics

NLS: National Literacy Strategy

NNS: National Numeracy Strategy

PFLM: Primary Framework for Literacy and Mathematics

PNS: Primary National Strategy

REPEY: Researching Effective Pedagogy in the Early Years

RC: Reception Class

QCA: Qualifications and Curriculum Authority

QCDA: Qualifications and Curriculum Development Agency

SCAA: School Curriculum Assessment Authority

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Declaration

I declare that to the best of my knowledge, the material contained herein is original, except where explicitly stated otherwise. This thesis has not been submitted for a degree at another university.

Thesis Abstract

This study examines implementation of early years mathematics policy in reception classes (RCs) in England. It addresses the core question: what is the relationship between policy and practice in the Foundation Stage (FS) mathematics curriculum for three- to five-year-olds, in particular, implementation in RCs?

Policies and their implementation are analysed by means of the policy trajectory model outlined by Bowe *et al*. (1992) which separates the creation and implementation of policy into three distinct but interactive cycles: context of influence, context of policy text production, and context of practice. It both guided and framed this study.

In the context of influence, scrutiny of international policy revealed a recognition of the importance of high-quality early years education, as a means to raising school achievement. This posed a challenge to RC teachers charged with both accessing and extending children's rich mathematical knowledge through appropriate, yet accepted FS practices.

The context of policy text production uncovereded a tension between the drive to raise standards through whole-class interactive methods and the need for an appropriately play-based and informal FS pedagogy. Elite interviews revealed an awareness of and concern about this but showed little optimism for future development of practice,

In the context of practice, RC teachers revealed a positive attitude towards FS curriculum and pedagogy. Observed practice, however, was seen to vary considerably. Tensions in FS mathematics policy were thus enacted in RCs through practice that ranged from didactic teacher-led numeracy tasks poorly matched to children's capabilities to colourful practical mathematics activities that did not necessarily extend children's learning.

The policy trajectory model revealed strong top-down pressures that took little account of the impact on those charged with implementation, with RC teachers caught in a nexus of forces, reflecting requirements to deliver accepted FS practice and increase formality of numeracy lessons.

Policy to Practice in Reception Class Mathematics

CHAPTER 1: CONTEXT OF THE STUDY

1.1. Introduction

Across the world, there is now a wide acceptance that educational provision preceding formal schooling offers children a valuable opportunity for developing social, emotional and educational skills. Research findings show that lasting and important attitudes to learning are shaped early, crucially before the age of six (Ball, C. 1994; Pascal and Bertram, 1999; Sylva, 1994; White, 1985). Sylva (1994) had demonstrated the long-term impact of early education on children's later success, pointing out in particular, the importance of aspirational motivation, socialisation, and self-esteem in children's learning. Along the same lines, Ball, C. (1994) indicated important learning characteristics associated with children's later achievement, making it clear that early learning could positively affect children's pro-socialisation, self-esteem, motivation and confidence in later life. More importantly, a series of studies (Kagitcibasi, 1991 and 1997; Sylva *et al.,* 2004; Engle *et al*., 2007) showed that preschool intervention offered educational benefits to all children, and particularly to those at risk of educational failure.

Even so, the types of educational and nurturing experiences provided for children very much reflect the long-term expectations held by both society in general, and by policy makers and practitioners in particular, about the appropriate outcomes and goals of education itself (Stephen, 2006). What is

thought to be an appropriate environment for young children in any given society is directly related to the construct of childhood held by that society (Nunes, 1994). In this way, conceptions of childhood and children differ widely between different cultures, societies, and communities (Hill and Tisdall, 1997), and can even differ markedly within the same society over a period of time. However, in the twenty-first century, the construction of an early childhood and early childhood education has become of global interest and concern, and now countries and nations are closely monitoring each other's provision of early childhood education and care (for example, the Organisation for Economic Co-operation and Development (OECD), 2001 and 2006).

1.2. Context

A high-quality early years experience provides a firm foundation on which to build future academic, social and emotional success. Key to this, however, is the ensuring of a continuity between pre-schooling and the early years of formal schooling. Transition between the two should be seen as a process, not as an event, and it should take place during children's first year of formal schooling (Department for Children School and Families (DCSF), 2008b). According to Earl *et al*. (2001), the most common types of transition practices that occur after the beginning of the school year are aimed at the class as a whole. Continuity of experience for children in all areas of learning and development, however, is equally important whether related to communication, language and literacy, or problem solving, reasoning and numeracy, or indeed to any other aspect of learning and development. Sound policy planning and implementation for pre-schooling and formal schooling is

a key to making children's learning effective and progression. Policy that guides effective practice will support practitioners in the creation of a successful learning environment and offer support to children's development in their first year in school.

This study aims to explore the process of the creation and implementation of the early years policy in England, specifically for the transition into school in the reception class (RC) which caters for children aged four to five years - in their first year at school - and focusing on mathematics. There will be a special emphasis on the period September 1999 to September 2008. This period begins with the National Numeracy Strategy (NNS) - a Framework of Teaching Objectives from Reception to Year 6 by Department of Education and Employment (DfEE, 1999a) - as well as the Early Learning Goals (ELGs) (Qualification and Curriculum Agency (QCA)/DfEE, 1999) for the new Foundation Stage (FS) (for children aged three to five years). The NNS was designed to raise standards in mathematics, while the ELGs introduced the content of the new FS curriculum for practitioners working with early years children in Curriculum Guidance for the Foundation Stage (CGFS, QCA/DfEE, 2000).

The period ends with the arrival of the new Early Years Foundation Stage (EYFS) framework, which was published by DCSF (DCSF, 2008b) and was designed for children aged from birth to five years old, incorporating Birth to Three Matters (DfES, 2002c) although this particular curriculum is beyond the scope of this study. Another development in the same year [2008] was the publication of the Williams' Review of Mathematics Teaching in Early Years

and Primary Schools (DCSF, 2008a). The review panel was led by Sir Peter Williams, and the brief was to examine the evidence and make recommendations for the teaching of mathematics in early years settings and in primary schools. The review was intended to build on the Primary Framework for Mathematics (PFM) Department of Education and Skills (DfES, 2006), for children aged five to eleven years, as well as for the EYFS framework (DCSF, 2008b), for children aged zero to five years, with a special focus on teachers of early years and primary schools.

With the Labour Government coming into office in 1997, a number of policy changes in the area of early childhood education, care and provision were implemented in England, extending from the late 1990s and into the first decade of the new century. Policy changes are part of a complex process, and by the time they are formalised they have usually passed through a number of stages and cycles - identified by Bowe, Ball, S.J. with Gold (Bowe *et al*., 1992), and labelled as the policy-making process. This chapter aims to discuss the main dynamics of the policy-making process relating to early years mathematics education (i.e. discourses, values and practices) while placing it in a wider context. Starting from a general discussion of internationally-influential political aspects, discourses and practices, the study will then move on to the more specific area of English early years education, with a focus on mathematics teaching.

In acknowledging the importance of the early years education, governments, policy makers and educationalists around the world are working hard to create educational policies and environments which they consider will most

effectively realise their aspirations for their children. Moreover, interest in early years education has made day care for working mothers a high priority worldwide (David, 1999), not only for the creation of a happy childhood, but also because a number of studies - particularly longitudinal ones (Schweinhart and Weikart, 1993 and 1997; Sylva *et al.,* 2004) - have shown the importance that early childhood development has on later academic and economic outcomes.

Constructs of childhood, as well as early years educational policies, are influenced by certain key ideas. According to Aubrey *et al.,* (2000) these ideas have an ideological, philosophical and economical base, and Stephen (2006) has proposed that these ideas arise from two distinct sources:

1. ideas [discourses] about children, and childhood learning; and
2. socio-political perspectives on the purposes and outcomes of educational provision in the early years (Stephen, 2006:5).

Key terminology will now be introduced and defined in brief. The two sources of ideas identified by Stephen will then be examined with a view to seeing the extent to which they exert influence on early years education policies and practices. Lastly, research findings in the area of early years education will be assessed for their impact on the debate as a whole.

1.3. Definitions of Relevant Terminology and Concepts

In this study, early years or early childhood education refers to the pre-school provision in England for three- to five-year-olds, specifically for the reception

class (RC) that forms the transitional year to formal schooling, as well as the final year of the Foundation Stage curriculum. Members of this group, or members of any other form of pre-schooling, will be referred to as 'young children', 'learners', 'children' or 'pupils'; their teachers, on the other hand, will be referred to either as 'practitioners', or, at some points, as 'staff'. 'Learning activities' will be used to describe any organised programme of activities structured by means of the FS curriculum.

Other terms and definitions relating to the policy-making processes will be adapted from Bowe *et al.* (1992), whose policy-cycle model frames this study. These include: 'discourse' which refers to a whole set of interconnected ideas that are held together by a particular ideology or worldview; so 'discourse' refers to a formal treatment of a subject, or topic, either in speech or in written text (Bowe *et al*., 1992). 'Policy' refers to a principle or course of action that is explicitly adopted, or proposed, by an official organisation, or by a central or local government, or a school**,** or by an individual who is in authority. Similarly, 'educational policy' refers to those policies that have been specifically designed for the guidance of practitioners, or for meeting the statutory requirements for effective planning, resourcing and practice of early childhood education, and in particular of early mathematics education. 'Practice' is another term which refers to the implementation of policies by the relevant early years practitioners; and which designates the actual application in concrete terms of the ideas which support learning, and which facilitate the development and care of young children.

Educational practice in England is subject to administration by the UK Government in Westminster. There are departments within the UK Government that are solely responsible for affairs in England, such as - at the time of writing - the Department of Children, Schools and Families (DCSF). For the purposes of this study, educational policies and practices will refer specifically to those of England.

1.4. Discourses and Perspectives on Children, Childhood, and Education

Various discourses, values and perspectives underlie the development of any specific approach to early childhood education. The current literature (e.g. Moss, 1999; Woodhead and Montgomery, 2003; Dahlberg and Moss, 2005, Stephen, 2006) clearly shows that there are a variety of competing discourses as to how children should best be cared for and educated. These discourses offer contrasting perspectives on childhood and the way it is perceived. In developed Asian regions, for example - such as South Korea and Hong Kong - there is a tension between traditional educational values and practices, and western developmental and constructionist views (Bertram and Pascal, 2002; Stephen, 2006). In Turkey, for instance - this researcher's home country - there are a number of strongly contrasting discourses and views, ranging from contemporary educational perspectives and westernising approaches, to religious-based approaches, all of which are competing to influence formal educational policies (Sahin and Uluc, 2007).

Similarly, in Western Europe and North America, there is a clear tension between opposing perspectives on childhood (Dahlberg *et al*., 1999). There is

an obvious divergence, for example, between a ‘romantic' childhood construct and a ‘puritan' one. The 'romantic' construct portrays children as cute and innocent creatures who should be allowed to find fulfilment in play, whereas the 'puritan' construct conceives of children as inherently immature and unformed, and needing to be taught (Woodhead and Montgomery, 2003). The tensions between these two perspectives are even more apparent when compared with yet a third discourse, that of the 'social constructionist', which will now be explained.

The social constructionist approach can be seen as an alternative to both of the aforementioned constructs (Woodhead and Montgomery, 2003). It emphasises the link between the individual child and the society in which that child lives. The interaction between individuals and the society in which they live is seen as giving rise to a identifiable social construct (Moss, 1999), dependent upon particular social and historical contexts. In this view, there is not just one single construct of childhood, but "…many possible childhoods, always constructed within particular social and historical contexts and discourses, in short, childhood as a social institution’ (Moss, 1999: p.235).

The social constructionist approach denies the supremacy of any particular view of childhood, and advocates instead the acceptance of multiple perspectives and meanings, together with diversity and uncertainty, as well as with all the complexities inherent in any democratic participation of individuals within a multi-cultural society. At the beginning of this chapter it was pointed out that constructs of childhood vary greatly between different cultures and societies, and from this perspective, the social constructionist theory has a

certain inherent validity. Yet in the light of contemporary history, it would be naïve to argue that educational policies arise only out of theoretical idealisations and conceptual perspectives: there are clearly other factors involved, such as socio-economic, political and global variables (Taylor *et al.,* 1997).

1.5. Socio-economic and Political Perspectives

There is now a strong tendency among economically-developed countries to expose education - and even preschool education - to market forces (Hill, 2001), there being a strong link between economic policies and the educational policy context. Globalisation (or the equivalent restructuring of institutions and policies across the world), competitive pressures between countries, and rapid technological developments have generated a belief in education - including the early years arena - as a key factor in securing economic growth. Education reform is now spreading internationally and has been so since the end of the last century (Ball, S.J., 2003). Levin (1998) described this as a ‘policy epidemic’, and he identified a number of factors encouraging the spread of this epidemic globally; through, for example, institutions such as the World Bank and OECD, as well as through the inherent appeal - to politicians and academic educators of different persuasions - of making policy pronouncements (Ball, S.J., 2001 cited in Ball, S.J., 2003). Suffice it to say, the notion of 'the early childhood' area has become an increasingly important feature of the policy agendas of both national and international organisations (Moss, 2006).

Responding to these pressures, governments have focused on adapting their educational policies and practices (Schmidt, 2002). As has been stated in section 1.4, it is interesting to see how the globalisation of capitalism has created its own discourse. According to Schmidt (2002) the role of the discourse as an ideational and interactive component of change - within the adjustment process of governments - has received surprisingly little attention, even to the point of being totally ignored. In fact, in some cases, competing discourses have been "'stitched together'' in the new policies' (Taylor *et al.,* 1997: 9), creating self-contradictory standpoints. Often new policies are improvised to suit a new situation.

The most dominant discourse in recent early years education has been the positivistic and instrumental approach of Western Europe and North America, which has focused on the idea that social and economic problems can be solved by delivering predetermined outcomes in early childhood services. These outcomes can be facilitated through the introduction of enhanced technological devices such as computerisation (Taylor *et al.,* 1997; Dahlberg and Moss, 2005). In other words, even very early years education has been seen as a vitally important factor in economic growth and development. By acknowledging this fact, the OECD countries over the past two decades have shown a marked interest in early childhood education. In 1998 the Organisation launched the Thematic Review of early Childhood Education and Care Policy, to review the policies, services, and support in early years education and care (ECEC) of twelve volunteer countries. The first paper (OECD, 2001) was written after the first review, and it offered many examples of new policy initiatives adopted in ECEC as a response to the policy lessons

of earlier reviews. In 2006 the second review was published, entitled *Starting Strong II: Early Childhood Education and Care* (OECD, 2006). In this review, the review committee described the social, economic, conceptual and research factors that were influencing early childhood policy in twenty countries. This second review also outlined the progress being made by the participating countries in their response to the key aspects of successful ECEC policy outlined in the previous volume (OECD, 2001). In other words, these reviews were directly influencing the related policies in the member countries, particularly by addressing issues of access, quality, diversity, child poverty and educational disadvantage.

Moreover, longitudinal research studies demonstrating the impact of early childhood development on later academic and economic outcomes have contributed to this influence as well. According to Sylva (1999), these 'impact' studies affected policy and practice not only in the countries where they were conducted, but all around the world. The American longitudinal project, (*the High/Scope Preschool Curriculum Comparison Study*) for example, focused on the impact of early years education on children's development through the years of schooling and into adult life (Schweinhart *et al.*, 1993; Barnett, 1996; Schweinhart and Weikart, 1997; Schweinhart *et al*., 2005). This project has presented evidence over time to show that quality preschool provision has improved school readiness, reduced the use of health and social systems, increased income, and reduced crime rates in those children who had received it. This study has had a major impact on policy makers all over the world by conveying the message that investing in high-quality early childhood education could save a government money later on (Sylva, 1999).

Another longitudinal study, the *Effective Provision of Pre-school Education* (EPPE) (for example, Melhuish *et al.*, 2002; Sammons *et al*., 2003; Sylva *et al.,* 2004) followed more than 3,000 children in England and Northern Ireland from home to preschool and through later schooling. It has shown that children who attended pre-school for varied lengths of time demonstrated higher levels of cognitive development, concentration and social skills - as well as many other developmental skills - when compared to those who had no pre-school experience; it also demonstrated significant differences between different types of educational setting and parental input. This Government-funded study, begun in 1997, has been providing evidenced-based research findings which have been deeply influential on the early years educational policies of the English Government.

In summary, Ball, S.J. (1999) has outlined how globalisation affects the development of a country's educational policy, yet these can be in contradictory and sometimes counterproductive ways. According to him,

> Education policy in the UK and other western countries, at all levels, displays a complex, fluctuating disarray of policy strategies, political projects and desires, which are popular and incoherent, totalising and individualising, homogenising and fragmenting (ibid. 188).

This suggests that the educational policies of individual countries are heavily influenced by international factors, and the dominant yet changing local approaches at the time, as well as being affected by economics. Although external factors such as globalisation have an important impact on an individual country’s educational policies, it does not mean that there are no

local or internal influences at play. Globalisation may invade a local context, but it does not destroy them (Giddens, 1996).

1.6. Educational Policy in England

Labour and Conservative parties in England have responded to the political pressures of globalization as well as to other local factors in their education policies (Ball, S.J., 1999; Gillard, 2009). However, the New Labour Government elected in 1997 took on - from their Conservative predecessors - three basic organisational principles of education, and left them more or less untouched and unquestioned (Ball, S.J., 1999). These were:

1. choice and competition (the commodification and consumerisation of education);
2. autonomy and performativity (the managerialisation and commercialisation of education);
3. centralisation and prescription (the imposition of centrally determined-schemes of work, classroom methods and assessments).

Ball, S.J. added that Labour policies suggested also a fourth organising principle, that of an ‘equality of opportunity’ (or a fairness in tackling the spiral of disadvantage). Despite the similarity between Labour and Conservative education policy in broad terms, they still had their differences. As Ball, S.J. sees it, they are different but not distinctively so (Ball, S.J., 1999). Labour’s education policies cannot be separated from a global educational agenda, but it does not mean that as a government it has had no real control over its policy decisions. In fact, as O’Brien (1998) reminds us, 'Labour policies can be

understood and analysed as a synthesis between market and social democratic values' (O'Brien, 1998:3). White (1998) calls this the 'Third Way', claiming that it amounts to an 'employment-centred social policy'. Market values can be seen as the effect of globalisation, whereas social democratic values are the result of Labour's own ideology. Consequently, as Ball, S.J. (1999) has stated, social and educational policies became combined into a single economic and industrial policy.

In order to evaluate its school-related policies, Labour adopted an input/output approach to educational planning (Ball, S.J., 1999). According to this, 'inputs' might consist of mental mathematics, a numeracy or a literacy hour, with a strong focus on effective teaching in literacy and numeracy, combined with an improved teacher training. 'Outputs' are similarly diverse, with the desire to see '75 percent of all 11 year-olds to reach Level 4', of the mathematics curriculum; and standards for assessing an average performance, through to having children possess well enough developed mental skills, and so on. Lauder *et al.* (1998) argued that, in England, the desire to raise basic educational standards provided a centralised curriculum and a high level of accountability, while at the same time - unfortunately - undermining creativity. The educational policies caused anxiety among secondary schools who wanted to be high up in published league tables, and made primary schools similarly anxious as to how they could demonstrate to the Qualifications and Curriculum Authority (QCA) (now renamed as the Qualifications and Curriculum Development Agency (QCDA)), clear signs of improvements in standards, and this in turn put pressure on early years settings and had

practitioners begin teaching formal subjects earlier than was appropriate (Alexander, 2010).

This extreme emphasis on performativity and results has clearly influenced actual practice in early years education. The growth of performativity and a centralised control in the education system focusing strongly on inputs and outputs has had the effect of trapping teachers between prescriptive expectations and student performance itself (Brown and Lauder, 1992; Edwards *et al.,* 2007.) The consequence has been that a meaningful conception of creativity has been lost, as teachers' energy and morale is eroded by policy overload (Edwards *et al.,* 2007). In the same vein, Brown and Lauder (1992) have pointed out that increasing the emphasis on performativity clearly diminishes the autonomy of practitioners within the system.

1.7. Conclusion

So far, this brief introductory chapter has shown that there are a number of key factors which need to be taken into account when analysing the early years policy-making process. These factors are the relevant discourses, values, views, socio-political and economic policies, as well as influential empirical research findings. In order to understand the interplay between educational and political discourse, and between policy and practice, this study will employ the policy trajectory model of Bowe *et al.,* (1992) as a framework within which to situate the political and educational concepts of early years mathematics in England, for the period between 1999 and 2008,

with a particular focus on the transition period between pre- and formal schooling, in RC. The following research questions provided the basis for the study that will be reported.

1.8. Research Questions

As a means of fully exploring the policy-making process, this research will address the following research questions:

1. What is the relationship between policy and practice in the early years mathematics curriculum for RC children in England?
2. What does the policy for early years mathematics require RC teachers to do in their classrooms in terms of curriculum implementation?
3. What are the RC teachers' views and understanding of the FS mathematics curriculum?
4. How did the RC teachers implement the early years mathematics policy in the context of actual classroom practice?
5. How did the RC children respond to the FS mathematics curriculum presented to them?

The next chapter will provide the policy framework.

1.9. The Organisation of the Thesis

This study arose out of an interest in early years learning, especially the teaching of mathematics at the Foundation Stage. The thesis attempts to address the question 'what is the relationship between policy and practice in the early years mathematics curriculum for three- to five-year-olds in England and particularly for reception-aged pupils?' It is divided into eleven chapters.

Chapter 1 introduces the educational context and explains the background which led the researcher to engage in the study.

Chapter 2 introduces the conceptual framework by means of which the well-known policy trajectory model of Bowe, Ball, S. J. with Gold (Bowe *et al.,* 1992) both guides and frames the study. This model identifies the three contexts (context of influence, context of policy text production and context of practice) which will come to be applied to an analysis of policy and practice in RC mathematics.

Chapter 3 introduces and discusses key developmental learning theories which shed a light on how young children learn and the particular challenges to RC teachers of accessing and extending this early knowledge and experience.

Chapter 4 provides a justification for the qualitative approach which has been used for designing the approach and data collection in this study. The various methods of data collection are described, and the rationale behind the methodology is analysed and explained. A later section of the chapter

discusses issues such as sampling and ethical observation, as well as trustworthiness, reliability and validity.

Chapter 5 introduces relevant policy texts for children's mathematical teaching and learning in RC and then singles out two key texts in particular, the NNS (DfEE, 1999a) and the CGFS (QCA/DfEE, 2000), before analysing them in depth.

Chapter 6 provides the detailed views of four élite participants on the three contexts of the policy-cycle in early years mathematics and these views later inform the conclusions drawn.

Chapter 7 provides the results of a self-completed questionnaire distributed to RC teachers, together with a discussion of their views whilst Chapter 8 provides - through observations made by means of field notes, audio-tape-recordings and video recordings - a detailed investigation of the actual teaching practice in three RCs.

Chapter 9 involves targeted observations of children in the same three schools in which the detailed investigations of classroom practice were conducted.

Chapter 10 offers interview findings with three participating RC teachers that contextualised the observations made.

Finally, Chapter 11 involves a conceptual analysis of the key theoretical issues in the light of the empirical findings and leading towards specific conclusions.

CHAPTER 2: POLICY FRAMEWORK

2.1. Introduction

This study aims to elucidate the policy-making cycle in early years learning, specifically with regard to mathematics in the reception class (RC). The well-known policy trajectory model of Bowe *et al.* (1992) will be used for macro- to micro-level analyses. Bowe *et al'*s (1992) policy-cycle model will first be introduced, and then the policy-making process will be analysed in three contexts identified by the model. as the *context of influence; the context of policy text production* and; *the context of practice*.

Policy has been defined as a formal statement of principles established and proposed either by an organisation, or by a person in authority (Bowe *et al.,* 1992). Education policy needs to be understood within the wider context of government action, as well as a context of economic and social policies that are both domestically and internationally determined (Lall, 2007). In England, the Government's increasing involvement in the educational policy-making process and in educational decisions has been justified using this line of argument (Kwon, 2002; Lall, 2007).

After the *Education Reform* Act (1988) it is now widely acknowledged that the control of education by teachers, schools and local authorities (LAs) has been decreased. At the same time, Government involvement has increased significantly (Tomlinson, 1991; Bartlett *et al*., 2001). Although diminished, teachers, practitioners and LAs still have some influence. As Marsh (1997 cited in Bartlett *et al*., 2001) have argued, education is the result of a complex

interaction between decision-makers, stake-holders and other interested parties, in which none of them is in total control. This is reflected in the Bowe *et al.*'s (1992) policy-cycle model, which considers the multiplicity of influences in any policy-making process.

2.2. Policy Cycle Model

Bowe *et al.* (1992) offers a policy-cycle model that allows us to analyse the policy-making process in depth. Writers such as Ball, S.J. (1990) have challenged the separation of policy, politics and practice of the state-centred model. He adopts a 'cumulative ethnographic approach to consider the interaction, interpretation and development of people and policy at (multiple) levels' (White and Crump, 1993: 416). Dale (1992) on the other hand advocates a state-centred explanation of the policy-making process. According to him the state is a primary actor in making education policy and therefore does not pay much attention to the contributions of outsiders. But he (Dale, 1989) nevertheless did argue that the state needs actively to seek consent if it is to secure hegemonic control.

Although Ball, S.J. (1990) and Bowe *et al*. (1992) have accepted the growing influence of state control on education and policy construction since 1979, Bowe *et al*., ascribe only a limited role to state intervention. They strongly disagree with the state-centred concept separating policy generation from policy implementation. Instead, Bowe *et al*. has argued that it cannot be 'simply a matter of implementers following a fixed policy text and putting the Act into practice' (Bowe *et al*., (1992:10): because policy is an interactive process, a dialectic. As he has stated:

> 'Instead we would want to approach legislation as but one aspect of a continual process in which the locii of power are constantly shifting as the various resources implicit and explicit in texts are recontextualized and employed in the struggle to maintain or change views of schooling' (Bowe *et al*., 1992:13).

To make the case, Bowe *et al*. (1992) cited conceptual distinctions made by Roland Barthes[i], between 'readerly' and 'writerly' texts. The former give little opportunity to the reader for creative interpretation, while the later self-consciously invite the reader to 'join-in', and to co-operate and co-author. Bowe *et al.* (1992) employed this distinction to show how some policies can be readerly, while some others can be writerly. These readerly and writerly texts are also the product of a policy process which emerges from, and continually interacts with, a variety of interrelated contexts, some of which will be discussed later on. Bowe *et al*. (1992) also argued that policy texts creators need to understand the background knowledge and ideologies of the people (teachers, in this study) on the receiving end of policy texts, and what drives them to implement policy in the way in which they do.

According to Bowe *et al.* (1992) policy does not just begin when it was created and received as a text by the people who have a duty to implement it. In their view, production of the text itself is never a static moment. This is another reason why Bowe *et al*. (1992) criticised the state-control model for its having a tendency to freeze policy texts, and thereby overlook and exclude the contextual slippages that occur throughout any policy cycle.

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[i] In Bowe *et al*. (1992) there is no direct reference for this citation, but it is cited from Hawkes (1977) by Bowe et al.

Bowe *et al*. (1992) characterise policy as both discourse and as text. These two notions are implicit in one other and further analysed in Ball, S.J. (1993). For Ball, discourse meant a regulated practice that gave rise to statements and produced a framework of meaning in which policy was thought through, and talked and written about (Ball, 1993). Policy texts were set within these frameworks, and these in turn gave rise to a series of possibilities for action, none of which were causally fixed. Bowe *et al*. (1992) claimed:

> They [policies] are also, as we conceive it, essentially contested in and between the arenas of formation and 'implementation'. While the construction of the policy text may well involve different parties and processes to the 'implementing' process, the opportunity for re-forming and re-interpreting the text mean policy formation does not end with the legislative 'moment' (Bowe *et al*., 1992:13).

Generation and implementation are continuous features of policy cycle, as illustrated in the figure below:

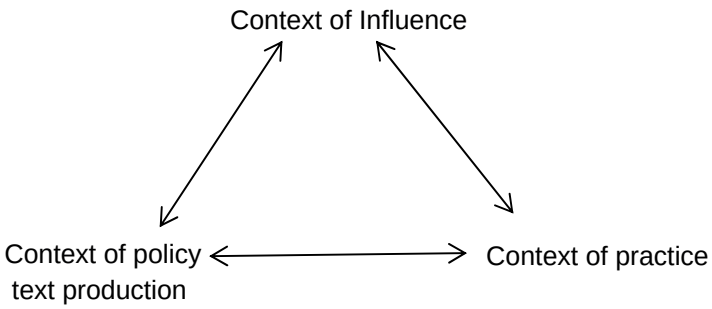


Figure. 2.1. Context of Policy-making (source: Bowe *et al*., 1992: pp. 20)

This figure needs to be read from the top and anti-clockwise: context of influence, context of policy text production and context of practice. Nevertheless, the context of practice is never the end of the process, because it returns cyclically to the context of influence, and is therefore continuous.

Context of influence is where public policy is normally initiated, and where policy discourses are constructed (Bowe *et al.,* 1992). There are a number of social agencies - and social intentionalities - in and around this context, and these interest groups (also called actors) struggle to influence the definitions and social purpose of education (Ball, S.J, 1993). Bowe *et al*. (1992) claim that each of these competing contexts consists of a number of arenas of action, both public and private. In the context of influence, the private arenas of influence are based in the social networks that are in and around the political parties, Government and legislative process. The resulting discourse either might give support to, or might challenge, any particular process. Complementing this, there are a number of arenas of public action, such as committees, national bodies, and representative groups. They might all be sites for the articulation of influence. This context can be seen as the initial stage of any policy-making process, and as such it exists only at a very theoretical level.

Context of policy text production is where the texts that embody policies are created. This context has a close but uneasy relationship to the *context of influence* (Bowe *et al.,* 1992). ‘While 'influence' is often related to the articulation of narrow interests and dogmatic ideologies, policy texts as such are normally articulated in the language of general public good’ (ibid. 20). In this sense, policy texts represent officialdom in documentary form. Policy texts might range from being almost incoherent, to being written in generalised language, or to being framed in an idealised way. But most importantly, throughout the policy cycle, it needs to be emphasised that policy is not

concluded at the legislative moment, it continues to develop through the texts. The texts have to be read and understood in relation to time and the place of production, as well as in relation to other relevant texts. A related issue concerns authority, insofar as it is important whose voice is going to be represented, and who is going to take control of the meaning of policy, as well as control over the timing of the publication. The public response to the published texts is another crucial feature of the interpretative and generative policy cycle.

Context of practice is the arena where policy texts are responded to by those who are charged with implementing them. As Bowe *et al.* (1992) have made clear, policy is never simply received and implemented within its targeted arena, it is always subject to interpretation and recreation. Practitioners do not face policy as naïve readers, because they come instead with histories, experiences, values and purposes of their own, as well as having a vested interest in the meaning of the policy itself. Interpretations will differ for any of a myriad of reasons, and as Bowe *et al.* (1992) has aptly put it, policy writers cannot control the meanings of their texts, because some parts of them can be rejected, selected out, ignored, or deliberately misunderstood. Therefore, interpretation is always a matter of interactive struggle.

2.3. Policy Cycle in Early Years Mathematical Development

In this section, the policy-cycle model of Bowe *et al*. (1992) will be used as a framework to elucidate the policy-making process in early years mathematical development for RC (for ages four to five years). Firstly, the context of influence of mathematical development in RC will be discussed from two

perspectives: the context of influence for polices related to mathematical development of young children; and the context of influence for early years curriculum policies. Secondly, the context of policy text production will be examined, and lastly, a discussion of the context of practice will end this chapter.

2.3.a. Context of Influence In Receprion Class Mathematics Policy-making

Traditionally there has been little Government intervention in England in primary school education. Nevertheless, especially in 1970s and 1980s the Government increasingly focused on basic numeracy and literacy skills, and appreciated the vitality of this knowledge to children's learning at school. This was a pivotal idea underpinning the introduction of the National Curriculum (NC) in 1988. The NC was built around ten foundation subjects, which included the core subjects of English, mathematics and science. The curriculum was compulsory for all pupils aged five to sixteen, and was divided into four stages. In 1991, standard assessment tests were introduced for seven-, eleven-, and fourteen-year-olds, and these ages corresponded to ends of the four stages. The publication of test scores for eleven-and fourteen-year-olds was required in order to compare national averages. By the introduction of the NC in 1988, the Conservative Government was more involved in prescribing the curriculum than at any time since World War Two (Bartlett *et al*., 2001).

At first, it looked as though the Government would control the degree of curriculum differentiation in the relevant sectors by means of the NC (Tomlinson, 1991). However, there were a number of problems, most of which were caused by the heavily prescribed content of the NC itself, and by the untried or untested assessment methods. Assessment methods at this time caused concern, as articulated by Aubrey (2002):

> … a fairer index of school effectiveness would be a measure of the progress made by pupils rather than their 'raw' results, which reflected a range of other social factors influencing prior learning or 'intake variables' (Aubrey, 2002: 67).

Aubrey (2002) also maintained that assessment tests were measuring a value-added analysis of schools' performance. In other words, the main emphasis was being placed on the effect of schools upon pupil performance rather than on children's individual success.

In 1991, the Secretary of State for Education and Science in the Conservative Government, Kenneth Clarke, began to take an interest in research on primary school practice, as he felt that primary schools were becoming too child-centred and focused on play. Clarke argued for a return to 'streaming' (i.e. classes ranked on the basis of ability) from an early age, and for far more subject-teaching (Chan *et al.,* 2002). He then commissioned a report to scrutinise primary teaching methods. This report - known as *Curriculum Organisation and Classroom Practice in Primary Schools: A discussion Document* and written by Alexander, Rose and Woodhead (Alexander *et al.*, 1992) - emphasised the downwards trend in many aspects of literacy and numeracy achievement in primary schools, as well as noting that the majority of primary teachers were not adequately equipped to teach subjects to their

fullest extent. The overall findings of this report, with their intensive reference to the value of subject-teaching and learning, lent support to the Conservative Government's call for a 'back to basics' in education. Moreover, they argued that overly–complex patterns of curriculum and classroom organisation, frusturate diagnosis, assessment, task matching and pupil learning (Alexander *et al*., 1992:3).

In 1992, during the general election campaign, education again became a key issue. John Patten produced the white paper *Choice and Diversity: A New Framework for Schools* (DfE, 1992 cited in Gillard, 2007). This document formed the basis of new legislation in the autumn of 1992, and later became the *Education Act 1993* (Chan *et al*., 2002). LAs' power over education was reduced by means of this Act, and schools were given the autonomy to opt out of local authority control. Along with reducing the power of LAs, the Act was heavily criticised by LAs and teachers because its curricular content was much greater than it had been in the prior *Education Reform Act of 1988* (Gillard, 2007).

In the same year, the Government also commissioned a report (Dearing report, SCAA 1993) to find ways of making the curriculum more manageable, at the same time devoting more than 50% to literacy and numeracy. By *1996 Education Act* the Government introduced national literacy and numeracy projects that were later to appear adopted as strategies.

The 1993 Dearing Report *The National Curriculum and Its Assessment* was the first major review of the NC. In an interim report, Dearing report (1993) had criticised the Government for going too far in reducing the input of LAs.

Dearing also claimed that education suffered from too much content, and that too many subjects were being taught in too much depth, and that assessing results was becoming difficult and confusing. That report also suggested that in early years schooling the main focus of the curriculum should be on mathematics and English. Any national testing system ought to measure these two subjects, along with science. Although Dearing's study noted that the NC had a strong subject-based side to it, and had accordingly advised a reduction in its heavy content, the new slim line version of the curriculum which then appeared in 1995 (HMSO, 1995) - for the five- to fourteen-year-olds - was merely a slightly-diluted version of the 1993 one (Bartlett *et al.*, 2001; Chan *et al*., 2002).

Nevertheless, falling standards in literacy and numeracy remained a persistent concern, and all through the 1990s a number of Her Majesty's Chief Inspector's reports and international comparative studies (i.e. the TIMSS report of Harris *et al*., 1997) showed that a majority of primary school children were not reaching the level expected of them, especially in mathematics (Aubrey *et al*., 2000). Brown (1996) described a situation in mid-1990s when was difficult to switch on the television (or to open a newspaper) without encountering yet another survey reporting how dismally the English perform at mathematics. And the more the standards were perceived to be falling, the more the policy-makers engaged in producing ever more formalised policies for numeracy and literacy.

A selection of press cuttings from the mid to late 1990s, under the title of 'What do the papers say about early mathematics in schools?'

(http://www.lancs.ac.uk/staff/towse/presscutt.html) contain a number of news items about Chris Woodhead, the then Chief Inspector of Schools. Together with colleagues, he strongly advised teachers to abandon the progressive child-centred teaching methods in primary schools which had left young people lagging behind students in other countries in mathematics and literacy. His co-authored report (Alexander *et al.,* 1992) calling for a 'back to basics' approach, had a direct influence on the National Literacy and Numeracy Strategies (NLS and NNS) introduced in 1998 and in 1999. Askew *et al.* (www.nuffieldfoundation.org/) identified two main influences on the form and content of the NNS: the first being the work of Chris Woodhead, who under the Major Government provided the apparent justification for, and the effective direction of, the National Numeracy and Literacy Projects based in 13 poorly-achieving LAs. Woodhead's influence carried over into the early years of the Labour Government, and was strongly associated with the agenda of 'raising standards'. 'Back to basics' meant returning towards structured whole-class teaching within an emphasis on calculation skills, and the NNS Framework was constructed within this context. The second major influence identified by Askew *et al.* (www.nuffieldfoundation.org/) was educational research. Some educationalists (for example, Professor Michael Barber in his advisory position in the task forces of literacy and numeracy projects) also advocated a 'back to basics' policy and helped to demonstrate that it was an attractive option.

After its 1997 election victory, the Labour Government produced a deluge of policies, the most relevant to this study being the NLS and NNS (DfEE, 1998 and DfEE, 1999a), designed to ensure that all primary children met agreed targets (Walford, 2005). By introducing the NNS, the Government set targets

to bring 75 percent of eleven-year-olds up to the expected level in mathematics by 2002. In fact by 2004 74% of children in Year 6 had reached level 4 or above. Yet, Earl *et al.* (2003) concluded that much of the improvement in standards had taken place prior to the introduction of the NNS in 1999.

In 2003 the document *'Excellence and Enjoyment: A Strategy for Primary Schools*' (DfES, 2003) was published to incorporate both literacy and numeracy strategies. The main purpose of this policy text was to encourage schools and teachers to take greater control of their curriculum and to be more innovative. It seemed that policy-makers had at last acknowledged that teachers have some power to decide how they teach, and that the Government ought to support that.

2.3.a.1. Early Years Education Policies for children age of three to five

The context of influence, as relating to early years education policies in England, can be characterised as a desire to raise standards, especially in numeracy and literacy. Aubrey (2002) traced the identification of literacy and numeracy as basic tools back to Callaghan's 1976 Ruskin Speech. Since then, a number of policy initiatives have been introduced for primary schools, including the RC. There is a tension generated between the various stake-holders (i.e. politicians, practitioners, and early childhood specialists) as they compete to influence the nature of the curriculum offered to young children (Anning, 1998). Introduction of a subject-based NC for all pupils aged five to sixteen in 1988 was one of the key debates between the policy makers and practitioners. Despite the fact that early years teachers and practitioners had a

deep-rooted belief that teaching should be based on children's interests and developmental needs, they were obliged to implement the NC for five-year-olds in the RC (Anning, 1998). As then the Secretary of State for Education and Employment, Gillian Shephard, put it, the system needed to 'get it right first time by giving children a solid grounding in basic skills from the start to reduce the need for remedial action later on' (DfEE, 1997: Foreword).

In the same vein, Chris Woodhead, the then Chief Inspector of Schools in England, argued that early years practitioners needed to use a formal approach and direct teaching methods while they were teaching their three- and four- year-old pupils (Woodhead, 1999). He maintained that 'direct teaching is crucial at this age as it is at every other age (p.10). After introducing the 'back to basics' approach to primary schools, and using traditional whole class direct-teaching, a curriculum for three-to five-year-olds (Curriculum Guidance for the Foundation Stage, QCA/DfEE, 2000) was introduced. Aubrey *et al.* (2000) identified two main assumptions of the policy makers underpinning the policies in early years education. These were:

- Early introduction to formal schooling will lead to the raising of standards;
- Higher levels of achievement are linked to economic progress and, hence, to future prosperity (Aubrey *et al*., 2000:182).

Both these assumptions were crucial to the reformulation of early childhood education policies.

In 1996, the newly-appointed School Curriculum Assessment Authority (SCAA) introduced *Desirable Outcomes for Children's Learning on Entering Compulsory Education* (DOCLs) (SCAA, 1996). This curriculum was

organised into six areas of learning: personal and social; language and literacy; mathematics; knowledge and understanding of the world; physical and creative development. The DOCLs gave special emphasis to the early development of children's literacy and numeracy, as a foundation for later achievement. In 1997 a short-lived voucher scheme was introduced to provide nursery education for every-four-year-old. In order to assess whether or not the voucher system was working, as well as to chart the progress of young children towards the DOCLs, OFSTED inspections were introduced (SCAA, 1996) .

When New Labour was elected in 1997, it tried to distance itself from Conservative ideas. Yet, as has been seen, there was a strong continuity with Conservative policies (Walford, 2005). Tony Blair, the then Prime Minister, claimed that Labour policies would be based on 'what works' rather than on ideology (Whitty, 2000). Labour promised to make education their first priority, and to ensure that all children had a strong educational foundation. Blair claimed repeatedly during the election campaign that the top three priorities of the Government would be 'education, education, education' (Labour Party, 1997). Labour aimed to reduce the cost of economic and social failure by giving the first priority to education (Walford, 2005). In early years education, Labour produced a huge number of policies and initiatives including free, part-time high-quality education for all three- and four-year-olds whose parents wanted it; joint local planning of early years childcare and education; and a network of early excellence centres (Aubrey, 2002); and OFSTED was appointed to assure the quality of the provision of free nursery education places. In other words, Labour attempted to increase services and support for

young children and their families with the intention of altering the nature and the way services were delivered (Sylva & Pugh, 2005).

In September 1998, a statutory baseline assessment of children's language and literacy, mathematics, and personal and social development at school entry was introduced. This was aimed at gathering information about a child's progress through the Key Stage 1 (for five- to- seven- year- olds); LAs began to take an interest in such data as well. Lindsay (2001) emphasised that originally 'baseline assessment grew out of two different interests: pedagogy and accountability' (ibid. 48). The first one concerns identifying children's learning needs, such as special educational needs and the monitoring of progress. The second focuses on the evaluation of progress made by comparing achievement with an expectation given their level at entry (value added). However, Lindsay (2001) maintained that the child/pedagogical focus of baseline assessment had shifted, and that the main focus was on school and accountability issues, and especially on value added analyses.

In 2000 the Labour Government revised the existing DOCLs (SCAA, 1996) and introduced the Early Learning Goals (ELGs) (QCA/DfEE, 1999), and the Curriculum Guidance for the Foundation Stage (CGFS) (QCA/DfEE, 2000). The new curriculum guidance was goal-orientated and directed children towards specific achievements (Kwon, 2002). However one presented it, the trend towards Government involvement in the policy-making process appeared not to have changed much (Bartlett *et al*., 2001).

2.3.b. Context of Policy Text Production in Reception Class Mathematics

Having discussed the context in which the text were produced, we can now turn to the documents themselves, the NNS (DfEE, 1999a) and CGFS (QCA/DfEE, 2000).

In September 2000, the new ELGs (QCA/DfEE, 1999) were to be implemented in preschool settings catering for three- to five-year-olds. The CGFS was issued, to 'help practitioners plan to meet the diverse needs of all children so that most will achieve, and some, where appropriate, will go beyond the early learning goals by the end of the foundation stage [RC]' (QCA/DfEE, 2000: 5). Some similarities to the DOCLs remained (SCAA, 1996), for example the six learning areas. In the CGFS, the areas were not to be treated as school subjects, but rather as a way of thinking about aspects of learning embedded within children's real and relevant experiences (David, 2001). The six early learning areas were:

- personal, social and emotional development
- communication, language and literacy
- mathematical development
- knowledge and understanding of the world
- physical development
- creative development.

Each area of learning had a set of related ELGs, and the CGFS identified progress with 'stepping stones', showing the development of the knowledge, understanding, skills and attitude possessed by children at each stage

(Rodger, 2003). The CGFS was based on the recognition that children learned best through play and active learning (QCA/DfES, 2000), and was therefore keen to promote more child-initiated and child-centred curricular approaches and pedagogy (Pascal 2003), as was already the approach of early years practitioners (David, 2001).

Nevertheless, while the CGFS was emphasising the uniqueness of each child's disposition and prior experience, it was also firmly focusing on the development of numeracy and literacy. Preceding the CGFS, the NNS (DfEE, 1999a) and its framework for RC to Year 6 were published. Thus, there were two documents directed at one development area (mathematics) in RC, with distinctive goals. In fact there was a third document, if one includes the National Curriculum for Mathematics (NCfM), (DfEE, 1999b), which was also published in 1999 as a part of the NC for England at Key Stages 1 and 2 (QCA, 1999). This booklet covered from age five to the end of KS2 (age eleven), yet despite its relevance to the period, it contained no direct reference to the early years education. This makes it difficult to argue that the NCfM was designed to be implemented as part of the children's mathematical development in RC.

In 1999, the NNS was launched to increase children's numeracy standards in primary school. Teachers were now expected to teach a structured three-part daily mathematics lesson of 45 minutes for Key Stage 1 and RC. Yet the document itself stated that the numeracy hour in this class was to be introduced gradually and towards the end of the summer term, when the teachers were advised to implement a dedicated daily hour of mathematics

proper . The NNS and its framework set out key objectives for RC's daily mathematics lesson and recommended whole-class interactive direct teaching in which oral and mental work should feature strongly.

The NNS provided examples that were intended as assessment indicators, but not as activities (Gifford, 2001). According to Gifford, the emphasis in the NNS was on narrow outcomes, and this gave this document a quite different feel from the CGFS. She went on to say that the RC examples in the NNS should have included more open-ended and higher-level experiences. Moreover, if attitudes had been included, the NNS might have been a very different document (Gifford, 2001). However, it differed from the CGFS in objectives and expectations.

There was criticism of the joint implementation of NNS and CGFS (DfEE, 1999a, or QCA/DfEE, 2000) for mathematical development in the RC . According to the Early Childhood Mathematics Group (2001), the differing curricula did not merge at all, and even appeared contradictory. When it came to mathematics development in particular, teachers were cautiously looking at the structures of the daily mathematics lesson, and getting children to sit down for too long. Quick *et al.,* (2002) expressed some main problems identified by head teachers and reception teachers about the joint implementation of NNS and the CGFS. One of these problems was unclear guidance, with a feeling that there had been a mixed message in both documents about the relationship between structured and unstructured work (Quick *et al*., 2002).

In 2002 the DfES introduced two mathematics booklets for the Foundation Stage (one for nursery classes and another for reception). The RC booklet was titled *Mathematical Activities for the Foundation Stage Reception* (MAFSR*)* (DfES, 2002a). The aim of both booklets was to help FS practitioners plan mathematical activities that were linked to the Stepping Stones identified in the CGFS (QCA/DFEE), and progressing towards the ELGs. These booklets were also accompanied with briefing notes, video-taped presentations and hand-outs for teachers and parents. Together they constituted another form of policy text. Compared with the objectives for RC in the NNS Framework (DfEE, 1999a), the Mathematical Activities for the Foundation Stage/Reception booklet provided clear guidance as to how mathematical activities for RC would fit into the curriculum outlined in the CGFS. Yet even the MAFSR (DfES, 2002a) did not completely clear the confusion caused by joint implementation of the NNS and the CGFS (Gifford, 2004); the CGFS did not mention direct-teaching for mathematical activities, whereas the MAFSR was strictly teacher directed (Gifford, 2004).

2.3.c. Context of Practice in Reception Class Mathematical Development

The NNS (DfEE, 1999a) and the CGFS (QCA/DfEE, 2000) have had a huge impact on teaching styles, classroom organisations and some other important aspects of teaching in the FS. Recently, a number of studies (Moyles *et al*. 2002; Quick *et al*., 2002; Siraj-Blatchford *et al.,* 2003; Hardman *et al*., 2003; Adams *et al*., 2004) have focused on the impact on pedagogy and practice in the early years and primary schooling, as a result of the implementation of these documents.

In the Researching Effective Pedagogy in the Early Years (REPEY) Project, Siraj-Blatchford *et al.* (2002 and 2003) conducted fourteen case-studies in twelve pre-school settings and in two RC. Results from this study showed that teaching and learning was most effective in centres where practice was characterised by:

- Cognitive interactions between adult and child including those which lead to sustained shared thinking;
- Sound teacher knowledge and understanding of subject matter;
- Frequent use of questioning techniques by adults especially in the context of children's play;
- Discipline and behaviour policies based on talking through conflicts;
- Pedagogic environments which encourage children's development;
- Home involvement in learning activities (Siraj-Blatchford *et al.,* 2003:4).

REPEY researchers classified pedagogical interactions into two groups – cognitive and social. Cognitive pedagogical interactions were characterised by sustained, shared, and explicit thinking; and by direct teaching and monitoring. Meanwhile, social pedagogical interactions included encouragement, behaviour management, social talk and care. In this case, it is clear that the research findings of this study indicated that the key elements for teaching and learning in effective centres demanded a quality of adult interaction, and a compatibility with existing policy.

Siraj-Blatchford *et al.* (2002) categorised the fourteen case study settings as either 'good' or 'excellent'. In excellent centres, pedagogy demonstrated the highest proportion of sustained shared thinking interactions, as well as an equal balance between adult-led and child-initiated interactions and activities. Siraj-Blatchford *et al.* (2003) suggested that these episodes promoted intellectual gains in children by providing an opportunity for the child and the

adult to construct an idea or activity together. However, in good centres (RC was put in this category) the commonly used pedagogy was direct teaching and monitoring, and most of the learning episodes in these settings were initiated by adults.

Moreover, the REPEY team also found out that cognitive outcomes depended on teacher-planned and initiated focused group work, as well as the amounts of shared thinking between the teachers and children. Effective practitioners were seen to assess children's performance so as to ensure the provision of challenging, yet achievable experiences; and to model appropriate language as well as encourage socio-dramatic play; to praise, encourage, and ask questions, and verbally interact with children. The other significant finding of relevance here is that the highest proportion of sustained shared thinking and direct teaching took place during children's literacy and mathematics activities. Those findings were clearly in line with the major expectations teachers had of the NNS (DfEE, 1999a), that is to say, for teaching with high-quality, lively and direct interaction with children.

Nevertheless, the findings of Hardman *et al*. (2003) for primary schools have suggested that although interactive whole-class teaching was promoted in the NNS, traditional methods of direct teaching had not been as dramatically transformed as had been hoped. Their most significant findings were as follows.

- During the whole-class teaching part of the daily mathematics lesson, teachers spent a great deal of their time either explaining or using highly structured questions-and-answer sequences.

- Teachers were far from encouraging and extending their pupils' contributions towards promoting higher levels of interaction and cognitive engagement.
- Teachers were asking too few open questions and not probing enough (in instances where the teacher stayed with the same child to ask further questions as a means of encouraging sustained and extended dialogue).
- Pupils initiating questions as well as interactive dialogue were only observed very occasionally, because teachers were focusing on more directive teaching.
- Even if children asked questions or initiated the question their questions always tended to be very short, limited to two to three words only (Hardman *et al.,* 2003).

Overall, Hardman *et al*. (2003) suggested that, while the NNS tried to change the curriculum by design, it left deeper levels of pedagogy untouched. Most importantly, traditional direct teaching persisted, as there was no clear definition or practical advice as to what interactive whole-class teaching was, and how it should be used in the classroom. In the same vein, Earl *et al*. (2003) in their final evaluation of the NLS and NNS, suggested that changing traditional patterns of whole-class teaching to more interactive practices remained the main challenge in securing the overall effectiveness of the strategies.

The DfES-sponsored Study of Pedagogical Effectiveness in Early Learning (SPEEL) project (Moyles *et al.,* 2002), worked intensively with selected, effective practitioners in order to reveal and identify the hidden characteristics of effective pedagogy. The main outcome of their research was a Framework of Effective Pedagogy, which could be used alongside the CGFS in identifying effective performance (Moyles *et al.,* 2002a). Moyles *et al.* (2002a) maintained that the FS teachers had controversial ideas about many

important concepts related to teaching in that settings. For example, most of the practitioners had concerns about the language of ‘teaching’. In this way, practitioners felt that ‘they supported children’s development within an enabling, facilitating and observing role rather than directly as ‘teachers’’ (Moyles *et al*., 2002: 130). This contrasted with others who thought ‘direct-teaching’ as the correct term to designate their approach to their daily activities.

Moyles *et al*. (2002) also found that early years practitioners accepted the value of the play, adult involvement and engagement in children’s play. However, they also emphasised that adult involvement and engagement in children’s play is not well understood or utilised as a means of learning; and in practice, play was not readily observed as part of the research. These aspects of the FS teachers’ views might well have affected their practice, as Hardman *et al*. (2003) suggested above for primary school teachers. Furthermore, Moyles *et al*. (2002a) suggested that effective pedagogy was more than the application of knowledge and skills, it was ‘an extremely complex phenomenon comprising a wide variety of practices underpinned by principles acquired through training and as a result of professional experiences and personal understanding’ (Moyles *et al*., 2002a:13).

Taylor, Nelson, Sofres and Aubrey (Quick *et al.*, 2002) showed that there was a variety of organisational strategies in the mathematics curriculum in RC. For example, 70% of the schools in their national survey organised teaching in RC in the same way throughout the year. Alternatively, some schools combined the FS learning areas and integrating their learning across the curriculum

throughout the year, without planning a dedicated daily maths lesson during the summer term. Only half of the schools were combining learning areas of the FS and integrating learning across the curriculum through the year, as well as introducing an hour daily maths lesson in the summer term.

In the same study (Quick *et al*., 2002), teachers' views on implementation were sought. Around two-thirds of RC teachers indicated that implementing the NNS with a more flexible approach for reception-aged children had not been a problem, but around 10% said it was highly problematic. Moreover, they also found that 27% of the RC teachers also taught older children in the same class and nearly two-thirds of them (60%) reported that they were having difficulties in teaching from both the CGFS and Key Stage 1 Programmes of Study in the same classroom. The problem reported by the teachers concerned the increased planning required to ensure that work was tailored appropriately to both age groups. In addition, these different planning schemes and styles of teaching also caused problems within a single classroom, as young four-year-old children would spend less time with the activity and make more noise than the older children from the RC.

Quick *et al*. (2002) also found that the transition process of children to Key Stage 1 had not been seen as a problem. Nonetheless, some teachers (15%) thought that implementing CGFS had not fully prepared children for Key Stage 1. According to those teachers, CGFS was mostly play-based and placed little emphasis on formal learning and written skills. In general though, most of the teachers expressed positive feelings towards the implementation of CGFS, and avoided making negative comments. Yet it was still clear that there were

some challenges which might influence their practice: Adams *et al*. (2004) suggested that teachers might not be sure about the policy expectations, or what constituted ideal early years practice, and were therefore in some doubt as to how best to proceed with the policy implementation.

Adams *et al.* (2004) also suggested that everyday practices in RC did not adequately reflect the principles of early childhood education. Consequently, the quality of RC children's experiences were not acknowledged by the FS and RC children were somehow not seen as part of the FS context. They were even seen exclusively in the whole school context and, as such, as only constituting the initial stage of statutory education. This can also be explained by another finding of the same study which underlined that in RC too much emphasis was placed on NLS (DfEE, 1998) and NNS (DfEE, 1999a), at the expense of a holistic and coherent curriculum. As a consequence, RC teachers experienced pressure from their Key Stage 1 colleagues to prioritise particular kinds of achievement, one of which was numeracy. RC was thus regarded as the first part of the primary school, not the last stage of the early years education.

Interestingly a recent review, the 'Independent Review of Mathematics Teaching in Early Years Settings and Primary School', chaired by Sir Peter Williams (DCSF, 2008a), discussed effective pedagogy in the early years and underlined a few key elements. Firstly, the review emphasised fostering children's natural interest in numeracy as well as problem-solving, reasoning, and recognising shapes and measures. Opportunities, both indoor and outdoor, and in a broad range of contexts it argued, will help children to

explore, enjoy, learn and practice as well as develop their self confidence in different areas of mathematical learning. The review emphasised that effective pedagogy is crucial in order to support children in learning new skills, or to develop their understanding of concepts and processes, as well as to consolidate and refine their skills and understanding. Skilled practitioners were the key element to effective pedagogy, as they can interact with children in a rich, stimulating and interesting environment. Lastly, other features of effective early years mathematical pedagogy - according to the review - were:

- building on play;
- making the most of everyday routines and spontaneous learning to develop mathematical skills and concepts;
- requiring practitioners to support, challenge and extended children's thinking and use of accurate mathematical language; and
- giving children opportunities to record their understanding and thoughts in early mathematical mark making (DCSF, 2008a:34).

In the review, Williams looked at mathematical learning through active involvement of the children's play activities, drawing on EPPE findings in many ways echoing the earlier CGFS.

2.4. Conclusion

Study findings discussed above clearly indicate that the recommendations of both the NNS (DfEE, 1999a) and the CGFS (QCA/DfEE, 2000) were never simply received and implemented by the RC teachers, but rather that they were interpreted and re-created, as Bowe *et al*. (1992) had indicated.

The main agenda of the recent Governments in the last two decades has been the raising of standards in numeracy and literacy in primary schools. This has had a direct effect on early years policies. The previous Labour

Government had granted priority to education, particularly early years education and care. To this end, it produced a large number of policy initiatives since coming to office in 1997. The most important of these for this study, were the NNS and the CGFS.

In this chapter, a discussion of context of influence in early years mathematics has covered the last three decades. The main reason for this being that even current policies in early years mathematics are rooted in the late 1970s, and can be traced back to the Ruskin speech of Jim Callaghan, a former prime minister. For the context of policy text production, and the context of practice, the focus has been on the period since the introduction of the NNS and the CGFS. Mathematical learning in young children has been closely related to changes in these policy cycle contexts and will be introduced in the next chapter.

CHAPTER 3: MATHEMATICAL DEVELOPMENT IN CHILDREN

3.1. Introduction

This chapter will examine in more depth the way young children learn and develop mathematical ideas.

The early years, especially the first eight years of childhood, cover an important period in the whole human lifespan in terms of the development of a child's thinking and their ability to make sense of the world (David, 1998). Mathematical understanding is a key area of development, and is crucial to a child's grasp of the world around them (Nunes and Bryant, 1996). The learning and teaching of mathematics at the FS - originally from age three to age five , but since 2008 for birth to age five - has thus becomes an increasingly important topic of study.

3.2. Theoretical Influences

Donlan (1998) identified a number of theoretical perspectives and research approaches useful for the understanding of how young children learn mathematics. He outlined innate (nativist) as well as empiricist studies of mathematical development in young children, but emphasised that these two features were not competing but complementary. Nunes and Bryant (1996: 4) examined the way children become numerate, *that is to say, by thinking with mathematical concepts*, by adapting the work of Gerard Vergnaud. The French psychologist Vergnaud (1996) combined psychology, social knowledge and physical education - as well as the ideas of others (Piaget, 1952; 1965; 1975; Vygotsky, 1978; Bruner, 1966) - into a theoretical

framework designed to address questions such as ‘what is a concept?’, ‘what is a scheme?’, and ‘what is conveyed by the distinction signifier/signified?’, as a means of understanding how children learn mathematics.

Nunes and Bryant (1996) adapted Vergnaud's framework, and identified three key requirements for learning. To be numerate, children need to be logical; they need to learn conventional systems; and they need to use their mathematical thinking meaningfully and appropriately in situations (Nunes and Bryant, 1996). These three requirements for numeracy could then be further elucidated using cognitive psychology and situated cognition (Donlan, 1998; Nunes and Bryant, 1996).

3.3. Piaget’s Constructivism and Children’s Mathematical Learning

Piaget’s work - as part of an experimental tradition - had a powerful impact on thinking about mathematical development and on mathematics education; particularly his focus on the individual development of the child (Clemson and Clemson, 1994). Piaget (1977) emphasized linear mental constructions of reality, and portrayed learning as a constructive process of conceptual growth, which generally involved the reorganization of concepts alongside the growth of general abilities.

Piaget (1952, 1965) identified four factors underpinning intellectual development: maturation; physical and logical-mathematical experiences; social transmission; and equilibration. Some authors (Donaldson, 1978; Dickson *et al*., 1984) have challenged his conclusions, particularly his analyses of development and maturation. Yet as Nunes and Bryant (1996)

have argued, children must necessarily grasp certain logical principles in order to understand mathematics, and we owe the identification of these principles to Piaget (1965). Piaget claimed the principles of conservation and transitivity as requirements for even a very basic mathematical activity like counting, and these two logical rules are now regarded as the first steps in the mathematical development of children whether at home or at school (Wood, 1998).

The logical principle of conservation stipulates that the number of a set of objects can only be changed by addition or subtraction, and that any form of visual rearrangement is irrelevant to the concept of number itself. For example, two rows of six apples could be displayed symmetrically on a table to a child. Once the child acknowledges that the number of apples is the same in each row, the distance between apples in one row can be progressively increased, while leaving the second row unchanged. If the child confirms that the number of apples remains the same, despite the rearrangements, then that child can be said to have grasped the logic of conservation, grasping the essence of the number in terms of quantity and cardinality, while being able to dismiss any kind of visual redistribution. Without a grasp of the principle of conservation, children would simply be ‘parroting’ number words without understanding the quantity they represented.

The other key logical principle is transitivity. This declares that if one quantity, A, is greater than another, B, and B itself is greater than a third quantity, C, it follows that A must also be greater than C (Piaget, 1965). By this logic, a child can quantitatively compare at least three entities. This permits a child to grasp

the significance of the order of numbers. For example, a child may be able to grasp the relationship between adjacent numbers, i.e. between 2, 3 and 4 or 6, 7 and 8, but without the principle of transitivity it might be difficult for a child to grasp the relationship between non-adjacent numbers (i.e. between 7, 9 and 14). A child could learn counting by rote, but without understanding the logic of transitivity would not understand the relationship between different numbers (Nunes and Bryant, 1996). These logical principles identified by Piaget are considered the most crucial to a child's ability to grasp mathematical concepts.

3.4. Social Constructivist Theory and Children's Mathematical Learning

Socio-constructivism, or socio-cultural theory, portrays learning as the outcome of a social-historical activity, so that any cognitive development - including mathematics - occurs as the result of an interaction between a child, and likely an adult, in a social context (Vygotsky, 1978). The Russian theorist Bakhtin (1984 cited in Doolittle, 1999) stated that "truth is not to be found inside the head of an individual person; it is borne between people collectively searching for truth, in the process of their dialogic interaction" (p. 110). Children are thus socialized into cultural learning, using relevant cognitive and communicative tools that are passed down from generation to generation. This means that children learn cognitive and linguistic skills from those more developed than they are, such as capable caregivers, peers and teachers, who assist and regulate the child's cognitive and linguistic performance (Vygotsky, 1978). Through such socialization, children learn an accumulation of ways of thinking and doing that are appropriate to their culture, and this

would include mathematical tools, such as the use of numbers. In Vygotsky's view, the acquisition of language was a central feature of the child's intellectual development during the preschool period. And as a communicative device in social life, it played a fundamental role in the development of a child's learning and understanding, including the realm of mathematical language learning.

Vygotsky (1978) gave an active role to the learner, who engaged actively with the task and had to work hard whilst the support and guidance of the teacher was crucial and demanded skilful intervention. Children acquired a variety of information by asking and getting responses from adults, by imitating them and through being instructed about how to act. This leads to a view of interactive learning in which both children and teacher are actively engaged and it has had a strong impact on the understanding of development. In this point of view, the learning of mathematics as a meaningful activity refers both to the process of attaching personal meaning to actions and methods and also to the results involved. In Vygotsky's (1978) theory, there were two developmental levels: the 'actual development level' (ADL) and 'zone of proximal development level' (ZPD).

The ADL was the level of development of a child's mental functions that had been established as a result of certain already completed developmental cycles (Vygotsky, 1978). This ADL level involved the abilities of the child in terms of what he/she could do by himself/herself, i.e. without getting help. To illustrate, the child might count up to 10 or 20 by himself/herself. The other level, ZPD, showed what the child could do with the assistance of others, who

were more knowledgeable peers or adults. For example, an adult can support the child to combine groups of objects to result in a total of ten. The ZPD defined the functions that had not yet matured but were in the process of maturation. The functions might mature tomorrow but were currently in an embryonic state (Vygotsky, 1978:86). The ZPD awakened a variety of internal processes that were able to operate only when the child was interacting with people in his/her environment and in cooperation with his/her peers. Wood *et al.* (1976) introduced the word of 'scaffolding' to help describe the ways in which adults/caregivers organised their interventions around the child's progress. Thus, adults scaffold the main concepts and ideas in order to help child's learning in ZPD level.

In summary, from this theoretical perspective mathematical teaching and learning is the child's and adult's conjoint pursuit of making sense of mathematics which is embodied in various practices in the surrounding world. Vygotsky (1978), in general, indicated that a skilful tutor (adult) could guide and extend development of children in mathematics.

3.5. Situated Cognition Theory and Children's Mathematical learning

Situated cognition theory offers a perspective for learning theory that is related to Vygotsky's notion of learning through social interaction. In contrast to classroom learning activities that involve abstract knowledge that is out of context, Lave (1998) argued that learning is situated and embedded within the activity, context and culture. Meanwhile, Collins (1988) defined situated learning as 'the notion of learning knowledge and skills in contexts that reflect the way they will be used in real life' (p.2). Thus, this theory demands

teachers to involve the children deeply in an environment that approximates as closely as possible to context in which their new ideas and behaviour will apply (Schell & Black, 1997).

Nunes *et al.*, (1993) and Nunes & Bryant, (1996) suggested that children's learning was embedded in the situation and children learned different things in different situations; these learning experiences sometimes did not relate to or support each other. They also defined the main differences between these two learning environments and maintained that the school mathematics was more abstract and formal, whilst 'everyday' mathematics was developed in 'hands-on' activities in a natural setting and mostly depended on concrete thinking (Nunes *et al.,* 1993).

In general, many of the original examples (Lave and Wenger, 1991; Nunes *et al.*, 1993) concerned adult learners or at least primary school children rather than pre-school or young children. In all those examples, the gradual acquisition of knowledge and skills occurred by the help of the experts in the context of everyday activities. In other words, the individual learns through experience and practice is a critical element of the learning (Lave & Wagner, 1991). An interesting example of how children make use of context to learn and solve problems was successfully given by Carraher *et al.* (1985). They showed that the street vendor children (primary-school-aged) in Brazil were capable of solving computational problems in their natural situation (i.e. their market-place counting and calculating for buying and selling). However, they would fail to solve the same problem if it was asked of them in a different context, i.e. in an abstract manner on paper with a pen. That suggested young

children could not transmit their mathematical learning from one situation to another, for example, young children may not transmit their informal learning from home or nursery to RC.

Nunes *et al*. (1993) maintained that street mathematics (children's informal mathematics) was not a 'lesser type of mathematics' without cognition. On the contrary, it represented cognition and teachers of young children should value this informal learning and encourage the children to bring their existing knowledge to the classroom (Nunes and Bryant, 1996). Later, in this chapter transferring everyday-informal mathematics to formal school mathematics will be discussed and it will be indicated that young children can have some difficulties during this transfer. Looking from the view point of situated cognition, this might help to understand the reasons for the difficulties or challenges. In the same vein, Hughes *et al*. (2000) have shown how young children in Key Stage 1 (for ages five to seven years) have had difficulty outside the school in using and applying mathematical knowledge to new problems. So far, although mentioning some well-known theories it might seem that the focus has been shifted from young children's learning, in reality they are a basis in order to understand the nature of the learning. Below, the origins of the numerical development will be discussed in the light of some studies' findings by starting from babyhood.

3.6. Origins of Numerical Reasoning

3.6.1. Babies' Numerical Reasoning

Mathematical, mostly numerical, development in babies and young toddlers has been investigated by a number of researchers (Starkey & Cooper, 1980; Wynn, 1992; Wynn, 1998). These researchers have studied, for example babies' sensitivity to numerical relationships in different contexts with diverse materials (i.e. lights, pictures, sounds and so on). The methodology in those studies was based on the idea that young babies (i.e. five-month-olds) tended to look longer at things that were new and unexpected to them but when they 'habituated' (were used to the phenomena) they looked at them for a significantly shorter time. Babies showed signs of sensitivity to the differences between two visual displays and it was generally accepted that they recognised the numerical relationships between small numbers. Wynn (1998) has suggested that babies had greater numerical knowledge than simply the ability to distinguish small amounts. They were also able to manipulate these representations in numerically meaningful ways.

In her studies Wynn (1998) attempted to gather evidence to show that babies as young as five to seven months of age were not only sensitive to the relationships between small numbers, but were also able to 'compute' the results of simple numerical operations. Moreover, Wynn's (1998) experiments showed young babies' reasoning through presentation of deliberate mistakes or impossible results, such as 1+1=1, or 2-1=2, enacted by the examiner with Mickey Mouse puppets. The findings suggested that babies were looking longer when the results were impossible as compared with the credible results (i.e.

1+1=2, 2-1=1). In this view, little babies were able to observe and reason about the properties of events to which older children and adults might attach numerical representations. This was interpreted as their having already some sort of innate understanding and competence in number reasoning. Wynn (1998) assumed an innate numerical competence in babies served as the base for mathematical understanding, but she also accepted that this base cannot explain the nature or extent of subsequent development.

However Sophian (1998), also from a developmental of view, suggested that babies' numerical responses might not arise solely from the number of items in two different displays, but it might be caused by the novelty of the items used. In that case, babies might look at the new task longer but nobody could say for sure that they could 'count'. If they 'counted' (in a nonverbal way), according to Sophian (1998), they might simply 'subitize' or recognise the number of items shown to them. 'Subitizing' is a process of seeing and recognising a small number of items simultaneously, rather than counting one by one (Sophian, 1998). In her account, Sophian (1998) re-examined the same early numerical responses as Wynn. She underlined the relation between young children's numerical abilities and the development of verbal counting over the early childhood and beyond. These findings suggest that even babies have some mathematical, particularly number abilities since they were born and they are ready to develop these abilities in their early years as well as later in schooling by the help of the adults around them.

3.6.2. Counting Principles

As was the case for Wynn (1998) and Sophian (1998), Gelman and Gallistel (1978) had argued earlier that learning to count or develop number understanding was not solely an empirical operation and it did involve some innate aspects. Gelman and Gallistel (1978) posited that before children have learned the correct counting sequence, they have to understand the conceptual principles that governed and defined the counting procedure. The first three counting principles were: 'the one-one principle' (when you count you must count all the objects and count all of them once and only once); 'the stable-order principle' (whenever we count, we must produce number words in the same order each time); and 'the cardinal principle' (the total of objects corresponds to the last number word in our counting) and dealt with rules of procedure or how to count. The fourth principle was the definition of countable or what to count (the abstraction principle); while the last principle (the order-irrelevance principle) dealt with a composite of features of the preceding four principles that no matter how an amount or array was re-arranged, the number remained the same. Gelman and Gallistel (1978) have suggested that children, even very young ones (i.e. as young as two-year-olds) could count and possess some counting principles, but not all of them. During the pre-schooling as well as RC probably these counting principles expand quickly.

Moreover, Gelman and Gallistel (1978) stated counting did not necessarily involve use of conventional counting words, but non-conventional or idiosyncratic tag sequences. Indeed young children sometimes did use conventional tags when they counted. Successful counting demanded the

coordinated application of all the principles defined by Gelman and Gallistel (1978). In young children some of these principles may not have been perfected, while some of them may operate more or less in isolation in the counting behaviour. Gelman and Gallistel (1978) provided some evidence by citing examples of children who counted idiosyncratically, yet in accordance with the principles. In the current literature, (Baroody and Price, 1983, Fuson and Hall, 1983, Sophian, 1998) it has been accepted that Gelman and Gallistel's counting principles were very sophisticated and provided compatible accounts of pre-schoolers' number learning.

Wagner and Walter's (1982) longitudinal study investigated the accuracy of Gelman and Gallistel's (1978) counting principles through investigation of children's early number concept development. For Gelman and Gallistel (1978), these counting principles governed the counting of children as young as two years who seemed to approach counting objects as if they had quantitative properties. Particularly, the first three counting principles (the one-one principle, the stable-order principle and the cardinal-principle) were established early and followed each other, helping children learn to count. However, Wagner and Walter (1982) have shown, unlike Gelman and Gallistel (1978) that the one-one principle was not the precursor of the cardinal principle, but it was subordinate to the cardinal principle. Moreover, the settlement of counting principles in children's number understanding was a whole process in embryonic form that could be observed from the age of two years. Different aspects of the counting principles developed separately and at different times, but they could be seen interacting at later developmental points (Wagner and Walter, 1982).

‘Counting would seem to be the basis of the arithmetical knowledge that the young children construct’ (Maclellan, 2008: 77). Children in their early schooling years, i.e. in RC, they might or might not have developed all these counting principles. In a later section of this chapter the variety of mathematical understanding and knowledge that children bring to school and the vitality of teachers’ understanding and knowledge of the way children’s existing skills can be used and developed further will be discussed.

3.6.3. Role of Language

Durkin *et al*. (1986) conducted a wider language study in order to document age-related changes in development, including the kinds of infants' counting and numbers usage under laboratory conditions. They observed ten infants for a period of time at monthly intervals from nine to twenty-four months and, thereafter, at three-monthly intervals until thirty-six months. Their findings indicated that toddlers (between twenty-one and thirty months) were reciting number sequences in the context of turn-taking that involved a substantial body of number words. Between the age of two and three, young children’s conversations involved number words in conversation or incidentally. Counting and usage of number words was increased at this stage, yet they were not complicated, only one set of objects at a time. Durkin *et al*. (1986) studied the role of the mothers and care-givers and found out that before pre-school, these particular adults had a crucial role in children’s number skills development and this pedagogic discourse was in many ways similar to that of teachers.

In this study, Durkin *et al*. (1986) identified six main types of number usage during the daily interaction of a mother and child. These were nursery rhymes, stories and songs, ('ready, one, two, three …') recitation of number strings ('count them, look, one, two, three …'), repetition and clarification of cardinality (i.e. 'look, four: one, two, three four', 'count with me') and 'incidental number use (i.e. 'how old are you?'). According to Durkin *et al*. (1986) mothers introduced numbers in various ways which facilitated young children's mathematical learning before the pre-school period. Children's learning at home and preschool setting is hard to distinguish however as more and more children spend time in day care from an early age. Thus, these two contexts of learning will be discussed together.

3.7. Young Children's Mathematical Learning in the Home and in Pre-school

In the above study Durkin *et al.* (1997) have already provided evidence about young children's mathematical learning from their mothers when they were infants. In recent literature (Young-Loveridge, 1989; Young, 1995; Bottle, 1999; Aubrey *et al*., 2000; Aubrey and Barber, 2003), there is enough evidence to discuss children's mathematical, particularly early number learning, by means of their caregivers. Also, quantity and quality of number-mediated interactions with the caregiver has a big role to play in children's accomplishments with number (Aubrey, Bottle and Godfrey, 2003; Aubrey and Barber, 2003). Yet, not all the caregivers have been reported to be supporting their children's mathematical learning in the same or even the most effective way.

Bottle (1999) included direct observation of mother and child working together within their homes through video-recording. This longitudinal study involved nine young children from the age of one and two to five years. She found out that young children were exposed to mathematical ideas by their mothers. Some parts of Bottle's (1999) corpus (observations and discourse in the home of two of those children) were examined by Aubrey, Bottle and Godfrey (2003). The main finding in this study was that quality of interaction between mother and child varied from mother to mother. For example, one mother was skilfully using her child's ideas and extending them, while the interaction of other mother and child was less rich in terms of mathematical learning and mathematical exchange and more didactic in approach.

In New Zealand, Young-Loveridge (1989) attempted to reveal the relationship between children's home experiences and their mathematical skills on entry to school. In this study Young-Loveridge (1989) tracked six children in order to describe their home experiences. She found out that children entered school with vastly different kinds of experiences with numbers and these seemed to be related to the extent of their knowledge of number concepts. Children who got high mathematical scores in this study were characterised by exposure to a wide range of experiences involving numbers, a strong orientation towards numeracy by members of their families. These high scorers had also the opportunity to observe their mothers using numbers for the solution of practical problems of their own. On the other hand, the low-scoring children had few number experiences, an orientation by their family members towards literacy but not numeracy. Moreover, these low scorers had less opportunity to observe their mothers using numbers for the solution of practical problems of

their own, as well as relatively low family expectations for their mathematical skills (Young-Loveridge, 1989).

Bottle (1999) underlined the same point and stated that: 'the development of mathematical experiences, for the child, by the parent varied from child to child and some were more supported in their early mathematical explorations than others' (ibid. 62-63). Also Bottle observed that parents were using different types of teaching styles: some collaborated with their children, others were initiating the learning or being less responsive to their children's ideas, and meanwhile the previously-mentioned study Durkin *et al*. (1986) reported that some parents were confusing their children rather than helping them.

As a part of her research Young-Loveridge (1989) gathered parents' views about their interactions with their child by interviewing them. Yet, parents may not always be aware of their own contribution to their child's mathematical development. In the same vein, Bottle (1999) and Aubrey, Godfrey and Godfrey (2000) stated that although adults (parents and caregivers) consolidated children's mathematical experience (particularly number experience) these were relatively infrequent events. For example, Aubrey, Godfrey and Godfrey (2000) identified only 2.1 percent of mother-child conversations contained reference to mathematics.

It appears that children's experiences, in numeracy, in their families are important in determining the development of number concepts. Aubrey and Barber (2003) acknowledged that another vital factor was children's interests and needs. It may be beyond the scope of this study to go further in exploration of whether the child's interest and needs draw the mother's

attention to assist in learning or the mother's knowledge and skills gather the child's interest and encourage the child's learning. The study findings (for example, Young-Loveridge, 1989 and Aubrey, Bottle and Godfrey, 2001) emphasised the mothers' approach to mathematical activities may be the first determinant of mathematical development of young children in heir home.

In England, Young (1995) studied young children's mathematical learning in both settings, home and pre-school by a number of observations. The findings from this study showed that learning experiences in both settings involved adult-consolidated number experiences, for example, reciting up to twenty, counting in one-to-one correspondence to ten and recognising small quantities. According to Aubrey and Barber (2003) children can develop subitising, simple calculation and number recognition after adult introduction of these aspects of numbers. An adult may interact mathematically with a child by many practical ways, such as baking and shopping, number games (playing with dominos, Snakes, Ladders and Bingo), experiences with time (calendars, clocks) and handling calculators (Young-Loveridge, 1989). Frequent engagement with such activities will provide a variety of experiences with numbers. In the next section, it will be mentioned in detail but it is worth noting here that young children bring into educational settings a wide variety of mathematical experiences and understanding upon which practitioners can build.

Children's mathematical learning in pre-schools and in nursery settings has also been studied (Munn and Schaffer, 1993; Young-Loveridge, 1995; Gifford, 2002 and 2004; Siraj-Blatchford *et al.,* 2002). In the REPEY project Siraj-

Blatchford *et al.* (2002) found out that in effective settings little time (approximately 5%) was spent on mathematical activities, thus little mathematical learning was going on. As noted previously, Aubrey, Godfrey and Godfrey (2000) suggested in the home 2.1% of mother-child conversation involved mathematics. Moreover in nursery settings, play is a main theme of the daily activities (Gifford, 2004) but study findings indicated that play activities were not always seen as opportunities to expand children's mathematical learning (Munn and Schaffer, 1993; Young-Loveridge, 1995; Gifford, 2002 and 2004), especially independent play without adult involvement may not much help children's mathematical learning (Gifford, 2005).

In their study, in Scottish nursery settings Munn and Schaffer (1993) found out that adults in nursery settings were less likely to focus on mathematics or mathematical learning of the children. They also found that two and three-year-olds in the Scottish nurseries relative to literacy spent little time in numeracy, in fact only 5%. Very few activities dealt explicitly with quantity or number work and very little talk concerned number or quantity. This lack of focus on mathematics or numeracy activities may be explained in a number of ways, such as practitioners in these settings having less understanding of children's early mathematical learning. Bottle (2005), meanwhile, proposed that for most adults, parents at home and teachers at school, literacy activities were associated with leisure and few adults were seeing numbers as objects to play. Yet, it can also be argued that 2.1% of time devoted to mathematics at home (Aubrey, Godfrey and Godfrey, 2000) and 5% of time at pre-school (Munn and Schaffer, 1993; Siraj-Blatchford *et al.,* 2002) might appear to be

sufficient to create an extensive amount of mathematical understanding young children gained before they started school. It has also been argued that any adult or child exchanges may vary in quality (Bottle, 2005): even a little help of an experienced adult might thus enhance children's mathematical learning immensely. The research findings below discuss children's mathematical knowledge brought to school RC.

3.8. Mathematical Learning in Reception Class

Research findings (Aubrey, 1997; Suggate *et al*., 1997; Griffin, 2004; Clements and Serama, 2007; Ginsburg *et al.,* 2008) and others showed that children start learning mathematical concepts and developing number sense long before they start preschool or formal schooling. Regardless of how mathematical development happens, socially or by innate unfolding, children's mathematical learning before schooling has been described as informal or *everyday mathematics* (Clements and Serama, 2007; Ginsburg *et al.,* 2008). It can be stated that mathematical learning has been developed extensively by young children nearly from birth to age five years. Everyday mathematics includes 'informal ideas of more and less, taking away, shape, size, location, pattern and position that is surprisingly broad, complex, and sometimes sophisticated' (Ginsburg *et al.*, 2008:3). Therefore, young children come to school with a wide range of number knowledge and mathematical understanding (Suggate *et al.*, 1997).

The Durham project carried by Aubrey (1997) gave a clear view about what children bring into the RC at age four to five years. This project assessed a sample of children when they had just commenced RC teaching. According to

the findings, children showed a range of competencies in their number understanding at the beginning of this class. The majority of children, for example, counted to more than 10 (reciting numbers), while half of them (50%) counted objects within sets. In addition, most children recognised numbers from 1 to 10, whereas a quarter of them could read the numbers (between 1 to 9) when these were shown randomly (Aubrey, 1997: 83-84). These findings suggested that before schooling/RC young children have acquired some forms of informal mathematical knowledge and skills, particularly about number, upon which to build new mathematical learning.

3.9. Transferring Informal Knowledge to the Formal School Knowledge

The main discussion now will be focused on transferring informal knowledge to the formal school knowledge and using it. Referring to Nunes and Bryant's (1996) theoretical framework, to be numerate children need to use their mathematics in specific social situations. This means using the existing learning to sort out new problems in different situations both meaningfully and correctly. However, particularly young children have difficulties in transferring their learning from one situation to another, particularly from home to pre-school or from pre-school to formal schooling (Aubrey, 1997; Munn, 1997; Aubrey and Barber, 2003; Schwartz, 2005) or they do not know which technique they need to use when they come across with a new problem (Nunes *et al.* 1993; Nunes and Bryant, 1996).

Aubrey (1997) noticed that children might fail to transfer their informal knowledge because of a discrepancy between the nature and direction of infants' and young children's development of math skills and the curriculum

used in RC. The main points to notice are that homes and pre-school settings may provide different mathematical experiences in terms of the quality and nature of adult intervention.

Moreover, Aubrey (1997) indicated that at that time the NC and the scheme of work for infants followed a sequence of sorting, matching and classifying, joining and separating of sets, counting and ordering, recognising and writing numbers 0 to 10 and where simple mathematical relationships were represented with concrete materials (Aubrey, 1997: 25). However, she also indicated that children's informal or existing mathematical knowledge was likely to allow flexible use of informal strategies while learning the numbers and counting, for example, or where objects were being manipulated.

According to Munn (1997) pre-school children were having difficulties in transmitting their informal mathematical knowledge to the pre-school learning. She stated that pre-school children's numerical goals might not be the same as the adults who worked with them. Munn (1997) suggested that despite the fact that children's counting ability was often substantial and accurate, they had surprisingly little sense of the adult's definition of counting as they went into school. Children seemed to believe that counting was merely playful and it had no connection with quantification. This indicated that, in spite of the fact that children may implicitly follow some of the principles of counting, early counting was essentially an imitative social practice and playful in intent rather than an explicit activity done with awareness (Munn, 1997).

Ginsburg *et al*. (2008) suggested that 'everyday mathematics (or informal mathematics) was so fundamental and pervasive a feature of the child's

cognition that it was hard to see how children could function without it' (ibid. 3). It was thus important to bear in mind that young children would come to school with their everyday mathematical skills and knowledge gained in out-of-school contexts. Nevertheless, without adult encouragement they might fail to transfer this knowledge to formal school knowledge and the consequence of this might be serious. In the English educational system, the RC is bridging the pre-school and primary schooling and therefore it plays a fundamental role during children's mathematical transition from everyday, informal mathematics to formal school mathematics in these classes.

3.9. Conclusion

Learning theories explain young children's mathematical development and learning in different dimensions. Nunes and Bryant (1996) and Donlan (1998) have brought together a number of diverse learning approaches to provide multiple explanations to the mathematical development in young children. In this chapter, different theoritical approaches were introduced and exemplified with a number of research findings.

Cognitive theoretician Piaget (1952 and 1965) held the view that cognitive development occurred when children interacted with objects of their world and children must learn logical rules in order to understand mathematics. Many of Piaget's ideas have been challenged by other research findings (i.e. Donaldson, 1978), yet there are a number of others helping us to understand different aspects of children's mathematical learning. For example, he introduced a number of logical rules for learning mathematics but two of them,

conservation and transitivity, were particularly highlighted and argued as first steps of mathematical learning.

Socio-cultural theory and its well-known theoretician Vygotsky (1978) underlined learning as a socio-cultural process and the vitality of the adult involvement in children's learning. From this point of view, mathematical teaching has to be conceived as a form of enculturation process and language is an important tool in order to build mathematical understanding. Situated cognitive learning theory had origins in the work of Vygotsky's social learning and was first proposed by Lave and Wagner (1991) as a model of learning in a community of practice and simply it suggested that learning took place in the same context in which it was applied. Lave and Wagner (1991) also maintained that it was not simply transmission of abstract and decontextualised knowledge from one individual to another but it was a social process whereby knowledge was co-constructed.

Wynn (1992 and 1998) meanwhile identified the innate character of children mathematical learning and suggested that young babies have knowledge to recognise numerical relationships between small numbers. Sophian (1998) examined the origins of young children's mathematical learning, too and its relationship to development over the early childhood and beyond period. Gelman and Gallistel (1978), also, emphasised innate aspect of children's mathematical learning and suggested that counting did not necessarily involve use of conventional counting. They posited five counting principles and they were explained as pre-cursers of the counting procedure. All these studies and their findings draw our attention to the view that young babies have some

sort of mathematical predisposition when they are born and this knowledge creates a foundation for their later learning.

Recently, among researchers there is a shift towards the socio-cultural aspects of young children mathematical learning. Durkin *et al*.'s (1986) have identified different types of number usage during the daily interaction of mothers and their children. This study also was an emphasis on children mathematical learning from others particularly from their care-givers.

In this chapter a number of studies have been reviewed. Most of those studies (Young-Loveridge, 1989; Young, 1995; Suggate *et a*l., 1997; Bottle, 1999; Aubrey *et al*., 2000; Aubrey and Barber, 2003) have focused on adult's role in children's mathematical learning in either their home or in pre-school settings, or both. Their findings were also providing evidence about conventional sides of children's mathematical learning. The main implication of these findings was that although relatively few interactions between adult and child involved mathematical learning, young children were starting school with an extensive mathematical knowledge and understanding. Before formal schooling this knowledge tends to have been called informal or everyday mathematical knowledge.

Nevertheless, research findings underline the fact that young children are having difficulties in transmitting their everyday mathematical knowledge to school and use it for new learning (Aubrey, 1997; Munn, 1997; Aubrey and Barber, 2003; Schwartz, 2005). Also there are a number of suggestions and explanations why young children have such difficulties. In general, there is a consensus among researchers (Nunes and Bryant, 1996 and Ginsburg *et al*.,

2008) to acknowledge children's everyday mathematical knowledge and encourage them to bring it into their school learning. In this sense, practitioners/teachers in schools (in this study in RC) have a vital role to help children transfer everyday mathematical knowledge to school learning.

RCs in England are a connecting point between the pre-school and formal schooling of Key Stage 1 (for five-to-seven-year-olds) even though they are seen as a first year of primary schooling. The curricular expectation in these classes has been mentioned previously. The task expected from teachers in RC seems to be an uneasy one, as two policy documents (NNS [DfEE, 1999a] and CGFS [QCA/DfEE, 2000] need to have been implemented as young children come to school already with a variety of rich informal knowledge.

In the next methodology and design of the study will be introduced.

CHAPTER 4: RESEARCH METHODOLOGY

4.1. Introduction

In the previous chapters (Chapter 2 and 3) educational and political literature has been reviewed and Bowe *et al*. (1992) policy cycle analysis which involves contexts of influence, context of text production and context of practice, has been adopted to provide a framework for interpreting the changing policies and processes in RC mathematics.

The overall purpose of this study was to explore the policy-to-practice context of early years mathematics. Accordingly, the study focused on the policies related to early years education and mathematical development of the children in the FS (three to five years), initially the English early years mathematical curricula (CGFS [QCA/DFEE, 2000] and the NNS [DfEE, 1999a]) and the pedagogy in early years setting for mathematical development that is the processes of learning and instruction in RC (for five-year-olds).

The educational context and the focus of the study led to a number of specific research questions. These were as follows:

1. What is the relationship between policy and practice in the early years mathematics curriculum for RC children in England?
2. What does the policy for early years mathematics require RC teachers to do in their classrooms in terms of curriculum implementation?
3. What are the RC teachers' views and understanding of the FS mathematics curriculum?

4. How did the RC teachers implement the early years mathematics policy in the context of actual classroom practice?

5. How did the RC children respond to the FS mathematics curriculum presented to them?

These research questions involve all three aspects of context of policy making or policy cycle model of Bowe *et al*. (1992) mentioned in the second chapter in details and named above. In this sense, 'it is necessary to bring together structural, macro–level analysis of education systems and education policies through document analysis and micro- level investigation, that is, which takes account of people's perception and experiences in the course of social activity (Ozga, 1990 cited in Ball, S.J., 1993:10). Hence, a case study approach was employed to explore the research questions in more depth and in a qualitative way. The main aim of this chapter is thus to outline the design and methodology employed for the study, using the policy trajectory model of Bowe *et al*. (1992).

4.2. Case Study

The overall project of this study was a case study of RC mathematics from policy to practice. The case study design, which was predominantly interpretive, sought to gain views values and discourses of the participants, therefore, it included document analysis, élite interviews, RC teachers' survey and detailed investigation of three school sites. Having a qualitative and interpretive philosophical orientation the case study needed rigorous attention to matters of design, data collection, analysis, interpretation and reporting

(Robson, 2002). According to Yin (1994) case study was an empirical investigation of selected phenomena within a real-life context by using multiple sources of evidence. These selected phenomena, namely called ‘case’, could be an individual, more than one individual, a group, an institution, or a school, so on. In the same vein, Stake (1995, cited in Basey, 1999) described case study as: ‘the study of the particularity and complexity of a single case, coming to understand its activity within important circumstances’ (p. 27). These definitions involved a particular emphasise on the unique aspect of the case study, that was, the researcher could see the practice, action or what was going on in the real environment of subjects. Moreover, the case of RC mathematics is of intrinsic interest, particularly when considered within set of policy-to-practice relationships that bind it together and shape it.

The value of the case study approach within the educational research has been debated. Especially, qualitative and ethnographic researchers opt for this strategy and advocate the necessity of case studies to understand the individuals in their social and real contexts. Meanwhile, researchers who use a positivist or scientific approach, treat this approach in a different way as Robson (2002) gathered: a ‘’soft option’, possibly admissible as an exploratory precursor to some more ‘hard-nosed’ experiment or survey or as a complement to such approaches, but of dubious value itself’ (Robson, 2002:180).

Bromley (1986) pointed out: ‘Case studies were sometimes carried out in a sloppy, perfunctory and incomplete manner and sometimes even in corrupt, dishonest ways’ (cited in Robson, 2002:180). Those two extracts, cited in

Robson, were not just critiquing the case study approach, but also they were not accepting, believing and trusting it at all. Although those critiques were much polarised, it was useful to accept the deficiencies of this research strategy. Yin (1994), who was one of the leading exponents in the social sciences of case study, also admitted that 'good case studies were very difficult to do' (p.11). According to him lack of rigour, time-consuming methods resulting in unreadable documents as well as having little basis for scientific generalization were the main limitations of case study.

Thomas (1998) emphasised the same weaknesses of this design, especially the last one. Thomas (1998) stated that generalizations or principles drawn from one case could be applied to other cases only at great risk of error" (p. 83). Nonetheless, Adelman *et al.* (1980) stated that case studies allow generalizations, either about a single (instance) case or from a single case to a class. In the same vein, Basey (1990) suggested that even though each case study might be unique, there were enough similarities to make the findings from one study useful, while seeking to understand others. In this study, employing case study was not aimed to make external generalizibility from the case study findings, but to explore the mathematical policies and practice in RC mathematics.

On the other hand, Adelman *et al.* (1980) underlined some possible advantages of case study. These were as follows:

(a) Case study data, paradoxically, is 'strong in reality' but difficult to organise. In contrast other research data is often 'weak in reality' but susceptible to ready organisation.
(b) Case studies recognise the complexity and 'embeddedness' of social truths. By carefully attending to social situations, case studies

can represent something of the discrepancies or conflicts between the viewpoints held by participants. The best case studies are capable of offering some support to alternative interpretations.

(c) Case studies present research or evaluation data in more publicly accessible form than other kinds of research report, although this virtue is to some extent bought at the expense of their length (Adelman *et al*. (1980: 59-60).

Adelman *et al.* (1980) underlined that although carrying out case studies was not easy; they were one of the best ways to research social reality within the social sciences, especially about instances.

The ‘case study’ has been mainly seen in the qualitative paradigm (Hammersley, 1992), within the context of an historical and interpretive tradition of the social sciences. Yet, most of the studies use both quantitative and qualitative data collection methods in combination in the case study design (Basey, 1999). Moreover, as a research strategy case study is seen as an umbrella term for a family of research instruments including observation (participant and non-participant), interview, audio-visual recording, note-taking, document analysis and so on (Adelman *et al.,* 1980). All these instruments are not necessarily used together in a case study, but selection could be made according to purpose and research questions of the study and these will be introduced below.

1 **Figure 4.1. Data collection techniques applied as a part of the case study design**

Documentary Analysis of Key Policy Documents	• The National Numeracy Strategy (NNS) (DfEE, 1999a) • Primary National Strategy (PNS) (DfES, 2006) • Curriculum Guidance for the Foundation Stage (CGFS) (QCA/DfEE, 2000),
Élite Interviews	With four lead educators
Questionnaire	Sent to 161 RC teachers
Detailed investigation in three school sites	1. Semi-structured observations, using • Tape-recorder • Video-recorder • Field notes 2. Interviews with three RC teachers 3. Structured target children observation (Sylva *et al*.,, 1980) (two children in each setting, two observations in each term with each child)

4.2.1. Policy Document Analyses

Document analysis is the systematic examination of the documents such as syllabi, assignments, lecture notes, and course evaluation results in order to identify instructional needs and challenges and describe an instructional activity. Lincoln and Guba (1985) distinguished documents and records on the basis of whether the text was official or personal. If the text is official (marriage certificate, driving licence or official policies and so on) it is called a record, but if the text is personal (i.e. personal diaries, memos, letters and so on) it is called a document. In this study all the texts and papers were official from this point of view, it might make sense calling it 'record analyses, yet Hodder (2003) also asserted that those two words can be used interchangeably**.**

There are many types of document analysis and the most common approach is the content analysis, the quantitative analysis of what is in the document

(Robson, 2002). Yet, content analysis extends far beyond simple word counts. Its reliance on coding and categorizing of the data, makes the technique particularly rich and meaningful (Stemler, 2001).

In this research, documentary analysis was conducted to achieve a contextual understanding of the policy and practice environment within which early years education was conducted. Relevant documents which were related to the mathematics in RC during a certain period of time (between 1999 and 2008) are analysed, these included the NNS (DfEE, 1999a), the CGFS (QCA/DfEE, 2000) and PNS (DfES, 2006). Analysing these curricular guidelines is particularly important to understand educational policies as well as they would help to frame the study as Bowe *et al.* (1992) expected.

Analysing text is particularly important for qualitative research, as records and documents are easy to access and low cost, also the information provided may not be available in different form (Hodder, 2003). Another important advantages of this technique is that it is an *unobtrusive measure* which is non-reactive (Robson, 2002, emphasis is in original). In this sense the documents under analysis are not affected by the fact that the research is using it.

However, policy documents influence and constrain 'implementers', as their own concerns and contextual constraints generate meanings and interpretations. In this sense, analysing policy texts and documents has an automatic drawback for the overseas researcher (who has a different educational background) that concerns experience and personal understanding. In the same vein, Hodder (2003) drew attention to the same cultural limitation in document analysis but suggested that documents can be

looked at it through different dimensions such as social, historical and anthropological.

By conducting this research, the researcher acquired experience and insight in terms of the implication of certain documents, RC children, their age, educational policies in England and so on. Therefore, by using this technique she intended to support the other techniques for answering the research questions, especially those relating to the RC teachers and initially the expectation of NNS (DfEE, 1999a) and CGFS (QCA/DfEE, 2000) from them. Additionally, this technique would help to discuss the tension between policies and practice in RC.

4.2.2. Interviews

The interview, similar to surveys, typically involved the researcher asking questions and received answers from the interviewees (Robson, 2002). Yet, unlike surveys, interviews were conducted one-to-one and face-to-face to explore detailed information about the research topic.

In this study, in-depth interview (unstructured or qualitative) technique was used first to explore expert participants' (four élites and three RC teachers) views about pre-structured open questions. Élite interviews questions were covering all three contexts of policy-making process (context of influence, context of policy text production and context of practice), whilst teacher interviews were focusing on related policy texts and their practice during the mathematics activities. In-depth interviewing is a type of interview which interviewer use to obtain information in order to understand respondents'

opinion, feelings and experiences that cannot be accessed through rigidly-structured questionnaires or standardized interview (Oppenheim, 1992). This interviewing involves asking open-ended questions and probing, wherever necessary, to elicit data by the researcher. That means in this type there are no pre-decided answers to pick, but the respondent is free to talk about the topic of the interview (Robson, 2002). By using a standardized interview it is possible to reach hundreds of people and get representative results to the whole population (Oppenheim, 1992). However, conducting exploratory interviews is time-consuming and it is difficult to go beyond thirty or forty interviews and therefore they may not be enough to generalize the results (Oppenheim, 1992).

Conducting in-depth interviews has treatment advantages as well as disadvantages. First of all, these types of interviews not only provide interesting, genuine and rich responses, but also offer non-verbal clues that might provide additional insight that support the verbal responses (Oppenheim, 1992 and Robson, 2002). Although lack of standardization, i.e. free flow of speech without strictly structured questions, seemed to reduce the reliability of the collected data (Robson, 2002), interviewing related people (in this study, élite participants and RC teachers) would give a chance to gather basic first-hand information that actually might make the research outcomes much more interesting and colourful. Most importantly, they could provide broad and deep understanding about the researched topic as well as throw up new dimension and suggest new ideas.

In the literature (Goldstein, 2002; Desmond, 2004; and Smith, 2006) there is a consensus that it is inevitable to adapt the interview process when interviewing élites compared to non-élites. In a society élite figures or the members are seen close proximity to power, have decision-making role or influence policy-making process (Smith, 2006). Conducting an interview with any person is already demanding, yet according to Goldstein (2002) and Desmond (2004) many factors are important when it comes to carrying out high-quality élite interviews.

First of all, it is hard to reach powerful figures to ask or arrange an interview; particularly it is doubly hard for a doctorate student unless receiving good support from the supervisor. Secondly, interviewing members of the élite is difficult, requires more preparation before the interview. Moreover, researcher has to go to the door of the interviewees, being a guest in their office rather than being host. Most importantly, the unequal situation, as the interviewee (the élite figure) has the power with a proud confidence (Goldstein, 2002 and Smith, 2006).

However, in practice it was not as difficult as it was intimated in the literature. Reaching to policy makers or key academics involved early years policymaking was difficult till the supervisor of the study was involved at least for the first set of communications. Also during the design of the study the researcher was aware that élite participants were in powerful position because of their professional life, yet did not create any threat to the interviewer-interviewee relationship. During the interview processes some difficulties were encountered, especially, being in someone’s office and trying to get the best

possible information from those busy people. Apart from those issues, élite interviews were very alike to the interviews carried out with the three RC teachers.

Carrying out interviews, particularly in-depth ones, required some necessary personal and technical skills. Nevertheless, they demand a degree of professionalism which does not come easily (Robson, 2002). These skills might interweave at some points, but still it is possible to distinguish one from another (Oppenheim, 1992). According to Oppenheim interpersonal skills are 'putting the respondent at ease, asking questions in an interested manner, noting down the responses without upsetting the conversational flow and giving support without introducing bias' (p. 1992:65). Bias is one of the most important issue as well as drawback for the interview and will be discussed later in this section.

The technical skills are various, including preparing the physical conditions for the interview such as the recording device, i.e. voice recorder or other, questions to ask and management skills to conduct a successful interview (see Patton, 1987; Oppenheim, 1992; and Robson, 2002). In the literature there are various suggestions and advice about the questioning techniques, it is difficult to discuss all of them, but the main ones are gathered. The most important one is expressed by Patton (1987). He stated that questions should be clear, single at a time and truly open. In this sense, questions should be easy to understand and make sense to the respondents as well as not lead the respondents' answer.

Meanwhile, Cohen and Manion (1994) advise following a sequence for the questions. This is called ‘funnelling’ or proceeding from general to specific. Starting from general statements initially and putting the respondents at ease, then asking their view might create a positive atmosphere for them to talk in a more open way and tell their true feeling and opinion. That demands talking about general points, giving general examples and asking the respondent’s view about that.

For Patton (1987) probing and/or asking follow-up questions are another skilful question technique to deepen the response to a question and in order to increase the richness of the data being elicited. The researcher could use direct questioning for this technique, for example ‘Could you explain more about that?’ Alternatively, the researcher can repeat significant words to imply she/he waits for more explanation or elaboration. Another technique is to encourage interviewees to talk freely but maintain the control (Robson, 2002). Asking that type of question is harder than it seems, as while encouraging free talk about the topic, also researcher needs to keep the interview under control in terms of topic (not losing where they are) and timing (not talking too long).

Furthermore, there are some questions to avoid asking. These are sensitive ones (see Robson, 2002:275). These questions might make respondents upset, resentful, angry and interrupt the flow of the meeting. For sensitive issues it might be better to consider the questions carefully before approaching the interviewee. Last of all, questions need to be asked with respect for the rights of the respondents. The researcher needs to wait till they finish answering the current question before she asks another one.

A well-known disadvantage of exploratory in-depth interviews is bias which can be caused from the misunderstanding of instructions, mistakes in judgement or equivocal responses. These problems can also be caused by the interviewer herself or respondents' behaviour. Oppenheim (1992) stated some potential biases such as respondents resenting talking with a complete stranger, not being accurate or attentive in their responses. They might take over the control of the interview and question the interviewer rather than the other way round. Also some uncontrollable characteristics of the interviewer might influence the interview process or interviewee. These might be sex, appearance or age, background, skin colour or accent of the interviewer. For instance, the researcher of this study is an overseas student who speaks English as a second language with a perceptible accent. Conducting interviews in English with élite figures had seemed a frightening and nerve-wracking experience before approaching the interviewees.

Considering all those demanding aspects of interview technique, at the beginning of the interview processes being a novice interviewer was very challenging. However, in a short time in practice technical and personal skills developed rapidly. Although in-depth interview types were employed, main outlines of the interviews were considered, questions and types were decided. Then the researcher of the study rehearsed several times before approaching the respondents. Thus, new researchers can be advised to first familiarise themselves with the interview techniques informed by the literature, then gain some 'hands-on' experience of these research tools before apply them to collect genuine data.

During the interview employing a voice recorder was helpful. All the participants in this study agreed for their speech to be recorded. Yet the researcher took some notes during the interviews in order to capture visually missing points (i.e. gestures and so on) as well as to re-ask or reflect some unclear points, or ask for clarification. Thus, employing in-depth interview technique for this study was intended to understand how policy makers develop policies as well as to understand institutional structures of the reality. Overall, interviews with lead educators (élite participants) also gave voice to policy makers in order to answer a related research question that was about the policy-making process. By contrast, RC teachers were able to clarify their observed practice, reveal their underlying strategies and, hence, their interpretation of policy.

4.2.3. Questionnaire

A questionnaire is a quantitative approach to reach a larger and ideally representative sample of a population in order to collect data about the people and their social lives (i.e. who they are, how they think and what they do). According to Balnaves and Caputi (2001:76), researchers can use a questionnaire when they cannot observe directly what they want to study. To illustrate, in this study teachers' views about a series of issues including the CGFS (QCA/DfEE, 2000), their years of teaching experience and so on was surveyed but they were not observed. Therefore, a questionnaire provides details of a large sample – it counts and describes 'what is out there', alongside being a detailed and quantified explanation, a precise map and/or a precise measurement of potential (Sapsford, 1999). This last description of

questionnaire clearly indicates that this strategy can provide quantitative data to support the ‘truth by numbers’, and also, express the findings statistically (Bartlett *et al*., 2001).

Strengths and limitation are inherent to any single data collection technique or research strategy. In the research literature those two aspects of questionnaire are well–documented, and sometimes advantages and disadvantages are interwoven, therefore, when necessary they will be discussed together. Although a questionnaire is a way of reaching a large sample of any population by an economical way, use of it is better for gathering relatively simple facts and it is not designed to answer complex questions (Balnaves and Caputi, 2001; Gorard, 2001). Yet, Robson (2002) states that it depends on the purpose of the questionnaire, if it is carried out for elucidatory purposes, the researcher can yield descriptive data which might involve simple facts. However, if it is carried out for interpretive purposes or for getting causal relationships, a researcher can gather very detailed information to explain the phenomena he/she studies. Still, questionnaire was employed for this research to gather facts as well as interpretive data.

Questionnaire usually takes the form of a question list that a person fills out alone (for example, postal questionnaire). In other words, respondents and the researcher cannot see each other or know who they are; therefore, respondents’ answers might involve an unknown mixture of politeness, boredom and a desire to be seen in a good light rather than express their true feelings, beliefs or behaviours (Robson, 2002). In addition, self-administrated

questionnaire can be filled without checking the identity of the respondent, without knowing if the person who filled the questionnaire was the correct candidate (Gillham, 2000). On the other hand, postal questionnaire is also a good way of collecting more truthful answers, as the respondents can be convinced that the responses are not only confidential (which is standard practice) but also anonymous. Moreover, not knowing who completed each returned form will create a chance for the respondent to answer questions truly (Gorard, 2001). In this sense, self-administrated (postal) questionnaires are more likely to collect true feelings and views of the respondents. One drawback of using the postal questionnaire is that the return rate can be very low (average 20%). The possible solution could be keeping the sample larger than the study demands, as it can increase the chance of success. Gorard (2001) exclaims that '100 envelopes does not take appreciably longer than posting ten' (p.14).

Standardization lies at the heart of questionnaire (Balnaves and Caputi, 2001). An appropriate questionnaire and its questions should meet the maximum demands of reliability, validity and generalizibility issues. For example, questions in a questionnaire should be consistent and comprehensible to obtain valid information from the respondents about their opinion, feeling and behaviour (Sapsford, 1999). These are related with design issues as well as proficiency of the person who runs the questionnaire. The possible ways to reduce potential errors might be good design, measurement and administration of a questionnaire (Balnaves and Caputi, 2001). These are keys to enhanced construct and internal validity of the method. For Balnaves and Caputi (2001) administration of the questionnaire

involves: layout, decisions on length of questionnaire, types of questions to be asked (closed, open or mixed, scale and so on), application of questionnaire (by post or face-to-face), monitoring the quality of answers, response rates, and ethical issues. Poor administration (or a problem in any of these processes) might lead to low rates, poor quality response and poor data generally. Piloting the questionnaire, sampling strategy and ethical issues will be discussed later in related sections. The questionnaire method applied in this study was adapted from a large-scale structured telephone survey of Quick *et al*. (2002). Using a tested method by a large-scale study might decrease some possible poor administration issues.

Under the light of the argument made above, it could be stated that any stage of questionnaire from preparation to application and collection of data are equally important and any possible mistake from any chain can affect the overall results of the survey and quality of data collected by this way. Lastly, it is good to bear in mind what Gorard (2001) said about surveys: he said even good surveys tend to generate much poor data, therefore, it is perhaps better that they are used as a part of a larger study that also involves other approaches, in this case élite interviews, classroom observations and teacher interviews.

4.2.4. Detailed Investigation of Practice

4.2.4.a. Observations

Observation is a technique by which a researcher can watch what people are doing, how they are doing it, recording in some ways and then describing and

analysing what has been observed (Robson, 2002). In this study, direct observation was carried out without participating. In other words the researcher's role during the observation was being there but not involved (non-participant). A great advantage of employing this technique is its directness, as the researcher does not need to ask people's opinion, but watch what they do and listen to what they say (Robson, 2002). Moreover, the observation technique might provide opportunity to observe the subject or subjects in their natural settings (Bassey, 1999). In this sense, observing teachers while they were teaching mathematics would provide first-hand data about their mathematical teaching practice.

Observation methods are classified according to the degree of pre-structure in the observation process. In general these are structured or formal and unstructured or informal (or unsystematic) observations (Robson, 2002). For the structured one, the observer needs to prepare a well-structured list that will guide the observation to be carried in a system. Informal or unstructured observations, on the other hand, are less structured and allow the researcher considerable freedom in what information is gathered and how it is recorded (Robson, 2002). Qualitative studies have a general tendency to employ participant observer with unstructured or unsystematic observation. Nevertheless, it is possible to have non-participant and unstructured observation. For example, in this study classroom observations were carried out in a non-participant role, but in an unstructured way.

According to Rolfe (2001) if a study's research questions call for detailed description of all the interactions and behaviours which occur over a time

period in a particular setting, then it is necessary to use a running record. A running record can be interpreted as regularly taking notes or audio-taping the events for a period of time or video-recording the events taking place in the classroom. Recording events on a tape recorder is less likely to be successful than video-recording (Basey, 1999). Yet, an audio-recorder still could detect most of the interactions and talk in the class during the mathematics lesson or mathematical activities by ensuring confidentiality. Moreover, transcribing audio-recorded data, word by word, would possibly give an opportunity to understand what is going on in the setting (Robson, 2002; Silverman 2005). Meanwhile, video-recording can fulfil the visually missing data, as well as capturing whole events in the classroom.

Regardless of the way of doing it, observation has some weaknesses. The most important drawback of this technique is the awareness of the people being observed of the presence of the researcher. During the data collection of this study, this drawback of the technique was experienced especially at the beginning of the study during the first observation in each class as well as during the video-recorded observation days. Video-taping was especially a problem, as it entails pointing the camera at teachers and children and thus making it clear that they are being directly observed (Bassey, 1999; Rolfe, 2001). According to Bassey (1999) the personal skills of the researcher are important in terms of putting the teachers at their ease. This statement is open to discussion. During the observation it was experienced that putting teachers at ease also very much depended on teachers' own characteristics (i.e. age, experience and personality) as well as the professional or technical skills of the researcher.

Together with audio-taping (six records for each teacher) and video-recording (on one occasion for each teacher), some notes on a clipboard pad were made. That increased the need for rapid note-taking, therefore, a symbol system of researcher's own devise was employed at the time of class. Then they were later expanded with increased detail by the verbatim transcriptions of the audio-recorders. The researcher tried to write everything after the class observation as objectively as possible. However, recording information and notes not only demands extra time, but also involves a risk that the observer might miss some important points (Wilkinson, 2000; Silverman, 2005) which could help the researcher understand what the teacher did and why. Furthermore, as a lone researcher it was difficult to observe and take notes without missing some important points (Silverman, 2005). The missing points from field notes were attempted to be addressed by using audio-recorders. In other words, the audio-taped and video-recordings of the teacher practices and field notes would complement each other and allow the researcher to cross-check her findings. Eventually, the researcher noticed another benefit of those recordings. This benefit was cross-checking target children observation schedules (records) filed during research in the classes.

4.2.4.b. Target children observation

In this study the target children observation was the main data source for exploring children's experiences in mathematical activities and how the teachers' practices and planned provision affected them. To observe target

children a well-structured target child observation schedule (Sylva *et al.*, 1980) was employed. Target child observation technique was developed in the 1970s as a part of the *Oxford Pre-school Project* carried out by Kathy Sylva and her colleagues (Sylva *et al*., 1980). This tool originally aimed to study concentration in pre-school children, but also a variety of studies (Sylva *et al.*, 1999; Adams *et al.,* 2004) employed it to evaluate children's experiences in early years settings. In this technique the observer records everything the target child is doing and saying at two-minute intervals over a period of time. Using this technique gives an opportunity to the researcher to explore what actually happens in the lives of the target children (Adams *et al.,* 2004).

The overall purpose of using the target children observation schedule is to collect data about how planned provision and activities actually affect the target child. In other words, by employing the target child observation technique it was possible to watch one particular child and see exactly what activities that child did over a set period time. Any language used or social interaction was also noted. Each target child was observed in the classroom or outside the classroom, when they were engaged with the activities during the mathematical activities hour, for a minimum of 20 minutes in the teaching session daily and an average of two times in each term during the whole research period. During the target child observation a target child was tracked and all of her/his behaviour monitored at two-minute intervals through the period of observation (Sylva *et al*., 1980). A 20-minute-tracking provided 10 samples during each observation.

The target child observation schedule had four main parts to record (see

appendix C). These are the *activity*, what the child is doing; *language,* what and with whom the child is talking); *task* is any activity arranged or planned for children development (i.e. art, 3Rs, gross motor play, small-scale construction and so on) and *social* code to show the child's social interaction or exchange with another child, group, or large group. For the activity and language sections there are no special predefined codes, but for the task and social sections there are a number of pre-defined and abbreviated codes that needed to be learned before employing the schedule for observing the child.

The variety of social and other task codes involved the impression that implementation of the schedule was difficult. Nonetheless, in reality after a few experiences, it became manageable to use. The researcher piloted this technique to gain experience and learn to use the device effectively. Instead of memorising all the codes given in the schedule, the researcher of the study developed an abbreviation system and after classroom observation she re-wrote each schedule by expanding the notes and using the codes developed by Sylva *et al*. (1980). This technique is a reliable instrument to see the quality of what happens in classrooms (Adams *et al*., 2004) as well as it gives a more focused example of a child's behaviour (Hobart and Frankel, 2004).

4.3. Sampling Strategy

'Population' involves the people who fall into the category of concern, while 'sampling' refers to a smaller group within the population. The key point is the relationship between the sample and its population. It is better to keep in mind that the main reason of using sampling is saving time and money as well, but

sampling may create an opportunity to generalise the findings to the researched population. Therefore, a high-quality sample is a vital precondition for high-quality research. How one might choose a relatively small number of cases to find out about a much bigger number depends on the sample's accuracy (Oppenheim, 1992). The first step is defining the population a researcher will work within. In this study, the population was RC teachers in two adjacent LAs in the Midlands of England. Reaching every single RC teacher in the certain area was difficult, yet it might be also costly. This study employed case study design with a number of data collection techniques which required different sampling strategies.

4.3.1. Sampling for Élite Interviews and School Observations

For élite Interviews and school observations purposeful sampling with the maximum variation technique was used. This sampling strategy owes much to Patton (1990) and according to him; purposeful sampling is the dominant strategy in qualitative research, as it investigates information-rich cases or instances that can be studied in depth. Maximum variation sampling is a type of purposeful sampling which describes qualitative research methods and is typically used when focusing on a varied yet limited number of informants, who are selected strategically so that their in-depth information will give insight into an issue about which little is known. In other words, if a researcher wants to obtain as complete as possible insight in a certain issue in all its variations, maximum variation sampling will be used.

Patton (1990) stated that for small samples a great deal of heterogeneity can be a problem because individual cases are so different from each other.

According to Patton (1990) the maximum variation sampling strategy turns that apparent weakness into strength by applying the following logic: any common patterns that emerge from great variation are of particular interest and value in capturing the core experiences and central, shared aspects or impacts of a program (Patton, 1990:172).

Therefore, for the élite interviews originally six informants who had some understanding and access to the policy decision-making process were identified, though two in practice were unavailable. Also, for observations originally five primary schools' RC were chosen in a LA as maximum variation, including urban with social and ethnic mix, rural with advantaged social intake, and rural with social mix. Yet, two teachers withdrew at an early point of the study.

In the schools target children were chosen according to their gender, age within the year group and the ethnicity of the children. In the study, while sampling target children in order to reduce the risk of a bias, the researcher used systematic sampling in order to choose the sample (Sira-Blatchford and Siraj-Blatchford (2001). Thus, the age record of the children was used to chose the second oldest and the second youngest children in the class. The evidence from baseline studies (Sammons and Smees, 1996; Tymms *et al*., 1997; Strand, 1999) showed that gender, birth-month within the year group and ethnicity was important variables which had considerable effect on children's success. In two rural schools there was no need to consider ethnicity as all the intake was white British; meanwhile in the third urban school ethnicity was a factor to be considered as it was a multicultural school.

Yet, in the urban School two white British children were chosen for consistency.

4.3.2. Sampling for Survey

In the above it was already stated that the population of the study was RC teachers in a LA in the Midlands. For the survey an effective as well as accurate sampling strategy needed to be drawn. The ideal way of doing this is randomising or probability sampling (Oppenheim, 1992: Gorard, 2001 and Robson, 2002). According to Oppenheim (1992) most populations are structured in some way, or could be divided into sub-sections because of their certain characteristics; that is, they can be clustered. Sampling RC teachers in a LA means some important factors are needed to be put into account, such as their size, socio-economic, socio-cultural status, as well as the area of the school (i.e. urban, rural or semi-rural). For the questionnaire survey total 161 primary schools with RC were identified by the help of the primary schools partnership office of the local university and a questionnaire was sent out to each school regardless of how many RCs there were in each. This could not be regarded as a representative sample of schools/RCs but at least it provided a maximum variation sample, including a variety of school types and structures, with varied social intake. Table 4.2 presents the sample for the three main methods: survey questionnaire, the case studies and élite interviews.

2 Figure 4.2. Sample of the study

Sample of the Study	
Survey Questionnaire	161 RC teachers in West Midlands
School Observations	-In 3 schools with 3 Reception Class Teachers -6 Target Children (2 observations a term, 6 in total)
Interview	4 Lead Educators/Academics

4.4. The Researcher's Role in the Process

Interviewing is a kind of data collection tool which involves face-to-face social interaction with the respondents to try to get them to talk freely and openly about the researched topic. These characteristics of the interview technique make the researcher's role vital in the process. The researcher is the one who has to take all the responsibility from the very beginning of design of the schedule through implementation to analysis of interview data and disseminating the results. Preparing a quiet, suitable interviewing environment and gaining the trust of the respondents represents the beginning or starting point of any successful interview (Oppenheim, 1992). Asking appropriate, open questions, listening more than speaking, treating the interviewer with respect, and taking the process under control are the main roles of the interviewer during the interview (Oppenheim, 1992: Robson, 2002).

In the whole study the most difficult role was being an interviewer for the researcher. The big challenge was being a novice interviewer who had first to interview four lead educators by trying to remember those roles of interviewers during the process. In order to avoid any possible bias that might

cause from a poorly played interviewer role, the researcher of the study rehearsed the desirable behaviours and roles.

Taking the observer role was far easier than being interviewer, as watching people while they work means you are not the main character in the setting. In this study the researcher was in the classes to take field-notes while the audio-recorder (and on one day the video recorder, in each class) was recording the conversations in the classrooms. Previously when the observation method was introduced, it was argued that there was a possibility that the observer might affect what she or he observes. In a classroom with young children this is a big possibility. Thirty pairs of curious eyes are looking at the researcher with several questions in their mind 'who is that?', 'why is she here?' what is she doing?' Positively, there is possibility of minimising the effects of the researcher in the class setting by being careful about some rigorous standards. These standards can be sitting in a suitable corner, avoiding distracting children's attention and avoiding affecting them (Aubrey *et al.,* 2000; and Rolfe, 2001). In this study the researcher always tried to enter the classrooms before the children, at the same time as the class teachers, as it was believed that this would minimise the effects of her presence.

Most importantly, teachers' awareness about the presence of the researcher was an issue as they might not be comfortable to carry out their daily routine, or might have paid naturally more attention to their work than they usually did (Harris, 2004). During the study it was also observed that at the beginning, although all the teachers looked a little bit nervous about being observed by someone, during the second visit they looked more relaxed, got used to being

observed and forget about the presence of the researcher. Moreover, it was found that people (i.e. teachers and children) showed little interest in the observer, especially when the observer rarely engaged in interaction with them as well as avoided any overt interaction and being obtrusive (Rolfe, 2001).

4.5. Issues of Access

Researching in schools is demanding. It involves gaining access to information, to people (students, teachers) or other resources through the gatekeepers. In most cases the gatekeepers are head teachers and/or governing body of the schools or management committees whose permission is vital (Aubrey *et al*., 2000). In this study a letter was sent to head teachers of schools where three case studies were conducted. The letter included the ethical issues considered by the researcher as well as the aim of the study and how the study would be conducted in their schools. Also a personal visit of the researcher and the supervisor was made to schools to explain the whole process face-to-face.

4.6. Ethical Issues

An educational researcher needs to recognise and follow ethical standards at every stage of his/her study in order to avoid deception, stress and any other possible negative outcomes. Ethics mean rules of conduct that involves a set of principles to consider (Reynolds, 1979 cited in Robson, 2002). Robson (2002) states that the ethical practice arises from the kind of research questions the researcher is asking and the methods used to seek answers,

especially the procedures used to avoid misleading results. In this study British Educational Research Association's (BERA, 2004) revised ethical guidelines were adopted to carry out every stage of the study to meet ethical aspects of what the researcher was proposing.

BERA (2004) revised ethical guidelines provide detailed consideration of educational research: the principles, the role of the researcher and many other aspects of conducting research. For the best practice, following these guidelines might assure collecting data in the safe boundary of ethical rules. The main consideration for a researcher seems particularly to consider the role of the researcher. These considerations include responsibilities to participants responsibilities to sponsors of research; and responsibilities to the community of educational researchers. Discussing these headings in detail can create a framework for the code of conduct.

In terms of responsibilities to participants, regardless of the role of the participants (active or passive in the research), as well as their gender, ethnicity, culture, and so on, a researcher has a series of responsibilities towards them. Firstly, participants' voluntary and informed consent was obtained. Informed consent means the participants should know why their involvement is necessary, how the research will be conducted and reported. According to BERA (2004) revised guidelines while gaining the consent of participants, the researcher needs to inform them about their right to withdraw from the research for any or no reason, and at any time. Moreover, during any stage of the data collection the researcher must avoid any dishonest way and deception towards the participants. Following these guidelines, RC teachers

were informed about the study as well as their rights to withdraw from the study.

If a research involves children, the researcher considered some special guidelines for the children and complies with Articles 3 and 12 of the United Nations Convention on the Rights of the Child (BERA, 2004). Regarding to the article 3, in all actions children should be considered, while Article 12 demands that children who can, form their own views freely in all matters affecting them as well as give fully informed consent. However, bearing in mind those young children (RC children) in this study might be considered as too young to give fully-informed consent. In this sense, Coady (2001) stated that:

> According to legal definitions children cannot give consent, but the child's legal guardian can give consent on behalf of the child. It is good practice, however, and in keeping with the United Nations Convention on the rights of the child, to ask the child also to give consent, or 'assent' as it is known in these circumstances. […] it is imperative to gain the consent of the child's parents […] (Coady, 2001: 66).

Hence, for the purpose of this study, the researcher informed the parents of the children and asked for their consent, on behalf of their children. Consent letters were sent to parents through the RC teachers and all the parents had no objection about their children's participation in a research.

Privacy and/or confidentiality or other matters of fact that should be handled carefully (BERA, 2004). Participants must be informed that their privacy and confidentiality is safe with the researcher during any stage of the research. However, during the research if any unpredictable harm arises from the

processes or findings of the research, the researcher must make these known to relevant sponsors of the research and/or participants/guardians (BERA, 2004). Storing the collected data also needs special treatment to ensure people's information is unobtainable by others.

Carrying out a research is an expensive process and most research studies are sponsored by some bodies or associations. BERA (2004) guidelines underpin the responsibilities to sponsors of research. This study has been sponsored by the Turkish Government (Ministry of National Education of Turkey). All the procedural aspects of agreement between the Turkish Government and the research student was made according to Turkish laws. The ethical responsibilities might be slightly different from the official legal ones but they may also overlap with each other. The researcher considered BERA (2004) guidelines alongside the guidelines for Turkish research students studying abroad, which were issued when the agreement was made between the Government and the student).

The last responsibility that was underlined by BERA (2004) is the responsibility to the community of educational research. This responsibility involves a series of serious points, i.e. avoiding plagiarism, respecting others' work, so on, and all researchers must obey all these rules, and so did the researcher of this study.

4.7. Piloting the Data Collection Methods

Piloting the data collection tools used in the study was vital. Wilkinson (2000) points out the reason for that:

> You will probably have only one opportunity in distributing the instrument to 'get it right', therefore piloting and amendments need to be carried out at an early stage (Wilkinson, 2000: 43).

Trying out the data collection methods before using them to collect data or applying the tool/s to the respondents might provide an opportunity to check if they are going to work as the researcher intends. As Wilkinson (2000) maintains, there would be only one chance to gather genuine data. For most of the data collection tools, i.e. survey questionnaire, piloting is a long process and involves several stages.

The in-depth interview employed for this study was piloted before it was conducted with four élite educators. Although it was an exploratory interview, some general questions were agreed with the supervisor and piloted on her peer group as well as with the supervisor of the study. Yet, coming face-to-face with the real respondents differed from piloting.

As it was previously mentioned the survey questionnaire of the study was modified from the study of Quick *et al.* (2002). Nevertheless, when it was modified some of the questions were changed; some were omitted and a few were added, according to the focus of the research. Therefore, it needed to be piloted. Piloting a questionnaire involves various stages. These are composing questions, trying them out, improving and then trying them out again (Oppenheim, 1992). As in Wilkinson's (2000) views above, Merriam and Simpson (1995) stated that the most serious potential disadvantage of the distribution of a questionnaire for self-completion is receiving unclear responses from the participants. Piloting the questionnaire may highlight the need for clarification, restatement or explanation. Thus, before sending out the

questionnaire to the respondents the adapted version was piloted with six RC teachers and some necessary amendments were made and it was re-piloted. This is a fairly lengthy process, but as (Oppenheim, 1992) stated, avoiding piloting is likely to prove more costly still.

As mentioned previously, case study is seen as an umbrella term for a group of research methods. In this study case study design also involved non-participated classroom observation by using audio-visual recording and note-taking as well as target children observation. Before conducting school observations, this technique was piloted in a multicultural primary school in London. That school provided a means of trialling instruments and gave insight and helpful experience to the researcher. Particularly it helped to see how busy a RC could be, how time could be managed, as well as how an observer could avoid disturbing the teacher and children while collecting data.

4.8. Trustworthiness of the Study

Any piece of conducted research needs to be questioned about quality and trustworthiness. The owner of the research is required to persuade his/her audiences (including self) that the findings of study are worth paying attention to (Lincoln and Guba, 1985). In order to check and ensure the quality of the study there are some basic rules that need to be followed conscientiously by the inquirer. According to Lincoln and Guba (1985) researchers can achieve these by posing four questions. These are:

(1) *"Truth value"*: How can one establish confidence in the "truth" of the findings of a particular inquiry for the subjects (respondents) for and the context in which the inquiry was carried out?
(2) *Applicability*: How can one determine the extent to which the findings of

a particular inquiry have applicability in other contexts or with other subjects (respondents)?

(3) *Consistency*: How can one determine whether the findings of an inquiry would be repeated if the inquiry were replicated with the same (or similar) subjects (respondents) in the same (or similar) context?

(4) *Neutrality:* How can one establish the degree to which the findings of an inquiry are determined by the subjects (respondents) and conditions of the inquiry and not by the biases, motivations, interest, or perspectives of the inquirer? (Lincoln and Guba, 1985: 290)

Within the research qualitative paradigm 'truth value' corresponds to 'internal validity'; 'applicability' to 'external validity', 'consistency' to 'reliability' and 'neutrality' to 'objectivity'. Although the extract taken from Lincoln and Guba (1985) wisely summarised these terminologies, it is worth discussing further.

According to Hammersley (1990:57) validity means '… truth: interpreted as the extent to which an account accurately represents the social phenomena to which it refers' (ibid. 57). In this sense truth is another word for validity. However, Cook and Campel (1979) preferred to use a milder expression and they stated that validity is the best available approximation to the truth. Approximate is meaningful here, as it means fairly accurate but not totally precise. Internal validity is the approximate truth (Cook and Campel, 1979) about inferences regarding cause-effect or causal relationships. Internal validity is a quantitative research concept and thus, it is only relevant in studies that try to establish a causal relationship. It is not relevant in most observational or descriptive studies. In this study checking for the internal validity of study findings might seem challenging, but in practice that does not mean that there is no reference to internal validity in qualitative research. In qualitative studies it refers to a more general concept, the match between the researcher's categories and interpretations and what is actually true. According to Tashakkori and Teddlie (1998) it can be asked if meaning,

categories and interpretations of the researcher reflect reality and if the answer is yes it is possible to mention internal validity.

On the other hand, external validity refers to the researcher's ability to generalize the results of their study to other settings, persons, times and measures (Tashakkori and Teddlie, 1998). Results obtained from representative samples of individuals or situations are more likely to be generalizable to the population. For this study, as representative a sample as possible was used for the survey in order to gather RC teachers' views about the multiple aspects of early years policies, texts production and practices of mathematical development in RC in the Midlands of England. Tashakkori and Teddlie (1998) stated that: 'The more representative your sample of individuals or events/situations the greater is the probability that your research findings have 'population external validity'' (ibid. 65). However, for qualitative researchers generalizing to other individuals, events, situations and settings are not required. Instead some qualitative researchers use 'transferability of results' rather than generazibility (Tashakkori and Teddlie, 1998).

The other important term for checking the quality of research is reliability which is the consistency of the researcher's measurement, or the degree to which an instrument measures the same way each time it is used under the same condition with the same subjects (Hammersley, 1990). In other words, a measure, procedure or instrument yields the same result on repeated trials. If our measure, say x, is reliable, we should find that if we measure or observe it twice on the same persons that the scores are pretty much the same. Yet, for qualitative research it seems hard to measure or observe the same event or

situation even with the same person, as the same person might react in different way to the same stimulation at different times. Lincoln and Guba (1985) that note the main threat to reliability was a careless act. This is true for any aspect of qualitative of research, but especially the consistency of the research process will affect the reliability of the study.

The last question Lincoln and Guba (1985) advised an inquirer should ask was about being neutral, or in other words, objectivity. Being impartial towards the researched subjects is particularly vital for qualitative studies. In terms of objectivity for qualitative aspects of this study, i.e. observations and interviews, this was more demanding than the quantitative part. According to Lincoln and Guba (1985) imperfect methodologies are threats to objectivity that make it possible to change direction of the data. In that case, some of my data collection methods might be imperfect for the purpose of objectivity, whilst for others perfect. Yet, they were all employed to study different aspects of the research topic.

Following the advice of Lincoln and Guba (1985) special trustworthiness measures were used. *Prolonged engagement* was ensured by remaining in the field long enough to build trust and understand the culture. Related to this *persistent observation* ensured all pervasive features were identified. *Triangulation* was ensured through use of different data sources. *Thick description* was provided from each source that illustrated the range of information obtained. Finally *auditing* the research process by maintaining all records of raw data, data reduction and analysis provided a means of external scrutiny and documented research process.

4.9. Conclusion

This chapter has introduced the case study design that had an intrinsic interest in the particularities of reception classes in the wider policy-to-practice context. The case study thus incorporated an interest in and investigation of the actions and meanings of teachers and children within the wider issues of the way policy is changed as it was integrated into practice. Capturing the variability of perspectives, settings and practices allowed triangulation of a variety of data sources (élites, teachers and children), multiple methods (including observation, survey and interview) and theory (related to learning and development of early mathematics) was important to enhance validity. The study had to be feasible for one researcher to carry out and reflexive in terms of maintaining sensitivity to and ethical concern for the number of emerging meanings as well as the researcher's impact on the study. Data analysis was organised to start as soon as collection began and continue throughout the process of implementation and reporting. The purpose was to provide an account of the multiple perspectives and their complexities to be revealed by the study. The next chapter will begin the process of reporting.

CHAPTER 5: DOCUMENTARY ANALYSIS OF POLICY TEXTS

5.1. Introduction

In the previous chapter (chapter 4) the methodology and design of the study was introduced and this indicated that analysing key policy texts would illuminate Bowe *et al*. (1992) context of policy text production. According to Robson (2002) particular contexts generate specific types of document therefore it was necessary to understand the early years mathematics policy context by starting from the texts level. In this chapter, relevant documents and policy texts in early years mathematics are focused upon. These documents are either statutory requirements and/or related guidance.

As was mentioned throughout the study, the particular period covered in this study was between 1999 and 2008. In this period, a number of policy texts and documents were published and introduced by the Government but those encompassed by the scope of this study covered only mathematical development in the RC. Firstly, in the context section below related published policy texts will be introduced according to their chronological order in the period of 1999 and 2008, then, key documents (National Numeracy Strategy, (NNS), DfEE, 1999a and the Curriculum Guidance for the Foundation Stage, CGFS, QCA/DfEE, 2000) will be focused upon for depth analysis.

5.2. The Context

In 1999, the NNS (DfEE, 1999a) and its framework for teaching mathematics from Reception to Year 6 (five to eleven years) was introduced to primary schools in England and Wales setting a target for 75% of all Year 6 pupils

(eleven year-olds) to reach at least level four in mathematics by 2002. The main purpose of the NNS was for primary school children to become properly numerate. Thus, it set out a term by term framework which prescribed in detail what mathematics was to be taught and how it was to be taught for each year group. Numeracy was described in this document as follows:

> Numeracy is a proficiency which involves confidence and competence with numbers and measures. It requires an understanding of the number system, a repertoire of computational skills and an inclination and ability to solve number problems in a variety of contexts (DfEE, 1999a:4).

This description was clearly not a definition of what mathematics was, but what the numeracy and numeracy skills were, though objectives in the NNS included all areas of mathematics. The NNS was developed alongside the proposals for the revised NC mathematics objectives, with the yearly teaching programmes covering all aspects of the NC for mathematics in Key Stages 1 and 2 so that it was compatible with them. The programme for RC took account of the ELGs (mentioned below) for three- to five-year-olds, and provided a bridge from the goals to the NC. When the NNS was introduced an extensive training for practitioners had been provided and the document enabled teachers to provide pupils with a firm foundation in mathematics and set ambitious targets for raising standards in these key skills. Considering the period for this study, this document was seen as one of the key documents which was to be analysed in depth.

In October 1999, the ELGs (QCA/DfEE, 1999) were published. The document contained the ELGs and principles and aims for the FS which included children from age three to the end of the reception year (age five). The

information in the ELGs booklet was included later on in the CGFS and published in May 2000. These were learning objectives for children to reach by the end of the FS (three-five years). From September 2000, early years practitioners worked within the framework of ELGs. The ELGs provided a useful tool for planning and assessment and were divided into six curriculum areas:

- personal, social and emotional development;
- communication, language and literacy;
- mathematical development;
- knowledge and understanding of the world;
- physical development;
- creative development.

For the purpose of this study, mathematical development of the children in the RC was the main area to focus on. The ELGs were the main objectives and have been kept unchanged in all related mathematics curriculum documents (i.e. the NNS and the CGFS) covering the RC between the period 1999 and 2008. These objectives were to:

- say and use number names in order in familiar contexts;
- count reliably up to 10 everyday objects;
- recognise numerals 1 to 9;
- use language such as 'more' or 'less', 'greater' or 'smaller', 'heavier' or 'lighter', to compare two numbers or quantities;
- in practical activities and discussion begin to use the vocabulary involved in adding and subtracting;
- find one more or one less than a number from 1 to 10;

- begin to relate addition to combining two groups of objects, and subtraction to 'taking away';
- talk about, recognise and recreate simple patterns;
- use language such as 'circle' or 'bigger' to describe the shape and size of solids and flat shapes;
- use everyday words to describe position;
- use developing mathematical ideas and methods to solve practical problems.

Also in the same year, National Curriculum for Mathematics (NCfM), (DfEE, 1999b) was published as a part of the NC for England at Key Stages 1 and 2 (KS1 and KS2) (QCA, 1999). This booklet set out the statutory requirements of the NC in England for Mathematics and provided information to help teachers implement mathematics in their schools. The NCfM covered from KS1 to KS2, and provided detailed objectives for pupils aged five to eleven. In this document there were a number of descriptions of mathematics from the viewpoints of academics one of which was:

> Mathematics is not just a collection of skills; it is a way of thinking. It lies at the core of scientific understanding, and of rational and logical argument. (Dr Colin Sparrow, Lecturer in Mathematics, University of Cambridge: DfEE, 1999b: 15)

Although NCfM covered five-year-old children, there was no direct reference to early years education (i.e. RC). At the beginning of the section for KS1, a section reviewed the ELGs and suggested building on these goals. The main emphasis in KS1 was on ‘number’ and ‘shape, space and measures’. The document did not describe how to implement the curriculum as it stated that ‘it is for schools to choose how they organise their school curriculum to include the programmes of study for mathematics’ (DfEE, 1999b:6). Also, it was clear

that schools did not have to implement both documents, the NNS and the NCfM, since choosing one was enough, particularly the NNS.

> Those schools that fully implement the Framework [the NNS] will fulfil their statutory duty in relation to the National curriculum for Mathematics at KS1 and 2' (DfEE, 1999b:6)

Also in the document, the section for KS1 emphasised that the mathematics programmes of study and the NNS framework for teaching mathematics were fully aligned and the framework provided a detailed foundation for implementing the statutory requirements of the programmes of study for KS1 in mathematics. In this sense, for the purpose of this study the main focus could be on the NNS rather than on the NCfM, especially considering that that document had no reference to RC, whilst the framework clearly covered RC with a number of teaching objectives, well structured playful activities and explanations how to organise mathematics lesson/activities for this age group.

At the beginning of the millennium, in 2000, the new early years curriculum, Curriculum Guidance for the Foundation Stage (CGFS) (QCA/DfEE, 2000), was published for the FS (for three to five years). The FS was a distinct curriculum stage, important in its own right, operating in close partnership with parents and carers, and guided by a set of pedagogic principles appropriate to the age of the children in this stage. The FS aimed to develop key learning skills such as listening, speaking, concentration, persistence and learning with other children. Also it prepared children for learning in KS1 (five- to seven-year-olds) and was consistent with the NC areas of study. The CGFS described stepping stones to show the knowledge, skills, understanding and

attitudes that children needed to gain during the FS to meet the ELGs which they should achieve by the end of the FS as noted in chapter 2.

The mathematical development area in this curriculum covered counting, sorting, matching, seeking patterns, making connections, recognising relationships and working with numbers, shapes, space and measures. According to the CGFS document mathematical development '…depends on becoming confident and competent in learning and using key skills' (QCA/DfEE, 1999:68)

In 2002, two booklets for the FS mathematics were introduced: one for the nursery class, the other for the RC (the *Mathematics Activities for the Foundation Stage/Reception*, MAFS/R, DfES, 2002a). These two booklets overlapped in terms of pitch and content to cater for groups of children working across the Stepping Stones in the CGFS. In the introduction section of the reception booklet it was clearly stated that:

> The aim of these booklets is to help FS practitioners to plan mathematical activities that are linked to the Stepping Stones identified in the CGFS (QCA/DfEE, 2000), progressing towards the ELGs. The ELGs are the same as the Key Objectives in the Framework for Teaching mathematics from Reception to Year 6 (National Numeracy Strategy/DfEE). References to one or both of these documents are written at the foot of each page in the booklets. These booklets should be read in conjunction with the Curriculum Guidance for the Foundation Stage (DfES, 2002a:2)

This extract showed that mathematical goals and objectives for the FS were the same in all related documents (the NNS, CGFS and MAFS/R). Moreover, later in this booklet there was another section which stated that:

> The booklets do not attempt to cover every statement in the Stepping Stones towards the Early Learning Goals. *The National*

> *Numeracy Strategy Framework for Teaching Mathematics from Reception to Year 6* provides other objectives (section 3 and supplement of examples, section 4) in addition to the Key Objectives for settings such as reception classes. They offer additional breadth in the second year of the Foundation Stage. (DfES, 2002a:3)

Considering all of those points, this RC booklet also stated that it was not completely covering the key objectives of the NNS, yet recommended to look up the NNS for those left out ones, particularly for the RC children's mathematical development. Thus, it seemed that not considering this document as a key one for the depth analysis was logical.

In 2002, the *Education Act 2002* (DfES, 2002b) extended the NC to the FS, defining the current six areas of learning as statutory (explained above). According to the Qualifications and Curriculum Development Agency, QCDA, (previously called Qualification and Curriculum Agency, QCA) official website (www.qcda.gov.uk/10034.aspx) when this happened in 2002 Ken Boston, chief executive of QCA, said that:

> There is overwhelming support for establishing the Early Learning Goals and the Curriculum Guidance for the Foundation Stage as the basis of a statutory entitlement. This gives early years practitioners a clear framework within which to plan and provide learning and teaching experiences of the highest quality.

This caused concerns to some educationalists and early years specialists, as they believed that making goals statutory would make the early years curriculum too restricted and inflexible. In the same speech, Ken Boston also noted the same concern of some educationalists and practitioners who took part to in QCA's consultation in 2002 having backed the ELGs and the CGFS as the basis of the NC for the FS, and stated that 'This is something we should guard against' (www.qcda.gov.uk/10034.aspx).

Thus, since then like the other five ELGs, mathematical development in the FS linked with the NC and became statutory.

In 2003, the Primary National Strategy (PNS), (DfES, 2003) was launched through the document *'Excellence and Enjoyment: A Strategy for Primary Schools'* (DfES, 2003). The existing NNS (DfEE, 1999a) and NLS (DfEE, 1998) were taken under the umbrella of the PNS. This document marked a further stage in the evolution of primary education under the current Government. Alongside a continued emphasis on high standards in literacy and mathematics, this document strongly affirmed the importance of the foundation subjects and the entitlement of children to receive a broad, balanced and creative curriculum. It encouraged schools 'to take control of their curriculum, to be more innovative and to develop their own character' and outlined a set of learning and teaching principles' (p. 29) which would guide future developments across the whole curriculum.

Three years later, in October 2006 the frameworks for teaching literacy and mathematics were "renewed" and issued in electronic form as the Primary Framework for Literacy and Mathematics (PFLM) (DfES, 2006). The renewed Framework, built on materials in use since the introduction of the NLS (DfEE, 1998) and the NNS (DfEE, 1999a) now part of the PNS, and reflected major developments that had taken place since that time. The renewed Framework marked an important step and brought new impetus and new structures that were a significant development rather than a repackaging of guidance that was already in place (DfES, 2006). The electronic version of the PFLM (http://nationalstrategies.standards.dcsf.gov.uk) indicated the changes to the

original framework as the renewed PFLM reflected national policy developments and was built on research and evaluation undertaken since the late 1990s. Also, it stated that there had been widespread consultation on the content of the Framework. The changes that have been incorporated included:

1. **An electronic version** – The most obvious difference is that the renewed Framework is an electronic version. The electronic format will allow you [teachers] to link quickly to a wide range of teaching and learning resources, so that you can customise your planning, teaching and assessment more easily.
2. **A clearer structure for mathematics** – To simplify the structure of the objectives, seven strands of learning in mathematics have been identified, giving a broad overview of the mathematics curriculum in the primary phase. The objectives are aligned to the seven strands to demonstrate progression in each strand.
3. **Slimmed-down objectives** - Another key difference is that objectives in the 1999 Framework for mathematics have been slimmed down to give a clearer sense of the important aspects of mathematics that need to be taught to children each year (DfES, 2006).

In this document mathematical objectives for the FS were not specified, as they started from Year 1.

So far, policy texts related to or included in mathematical development in the RC have been briefly introduced. It is clear that there have been little changes on the general context of mathematics teaching in the RC.

5.3. Aims

The main purpose of this chapter is to provide a context for the policy texts related to early years mathematics teaching and learning. The research question which related to this chapter is:

- What does the policy for early years mathematics require RC teachers to do in their classrooms in terms of curriculum implementation?

5.4. Methods

5.4.1. Materials: related documents and texts

Above, a number of policy texts related to children's mathematical development in RC were introduced. For further analysis, some of these documents were excluded for some specific reasons. Connecting these policy texts with the data collection process and period of study would help to generate the excluding or including criteria for the documents analysis.

Between 2004 and 2005, the detailed classroom investigations were conducted in three primary schools' RCs. For the FS (three to five years), the CGFS was in use, whilst for the five- to eleven-year-olds' mathematical development firstly the PNS (DfES, 2003) and then PFLM (DfES, 2006) was in use. In 2006 to 2007 the survey was designed and implemented, at that time the CGFS was for the FS, and PFLM was for the KS1 and 2. However, in this period, for the RC mathematics another curricular document was the MAFS/R (DfES, 2002a). In the context section above, it was already explained that this document did not include all the key objectives of the NNS and the RC teachers were advised to use the NNS for some excluded objectives. From this point, it was determined that the NNS (DfEE, 1999a) and the CGFS were analysed further. By the time the élite interviews had already been completed in 2008, the renewed version of EYFS framework (DCSF, 2008) was being introduced. Thus, this latter document was beyond the scope of

teachers in this study, as it came out after this phase of data collection was completed though it was raised in élite interviews.

5.4.2. Procedures

The relevant documents identified and mentioned above were read from beginning to end to understand their expectations and recommendations for the RC mathematics. Then those were introduced and discussed in the context section. The key documents, the NNS and the CGFS, were analysed first by applying a priori categorising units.

5.4.3. Analysis

There are many types of document analysis and the most common approach is the content analysis, the quantitative analysis of what is in the document (Robson, 2002). Content analysis extends far beyond simple word counts, however. What makes the technique particularly rich and meaningful is its reliance on coding and categorizing of the data (Stemler, 2001). In this study, the extensive data were derived from two policy texts that needed to be more than just quantifying what was in the text analysis. Yet, it was also necessary to check via pre-set (a priori) categories which would help address the research questions were present in the text, and if so, whether there was frequent emphasis on them. That demanded going further than quantitative analysis but checking the contexts of the target documents.

When dealing with *a priori* coding, the categories were established prior to the analysis based upon Holsti's (1969 cited in Robson, 2002) categories for

analysing the policy texts. These categories were adapted according to purpose of this study by the researcher. The main rationale for this adaptation was Holsti's lists (see in Robson, 2002:355) as being very general these could be applied to any policy texts. Yet, they were tailored and sub-categorised according to the purposes of the study and are given below (Table. 5.1).

3 Figure 5.1. Categories which are applied to analyse the documents

Subject matter: What is the text about?
- Statutory framework or guidance
- Supplementary documents (not compulsory)

Audience of the text

Goals introductions and descriptions: What are the purposes of the text?
- Outline and introduce objectives and goals
- Introduces the expected practice and exemplified
- Values that are revealed (i.e. raising standards, high quality provision and high standards in mathematics)

Actors:
- What are the views of the politicians?
- Role of the teachers/practitioners described
- Role of the learners/children described
- A special reference to RC mathematics objectives and activities

Pedagogy: How is the pedagogy described?
- Direct teaching or adult-led
- Interactive
- Child-centred
- Playful

Organisation of the mathematics lessons/activities:
- Daily mathematics lesson
- Integrating the day

Liaison with parents and other related professionals

Procedure:
- Planning
- Monitoring
- Assessing

5.4.4. In-depth Analysis of the Key Policy Texts Related to the RC Mathematics

In this section firstly the NNS (DfEE, 1999a) and then the CGFS (QCA/DfEE, 2000) will be analysed, then under the discussion section, the findings from the analysis will be combined.

5.5. Results

5.5.1. Results of the Document Analysis of the NNS (DfEE, 1999a)

5.5.1.1. Audience of the NNS: this is the children from RC (five-year-old) to Year 6 (eleve-year-old), their teachers, primary school staff and head teachers.

5.5.1.2. Statutory Framework or Guidance (statutory or not): This Framework provided guidance to supplement the order. It included guidance on the daily mathematics lesson for RC to Year 6. It was compatible with the NC and the ELGs from three- to five-year-olds. Implementing the NNS was not compulsory in the RC.

5.5.1.3. Politicians' Views Reflected in the Document: in the NNS, David Blunkett, Secretary of State for Education and Employment emphasised raising standards in numeracy as well as the value of children's development in this area, and how the Government supported the schools and teachers for the implementation of the framework.

5.5.1.4. Outline/introduced Goals/objectives for the RC: The NNS introduced a series of objectives for each year group. The objectives for the RC took account of the ELGs for three- to five-year-olds. These were the objectives given above in the context section.

5.5.1.5. Introduced the Expected Practice and Exemplified: The document separated a big section for introduction and explanation about how to implement the text for children's mathematical development in the primary schools including RC. Supplements of examples were involved to illustrate for

each of the teaching objectives and examples were given about what pupils should know. Moreover, for each year group, the section planning (see p. 38) set up key objectives, yearly teaching programmes, planning grids and examples in details.

The section about ‘school and class organisation: some questions answered’ involved valuable information about the practice. Although it was advised that children in each class should, as far as possible, work together through the yearly programme, when necessary, to cater for needs of particular pupils, differentiating group work could be organised. The lesson should start and end with the whole class, but for the small-group activities children might need to be grouped according to their attainment: one high, two middle and one low, four groups altogether. The document stated that this would allow for a controlled degree of differentiation work on the topic being taught to the whole class (DfEE, 1999a).

5.5.1.6. Special Reference to RC: In the NNS, there were a number of specific references for the RC. A whole section was separated to explain how the document and its framework could be put into practice in this class. The recommended practice in this document for RC mathematics was very like the practice in the later year groups in primary schools.

5.5.1.7. Pedagogy (direct teaching or adult-led, child-centred): The NNS expected teacher-directed pedagogy and described high-quality direct teaching as oral, interactive and lively. It warned the teachers:

> It [direct teaching] is not achieved by adopting a simplistic formula of ‘drill and practice’ and lecturing the class, or by expecting

> pupils to teach themselves from books. It is a two-way process in which pupils are expected to play an active part by answering questions, contributing points to discussions, and explaining demonstrating their methods to the class' (DfEE, 1999a:11)

In this extract, the NNS clearly laid out a teacher-directed pedagogy. It did not mean children were sitting and being passive receivers of the teachers' practice. Also, according to the document the direct teaching was achieved by balancing different elements. These were: directing, instructing, demonstrating, explaining and illustrating, questioning and discussing, consolidating, evaluating pupil's responses, summarising. However, in these elements, the teachers' skills and knowledge would encourage the children to be active or interacting. For the RC, the document was introducing slightly different teaching approaches and called them 'appropriate'. These were promoting mathematical understanding of young children through stories, songs, rhymes, games and imaginative play. All of those teaching approaches needed teacher direction, but of a different kind that was playful and active. However, in a later section on forging links with Year 1, the document clearly emphasised its expectation of the RC teachers and recommended them to provide some direct teaching in the RC.

5.5.1.8. Role of the teachers/practitioners: in many places in the NNS the role of the teachers during children's mathematical learning or activities in RC were described and explained. The document recommended teachers to plan interesting, linked activities and talking points with their chosen activities in mind. For RC mathematical activities, the RC teachers were required to plan interesting and playful activities that would demand children to take part actively. They could use dedicated corners in the classroom, for example the

sand and water trays, or they could sing, act different versions of nursery rhymes for counting, or play freely and so on. Even ordinary classroom routines were seen as opportunities for teachers to talk about numbers, counting and discussing mathematical ideas.

5.5.1.9. Interactive Teaching: Interactive teaching was seeking and encouraging children's active involvement in the activities, asking open-ended questions to encourage discussions and so on. In the NNS, when the pedagogy was described as teacher-directed it was strictly emphasised that it did not mean simply lecturing, drill and practice but that high-quality direct teaching was interactive and lively, involving children's active involvement in the activities and lessons. Also in a small section in the document asking open and closed questions of children was recommended. In general, in the NNS the main emphasis was on teacher-led activities with some references to free play activities for the RC children's mathematical development.

5.5.1.10. Play and Practical Work: There were some play opportunities as well as some playfulness in the activities provided in the NNS. For the RC, there were some references to children's play in the free-play area, but the teacher assistants were advised to intervene in play to question children and develop their understandings in ways that teachers planned in advance.

5.5.1.11. Role of the learners/pupils: rather than focusing on the role of the children, the outcomes of their learning were mentioned as follows:

> 'The outcome should be numerate pupils who are confident enough to tackle mathematical problems without going immediately to teachers and friends for help' (DfEE, 1999a:4)

In this extract, the learning outcomes that were exemplified in the document could be interpreted in terms of the learners' role to participate in the activities and strive to learn before seeking help from others. The document acknowledged that RC children come to school with a variety of knowledge and understanding in mathematics. The NNS emphasised that 'It is better to find out about and build on the awareness children already have than to start with an assumption of lack of knowledge' (DfEE, 1999a:28).

5.5.1.12. Organisation of the mathematics activities/lessons (integrating the day or daily mathematics lesson): In the NNS, there was a section which was entitled 'making links between mathematics and other subjects', but the emphasis was not on integration of subjects. In the RC section of the document, there was reference to integrating mathematics with other areas. Regardless of age or year group, planning a daily mathematics lesson was the main feature of the NNS. In order to ensure a smooth transition to the Year 1 daily mathematics lesson, RC teachers were advised to plan and organise a forty-five minutes daily mathematics lesson by the end of the reception year.

5.5.1.13. Liaison with parents and partnership with others: where it seemed that the NNS had not much emphasised liaison with parents. In only one sentence for the RC children, teachers were advised to listen to parents regarding what they were thinking about their children's learning and to keep them fully informed. The general expectation of the document from the schools was well informed head teachers, curriculum co-ordinators and teachers.

5.5.1.14. Planning and assessing: Planning had a big share in this document. In the NNS, each yearly teaching programme was accompanied by planning grids to help teachers plan their short-, medium- and long-term activities. Each planning grid explained and exemplified how mathematical topics could be grouped in units of work throughout the week, term and year. For the mathematical learning area the ELGs which were in line with the objectives in the NNS were expected to be used for planning activities. Lastly, significance of assessing was well emphasised and the document included a big section to inform why and how assessment should be carried out through the year.

5.5.2. Results of the Document Analysis of the CGFS (QCA/DfEE, 2000)

5.5.2.1. Audience of the Text: The focus of the document is children of age of three to five years (early years settings including playgroup, nursery and RC), their practitioners, carers and parents.

5.4.4-B-2. Statutory Framework or Guidance (statutory or not): It was a statutory document to be implemented to children aged three to five-year-olds in settings receiving funding.

5.5.2.3. Politicians' Views Reflected in the Document: In the CGFS Margaret Hodson, Parliamentary Under Secretary of State for Employment and Equal opportunities, considered early years education from a wider perspective including the impact of high-quality early years education on young children's development. She emphasised that:

> '… it [the CGFS] is not simply a product of Government. It is something you have asked for and it has been developed drawing on the extensive expertise of a group of early education

> specialists, representing a broad range of early years interests. Contributors include leading practitioners, academics, and representatives from organisations committed to the care, development and education of young children (ACQ/DfEE, 2000: foreword by Margaret Hodge, MP).

5.5.2.4. Outline/introduces Goals/objectives for the RC: The CGFS had well structured objectives for mathematical development. They were ELGs originated from the original ELGs document (QCA, 1999) and introduced in the context section.

5.5.2.5. Introduces the expected practice and exemplifies: This document was well-structured to help practitioners plan and meet the diverse needs of all FS children. The document began with an additional guidance to help practitioners to plan and teach learning areas including mathematics. Then a set of principles were introduced. According to the CGFS, these principles were drawn from, and were evident in, good and effective practice in early years settings, these were:

- Effective education requires both a relevant curriculum and practitioners who understand and are able to implement the curriculum requirements.
- Effective education requires practitioners who understand that children develop rapidly during the early years – physically, intellectually, emotionally and socially.
- Practitioners should ensure that all children feel included, secure and valued.
- Early years experience should build on what children already know and can do.
- No child should be excluded or disadvantaged.
- Parents and practitioners should work together.
- To be effective, an early years curriculum should be carefully structured.
- There should be opportunities for children to engage in activities planned by adults and also those that they plan or initiate themselves.
- Practitioners must be able to observe and respond appropriately to children.

- Well-planned, purposeful activity and appropriate intervention by practitioners will engage children in the learning process.
- For children to have rich and stimulating experiences, the learning environment should be well planned and well organised.
- Above all, effective learning and development for young children requires high-quality care and education by practitioners.
- These principles are the basis on which every part of this guidance has been developed, and are reflected throughout. (QCA/DfEE, 2000:11)

Then in the later section, three main elements were explained to help the teachers in detail. One of these was ‘stepping stones’, the knowledge, skills and understanding and attitudes that children needed to learn during the FS in order to achieve the ELGs. The other ‘examples of what children do’ section (to help practitioners assess), would help practitioners to identify when knowledge, skills, understanding and attitudes have been achieved by children. The ‘what does the practitioner need to do?’ section showed how practitioners could both consolidate and support children’s learning in order to help children make good progress.

5.5.2.6. A Special reference to RC: In the CGFS there was only one small section which explains how to link the NNS with the mathematical learning area in RC. In general, neither mathematics ELGs nor stepping stones in the CGFS were seen in isolation as these were intended for the RC, and for the Nursery. They were seen as a whole and ELGs were expected to be achieved by the end of the FS, or end of the RC.

5.5.2.7. Pedagogy (direct teaching or adult-led, child-centred): Direct-teaching was not the main character of the CGFS and there was no direct reference to it. The document emphasised number rhymes, incidental talk and

opportunistic involvement to the children's play which was non-directive. In one example (examples of what children do) it stated:

> One of the children's favourite games was helping the teddy to learn to count. The practitioner used teddy to count. 'One, two, four, five.' William and Leah shouted out, 'He missed the three!' and began making up their own jumbled sequences of numbers and correcting each other. (QCA/DfEE, 2000:74)

In this example, the practitioner was directing the activity by involving herself in children's learning in a playful way. In 'what does the practitioner do?' section the examples given included some teacher-directed activities, especially by being a model for children to do or use something, for example; 'model touching or moving objects while counting them', or 'model estimating 'how many' in large groups of objects'. However, whilst these activities were teacher-directed, in general, in the CGFS activities were distinctly child-initiated and child-centred; at least they were in balance with teacher-directed activities.

5.5.2.8. Role of the Teachers/practitioners: In the text, there was a flexible, multiple explanation for the term teaching:

> Teaching means systematically helping children to learn so that they are helped to make connections in their learning and are actively led forward, as well as helped to reflect on what they have already learned (QCA/DfEE, 2000:22).

Helping children to learn can be interpreted in a number of ways. It might involve a type of direct teaching, too. In the CGFS, teaching aspects were explained and these were: planning and creating a learning environment, organising time and material resources, interacting, questioning, and responding to questions, working with and observing children, assessing and

recording children's progress and sharing knowledge gained with other practitioners and parents. These were the main features of teaching regardless of age group or stage of the education. Later the CGFS stated that 'the strategies used in the learning and teaching should vary and should be adapted to suit the needs of the child' (QCA/DfEE, 2000:22). Also, in the document, the role of the teachers were described against each principle (mentioned above) and exemplified in a clear way.

5.5.2.9. Interactive Teaching: In the CGFS, interactive teaching, seeking and encouraging children's active involvement to the activities, asking open-ended questions to encourage discussions were emphasised on a regular way. In this text, the teaching section put an extra emphasis on exploration with some examples, it was stated that:

> Conversation, open-ended questions and thinking out loud are important tools in developing vocabulary and in challenging thinking. Practitioners can use discussion times well by demonstrating questions such as 'How can we…?', 'Can we find a way to…?' (QCA/DfEE, 2000:23)

The general tendency in the CGFS was that interacting with children was seen as an opportunity to affect their attitudes positively towards their learning.

5.5.2.10. Play and Practical Work: 'Well planned play is a key way in which children learn with enjoyment and challenge during the FS' (QCA/DfEE, 2000:7). In the CGFS, play and playfulness were seen as an opportunity to increase children's mathematical learning. These areas could be developed at this age through stories, songs, games and imaginative play. The

mathematical development area involved a number of practical activities and games in which children could enjoy and learn.

5.5.2.11. Role of the Learners/pupils: Describing the role of the learners/pupils and expectations from them were not directly mentioned in the CGFS. Yet, a big section explained ‘learning and teaching’ which involved some short subsections about how young children learn as well as describing the learning:

> Learning for young children is rewarding and enjoyable experiences in which they explore investigate, discover, create, practise, rehearse, repeat, revise and consolidate their developing knowledge, skills, understanding and attitudes. During the foundation stage, many of these aspects of learning are brought together effectively through playing and talking. (QCA/DfEE, 200:20)

It could be inferred that the document expects children/learners to participate in the activities by many means in order to learn. This was, of course, in active and playful ways for the development of mathematics.

Valuing children’s previous learning and understanding, while building new knowledge was well-valued in the CGFS; there is a principle which is ‘early years experience should build on what children already know and can do’. This principle in itself shows that this curriculum requires teachers to find out and use children’s previous learning, while they are teaching new ones as stressed in literature in chapter 3.

5.5.2.12. Organisation of the mathematics activities/lessons (integrating the day or daily mathematics lesson): In the CGFS, the general tendency was to

integrate all learning areas during the day. However, for mathematics and literacy development areas it was also stated that:

> The early learning goals are in line with the objectives in the frameworks for teaching literacy and mathematics, which should be taught throughout the reception year. This guidance helps reception teachers to plan using those objectives in order to meet the needs of the children in their class. Reception teachers may chose to cover the elements of the literacy hour and daily mathematics lesson across the day rather than in a single unit of time. In order to ensure a smooth transition to the literacy hour and daily mathematics lesson in year 1, both should be placed by the end of the reception year. (QCA/DfEE, 2000:27)

This long extract, clearly indicated that the NNS and its framework should be used for children mathematical development in the RC. However, it also has given a message that for children's mathematical development in this class integration might not be the case, but planning daily mathematics lesson as it was expected in the NNS. In summary, in both documents in order to ensure a smooth transition to the Year 1 daily mathematics lesson, RC teachers are advised to plan and organise forty-five minutes daily mathematics lesson by the end of the reception year.

5.5.2.13. Liaison with parents and partnership with others: Liaison with parents and partnership with other professionals related to children is much valued by the CGFS. Particularly working closely with the parents of the children, getting their support and providing support to them (related to their children learning and development) is one of the key principles in that document. The guidance also emphasised that: 'it is important that early years practitioners work in partnership with parents and other adults (speech therapists, district nurses, health nurses… (QCA/DfEE, 2000:6)

5.5.2.14. Planning and assessing: A year after of publication of the CGFS, a planning booklet was published and put into the CGFS. This booklet involved great detail about planning six learning areas through the FS. For the mathematical learning area the ELGs, which were in line with the objectives in the NNS, were expected to be used for planning activities.

Monitoring and assessment were also seen as vital components of the teaching and learning.

> ‘Monitoring of each child’s progress throughout the FS is essential to ensure that they are making progress… particularly difficulties … are identified and addressed… monitoring of each child’s progress throughout the FS will also ensure that their achievement can be celebrated’ (QCA/DfEE, 2000:8)

5.6. Discussions

From the findings of the document analysis of the NNS and CGFS there are some points arising that need to be highlighted and discussed here.

From the politicians’ views (Margaret Hodgson, MP in the CGFS and Ken Boston, chief executive of QCA) in the policy texts, it seemed that the CGFS was based on a wide consultation amongst practitioners, early years specialists and academics. This was also consistent with what the Early Childhood Mathematics Group (ECMG, 2001) maintained: ‘the ECMG was very much involved in the writing of the Curriculum Guidance’. However, till the publication of the PFLM (DfES, 2006), for the primary mathematics curriculum it was hard to see much involvement from the practitioners’ side. The renewed PFLM considered and was based on research findings since the

NNS was introduced and also there had been widespread consultation on the content of this renewed framework (PFLM). Thus it seemed that even the policy text itself acknowledged that preparation and implementation of the NNS was less based on research findings or wide consultation amongst the related teaching community, specialists and academics.

The data from the in-depth analysis of the NNS and CGFS indicated that both documents had appropriate activities for the RC children's mathematical development. The example activities in both documents indicated that RC teachers should plan an interactive, playful active learning environment for children's mathematical learning. Expectations of the NNS from the RC teachers were flexible; there were a number of models of the mathematics lesson that could be introduced by supporting a play-based curriculum. For the first two terms in RC, the teachers were advised to integrate parts of the lesson throughout the day. Also, in the framework there were some familiar activities appropriate to RC practice, for example, singing number rhymes, reading stories, playing freely and setting up play areas with a mathematical theme. All those activities were consistent with what the CGFS set up for children's mathematical development.

Both documents expected the practitioners or support teachers to be involved and somehow direct children's activities during mathematics lessons/activities. This was also consistent what the research findings indicated for mathematical learning of the young children in an early years setting. REPEY's (Siraj-Blatchford *et al*., 2003) findings suggested that effective early years pedagogy should nonetheless be in some way instructional. However,

this role should be non-pressuring, non-confrontational and playful (Gifford, 2004). Sylva *et al.* (1980) maintained that having adult involvement in children's activities even increased the complexity of children's play. In other words, even without involvement in the activities the presence of an adult is even more effective where she/he did not have to be in the role of directing, instructing and teaching.

Interestingly, the mathematical objectives/goals for the mathematical development of the children in RC remained unchanged for a long time in the texts related to the mathematical development of the children in the RC. Originally, they appeared in the NNS and ELGs (QCA, 1999) describing mathematical goals most children should reach by the end of the reception year. They were placed in the CGFS documents without change, except in their names. In the NNS, they were called learning objectives and in the CGFS they were called ELGs. In the early section in this chapter it was already mentioned that these objectives/goals also appeared in the later policy texts related to children's mathematics development in the RC. Having the same ELGs in different policy texts with a different pedagogical approach might provide some opportunities for teachers. Firstly, they would have alternative ways of putting these objectives into practice; secondly, they would feel relaxed as in any way they would work for the same objectives without worrying about a different set of objectives in another document.

As it has been emphasised, the NNS and the CGFS were both objectives-led and well-structured curricula. These were exemplifying the ways of teaching mathematics (CGFS was doing this for all areas in the FS) and were helping

to provide well-planned curricula for teachers who needed a structure to follow to follow. This was a valuable opportunity for those who were less confident in teaching mathematics to young children. However, according to the Advisory Committee on Mathematics Education (ACME, 2006), this increased teachers' reliance on published texts without considering their children's specific needs in their own classes, moreover it might damage teachers' professional judgements as experienced teachers.

From the analysis it also appeared that there were some tensions and contradictions not only between the key documents (the NNS and CGFS), but also in documents themselves. For every learning area, including the mathematical development, the CGFS emphasised integrated organisation of the learning areas, teacher-led and child-led activities in balance, a playful pedagogy. However, later in this document, for the mathematical learning area, the RC teachers were advised to use the NNS as well and follow its expectations. In the NNS, although activities for RC were appropriate, the key elements of the document especially emphasised planning the three-part daily mathematics lesson throughout the RC were open to being misunderstood by this class teachers. In the text, in a small subsection, the teachers were advised to plan the forty-five minutes daily mathematics lesson during the last term of this year but there was also a big section which explained how to the organise daily mathematics lesson in RC, that gave an image that was the main expectation of RC teachers from the beginning of the year. Therefore, tension in the documents about how to and when a daily mathematics lesson should be planned in the RC seemed to have a potential of creating confusion in teachers' practice.

In both documents meeting diverse needs of the children has been valued and emphasised. In the CGFS, the diverse needs of the children were seen in a very wide perspective and the practitioners were advised to provide relevant learning and development opportunities to cover the children from any race, gender and disability, ethnicity, learning ability and so on. In the NNS the main emphasis was on diversity of children's abilities. To tackle this, after whole class teaching teachers were expected to organise small group activities according to children's level of attainments. Differentiating the work according to children's level of learning might definitely help children's learning, however, the literature (Suknandan and Lee, 1998; Hallam *et al.*, 2002) showed that grouping primary-aged children according to their ability does not increase the standards in terms of children's learning. High ability pupils show more progress in setted groups, but children in low ability groups benefit more in mixed groups. Most importantly Hallam *et al.* (2002) proposed that grouping primary-aged children according to their ability tends to lower expectations for children who are not in the highest group. These children receive a different curriculum, taught differently, and teachers believe these are matched to pupils' needs. Nonetheless, most of the time those pupils perceive work as too easy and lacking in challenges as well as losing the chance to access the other parts of the curriculum. Last but not least, children in low-ability groups are facing lack of high-ability role models and examples of high-quality work they might emulate (Hallam *et al*., 2002). The only benefit of ability grouping is teachers find planning and teaching easier when they are working with pupils of similar attainment (Baines *et al*., 2003).

5.7. Conclusion

The document analysis in this chapter helped to understand the context of policy texts related to children's mathematical development in the RC. The curricular expectations for children mathematical development seemed to be providing clear guidance, with appropriate early years learning activities and pedagogy. In depth details, a step-by-step guide and a well-explained pedagogy as well as learning activities might help even a novice teacher, or someone inexperienced in the profession, to teach mathematics to young children.

On the other hand, having more than one curriculum for children's mathematical development in the RC might create some confusion in teachers' minds when they need to use them in parallel. The key texts, the NNS and CGFS, had some common points, i.e. objectives, playful early years appropriate activities and so on, yet in general pedagogical approaches in them were different. The NNS expected teacher-directed activities. Children were expected to be active and taking part in their learning, yet teacher domination was the fact. In the CGFS, in general teacher-directed and child-initiated activities were expected to be in balance, the practitioners' role being facilitator. However, for the mathematical development of the children, the CGFS recommended that the NNS and its framework were also to be used in the RC. Later in this study, empirical chapters will explore how RC teachers were putting these combined expectations and recommendations in practice.

In the next chapter (Chapter 6) élite interviews and their findings will be introduced and discussed.

CHAPTER 6: ÉLITE INTERVIEWS

6.1. Introduction

In the previous chapter (Chapter 5) the policy text analysis was carried out. In this particular study, however élite interviews comprise a special place as they are the main means by which to explore every stage of the policy-cycle model of Bowe *et al*. (1992). In this sense, the interviews were constructed in such a way as to obtain the élite participants' views as to how policies are influenced and texts are created, and how they are put into practice. A specific type of in-depth interview was applied to four élite members, all of whom were close to the decision-making process over the period of the study as well as having some influence in the educational policy-making processes, and all of whom have participated in important projects related to early years education in England or in one case Scotland.

6.2. Aims

This chapter has as its main purpose the reporting of the findings of the élite interviews, which addressed the first research question:

- What is the relationship between policy and practice in the early years mathematics curriculum for RC children in England?

This is an umbrella question for the rest of the research questions; and therefore the answer to it casts a light on the whole study.

6.3. Methods

6.3.1. Participants

In order to explore the influences on early years mathematics policy texts, particularly the objectives for reception classes (RC) in the NNS, this researcher approached some people who had worked with the Director of the NNS - Anita Straker - during the period at which the NNS was being written and prior to publication published in 1999. Anita Straker herself had retired and was thus unavailable for interview. A major collaborator of hers in the field of primary mathematics education had also retired and, though still working in the field, was also unwilling to be interviewed.

In the end, four élite participants (Élt.1, Élt.2, Élt.3 and Élt.4) were recruited. Three of these (Élt.1, Élt.2 and Élt.3) were part of a small advisory group who worked briefly with Anita Straker at the RC level of the NNS. Élt. 1 and Élt.4 were consulted with regard to their involvement in the assessment of mathematics by the then Qualifications and Assessment Authority. These participants had also been involved in a variety of ways with the policy-to-practice context of early years mathematics education, and it could be said that they had at least some small influence on the policy-making process.

Élite Participant 1 (Élt.1): was a senior academic who had directed or had been involved in a number of research projects in early years mathematics, nationally and internationally. Élt.1 had written extensively for academics and professionals, and was involved in evaluative work for the implementation of the CGFS for the DfES.

Élite participant 2 (Élt.2): was another senior academic involved in a number of early mathematics research projects, as well as being a popular national speaker and a writer of academic and professional texts.

Élite Participant 3 (Élt.3): had been a long-term senior LA advisor for early years mathematics. Also Elt.3 was teaching, researching and writing texts for professionals before she retired in order to work for a private educational publishing company.

Élite Participant 4 (Élt.4): represented a Scottish perspective. Her early research investigations focused on children's nursery mathematics. More recently, her work has focused on mathematical recovery as a framework for developing the primary mathematics curriculum.

6.3.2. Materials

Eleven pre-structured open questions were prepared covering the three contexts of the policymaking process of Bowe *et al.* (1992). The first question was an introductory warm-up to the interview, with the last question as a general concluding one. Then each of the contexts (influence, text production and practice) was addressed by sets of three questions, all with the intention of gaining an insight into the policy-making process.

6.3.3. Procedure

Firstly, advance requests were sent to each of the élite figures, explaining the basic outline of the research in general - and the interview in particular - and making clear the amount of the time the research interview would require.

Moreover, this advance communication specified the ground rules for the interview, as well as listing the interview questions. It was made clear that a digital-recorder would be used to record the interview, but that the interviewees' identity would remain anonymous. It was also made clear that transcribed interview texts would be returned for verification. Six élite figures agreed to participate after the first communication, with one refusal. A second communication was then sent to the six participants in order to arrange a date and time for the interview. In the end four interviews were conducted successfully, with two of the original six unavailable to participate on the day of interview.

6.3.4. Analysis

Verbatim transcripts were made from the élite participants' interviews and prepared as Word documents. Bearing in mind the differences between spoken and written languages, some grammatical corrections were made to the verbatim transcripts, and language mannerisms (hmm, er, etc.) removed. The four participants' responses to each question were grouped together. In other words, all the responses to question one were analysed together, the responses to question two similarly and so on. As mentioned above, the interview questions were grouped under three main sections: introductory question, three questions relating to context of influence, three relating to context of policy text production and three relating to the context of practice, and a final concluding question.

The data was then entered into an Nvivo7 qualitative data analysis program, to facilitate coding and condense the data in order to reach general themes.

Miles and Huberman (1994) suggested three paths of action for the analysis of qualitative data, and these are: data reduction or coding; data display; and verification and the drawing of conclusions. According to Miles and Huberman (1994) data reduction is a part of the analysis that sharpens, sorts, focuses, discards as well as organises data. Organising or displaying data is the main step in the analysis. At this stage the data can be organised into a compact form (i.e. in figures, graphs, charts and so on) so that it is clear and accessible. After this, drawing conclusions and verifying is made easier (Miles and Huberman, 1994).

The findings from élite interviews are believed to inform the whole thesis and thereby create a general context for the findings from the other data collection methods.

6.4. Results

6.4.1. The Change in the Views and Definitions of Mathematics Education of Young Children over the Last Eight Years:

The participants thought that the views and definitions of early years mathematics education for young children have changed over the past eight to nine year period 1999-2008. Characterisations of this change could be grouped in two broad sections: positive change (an improvement) and negative change (with less positive implications).

All together, 13 references were made commenting on the affirmative changes in the early years mathematics in the previous eight years. The élite participants indicated that mathematics in early years education ‘has been

given a higher profile' (4 references), and that this was considered to be an optimistic outcome. One of the participants (Élt.1) stated that:

> 'We now know the amount of mathematics that typically takes place in early years settings. This is probably an improvement because Munn was saying of Scottish nurseries in the 1990s that only 5% of time was occupied by early numerical mathematical tasks, so clearly mathematics has a higher profile…'

The participants thought that the mathematics curriculum in the last eight years was 'broader' and involved a 'clearer range of activities' (2 references each). Moreover, participants reported that due to improvements in the mathematics curriculum, 'the early years practitioners were more confident' (3 references); 'had a range of clear views' (1 reference) and 'had a more proactive role than they had eight years ago' (1 reference).

On the other hand, the élite participants also criticised the mathematics education in the early years, with 8 references constituting negative comments. Particularly, Élt.3 was pessimistic about the nature of the early years mathematics curriculum. She believed that:

> 'There is a group of a people valiantly trying to change the direction of education, whether they would be influential enough…'

Participants reported that the early years curriculum was becoming 'more formalised and more defined' (2 participants, 2 references each); thus 'it [the curriculum] was inappropriate particularly for young children' (2 references) and it was 'not like the practice in other European countries' (2 references). One participant thought that there was 'too much emphasis on assessments' (1 reference) and 'too specific a reference to numeracy' (1 reference) in the mathematics curriculum. Another (Élt.3) stated that 'the curriculum was not

holistic anymore' (1 reference), and she explained this with reference to 'the funding' arrangements and the inspection system already in place. Élt.3 also mentioned the view of some other academics who talked about the 'toxic child', but like responses to a previous questions participants was not altogether sure if the mathematics curriculum was either totally bad or totally good.

6.4.2. Context of Influence

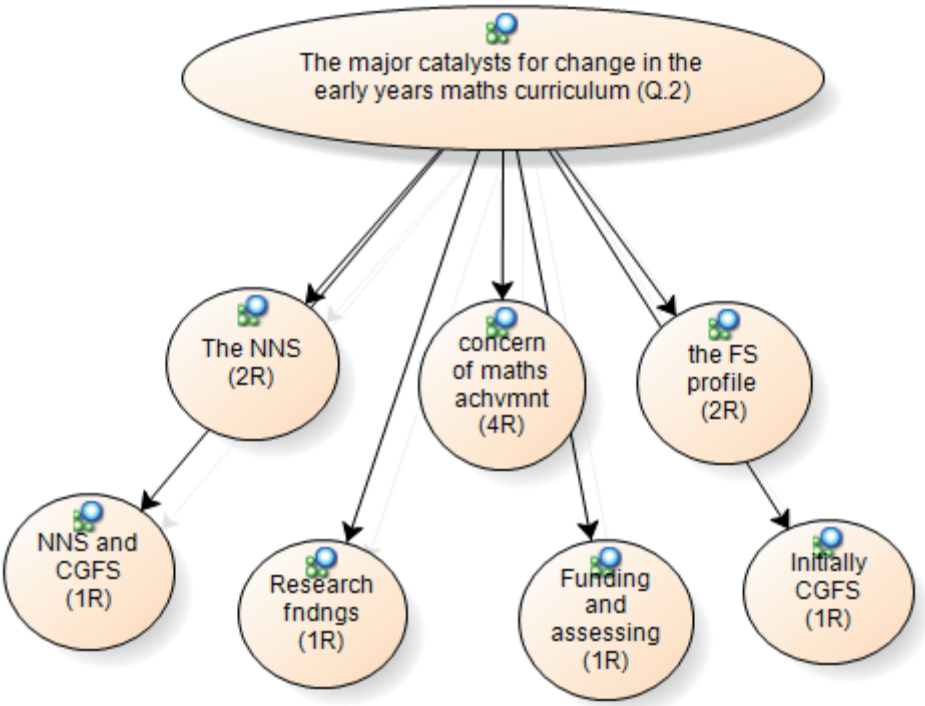
In Bowe *et al.'s* (1992) model the *Context of influence* was where the policy was initiated and policy discussion was made (Bowe *et al.,* 1992). In this section, the aim was to understand the context of influence of the early years mathematics policymaking process.

6.4.2a. The major catalysts for change in the early years mathematics curriculum

According to the élite participants, the main factors accounting for change in the early years mathematics curriculum were varied. Figure 6.1 illustrates that participants thought that policy makers' concern about the achievements of children in the later years of schooling was the main catalyst for the modification in the early years mathematics (4 references). Also participants believed that the policy texts and initiatives, i.e. 'the NNS' (2 references), 'the FS profile' (2 references), 'initially the CGFS' (1 reference) and 'the NNS and CGFS together' (1 reference), created a context for change in the early years mathematics. These were followed by 'research findings' (1 reference) and 'funding arrangements' (1 reference). Here it is worth saying that in order to

gain ‘funding’ for delivery of the early years curriculum, there is an inspection requirement. This may have had an influence on practice.

4 Figure 6.1. The major catalysist for the change in the early years mathematics curriculum

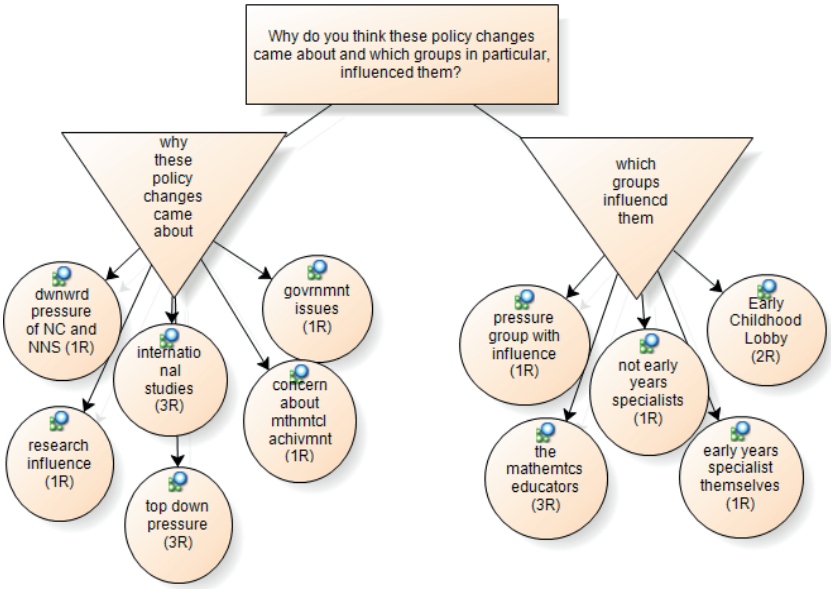


6.4.2b. Why these policy changes came about and which groups, in particular, influenced them

The second question attempted to find out two important aspects of the context of influence: why policies were changing and who in particular influenced them. The left side of the Figure 6.2 shows that the views of the élite participants about why the policies have changed. Some of these responses interweave to some degree, indicating a possible causal relationship. For the question as to why the policy for early years mathematics education had changed, participants thought that the most important influence was ‘international studies’ (3 references), which brought to general attention a

low level of achievement in mathematics for English pupils aged nine and thirteen years. It can be argued that this was one of the important influences for the policy changes and created a ‘top down pressure’ (3 references) as well as being directly related to another series of influences, i.e. that of a ‘concern about mathematical achievement’ (1 reference), ‘Government issues’ (1 reference), and the ‘downward pressure of the NC and the NNS’ (1 reference). Alongside international comparison studies, other research findings (i.e. EPPE study) (1 reference) relating to early years education were seen as an influence for the policy changes.

5 Figure 6.2. Why the policy changes came about and who infleunced them



The right side of Figure 6.2 represents the other part of the same question which asked who particularly influenced the policies. Three codes indicated that the policy influence group might not have any understanding of early years education. These codes were (a) ‘the mathematics educators’ whose expertise is primarily in the upper stages of secondary and university sectors (3 references); (b) they are ‘not early years specialists’ (1 reference); and (c)

they are a ‘pressure group with influence’ (1 reference). One élite participant (Élt.4), thought - optimistically - that ‘early years practitioners themselves’ had an influence on policy changes, whilst another (Élt.2) maintained that although very small, ‘the early childhood lobby’ had had some representation to the Government about the early years education.

6.4.2c. The impact of the Williams Report (DCFSa, 2008) on policy and practice

By 2007 Sir Peter Williams was asked, by the Secretary of State of England, to review mathematics teaching in early years settings and in primary schools. In July 2008 a final report (DCFSa, 2008) of this review was published. Reflecting on the period of study the élite participants of this study were asked if the Williams’ report would have any impact on policy and practice in early years mathematics education.

6 Figure 6.3. Impact of the Williams Report (DCSF, 2008a)

Affirmative comments	References
focused on mathematics teaching, mathematics pedagogy	3
focused on the early years	2
a very strong overview of mathematics achievement	1
focused on teachers knowledge	1
underlined the need for mathematics specialists and better trained teachers	1
very broadest sense	1
greater emphasis on informal mathematical knowledge	1
Negative comments	
Williams would not make a lot of difference to early years education	3
more suitable for the older children	3
I don't think teachers have heard of it	1
inconsistent and contradictory	1
lack of continuity	1
might create a higher profile for early mathematics	1
hard text, and there are a lot of mixed messages	1
teachers feel uneasy	1

One participants (Élt.4) did not answer the question, one participant (Élt.1) was optimistic, whilst the other two (Élt.2 and Élt.3) were utterly pessimistic about the content and findings of the report.

The first part of Figure 6.3 represents the positive verdicts of the élite participants about the Williams report (DCFS, 2008a). They believed that it focused mainly on ‘teachers’ knowledge’ (3 references); and that it ‘underlined the need for mathematics specialists and better trained teachers’ (2 references) not only for primary schools but also for early years settings. The élite participants also thought that the report emphasised the ‘mathematical teaching and pedagogy’ (1 reference); that it provided a ‘very strong overview of mathematical achievement’ (1 reference); and that it ‘broadly made sense’

(1 reference). They also stated that a big part of the Williams report ‘focused on early years education’ (1 reference) and put ‘greater emphasis on the informal mathematical knowledge’ (1 reference) of young children.

For the Williams report (DCFS, 2008a) there were more negative comments than positive ones (12 versus 10). Élites believed that the ‘Williams report would not make a lot of difference to the early years education’ (3 references); that it was ‘more suitable for the older children’ (3 references). They claimed that it was a ‘hard text, with a lot of mixed messages’ (1 reference) and that it involved ‘inconsistent and contradictory’ (1) messages, and that there was ‘lack of continuity’ (1). One of the participants, (Élt.2) stated that:

> Williams himself was emphasising a continuity between the EYFS and the NC which I think is an issue. I think there is such a thing as lack of continuity there, that hasn’t come out in his report, I think his report emphasises learning through play and imaginative play, whereas in fact the research that is quoted says there needs to be more focused on teacher-initiated and small group activity, so I am not quite sure what will be made of his recommendation…

Furthermore, another participant (Elt.3) reported that:

> ‘I don’t think teachers have heard of it [the report]’.

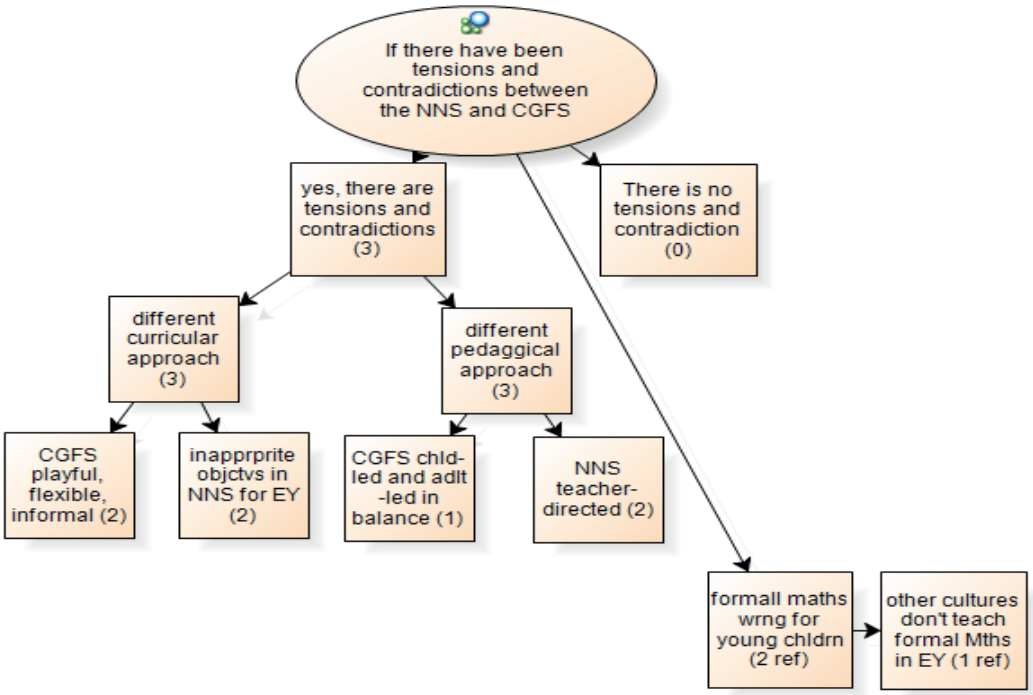
Also, the same participant thought that the report’s recommendations, particularly ‘revising the EYFS (DCSF, 2008b) in two years time’ might make ‘teachers feel uneasy’, though it ‘might create a high profile for early mathematics education’ (1 reference).

6.4.3. Context of Policy Text Production

Context of policy text production relates to policies being put into text form (Bowe *et al.,* 1992). In this section, in order to contextualise how policy texts were created in early years mathematical development, the élite participants were asked three questions. The findings are reported below.

6.4.3a. Whether the NNS and the CGFS have been complementary or contradictory

7 Figure 6.4. Tensions and contradictions between the NNS and the CGFS



Above, figure 6.4 shows that the élite participants believed 'there were tensions and contradictions between the two curricula', i.e. in the NNS and CGFS, (3 references). It was reported that although the CGFS had been embedded within the first level of objectives from the NNS, these two documents represented 'different curricular and pedagogical' approaches (3 references for each). Two participants stated that 'the CGFS is playful, flexible and informal', while 'the NNS involved inappropriate expectations and

objectives for early years mathematical development'. The pedagogical approach in 'the CGFS was child-led (initiated) and adult-led in balance' (1 reference), whereas 'the NNS demanded teacher-directed pedagogy' (2 references).

In general, the élite participants found teaching formal mathematics with inappropriate objectives to young children was wrong. One participant stated that other cultures do not teach formal mathematics to young children.

6.4.3b. Early Learning Goals for mathematics

In this section the élite participants' views of the ELGs for mathematics were solicited. The findings are reported below.

8 Figure 6.5. Élite participants' views of ELGs for mathematics

	References
Positive aspects of ELGs for mathematics	
indication and guide for teachers	**1**
there is a good emphasis on language and problem solving	**1**
Negative aspects of the ELGs for mathematics	
they are a bit artificial, unstructured, and not specific enough to be helpful to practitioners	**2**
not good early years goals to start with	**2**
they are written by non-specialists	**2**
uneven balance between ELGs	**1**
some goals are less helpful	**1**
they are not in the right order	**1**
how ELGs were shaped or created was arguable	**1**
a comparison study: English children were not better than Slovenian children	**1**
early introduction of mathematics does not appear	**1**

Figure 6.5 provides a number of comments for a variety of aspects ranging from negative to positive for the ELGs. In general, participants held a negative

attitude towards the goals for early mathematics. Starting with the positive response, one élite participant thought that having goals could be seen as an ‘indication and guide for the teachers’; while another said that in the early learning goals there was also ‘a good emphasis on language and problem-solving’.

On the other hand, there were 12 negative comments (versus 2 positive ones). Élite participants thought ‘ELGs are ‘not good goals for early years to start with’ (2 references). They also believed (particularly, Élt.2 and Élt.3) that ‘the ELGs for mathematics were a bit fake, unstructured, and not specific enough to be helpful to practitioners’ (2 references). More importantly, participants stated that ‘they (ELGs) were not written by early years specialists’ (2 references); and were ‘not in the right order’ (1 reference) and that 'they were unevenly balanced’ (1 reference). One of the élites (Élt.2), referring to all the goals for mathematics, stated that: ‘I do not think they are providing sufficient framework and guidance for practitioners’. Yet another (Élt.3) indicated that ‘some of the goals were less helpful’, i.e. shapes and space.

Participants were also critical of the way the ELGs were written. The circumstances under which they were written is well explained by one élite participant (Élt.3) who said:

> Anita Straker was one of the few people I think who would have the energy needed to drive and establish something like that (NNS), because it was a huge job. But she was not particularly suited as she wasn’t an early years specialist. What started as the early learning goals came about… When the framework was first written there were not early learning goals for any year group, and then she was asked

> by ministers to… there isn't a minimum… list things children should have achieved.

This quotation suggested that when the ELGs were created in the late 1990s there was little - or minimum - involvement from early years specialists in the construction of the goals. Yet it was decided to give this task to people who had little or no understanding of the early years. Also in the same figure (Figure 6.5) participants, particularly Élt.1 emphasised that the early introduction of formal mathematics by means of ELGs for mathematics did not lead to greater achievement in mathematics later on. This was supported by the findings of an international study (Godfrey and Aubrey, 1999) in which Belgian, German, Greek, Dutch, Slovenian and English children aged five took part.

9 Figure 6.6. Élite participants' views about early learning goals for mathematics

ELGs Should be:	
goals should be calibrating children's learning	**1**
goals should be about integration and coherence	**1**
goals should be about mathematics experience benefiting all children	**1**
goals for young children should really be closely related to where the children are	**1**
EY mathematics should not be an academic subject	**1**
ELGs should consider the range of the children catered for	**1**
ELGs for other areas should be interwoven with mathematics development	**1**

Figure 6.6 includes élite participants' views of how ELGs should be contextualised. Each of these views constituted only one reference. First of all, 'they should be calibrating children's learning'; 'there should be integration and coherence'; 'providing experiences benefiting all children'; 'related to children's level of learning' as well as 'considering the range of children for whom it catered'. Moreover, 'ELGs for mathematics for young children should

not include formal aspects of mathematics', such as recording numbers, written work, and so on, but 'it should be integrated with other learning areas of early years education'.

6.4.3c. The Early Years Foundation Stage Framework (EYFS) (DCSF, 2008b), setting standards for learning, development and care for children birth to five, and its proposed review in two years. Do you think this will lead to changes in the numeracy goal?

Beverley Hughes, the then Minister of State for Children, announced that an EYFS (DCSF, 2008b) review was scheduled to begin in 2010. According to the Minister the review would assess how the framework had been implemented and how well it met the needs of children, families and childcare providers. Work was to begin immediately to gather information to substantiate the review, including the compiling of national and international evidence on child development, and the monitoring of the way in which the EYFS was implemented (www.dcsf.gov.uk/pns/Display)

Looking into the future, élite participants were asked whether they thought a review of the EYFS framework after two years would lead to changes in its formulation. Three participants answered this question, and in each case stated: 'I have no idea what the change in numeracy goals might be' (3 references). Primarily they said they could not predict what the changes would be, but they did try to anticipate them. Their concerns involved a worry that revision might mean having more formalised mathematics activities, as had

happened as the result of a similar review by Sir Jim Rose of the ‘teaching of early reading’. According to Élt.3, Rose’s review

> '…has led to a much greater emphasis on phonics teaching with very young children at four- to five-years of age, so it is very difficult to anticipate what the changes to numeracy goals might be, but it seems that the critics of the early years foundation stage focused most of their attention on literacy rather than numeracy and indeed one, I guess, cannot anticipate in what sense the changes that are advocated might be.'

On the other hand, élite participants made their recommendations about possible changes to early mathematics ELGs in 2010 when the EYFS framework was revised. It has been mentioned earlier that the élite participants were mainly dissatisfied with the ELGs for early years mathematics. One participant repeated the fact that ‘ELGs are incomplete and inappropriate’ and she hoped that ‘there would be changes’, i.e. a clearer framework, and more specific ELGs for mathematics (Élt.2). Another participant (Élt.3), was concerned about ‘the underachievement in mathematics’, particularly in relation to the ability to calculate, so she was hoping that ‘the potential changes to mathematics would balance the ELGs for mathematics’.

The Élt.1 drew attention to another aspect, that of the very variably trained teaching force for the early years. She referred to the effect of teachers’ skills on children's learning that had been highlighted by some well-known research findings (i.e. EPPE, in Sylva *et al.,* 2002). Sylva had indicated that in England a variably-trained teaching force may be more of a problem than either the curriculum or the ELGs.

6.4.4. Context of Practice

In this context, policy texts are responded to by those who implement them, i.e. schools and teachers. According to creators of the policy-cycle model - Bowe *et al.* (1992) - policies are not simply received and implemented within a targeted arena, but are also subject to interpretation and reconstruction. Élite participants' views about the implementation of policies in practice in early years mathematics are reported below.

6.4.4a Responses of Reception Class Teachers to changes in the CGFS over period 1999-2008

10 Figure 6.7. Teachers' responses to the changes in the CGFS over period 1999-2008

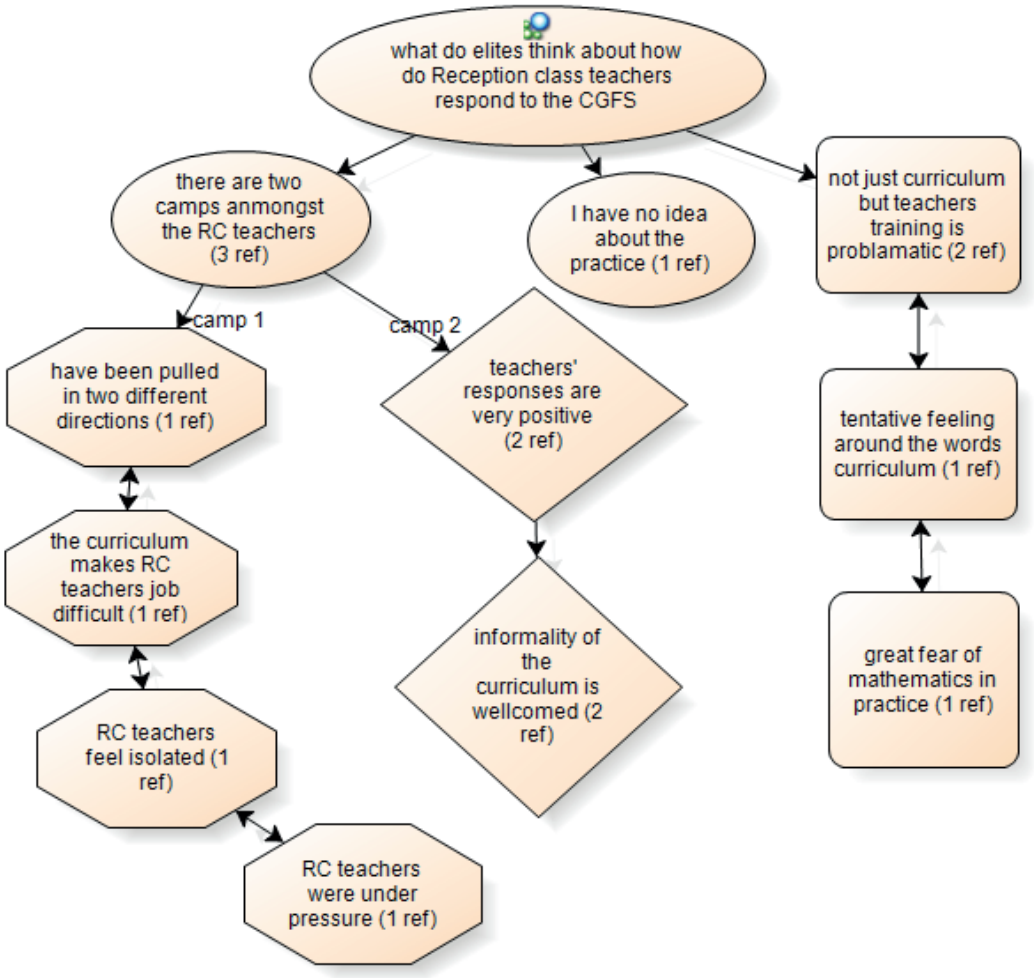


Figure 6.7 includes a variety of views of the élite participants as to how RC teachers responded to the changes over 1999-2008. Firstly, there were three main opinions: ‘there are two camps amongst the RC teachers’ (3 references), ‘I have no idea about the practice’ (1 reference), and ‘not just the curriculum but the teacher training is problematic’ (2 references). These primary responses are then further subdivided. The first view (that there are two camps among the teachers) involved both the positive and negative aspects encountered by the RC teachers as a result of the changes in the FS curriculum.

One participant thought that ‘RC teachers have been pulled in two different directions’ because of the CGFS and the mathematics framework of (the NNS) for early years. For this reason the same participant also believed that ‘the curricula, particularly in the RC made teachers’ job difficult’. Moreover this élite participant also stated that ‘RC teachers felt isolated’ and that they might prefer to be in contact with other early years practitioners for three to five-year-olds rather than with KS1 teachers. At a more negative level, the view was expressed that the changes in the curricula meant that ‘the RC teachers were under pressure’ (1 reference).

In camp 2, élite participants expressed the view that RC ‘teachers are very positive’ (2 references) towards the changes in the CGFS, and in particular the ‘informality of the curriculum was welcomed by the teachers’ (2 references). Returning to camp 1, élite participants gave four negative statements with a total four references. In camp 2, there were four references for two positive statements. In this sense, it can be argued that from the élite

participants' point of view, RC teachers were neither totally positive nor totally negative towards the changes in the CGFS, but evenly split.

The right-hand side of the Figure 6.7 illustrates a different aspect of the situation, and one which does not directly address how teachers reacted to the changes in policy text, but focuses instead on teacher training in early years education. Two references were made regarding 'not just the curriculum, but what teacher training amounts to'. Moreover, one reference was made as to how 'teachers were feeling tentative towards the word curriculum'. This also related to the last opinion which was that '[teachers] have a great fear of mathematics in practice' (1 reference). In general, the suggestion was that there was insufficient training of teachers for an early years education.

6.4.4b. The impact of the current Foundation Stage Profile (FSP) on the teaching of early years mathematics

In 2003, the Foundation Stage Profile (QCA, 2003) replaced the Baseline Assessment in order to assess each child's progress and learning needs at the end of the FS. The FSP is based on teachers' on-going observations and assessments on all six areas of learning set out in the CGFS. The élite participants were asked what the impact of the FSP was on the teaching of early years mathematics.

11 Figure 6.8. The impacts of the FSP on teaching

The Foundation Stage Profile	Ref
the FSP has a positive impact	3
the FSP is better than the previous base line assessment	2
the FSP has been supportive in providing examples of activity	1
Negative comments	
the FSP has put more emphasis on the literacy so mathematics has become less important	4
the FSP has formalised the assessment and now there is an increasing emphasis on assessing	3
the FSP is not very great at the moment	1
the impact of the FSP will be felt most in reception classes	1
the FSP has not been found to be a reliable measurement	1

Figure 6.8 illustrates the variety of views of the élite participants. The first three comments about the FSP are positive: ‘it [FSP] has a positive impact’ (3 references), ‘better than the previous base-line assessment’ (2 references) and it has been supportive in providing examples of activity’ (1 reference). Nevertheless, participants also made a few negative comments about the profile. Firstly, they thought ‘the FSP has put more emphasis on literacy and mathematics has become less important’ (4 references) and ‘the FSP has formalised the assessment and now there is an increasing emphasis on assessing’ (3 references). One participant (Élt.2) indicated that:

> 'I think that now there is increasing emphasis on assessing which may be having a detrimental effect…'

Meanwhile Élt.3 stated that:

> I think [the FSP] is not very great at the moment, because of the emphasis on literacy, I think that the mathematics has become less important… not important and that is not right,

One participant (Élt.1) reasonably believed that ‘the impact of the FSP will be felt most in RC’ (1 reference). The FSP covered a two-year period of early years education, the last year being the RC. It seemed unavoidable, therefore, that the great majority of observations and recordings on the profile would concentrate on that class. In this sense, RC teachers’ job might become more difficult. The same participant (Élt.1), stated that ‘although the FSP is an unreliable instrument… yet overall I would guess it has had a positive impact’.

6.4.4c. The successes of the early years mathematics practice over the last eight to ten years

Participants’ views about the development and successes of the early years mathematics practice were also gathered.

12 Figure 6.9. The success in early years education in the last decade

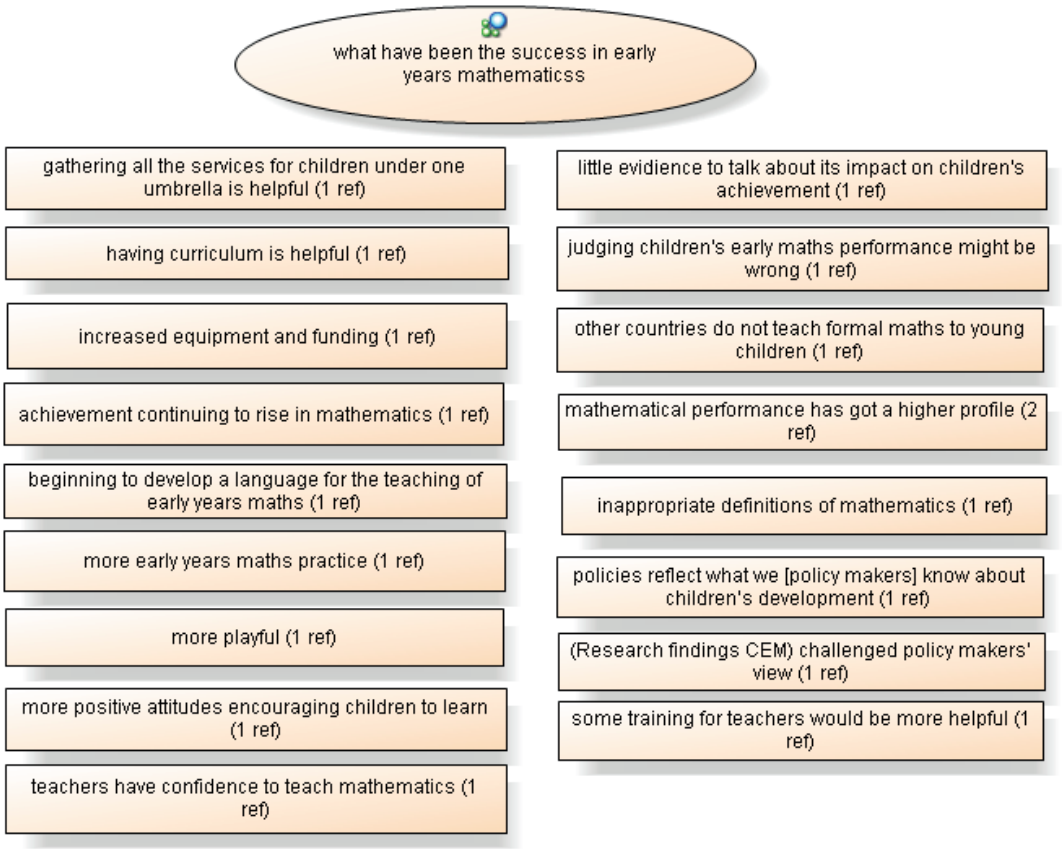


Figure 6.9 represents the developments in early years mathematics from the élite participants' points of views. Like previous responses, élites' answers can be divided mainly into two sections: positive and slightly negative comments, with recommendations. All the comments on the left-hand side of the Figure (6.9) have only one reference each. The major changes in the early years education, 'gathering all the services for children under one umbrella is helpful'; 'having a curriculum is helpful' as well as 'increasing equipment and funding' can be seen as a success for the early years education. Also the élites stated that 'achievement continues to rise in mathematics' and teachers were 'beginning to develop a language for teaching of early years mathematics'. The élites also commented about the early years curriculum and stated that it involved 'more early years mathematics practice' as well as being 'more playful'. From the teachers' perspective, participants believed that there have been 'more positive attitudes encouraging children to learn' as well as 'teachers have the confidence to teach mathematics'. These can be seen as encouraging changes and successes in the early years mathematics.

On the other side, élite participants stated some slightly negative comments, and made suggestions as to how the system could be improved. Most of these are represented by only one reference. In referring to the curriculum, one participant stated that there was 'little evidence to talk about its impact on children's achievement', whilst another maintained that 'judging young children's early mathematics performance might be wrong'. As was stated earlier by Élt.1, 'other countries do not teach formal mathematics to young children', and this is a concern which appeared when the early mathematical

curriculum was discussed. Moreover, there is another point which has been an issue from the beginning - as expressed by Élt.1 and Élt.3 - who claimed that: ‘mathematical performance [of young children] has got a higher profile’ (two references). At this point Élt.1 described it in these terms:

> '…it seems that mathematical performance has got a higher profile and the evidence is that without that, very few or a relatively small amount of time is devoted to mathematical activities and, indeed, Sue Gifford has shown that these can be subverted by young children themselves to serve their own ends. So there is a higher profile for mathematics that is important but at the same time we would have to say, to be rather more careful, there is less evidence that this has had a large impact on children’s achievement and this would be in line with the Williams report that says we now need to ensure the mathematics teaching for very young children is vastly improved.'

Élt.1 accepted that mathematics teaching had been improved, yet implied that this has not been fully realised. This quotation can also be related to the last statement in the right-hand side of the Figure (6.9) that ‘some training for teachers would be more helpful’. Moreover, one participant complained about the ‘inappropriate definitions of mathematics’ in the early years education. Participant Élt.4 related this inappropriateness to the policies and stated that ‘curricular policies reflect what we know about children’s development’. Further, this participant thought that there had been an improvement in early years education as a whole, yet some problems persist, particularly from the teacher training perspective.

6.4.5. The challenges for early years mathematics for the future

When the challenges for the early years mathematics’ future were questioned Élt.3 focused on mathematics success of school-age children and school leavers. She thought that the main challenge was that children should attain

higher achievement levels in mathematics and not give it up at the first opportunity. Élt.1, also, gave a message to the policy-makers and stated that:

> '… The biggest challenge is for policy-makers to recognise that increasing overall mathematical achievement of our children is not going to be gained by introducing mathematics at an earlier age.'

For Élt.2 the main challenge was to have a clearer framework for progression, and for assessment. Élt.2 thought this was necessary as practitioners should then know what they were looking for and what they were trying to do, as well as how they could do it. For teachers or practitioners, Élt.1 believed the major challenge was the practitioners' nervousness, lack of confidence, and lack of knowledge. Although she did not express it as such, the main challenge appeared to be insufficient teacher education and training, rather than an indistinct early years framework or curriculum.

Élt.3 underlined the decreasing emphasis on mathematics and increasing emphasis on literacy in early years education, and saw this as worrying. From Élt.4's perspective, the first challenge was the adult understanding of what the early years mathematics was, with the second challenge as the adults' confidence in mathematics. The adults should not only understand the developmental background of mathematics, but should also understand mathematics from the child's point of view. The big challenge for the early years mathematics teaching was to recognise this very complex mathematical understanding.

The findings of the élite interviews will be discussed in detail below.

6.5. Discussion

The findings of the élite interviews reported above draw on a broad picture of the three main contexts (influence, text production and practice) of the policy-making process of the teaching of early years mathematics.

From the answers to the introductory question it is clear that participants believe that there had been a change in the last eight years in the early years education. The majority of changes are perceived as positive and this is encouraging for the future of early years mathematics education. The granting of importance to early years mathematics, and having a curriculum with broader and clearer mathematical activities, would provide benefits to both children and their teachers. However, participants also expressed their concerns about more formalised and possibly less appropriate activities for young children in the RC. It seems that the élites valued a balance which should neither put too much nor too little emphasis on mathematical activities. Young children need mathematics-orientated - but not formalised - mathematical activities.

6.5.1. Context of Influence

It would appear from the élite participants' point of view that the main influence on policy changes in early mathematics concerned the raising of of mathematical achievement of young children in their years of schooling. It seems that this has been a major catalyst influencing policy-makers' decisions. For example, the introduction of some policy initiatives, (i.e. the NNS, CGFS and the FSP) was as a result of the concern about the

decreasing success in mathematics in international terms. In practice, this inevitably results in the experience of top-down pressure from upper stages towards the lower stages of schooling (i.e. early years) in order to push early years practitioners into teaching more formal mathematics to young children.

Research findings into the early years education arena were seen as another catalyst for change. In England, EPPE (1997-2003), a longitudinal study, had been sponsored by the DFEE (which later became the DfES and then the DCSF), in order to investigate the effects of the pre-school provision on young children's development, and the characteristics of effective practice, etc (Sylva *et al*., 2003). It can be seen that EPPE has had a powerful impact on policy and practice in early years education, and is therefore one of the recent and most poweful catalysts for change in the early years education.

Élite participants' response to the question 'who influences the policy changes?' provoked interesting answers. The élites thought that whoever it was who was influencing it, had either little or no understanding of early years mathematics, as the emerging policies had been created without a consideration of young children in the early years setting. In answering this question, élite participants also mentioned the research findings (i.e. EPPE mentioned above). Participants also acknowledged that early years practitioners and the early years lobby had had some influence on policy, even if it was small. This is consistent with what Bowe *et al.* (1992) have stated, as outlined in the introduction to chapter two of this thesis. Although it is not a major factor, the practitioners (implementers of policies) have had an influence on the policy-generation stage.

The possible future influence of the Williams report (DCFS, 2008a) on policy and practice in early years mathematics can also be analysed. It would appear that although this report focused on mathematical teaching and pedagogy with an emphasis on early years, the élites generally thought it would not have a major effect on the early years education policy-making process. From élite participants' point of view, the report was not consistent as a text, even involved mixed messages and was probably more relevant to the older children.

6.5.2. Context of Policy Text Production

The main policy texts at the time, the NNS and the CGFS, were highlighted to see whether there have been tensions and contradiction between them. In general, the élite participants agreed that there were. Each had a distinct pedagogy and a distinct approach to curriculum. The CGFS had been found to involve informal and playful mathematics activities; the teachers' role was not specifically directorial, but allowed children to initiate their own activities. On the other hand, the NNS primarily promoted a directed pedagogy, with inappropriate numeracy objectives for the RC. The élites repeatedly emphasised that formal mathematics was not suitable for young children, and that other cultures/nations did not normally teach mathematics of this form to children. One could conclude, therefore, that the curricula within the NNS and the CGFS were not viewed congruent enough to be used together for the mathematical development of young children in the RC.

As a policy text ELGs (QCA/DfEE, 1999) for mathematics was also questioned. From a positive perspective, the ELGs for mathematics were seen as at least a guide for practitioners. However, the negative aspects weighed more than the positive ones. Participants thought that the ELGs were artificial, unnecessary and not specific enough. Most importantly, they had been written by the people who were not early years mathematics specialists. For example, at the time it was written, the Director of the NNS was Anita Straker, yet she was not early years specialist. As a result of those factors élite participants believed that the ELGs for mathematics would have had little impact on increasing children's success or achievement.

From the élites' point of view, ELGs for mathematics ought to have introduced a qualitative element, benefiting all the children, and with a consistent integration in teaching across learning areas.

There was also the announcement that the later EYFS framework (DCSF, 2008b) would be reviewed two years after it was introduced, the date fixed for May, 2010. In general, participants were reluctant to predict whether or not reviewing the EYFS would lead to change in early years mathematics, or/and its ELGs. Despite this, they anticipated some possible - and hoped for - changes in the curriculum. Their main concern was the early years mathematics would become more formalised, as had literacy after the Rose review (DFES, 2006) the review itself having a huge impact on the teaching of early reading. The élites' expectations were that ELGs for mathematics were to become more refined and provide a clearer framework, so as to reduce any underachievement in mathematics. On the other hand, one participant in

particular (Élt.1) insisted that reviewing or changing the curriculum might not have a desired effect unless sufficient teacher training was provided to early years teachers.

While policy texts are being produced, the question as to who takes control of their meaning is discussed by Bowe *et al*. (1992), and outlined in chapter two of this thesis. Élite participants believed that policy texts in early years mathematics largely represented the voice of the policy-makers. These policy-makers had been trained in different spheres of education rather than in early years, and were more directly concerned with children's later academic success.

6.5.3. Context of Practice

According to élite participants, RC teachers had been experiencing some difficulties - as well as benefits - as a result of the changes through the CGFS curriculum over the last eight to nine years. The difficulties were mostly caused by the position of the RC between two stages, i.e. between the Foundation and Key Stage 1. Élites thought RC teachers felt caught between these two stages, yet did not feel a sense belonging to either of them. The curriculum at this point also appeared unhelpful, and even confusing. On the other hand, according to élite participants, RC teachers had welcomed the informality and playful pedagogy contained within the CGFS. Yet the adequacy of teacher training was the main concern. The general view was that if the teachers received adequate training, their expertise would bring about changes in the curriculum. But it could be argued that holding teachers training responsible for the shape of the curriculum might undermine accurate

identification of the difficulties caused by the curriculum itself, or by the policy texts.

The impact of another policy text, the FSP, on early years mathematics practice was also questioned with the élite participants. The élites were similarly divided: some supportive and some disapproving, though the latter view was far stronger than the former. The emphasis on numeracy and literacy had been a cause of concern, particularly the overemphasis on literacy at the expense of other developmental areas. It also appeared that the FSP had shifted the attention of teachers from learning to assessing. Nevertheless, it has been thought better than the previous baseline assessment, as it was considered more formative and less standardised in treatment (Élt.1). Further, the emphasis on child-initiated activities given in the FSP was seen as helpful and supportive of mathematical activities in the RC. But in general it appeared that the participants thought the profile had not impacted well on the mathematics practice.

Finally, élite participants were asked to assess the success of the early years curriculum over the previous nine years. This time a different picture emerged, with both negative and positive comments evening out (9 references for each). Having a playful curriculum with plenty of activities and practices was welcomed by the participants. Funding (economic support) and classroom equipment had been improved in the early years settings. Achievement levels in mathematics at KS1 and KS2 had also been continuing to rise. Teachers' self-confidence had been boosted, and there had been a more positive environment within which to encourage children to learn.

However, participants also stated that increase in mathematics success had not been achieved in the way claimed by the Government. Judging children's success in mathematics at an early age was not thought appropriate. In general it appeared that the élite participants were pessimistic about the context of influence and the context of policy text production in early years mathematical development. Yet for the context of practice comparing to the other two contexts, élites seemed slightly more positive.

6.5.4. Challenges for the Future of Early Years Mathematics Education

Participants' responded to the question as to what the possible challenges for the future of the early years mathematics would be. One participant wanted all children to reach a high level of achievement in mathematics and not give up the subject even after they had left the school. Yet she did not think the early introduction of mathematics would increase any success in mathematics in later schooling. Another challenge for the future they raised was the greater emphasis that might be placed on mathematical development in order to lift it to the level of literacy development. The teachers' education and training was also underscored in that regard, and it was suggested that a teacher's lack of knowledge as well as a lack of confidence could be reduced by providing appropriate teacher training. Otherwise it might present a serious obstacle for the future. Teacher training was also prioritised as a means of underlining that teachers ought to learn how to understand mathematics from the child's point of view rather than from an adult's.

6.6. Conclusion

Élite interviews gathered the responses to the three contexts of the policy cycle of early years mathematics education as outlined in Bowe *et al.* (1992). Reporting and discussing the findings from the interviews has not only answered the main research questions but also given depth and breadth to the whole thesis.

In the early years for mathematics policy-making, the main influence group has unfortunately come from outside of early years education. The mathematical and pedagogical understanding of these outsiders had been for formal school aged children rather than younger ones. There appears to be little voice representing early years practitioners and specialists in the realm of policy-making. This affects the next chain of policy cycle which is the context of policy text production. Particularly the NNS was a policy text which was seen as inappropriate for younger children, because it had been created by people who had little understanding of how younger children learn mathematics.

Élite participants also expressed their concern for the lack of adequate teacher training programmes, and went as far as to hold teacher training responsible for the underachievement in mathematics. Despite this, élite participants' views about the context of practice seemed not to fully accord with their views about teacher training. They indicated that of the three contexts of policy cycle, the most positive one - in their view - was the context of practice. In the next chapter, the context of practice will be examined in the light of responses from the RC teachers.

CHAPTER 7: THE TEACHERS' QUESTIONNAIRE

7.1. Introduction

In the previous chapter data gathered from the interviews with the élite figures in early years education provided a qualitative overview of the policy to practice context. In order to gain a wider understanding of the reception class (RC) mathematical development area within the context of local policy to practice context, a regional survey was conducted.

7.2. Aims

In this chapter the main purpose is to report the findings from a survey which addressed the second research question to ascertain what the RC teachers' views and understanding of the FS mathematics curriculum were. The main expectation from conducting the survey was to gain a 'snapshot' of reported mathematics practice in the FS as teachers became more familiar with the requirements and practice became established. Indeed, this method provided a useful review of teachers' views, beliefs and reported practice.

7.3. Methods

7.3.1. Participants

A structured questionnaire with a few open-ended questions was sent out to collect data on RC mathematics across a range of a local university partnership schools area (161 primary schools), involving urban, rural and mixed areas as well as representing diversity in size and type of schools. Yet, according to the schools partnership office of the university concerned, they

considered OFSTED reports of schools when they chose their partnership schools. If a school got less than a ‘satisfactory’ report from OFSTED they stopped working with the school till it got at least ‘satisfactory’ again. In other words the sample group of the survey did not involve any failing schools.

The questionnaires were addressed the RC teachers as it was assumed that they would be in a key position to give recent and relevant knowledge of the requirements of the CGFS (QCA/DfEE, 2000), the NNS (DfEE, 1999a) and how they were putting these into practice within their school.

7.3.2. Materials

The questionnaire involved thirty-six closed questions (multiple choice or rating) and four open-ended questions, giving an overall total of forty questions. The questionnaire was adapted from another study (Quick *et al.,* 2002), that investigated implementation of the FS during its first year. Before sending the instrument out to schools, the questionnaire was piloted with four RC teachers in two primary schools in London and necessary adjustments were made. Copies of the final questionnaire can be found in appendix (appendix-B). The areas it covered were information about teachers’ background and experience, support staff, admission processes, planning and time-tabling the learning areas, assessment as well as the implementation of the numeracy objectives (DfEE, 1999a; DfES, 2006) and the CGFS (QCA/DfEE, 2000) for mathematical development in theRC.

7.3.3. Procedure

The questionnaire was sent out to schools with a pre-paid and addressed envelope and a covering letter, explaining its purpose as well as the overall

aims of the research. No personal details were asked for and no follow-up requests were made of the teachers. The return rate was 20% (31 questionnaires) which is an average return rate for a postal survey to obtain (Robson, 2002).

7.3.4 Analysis

Returned questionnaire data were entered into SPSS 15.0 that is a sophisticated software program for quantitative analysis of survey data. In order to explore the data set only descriptive statistics were used for the purpose of this study. Teachers' answers to the open questions were entered in Nvivo7 qualitative data analysis program to assist coding and reduce the data and in order to reach general themes. Findings from those two analyses were intended to give an overview of the RC teachers' reported practice and views on planning/time-tabling, pedagogy, assessment and curriculum in maths. Quantitative data were recast in terms of frequency distributions and displayed graphically.

7.4. Results

7.4.1. Teacher development and teaching experience

The majority of teachers 24 out of 31 teachers (77.4%) had less than ten years teaching experience, whilst only 7 teachers (22.6%) had over ten years experience. Nearly half of them (13 teachers or 41.9%) had less than two years teaching experience in RC; 6 teachers (19.4%) had less than five years; 10 teachers (32.3%) had less than ten years (6 -10 years) while over ten years (11-to 20 years) experience was reported by only 6.4% (2 teachers).That means only 12 (38.7%) RC teachers had six or over six years

teaching experience. It would appear that the great majority of them were young teachers and/or had relatively little experience, not only in RC but also in teaching.

Teachers had different types of original qualifications. The most frequent qualifications were Bachelor of Arts with Qualified Teacher Status (BA with QTS) or Bachelor of Education (BEd) (15 teachers or 48.4%). Meanwhile, 9 teachers held PGCE (Post Graduate Certificate in Education); and 3 teachers held a Teaching Certificate. The rest of the respondents (4 teachers or 12.9%) reported they had other types of qualification, i.e. Diploma in Education or Education and Economic Studies (in Scotland). The age group for which the teachers were trained also varied: 9 teachers (29%) were trained for 3 to 8 year-olds; the same number for 3 to 11 year-olds; 10 teachers (32.3%) for 5 to 11 years, whereas a small number of them (3 teachers or 9.7%) were trained for older age group, i.e. 7 to 11 years. Only a small number of the participants (5 teachers or 16.2%) reported that either they were working on or had completed an additional qualification (3 teachers or 9.7%), such as Master in Education or Advanced Certificate.

Of the respondents, 25 (80.6%) had training in the CGFS, 9 (29%) had in literacy, and 8 (25.8%) had in numeracy in RC. Almost the entire sample group (95% or 29 teachers) had attended at least one type of short course related to the reception class. However, only 7 participants (22.6%) attended a recent course covering mathematical development in the FS.

13 Figure 7.1. Views about training in the Foundation Stage mathematics

Training in the FS mathematics	Frequency	Percent
enough training	17	54.8
nearly enough training- but a bit more would be helpful	12	38.7
not nearly enough training	2	6.5
Total	31	100.0

Figure 7.1 shows how the teachers responded to the question about whether they had received sufficient training to help them to deliver the FS mathematics. More than half of them (17 teachers, 54.8%) believed that they had enough training. This was followed by 'nearly enough training' (12 teachers or 38.7%) and 'not nearly enough training' (2 teachers or 6.5%). Thus, it would appear that the vast majority RC teachers had enough confidence in their training related to the FS and the maths in RC.

RC teachers had additional responsibilities (as well as teaching their classes) within the school. A number of teachers (11 teachers, 35.5%) had two; a few of them (2 or 6.5% teachers) had three responsibilities including Early Years or Foundation Stage co-ordinator. The rest of them had one additional responsibility; 7 teachers had subject co-ordinating roles; 4 had early years co-ordinator role and another 4 had Foundation Stage co-ordinator role. Thus 13 of the participants (42%) had one or more responsibility, as well as being a full-time RC teacher and that would be demanding.

7.4.2. Support Staff

All participants, except one of them, reported that they had at least one general support member of staff/teaching assistant (SS/TA). More than one-

third (12 teachers or 38.7%) had one full-time; 25 (80.6%) of them had at least one part-time or one part-time and one full-time support teacher. Nearly half of them (15 teachers or 48.4%) reported that their SS/TA was involved in their long-term planning and the same number (15 teachers) reported they were involved the short-term planning. Also 13 (41.9%) of teachers reported that their support teachers were neither involved in long-term nor involved in short-term planning. Interestingly, the same number (13) of teachers indicated that in order to evaluate lessons afterwards, support staff were involved ‘quite a lot’, whilst 12 teachers (38.7%) reported ‘a great deal’ and only 6 teachers (19.4%) said ‘a little’. It would appear that although all the RC teachers who responded to the questionnaire had support teachers, less than half of them were benefiting from their input in planning and/or reviewing the lesson.

7.4.3. Age of the Children and Admission Process to School

RC teachers were asked for the youngest and oldest children’s ages in their class. The teachers were asked to report the age of the children when they started RC in September.

Figure 7.2 shows that in one class (which must have involved both nursery and reception age group) the youngest child was three year olds, but the vast majority of RC teachers’ classes (29 teachers or 93.6%) comprised young children who had just reached the age of four years.

14 Figure 7.2. Age of youngest child in years and months

Youngest child's age	Frequency	Percent
3.01	1	3.2
4.00	2	6.5
4.01	16	51.6
4.02	7	22.6
4.03	4	12.9
4.11	1	3.2

Figure 7.3 indicates that older children in RC were just five years or slightly over five. Moreover, all the respondents reported that children at their school entered RC only in a September intake. No other admission during the year was reported.

15 Figure 7.3. Age of oldest child in years and months

Oldest child's age	Frequency	Percent
5.00	16	51.6
5.01	12	38.7
5.02	2	6.5
5.05	1	3.2

The respondents were also asked which types of information they had before children started the RC. The majority of teachers (27 or 87.1%) stated that they always received children's records from their pre-school providers, 18 (58.1%) said they always met with children's pre-school providers but 25.8% (8 teachers) reported they never met with preschool providers. Meeting children themselves was very common as almost all participants (30, 96.8%) always did this, followed by meeting the child's parents by 28 teachers (90.1%). Just over half of the sample (16 teachers, 54.8%) stated that they never met children at their home, whereas 11 teachers (35.4%) reported that they always did have visits before the child started RC. Whilst all RC teachers had gathered information about their future pupils in more than one way

before starting to teach them, the most common one was meeting with the children themselves.

The majority of teachers (24 or 77.4 %) discussed children's progress with their parents every term; while (7 teachers or 22.6%) did this more than once a term. For transition purposes, a big majority of respondents (28 teachers or 90.3%) discussed children's progress with their future Year 1 teacher at the end of the reception year but 3 teachers (9.7%) said they did this every term.

7.4.4. Planning and Time-tabling the Mathematics Activities

Figure 7.4 represents the way teachers were time-tabling the six learning areas in term 1, term 2 and term 3.

16 Figure 7.4 Time tabling six areas of learning in Reception Class during the year

Time tabling six areas of learning in RC, in term 1

		Frequency	Percent
Valid	the areas of learning in distinct blocks	2	6.5
	integrate the six areas of learning	17	54.8
	as a mixture of the two	12	38.7
	Total	31	100.0

Time tabling six areas of learning in RC in term 2

		Frequency	Percent
Valid	the areas of learning in distinct blocks	2	6.5
	integrate the six areas of learning	16	51.6
	as a mixture of the two	13	41.9
	Total	31	100.0

Time tableing six areas of learning in RC in term 3

		Frequency	Percent
Valid	the areas of learning in distinct blocks	2	6.5
	integrate the six areas of learning	15	48.4
	as a mixture of the two	14	45.1
	Total	31	100.0

More than half of the teachers (17 or 54.8%) were integrating those learning areas during the first term. In the second term this decreased to 16 teachers (51.6%) and third term to 15 (48.4%). In the first term, 12 teachers reported time-tabling learning areas as a mixture of two: teaching the areas of learning in distinct blocks and integrating six areas of learning. It was increasing to 13 teachers (41.9%) in the second term; and to 14 (45.1%) in the third term.

Nevertheless, a minority of teachers (2 teachers, 6.5%) were time-tabling those learning areas in distinct blocks all through the year. That meant teaching in distinct blocks increased over the year.

Figure 7.5 presents the way the teachers were implementing the NNS over three terms. In term 1, the great majority of participants (23 teachers, 74.2%) implemented it flexibly (integrating with other areas) and only 6 teachers (19.4%) implemented a daily mathematics lesson. In term 2 number of teachers who were implementing flexibly decreased to 21 (67.7%), while number of those who were implementing as a daily maths lesson increased to 8 (25.8%).

17 Figure 7.5. Implementing the NNS in Term 1, 2 and 3

in term 1		Frequency	Percent
Valid		2	6.5
	flexibly	23	74.2
	as a daily maths lesson	6	19.4
	Total	31	100.0
in term 2			
Valid		2	6.5
	flexibly	21	67.7
	as a daily maths lesson	8	25.8
	Total	31	100.0
in term			
Valid		2	6.5
	flexibly	15	48.4
	as a daily maths lesson	14	45.2
	Total	31	100.0

By term 3, 15 participants (48.4%) implemented the NNS flexibly, whilst the number of others who organised as daily mathematics lesson climbed up to

14 (45.2%). Nearly a half of all teachers (14) were teaching a daily mathematics lesson by the end of the year.

The teachers were asked the frequency of informal exploration of numeracy in RC. The vast majority of them (28 teachers or 90.3%) reported informal exploration daily, whilst 2 of them (6.5%) said at least weekly. Moreover, weekly duration of the informal/spontaneous mathematics activities the RC children were engaged in was asked. A small number of participants (2 teachers, 6.5%) reported up to two hours; 5 teachers (16.1%) up to three hours; 4 teachers (12.9%) up to five hours; 11 teachers (35%) up to ten hours; whilst 7 teachers (22.6%) reported all the time.

Other findings about the organisation of daily mathematics lesson also showed that teachers devoted different amounts of time for the element of the daily maths lesson expected by the NNS. More than half of the participants (18 teachers 58.1%) were sparing 10% to 35% of their mathematics activities time devoted to the whole class activities during the first term. Whilst, some teachers (4 teachers or 12.8%) reported that they did not plan whole-class teacher-directed mathematics lessons, during the first term. For the second and third term, these figures changed. From the teachers' response, the mean score (average) was found. In term 1 it was 15.7%, in term 2 it was 17.9% and in term 3 it was 18.5% of class time spent on whole-class teacher-directed maths activities. This shows that every term the teachers were gradually increasing the whole-class time in mathematics activities or lesson.

The RC teachers were asked who would be involved in their long-term and short-term planning during the year.

18 Figure 7.6. Staff involvement in the long and short-term planning

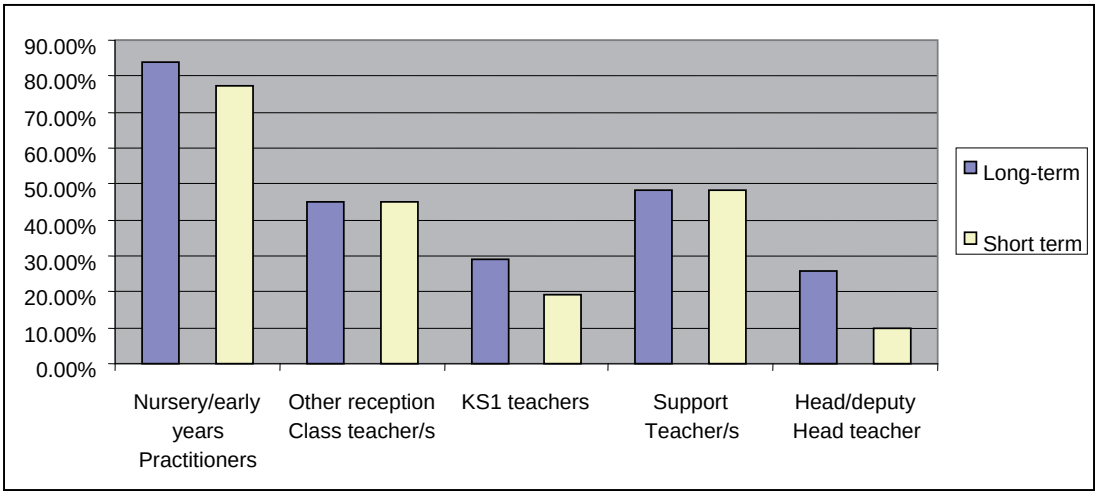


Figure 7.6 presents the staff involvement in short-term and long-term planning of RC in participant teachers' schools. The majority of the respondents reported that in their schools early years nursery staff were involved in long-term (28 teachers) and short-term planning (24 teachers). Almost half of the teachers (14) reported that the other RC teacher/s in their schools involved both long and short term planning, whilst according to their reports support teachers' 'involvement' in both kinds of planning (15 teachers reported) was slightly higher than the involvement of other RC teacher/s. This might mean that in some schools there is only one RC. Less involvement in long-term and short-term, but particularly the short-term one came from the KS1 teachers and the head/deputy head teachers.

Respondents' views about the teaching community's level of commitment to the FS were obtained. Only a small number of respondents (3, 9.7%) reported it to be low, whilst 7 teachers (22.6%) reported it to be moderate. The majority of them (21, 67.7%) reported that the commitment was high or very high. It

would appear that KS1 and KS2 teachers in their primary schools were valuing the FS and helping its teachers to implement it.

7.4.5. Assessment and Monitoring

In order to assess or monitor children's mathematical progress in the reception year the most popular assessment methods teachers used were 'utilising their own FS profiles assessment information', 'general observation' and 'annotated samples of work'. Each of these was chosen by all participants (31 teachers). This was followed by 'using photographic observation' (30 teachers, 96.8%) and 'asking children's view of their learning for assessment' (21 teachers, 67.7%). The least popular ways of assessment were 'use of parents' diaries/records for assessment' (9 teachers, 29.0%) and using video-recording' (6 teachers, 19.4%).

7.4.6 The FS, CGFS and NNS and Their Implementation in Reception Class

Previously it was mentioned that the majority of the teachers had less than ten years teaching experience in RC and even in their teaching post. Consequently, most of teachers had no experience of the curricula prior to CGFS and the NNS and could not respond to a few related questions. Some teachers either left these questions blank or put a note of 'don't know' or 'not applicable'.

The Figure 7.7 presents teachers' personal views about the FS. The vast majority (26 teachers or 83.9%) of those believed it was a 'very good thing' whilst 4 of participants (12.9%) thought it is 'quite a good thing'. Therefore, in

general, teachers were very positive about the FS and its mathematics in the RC.

19 Figure 7.7. Teachers' personal views about the Foundation Stage

Personal views about the FS	Frequency	Percentage (%)
Very good thing	26	83.9
Quite a good thing	4	12.9
Neither a good nor a bad	1	3.2
Total	31	100

An open question was asked to find out the benefits of implementation of the CGFS for the RC mathematics. This open-ended question was answered by 21 (67.7%) of the sample group. Their answers were coded by the software program Nvivo7. It is worth mentioning that a few teachers wrote more than one benefit they experienced by the implementation of the FS. Thus, in figure 7.8 counting frequencies might not necessarily give the number of respondents.

Figure 7.8 presents teachers' views about the main benefits of implementing the FS. A number of teachers (11) believed that the CGFS mathematics involved more practical activities. This was followed by the statements about child-centred approaches and activities (7 teachers) as well as play-based learning (5 teachers), a less formal learning approach (4 teachers) and a more structured approach to mathematics (4 teachers). The rest of the statements were written down by only 1 or 2 teachers. Yet, participants who responded to this open-ended question clearly indicated that they recognised the benefits of the CGFS mathematics.

20 Figure 7.8. Benefits of implementing the CGFS for the RC mathematics

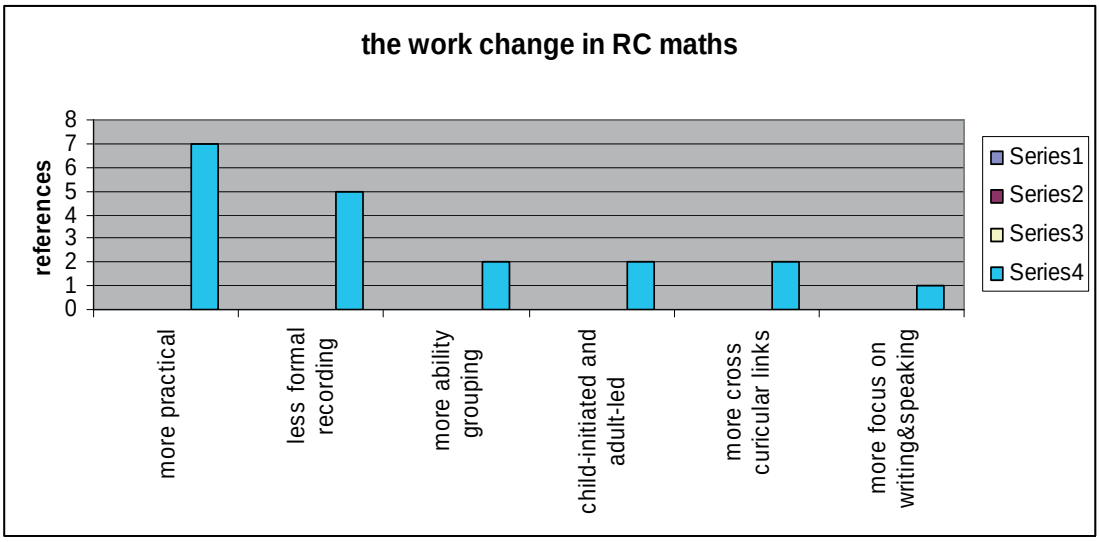
Answer Codes	Frequency
Practical activities	11
child-centred approach and activities	7
play based learning	5
less formal	4
more structured approach to maths	4
cross curricular activities	2
promoting outdoor curriculum	2
focus on language development	2
more emphasis on learning through play	1
good resources	1
FS curriculum has enabled more flexible	1
effective assessment	1
focus on reasoning skills	1

When the respondents were asked if the mathematics education in RC had changed in the last eight years (between 1999 and 2007), only 12 teachers (38.7%) answered this question. Two (6.5%) of those reported it had changed a ‘great deal’; 7 (22.5%) stated ‘quite a lot’ and 3 (9.7%) indicated ‘a little’.

Another open-ended question (Question 15) attempted to find out more about the teachers’ view related to the work change in mathematics in RC. They were also required to report how the work in their class has changed since the introduction of the FS. This question was answered by only 11 teachers (35.4%). Based on the findings from the qualitative analysis software program (Nvivo7), Figure 7.9 was drawn. It shows that the most repeated statements of the teachers about the change in RC mathematics were ‘more practical’ (7 references), ‘less formal recording’ (5 references). These statements were followed by ‘more ability grouping’, ‘child-initiated and adult-led activities in balance’ and ‘more cross-curricular links’ (2 references for each). ‘More focused on speaking & writing’ had only one reference. All those statements could be interpreted as teachers being positive about the change towards

more practical work in mathematics in the RC since the introduction of the CGFS.

21 Figure 7.9. How the work changed in RC maths since the introduction of the CGFS



RC teachers were asked if the FS had 'got it right' in essential skills children needed to acquire during the early years. Figure 7.10 clearly presents that almost all the sample group believed that the FS had 'got it right' in play (30 teachers, 96.8%), in taking a developmental approach (30 teachers, 96.8%) and in verbal skills (28 teachers, 90.3%).

22 Figure 7.10. If the FS has 'got it right' in some skills

	Formal learning	**play**	**Written skills**	**Verbal skills**	**Taking developmental approach**
	Frequency percent	Frequency percent	Frequency percent	Frequency percent	Frequency percent
right	24 (77.4%)	30 (96.8%)	22 (71%)	28 (90.3%)	30 (96.8%)
Too much	_	1 (3.2%)	5 (16.1%)	1 (3.2%)	_
Too little	7 (22.6%)	_	4 (12.9%)	2 (6.5%)	1 (3.2%)
total	31	31	31	31	31

(77.4%) teachers believed in its formal learning element and 22 (71%) in written skills that the FS had ‘got it right’. However, some teachers indicated that the FS put ‘too little’ emphasis on formal learning (7 teachers, 22.6%) and on written skills (it reached 4 or 12.9%). Frequencies can also be seen on the table. Overall the emphasis on play, a developmental approach and verbal skills was highly regarded with a minority believing there was too little emphasis on formality.

Figure 7.11 (below) illustrates how respondents rated the necessary skills children needed to gain in the FS. In this rating order, 1 meant ‘absolutely not necessary’, while 10 means ‘absolutely vital’, with other rates in between these two. All teachers rated all skills 5 or above thus it would appear that all of them thought all of these were the vital skills for young children to develop.

23 Figure 7.11. The necessary skills children need to learn in the FS

	Rate 1	Rate 2	Rate 3	Rate 4	Rate 5	Rate 6	Rate 7	Rate 8	Rate 9	Rate 10
skills	**F* %****	**F %**	**F %**	**F %**	**F %**	**F %**	**F %**	**F %**	**F %**	**F %**
Concentration						2 6.45 %	4 12.9 %	4 12.9 %	4 12.9 %	17 54.8 %
Motivation						2 6.45 %	1 3.2%	2 6.45 %	6 19.3 %	20 64.5 %
Working with others							2 6.45 %	2 6.45 %	4 12.9 %	23 74.1 %
Active independence							3 9.6%	2 6.45 %	5 16.5 %	21 67.7 %
Enthusiasm						3 9.6%	1 3.2%	3 9.6%	2 6.45 %	21 67.7 %
Literacy					2 6.45 %	2 6.45 %	4 12.9 %	7 22.5 %	4 12.9 %	12 38.7 %
Numeracy					2 6.45 %	2 6.45 %	3 9.6%	7 22.5 %	4 12.9 %	12 38.7 %
Physical Development					2 6.45 %		2 6.45 %	5 16.5 %	7 22.5 %	14 45.1 %
Creative development					4 12.9 %			8 25.8 %	5 16.5 %	13 41.9 %

F*: frequency
%: percentage**

Although a few respondents (2 or 6.45%) rated ‘physical development’ as 5, the majority of them rated it 7 or above. Literacy, numeracy and creative development was rated less than 7 by only 4 teachers (12.9%) whilst most gave a higher rating. That shows almost all those skills were seen as necessary to be developed during the FS by majority, yet literacy and numeracy were seen as slightly less vital than attitudes of ‘concentration’, ‘motivation’, ‘enthusiasm’, ‘working with others’ and ‘active independence’.

Some questions particularly sought to investigate the implementation of the NNS objectives in RC. For example below, some statements about the CGFS and the NNS were given and teachers were asked to rate them on the scale (1 meaning ‘absolutely wrong’, 2 ‘wrong’, 3 ‘sometimes wrong sometimes right’ 4 ‘right’ and 5 meaning ‘absolutely right’).

24 Figure 7.12 Implementing the NNS and the CGFS in the FS Reception Class

statements	**Rate 1** **F*** **(%)****	**Rate 2** **F** **(%)**	**Rate 3** **F** **(%)**	**Rate 4** **F** **(%)**	**Rate 5** **F** **(%)**
CGFS and NNS fit each other	_	2 (6.5%)	19 (61.3%)	5 (16.1%)	4 (12.9%)
NNS has a clear guidance	_	_	11 (35.5%)	13 (41.9%)	7 (22.6%)
CGFS has a clear guidance	_	_	7 (22.6%)	11 (35.5%)	13 (41.9%)
Implementing CGFS to young children is appropriate	_	2 (6.5%)	4 (12.9%)	12 (38.7%)	13 (41.9%)
Implementing NNS to young children is appropriate	1 (3.2%)	4 (12.9%)	15 (48.4%)	6 (19.4%)	5 (16.1%)
Implementing CGFS & NNS to mix-age-classes is appropriate	1 (3.2%)	8 (25.8%)	8 (25.8%)	4 (12.9%)	3 (9.7%)

F*: frequency, %**: percentage

Above Figure 7.12 shows that two thirds of the respondents (19 or 61.3%) were not sure if those two policy initiatives fitted each other all the time, while a total of 9 (29%) reported the statement was ‘right’ or ‘absolutely right’. Almost all respondents believed that (more or less) each document, the CGFS and NNS, had a clear guidance, as all the teachers rated them 3 or above. Implementation of CGFS to the young children seems approved of by a big majority of the teachers (25 or 80.6%), as those either picked ‘right’ or ‘absolutely right’. Yet six teachers rated it 3 (sometimes wrong sometimes right) or 2 (wrong).

A total of 11 teachers (35.5%) approved implementing the NNS to young children, whilst 15 (48.4%) thought ‘sometimes right, sometimes wrong’, 4 (12.9%) believed it ‘wrong’ and one (3.2%) reported ‘absolutely wrong’. Rating the joint implementation of the NNS and the CGFS for the mixed-age classes (younger children and reception age) seemed a little challenging for the teachers as their general tendency (20 teachers, 64.5%) was to chose the mid-rating rather than absolutely wrong (rating 1, only 3.2%) or absolutely right (rating 5, only 3 teachers, 9.7%).

Moreover, teachers’ views about implementing the NNS in a more flexible approach were asked (Figure 7.13). Only two-third of them (21 teachers or 67.8%) responded and 18 (58.1%) of those indicated that this was not a problem, while 3 teachers (9.7%) reported it was a small problem. Overall teachers do not view the implementation of the NNS as a big problem.

25 Figure 7.13 Implementing NNS in more flexible approach

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		10	32.3	32.3	32.3
	not a problem	18	58.1	58.1	90.3
	a small problem	3	9.7	9.7	100.0
	Total	31	100.0	100.0	

Another open question was asked to obtain teachers' views about the drawbacks of the implementation of the FS in. As in other open questions, only some of the participants (15 teachers or 48.2%) in this case responded to that open question.

26 Figure 7.14. Drawbacks of the implementing the FS mathematics

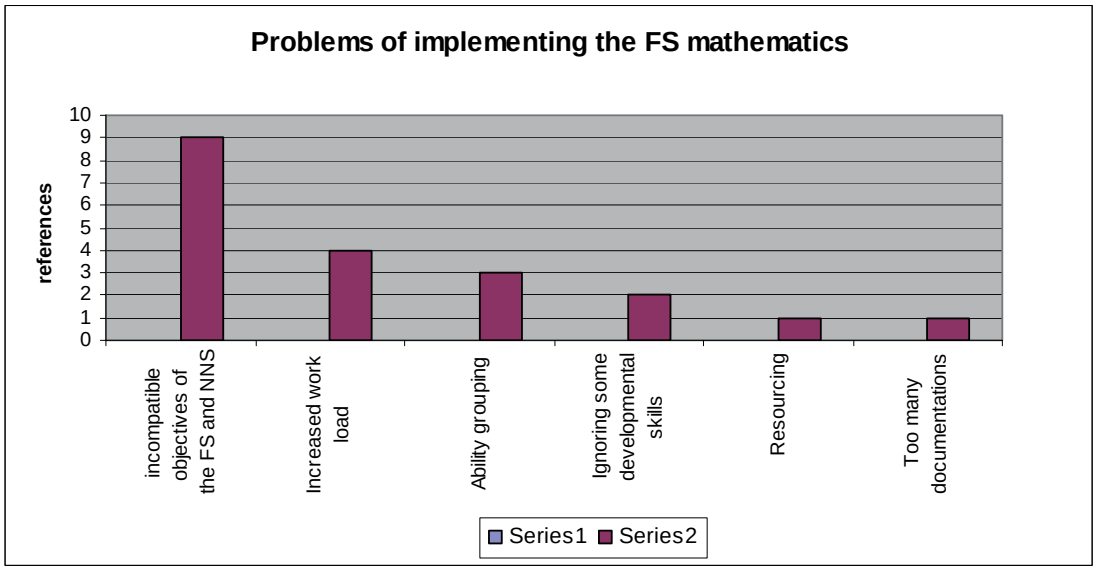


Figure 7.14. shows that the main concern of the teachers (10 teachers) about the work change in the FS mathematics was objectives of the NNS and their incompatibility with those of the CGFS, with their own words:

> *'Objectives of the NNS and the CGFS for RC were incompatible; particularly NNS objectives did not really match the FS expectations'*
>
> *'Objectives related to the problem solving were problematic'*
>
> *'Fitting the demanding mathematical activities (in NNS) into play based curriculum (CGFS) sometimes hard'*

Moreover, Figure 7.14 shows that some teachers (4) also reported that FS mathematics had increased the workload of the teachers, particularly, for those who had limited adult support. It can also be seen that setting children according to their abilities for the mathematics activities were creating

problems for 3 teachers. ‘Too much emphasis’ made to mathematical development was reported by 2 teachers. Lastly, resourcing and having more than one policy text were also seen as the problematic sides of the FS by one:

> *There are too many texts, too many expectations, [therefore] finding time to read all documentations marrying this to the Numeracy Framework is sometimes hard.*

It would appear that having more than one policy text for the mathematical development of the children created problems, extra burdens and also concerns for a few of the teachers who responded. Amongst the teachers’ responses, the NNS and its objectives for the RC were quoted as the most problematic side of RC mathematics.

7.5. Discussion

This section will introduce a more in-depth discussion of issues arising from the questionnaire findings.

7.5.1. Teachers’ Professional Development

The findings from the questionnaire suggest that most RC teachers had less than 10 years teaching experience not only in the RC but also in teaching post. Findings from Quick *et al*. (2002) showed that nearly half of the teachers had more than 20 years teaching experience; in the current study these constituted only 6.4%. This fact probably reflects the expansion in early years provision and the new posts created over the last decade. However, it is hard to draw a bigger picture with this small-scale study.

Moreover, the findings suggested that teachers were mostly holding relevant early years qualifications. The majority of the respondents had BA with QTS or BEd or PGCE qualifications. That could be interpreted as a good development as young early years teachers seemed to be holding relevant training. A large number of teachers also had training in the CGFS, as well as some in its specific areas (i.e. literacy and numeracy). That shows they had prepared themselves and had ample confidence for the implementation of the early years curricula in their classes.

It appears that RC teachers were also busy with additional responsibilities. Having a second duty related to the FS or early learning settings seemed compatible with their teaching role in RC. Yet, 22.6% teachers (who were probably working in small schools) reported that they had subject co-ordinating roles, such as in geography, science and so on, as a third responsibility.

7.5.2. Age of the Children and Admission to School

Although most RCs did not appear to have children younger than age 4 years, all participants reported the youngest child/children in their class at the age of four years (figure 7.2), meanwhile the eldest child/children were just past five years (figure 7.3). This suggests that because of only one admission point, which is in September, at the beginning of the RC year all of the children in this year group were very young, some just reaching four, some just reaching five. Having such young children in a setting demands particular conditions as essentials (The Early Years Curriculum Group, 1996). According to The Early Years Curriculum Group (1996) one of these

conditions was that a staff ratio of at least one early years trained teacher and one qualified nursery nurse for every 26 children should be expected. Findings from the questionnaire show that in their classes almost all of the teachers had at least one part-time support teacher which is encouraging in terms of increased adult-child ratio.

During or slightly before the admission to school, the RC teachers were having various contacts with the children, their pre-school providers and their parents. Gathering enough information about the children can be assumed for teachers to ease in their transition from pre-school to RC. Moreover, working closely with the parents or guardians of the children is an important part of early years education and that will assist a smooth transition from home to early years settings. RC teachers also reported that they contacted and discussed children's progress with their future teacher (Year 1) at least at the end of the year. It would appear that teachers were valuing accurate transfer of information on children's transition from pre-school to Reception Year and from there to Year 1.

7.5.3. Planning and Time-tabling the Learning Areas

Findings suggest that slightly more than half of teachers tended to integrate learning areas at the beginning of the year, but differentiated more towards the end. In this sense, they initially delivered the NNS flexibly across the day (in term 1 and term 2), but by the third term the daily mathematics lesson tended to be more likely to be planned. However, it is hard to ignore the way of time-tabling that the other half of the respondents use. Two in six teachers had integrated six learning areas throughout the year without changing in the

last term, whilst nearly one-sixth of them had used the NNS since the beginning of the year by planning daily maths lesson lasting forty-five minutes to one hour. Overall a very mixed picture emerged.

The NNS (DfEE, 1999a) recommended teachers to integrate mathematics with other learning areas during the year, but in term 3 teachers were recommended to plan a 45-minute daily mathematics lesson in order to prepare children for the daily mathematics lesson in Year 1. Meanwhile, in the CGFS (QCA/DfEE, 2000) a main expectation was for teachers to integrate all learning areas. The way teachers reported time-tabling six areas of learning and implementing the NNS clearly indicated that amongst RC teachers, there were different types of practice. It would appear that not all of the teachers were following the same planning procedure or following the same policy guidelines in the same way. It could be argued that they were interpreting what they thought appropriate.

In general, RC teachers thought that the teaching community at their school had a high level of commitment for the implementation of the FS. Yet, involvement in the RC long-term and short-term planning from other staff, apart from early years teachers and support staff, was relatively low. Particularly, short-term planning was left to RC teachers themselves and other early years teachers, i.e. nursery class teachers with minimum or no involvement from the KS1 and KS2 teachers or head and deputy head teachers.

7.5.4. Assessment and Monitoring

The evidence suggests that for assessment and monitoring purposes the most common was using the FS profile as well as other methods such as general observation and annotated samples of work. Using photographic observation was also common amongst the teachers, whilst some of them were also asking children's view of their learning for assessment purposes. Those findings suggest that there are no apparent differences amongst the teachers for assessment and monitoring procedures as they all were using a range of well-known methods.

7.5.5. Teachers' View about the FS, CGFS, NNS and RC

Almost all the teachers believed that the FS was 'good' or 'very good thing'. Equally they approved the CGFS and thought that this curriculum had clear guidance. Implementing it to younger or older children in the FS was not a problem.

The main benefits of the CGFS and its mathematics for RC were thought to be more practical activities, child-centred approaches and play-based and less formal learning. Also teachers believed that this curriculum had a more structured approach to mathematics. Evidently, optimist views were expressed for the change in mathematics work in RC (since 1999). In an open question teachers were asked to comment on curriculum changes. Teachers thought that being more practical and being less formal were the main important changes in the curricular expectation that the FS brought about.

Equally, having a balance between child-initiated and adult-led activities and creating more cross-curricular links between the learning areas were also expressed as positive changes which occurred in mathematics work in the RC. In the way teachers reported, it seems that they were not approving of setting in the classroom according to children's abilities (ability grouping). The reason why, they were so was not asked in this study. Yet, other findings (Suknandan and Lee, 1998; Baines *et al.,* 2003) indicated that teachers find planning and teaching easier when they are working with pupils of similar attainment (set groups). However, grouping children because of their ability might not provide an effective milieu in which all children can benefit (Suknandan and Lee, 1998 and Hallam *et al*., 2002).

The majority of teachers reported that their daily planning involved spontaneous exploration of numeracy. Those activities would provide ample opportunities for children to engage in informal, playful mathematical activities during the week. Moreover, the vast majority of respondents (90%) tended to feel the FS has 'got it right' in terms of emphasis on 'play', 'verbal skills', and 'taking a developmental approach'. Yet, for 'formal learning' and 'written skills' only one-third said it had 'got it right'. At the same time a quarter of respondents called for 'formal learning' and one-eighth for 'written skills', indicating that they felt these were given 'too little' emphasis. These findings are consistent with the Quick *et al.'s* (2002) findings for a similar inquiry at the time the CGFS was first implemented. Quick and her colleagues commented that 'there may still be some uncertainty on the part of some teachers about a broader pedagogical approach' (p. 116). In other words, teachers were not clear of the value of the formal learning and writing skills in the early years.

When the teachers were required to rate different types of skills, they tended to give high rating to concentration, motivation, working with others, active independence and enthusiasm. Although literacy, numeracy, physical and creative developments were rated slightly lower than those skills, it is unavoidable to accept more than one-third of the respondents were prioritising particularly literacy and numeracy development.

On the other hand, when the respondents were asked directly about the NNS objectives (rather than asking about the CGFS mathematics) teachers' positive expressions disappeared or at least they were not as positive as they were for the FS and the CGFS. A number of teachers believed that the CGFS and the NNS did not fit together. They thought the guidance of the NNS clear enough, yet implementing it to younger children, i.e. young four-year-olds, was problematic. Moreover, when they were questioned about the problems and difficulties, in an open way, teachers reported experiencing difficulties implementing the FS mathematics. The majority of reported difficulties were about the NNS, its objectives, its compatibility with the curriculum of the FS and its implementation in the RC.

Findings relating to the NNS clearly showed that the NNS was seen as the most troublesome side of the mathematical curricula in the RC. Teachers suggested a mismatch with the CGFS and demanding objectives that could create an imbalance between the learning areas. Most importantly, NNS implementation increased the work-load of the teachers in the RC. Putting all those findings related to the FS, CGFS and the NNS together, the data indicated that the RC teachers were generally welcoming and sympathetic

with the FS and the CGFS' mathematics far more than they were with the NNS.

7.6. Conclusion

This chapter has aimed to answer the second research question which was 'how RC teachers received the early years mathematics policy texts, reconstructed and implemented within the context of practice'. Although the size of the sample for the teachers survey was relatively small (31 teachers), the data from the RC teachers' survey provided a wide overview of RC mathematics within the context of practice and well addressed this query.

Teachers have received these policy texts, the NNS and the CGFS, in different ways. It would appear that the main tendency of them was to express positive comments when their views were asked about the FS and CGFS. They affirmed the change in the RC mathematics since the introduction of these two and they believed that most necessary skills identified by the FS and CGFS were appropriate. However, it can be argued that teachers took a less positive view of implementation of the NNS and its key elements in the RC.

Teachers' responses to inquiries related to planning and organisation of the six learning areas generated vital information about how they reconstructed and implemented the policy texts (the NNS and the CGFS). The general trend was to organise the day in an integrated way during the first two terms with more planned daily lessons, particularly in numeracy and literacy, towards the end of the year. This indicated the integration of these two policy texts, the CGFS and the NNS. On the other hand, some other teachers followed

planning a daily block lesson from beginning the year, whilst others integrated learning areas for the whole year. It could be argued that RC teachers were interpreting and reconstructing the policy text according to what they believed appropriate for young children's mathematical learning.

Finally, whilst the survey asks the view of the participants about the emphasis on play in the Foundation Stage and participants themselves refer to the benefits of 'play-based' learning and 'child'centered approaches' it must be acknowledged that the role of pllay and child-centred learning remain unexamined (QCA/DfEE, 2000: 25). The CGFS (QCA/DfEE, 2000) makes reference to 'well-planned play … (as) a key way in which young children learn but the underpinning ideological, philosophical and educational principles remain implicit. Despite endorsement of the CGFS and the EYFS (DCSF, 2008b), however, the place of play remain deeply problematic. As their study shows, whilct teachers may hold similar theories about the value of a play and child-centerd learnijng and share a common discourse to describe this, there may still be significant differences in the way the curriculum is organised to include play. In fact, a common concern to improve the quality of children's play and learning may lead to considerable differences in the way this is realised in practice. More fundamentally, this raises the question of threats to the validity of such items that must be acknowledged. In this case, since the study was designed in successive stages of data-gathering, there was an opportunity to unravel levels of teachers' understanding of play and child-centred learning derived from different methods, in this case, observation and interview.

Thus, this chapter has described key issues and points underpinning the RC mathematics in practice. These will be explored in greater detail in the classroom observations presented in the next chapter.

CHAPTER 8: CLASSROOM OBSERVATIONS

8.1. Introduction

In two previous chapters (chapter 6 and 7) 'élite participants' and RC teachers' views related to the FS mathematics curricula were reported and discussed. The élite interviews illuminated the three contexts of policy-making process (influence, policy text production and practice), whilst the teachers' survey enlarged upon the context of practice. Yet, both sets of interviews necessarily focused on reported views of the participants. In this chapter teachers' practice inside the classrooms has been observed and documented in a number of direct ways and reported here by qualitative means. Thus, being in the classroom, collecting first-hand data through observations shed light on actual classroom processes rather than reports of these.

8.2. Aims

The main purpose of this chapter is to describe and analyse as well as report the findings from classroom observations of three RC teachers. The observations aimed to answer the fourth research question:

- How did the RC teachers implement the early years mathematics policy in the context of actual classroom practice?

8.3. Methods

8.3.1. Participants

Three RC teachers in three different primary schools were selected for the classroom observations in adjacent LAs and representing urban with social

and ethnic mix, rural with advantaged social intake and semi-rural socially mixed but predominantly advantaged.

i) Urban School

This school was an inner-city school which had a mixed social (multicultural) and economic intake. According to the school office nearly twenty-six home languages (i.e. Punjabi, Urdu, Bengali, Chinese and some other dialects) were spoken by different pupils and the proportion of pupils learning English as a second language was very high. Also this school was well above-average in proportion of pupils entitled to free school meals. Although there were two RC and two teachers in the Urban School, only one teacher, Mrs. Crown, was observed. In this school two nursery classes, one in the morning one in the afternoon, were attached to the school and they shared the FS play area with RC.

Mrs Crown took charge of most of the responsibilities for those two RCs in this school but, according to her response to the interview question she was not the 'Early Years Coordinator' in the school, but she was 'PE Coordinator'. She had more than 20 years teaching experience, 14 years of this experience she had spent teaching RC. Her original training was for Early Years/ Primary 3 to 7 or 8 years. She had acquired a teaching certificate and a BA degree qualification.

ii) Rural-H School

This was a semi-rural village school with one hundred per cent white British intake. The intake of the school was socially and economically mixed. The school was small, with six classes (one class in each year group) and there was one RC with 26 children. In this school there was no nursery class, yet

there was a close liaison with playgroups run in the nearest church.

The RC teacher, Mrs. Lesley, had been trained to teach early years as her original qualification was a teaching certificate in Early Years/ Primary, 3 to 7 or 8 years. At the school she had an Early Years Co-ordinator responsibility, over twenty years of teaching experience in general and almost ten years of teaching experience in RC. This year was the last year of the teacher in this school, since the school was contracting with a new teacher for the next year.

iii) Rural-C School

This was a village school with a socially and economically advantaged white British intake, working in nearby urban areas but though choosing to live in the countryside. The school was very small and there were 198 students on roll. According to the school secretary, this number was slightly decreasing year by year. The school office reported that only four percent of the children were receiving free-school meals and just a few students (6) were from different ethnic minority groups. In this school, there were six classes one in each year group and one RC with twenty-nine children. Therefore, FS was implemented in only one RC classroom and there was no nursery class attached to school.

The class teacher, Mrs Cheri, in Rural-C School held a BA (QTS) teaching qualification, her initial training being for Primary, 5 to 11 years. She had ten years teaching experience and all of those years had been spent in teaching RC at the same school. Within the school, she had the FS Co-ordinator role and Geography/History Co-ordinator, as well as SENCO Co-ordinator responsibilities.

8.3.2. Materials

In the three RCs, for each term a total of two lessons were observed giving six daily mathematics activities observed overall. The researcher sat in a corner of classroom and took field notes whilst audio-recorder recorded the teachers' voice. Field notes were made against a time line of observed activities, resources available and, where possible, interactions, including 'selective verbatim' were noted. These notes were expanded later by the verbatim transcripts of audio-recorder. A video-recorder was also employed to film one day's mathematics activities in all three RCs at a mid-point within the year.

8.3.3. Procedures

In the methodology chapter (chapter 4) under the title of 'issues of access' the procedure including for classroom observations was explained. To sum up, initially, a letter was sent to head teachers of the potential participant schools in order to explain the basic outline of the research in general and the classroom observations specifically. After head teachers' positive responses were obtained, a personal visit was made to schools by the researcher and the supervisor in order to explain the whole process face-to-face. During the first visit the researcher and the RC teachers made all necessary further arrangements during the data collection period.

8.3.4. Analysis

Data collected across each of the three schools were six sets of field notes, six sets of audio-records and video-records of one day's mathematics activities for each class.

i) Analysis of field notes

The field notes attempted to provide contextual information as well as classroom processes about all three schools. Immediately after observation visits notes taken in the classroom were expanded while they were fresh in researcher's mind. For the analysis purposes these notes were organised in a consistent way for three schools by using a general framework which involved: classroom layout and mathematical resources/materials; grouping procedures; lesson structure; use of classroom assistant; objectives/content of mathematics used during the observed mathematics lessons, as well as patterns of interaction taking place during the lesson.

ii) Analysis of video-recordings

In order to analyse video-recordings verbatim transcriptions were made as word documents. Then the data were entered into Nvivo7 qualitative data analysis program to ease coding and reduce the data in order to reach general themes. The coding scheme focused on interactions between the teacher and the children with the help of Nvivo7. Instead of looking for pre-defined particular codes in transcribed video-recordings gathered in three RCs, it was preferred to use loose codes according to practice that emerged in each classroom.

The term 'interaction' implies an action-reaction or a two-way influence which might be between individuals (that is teacher to child, child to teacher and child to child (Biddle, 1967 cited in Tisher, 1972). Moreover, as Edwards and Mercer (1989) and Sinclair and Coulthart (1975) observed, classroom lessons have been described as an unfolding series of initiation-reply-evaluation (IRE)

sequences with ‘elicitations’ being the most prevalent speech act in lessons often known as ‘known interaction question’ which elicit information about topics for which the teacher already has the answer. Nvivo7 was used to code verbal as well as non-verbal behaviour of both sides (teacher and the pupils) captured by the video-recordings’ verbatim transcriptions. Thus, in the classroom pupils’ interaction was encapsulated in the forms of questions and response sequences. Although this chapter will focus mainly upon the three teachers and children’s responses, the next chapter will examine children’s behaviour

Below, firstly the contextual information and classroom processes emerging from field notes about all three schools’ RCs will be introduced. Then, the findings from the video-recording will be reported.

8.4. Results of Field Notes

8.4.1 Urban School

a) Classroom layout and mathematical resources/materials

In this school, there were two RCs and although the school was very big the inside area for RCs was in fact very small. Two classes (in Urban School) had not got their own separate classes and shared a big room where there were two corners with two classes placed one in an each corner. When those two RCs were working on a task or carrying out their daily area work, the children from the two classes and their teachers could see and hear each other. The teachers sometimes had difficulty to get their voices heard by their own pupils, because of voices coming from the other class.

Two RC teachers in the urban school were sharing all resources, their computers, toys and other equipment. In this school, the lack of space had meant that there was no dedicated home corner, water play and free-play activities corner with small construction materials. Although space was a challenge, RCs were well supplied with subject-specific equipment and mathematical games. There were three computers for each RC corner one of which (in each class) connected to an interactive white board and children were encouraged to use them, particularly before the registration time in the morning. Outdoor activities were not well planned or equipped. Children went outside to have fresh air and rode tricycles in turn.

b) Grouping Arrangement for Mathematics Activities

The class was divided into three small groups for different activities. All the groups were supervised or directed by an adult, i.e. class teacher or support assistant. Thus, there was no observed child-initiated, free-play activity in this RC class. Whole-class mathematics activities were directed mainly by class teachers along with one of the support teachers. Before lunch time, there were two morning classes, one early morning before play-time and one late morning after play-time.

After registration, the teachers divided the class (thirty children) into three ability groups in which there were ten children. The names of these groups were Red, Blue and Yellow. The class teacher carried out mathematics activities with one of the groups and she swapped the group after break (play-time) and did the same activity with a new group. The last group had the mathematical activity after lunch. Mathematical activities' time for each group

had been fixed, but the order changed daily. For example, on Monday the first group for such activities, would be ‘Blue group’, second group (after play time) would be ‘Red group’ and the third group (after lunch) would be ‘Yellow group’, but on Wednesday the first group, for certain activities, would be ‘Yellow group’, while on Thursday the first group would be ‘Red group’.

c) Lesson Structure

Mathematical activities were planned for four days in a week and took place for the whole morning. The mathematics lesson or activities started during the registration period with some counting of number of students on the register roll and number of students who were going to have school dinner or packed lunch. During six observation visits there was no whole-class teaching time to introduce the day’s topic or carry out some mathematical activities as a large group. Some times (in two observations) there was some initial phonic work but following this the class was divided into three groups for intensive mathematics activities.

During the morning, the class teacher was working with two groups for an average of 30 to 40 minutes with each; one before play time and one after. The third group might have a turn for intensive work with the teacher after lunch, whilst other groups worked on another area of the curriculum. In the Urban School, it was observed that the teacher did not plan any plenary or review sessions. She finished the lesson after the completed group activity by sending children for a play-time or for the lunch break, without a review.

d) Use of Classroom Assistant (Teaching Assistant)

There were two full-time support staff alongside a full-time class teacher for each reception class. Also one part-time member of staff (an EAL support teacher) was shared between two classes, as was an SEN member of staff who came once a week. In other words, in this multi-cultural school, on some days the ratio of staff children was 5:30, whilst normally this ratio was 3:30. One support teacher was always sitting opposite the teacher and wrote what the class teacher said on the white board during registration times. When the class divided into three groups, each group was supervised by an adult. The most apparent aspect of the support staff's role was that they were all speaking English as a second language but they spoke the home language with the children in RCs. Particularly at the beginning of the reception year, this eased the communication between staff and the children who had a little English.

e) Objectives/Content of Mathematics Lesson

During the six visits to school, it was observed four times that the teacher focused on these numeracy objectives:

- say and use number names in order in familiar contexts;
- count reliably up to 10 everyday objects;
- recognise numerals 1 to 9.

Once she focused on:

- Use language such as 'more' or 'less', 'greater' or 'smaller', 'heavier' or 'lighter', to compare two numbers or quantities;

and once she focused on:

- Talk about, recognise and recreate simple patterns.

Thus, it might be argued that the teacher placed more emphasis on numeracy objectives rather than other objectives, i.e. measurement, shapes, space and time at least in observed lessons.

f) Patterns of interaction taking place during the lesson

In the Urban School the interaction between the teacher and the children seemed dominated by elicitations of known-information questions. Children's dominant action-reactions to the teacher's query were both verbal and non-verbal. Verbal ones were mostly answering questions with few words, whilst non-verbal ones were 'showing', i.e. number keys, 'making' even 'writing down' on a small white board or sheet.

Children's interactions with the support teachers were also responses to information-checking questions. When one group of children was working with the class teacher another group was engaged in a cutting and sticking activity with the support teacher, whilst the other one was playing outside under the supervision of an adult. Cutting and sticking activities rarely involved child-initiated talk apart from asking some simple and short questions related to the activity. Yet, adult interactions during the cutting and sticking activities involved requests or short instructions, i.e. 'cut this one' and 'stick there' or 'be careful'. The adult would not normally become involved in outside play but just watched and chatted with the other adult, who supervised the other class' outside group. In the outside area, there were few interactions between children and the adult except brief involvements to the conflicts between the children.

8.4.2. Rural-H School

a) Classroom layout and mathematical resources/materials

The RC in this school, in contrast to the Urban School, was in a spacious classroom. There was a big home corner, a shop corner, and a large space for indoor free-play activities. It is interesting to mention that although there was a water tank and a sand tray, they were empty. The reason stated by the teacher was that they caused ‘a lot of mess’ in the classroom. During the teaching time of the daily mathematics lesson, a group of children was using the playground, in turn, for outdoor mathematical activities under the supervision of the support teacher. In general, the class was well equipped, though there was only one computer and the children rarely used it. This was not because they were not allowed to use it, but because they were not encouraged to, as most of the time it was switched off.

One of the corners in the play area in the classroom was organised according to the week’s topic and well equipped. To illustrate, one week it was designed as a patisserie with real cookies, cakes and bread, previously baked with children. All of the items were labelled and all of the children whilst in small groups had a chance to use real money to buy what they wanted in the shop and eat this.

b) Grouping Arrangement for Mathematics Activities

The class was divided into five small groups. There were no group names. The first group would work or carry out some activities with the class teacher and when they finished the activity they would be replaced with another group, whilst first group would go to play freely or work with other adult/s. Group two

would work with one of the support teachers, group three would do topic-related mathematics activities outside, whilst the last two groups would go to any of the topic-orientated play corners, either to play freely or engage in mathematics-related activities.

c) Lesson Structure

The morning class normally started at 9: 00 am, after registration. This typically took ten minutes or even less than this. Then the class had ten to fifteen minutes on counting activities. Next, all the classes including RC went to the hall for daily assembly. As this village school was relatively small all the children attended the assembly. According to the RC teacher, the assembly was led by a different teacher or the deputy head teacher every day. After around twenty or twenty-five minutes assembly, the classes went back to their classroom.

Normally, when the class came back from the assembly, the teacher introduced the day's topic for ten to fifteen minutes before dividing pupils into five small groups. The first part of the lesson, including the whole-class topic introduction and small group teaching time, took forty to forty-five minutes. Before the second part of the lesson children had their milk and play-time. The second part of the classroom took nearly forty-five to fifty minutes, including a short whole-class activity, small group teaching and a plenary session. During these 'double mathematics' lessons in the morning, all children in five small groups took part in all organised activities, i.e. working with class teacher, working with support teachers (there were two), as well as having their free-play activity time.

d) Use of Classroom Assistant (Teaching Assistant)

Alongside the class teacher, there were two part-time support teachers each working twenty hours per week and being present especially for the literacy and numeracy hours for the group activity. Also, one adult was helping to the school on the regular base as a volunteer. During any mathematics lesson the ratio of adult children was 3:26. The support teachers or volunteer adult would set up the tables for small-group activities, would supervise the children during the play times, as well as direct group activities organised by the teacher. According to the teacher they were not involved in long-term planning but one of them was involved in the short-term planning.

e) Objectives/Content of Mathematics Lesson

In Rural-H School after registration and before assembly, there were counting activities for between ten to fifteen minutes daily. During six visits to the school, it was observed that these numeracy objectives were addressed:

- Say and use the number names in order in familiar contexts;
- Count reliably up to 10 everyday objects;
- Recognise numerals 1 to 9;
- Use language such as more or less, greater or smaller, heavier or lighter, to compare two numbers or quantities;
- In practical activities and discussion, begin to use the vocabulary involved in adding and subtracting;
- Find one more or one less than a number from 1 to 10.

For the daily mathematics activities, after daily assembly in the school hall, the teacher planned to address:

- Use of mathematical language such as ‘circle’ or ‘bigger’ to describe the shape and size of solids and flat shapes;
- Use of everyday words to describe position;
- Developing mathematical ideas and methods to solve practical problems.

As well as these activities the teacher introduced time and symmetry. Thus, in the observed lessons she planned almost every single objective stated in the CGFS for RC.

f) Patterns of interaction taking place during the lesson

In Rural-H School the interaction between the teachers and the children seemed two-way in influence: from teacher to children and children to teacher. Yet, here too, the teacher's known elicitation questions were dominant. Particularly during whole-class teaching, children were also asking questions, commenting and actively involved in the activities. Small-group activities (with or without an adult) demanded child involvement and some times child-initiation. The teacher organised small-group activities to encourage children to be active, as well as take turns. Other small groups, who worked with a support teacher or an adult, were encouraged to be actively involved in the activity and talk to the adult.

The use of the outside play area particularly involved active and child involvement to the activities whilst it was supervised by the support teacher. During one observation visit, the support teacher and one small group (working as two teams) were throwing a ball through the hoop in turn and putting a green brick into their bucket when they scored. At the end of the activity they came together to count how many green bricks each team had. Then, with the help of the support teacher, they prepared their own chart to show their score. During the plenary session children in these teams were selected to explain their activity as well as their charts.

8.4.3. Rural-C School

a) Classroom layout and mathematical resources/materials

The RC in Rural-C School had an adequate classroom with a few activity corners, i.e. home corner, shop corner or science corner. In the classroom, there were no sand and water tank facilities. For a home corner, there was a little tent that was decorated with some colourful cushions and clothes. The science corner involved some little flowerpots, some stones and rocks gathered from the school garden and also a big glass tank, in which there were some snails. Moreover, there were some storage cupboards for games, jigsaws, books, pencil pots, crayons and some other equipment. However, in general, storage for big toys, even books was a big problem for the teacher and she used a garden shed as a storage facility.

A big playground area surrounded the school. RC children shared half of the main playground with the rest of the infant-aged children (Year 1 and Year 2 of six and seven years). Also at the back of the RC there was another exit leading to a small outdoor play area, designed especially for RC children, with a small garden shed of equipment and outdoor play toys. The outdoor play area was always well organised and was used for daily mathematics activities by a group of children in turn. There was only one computer and the children did not use it, as there was no encouragement to do so from the teacher. During the daily mathematics lesson, the teacher employed varied and stimulating equipment both commercially and home-produced. This was the most characteristic aspect of this teacher in Rural-C School.

b) Grouping Arrangement for Mathematics Activities

The children in Rural-C School's RC were ability grouped. In the classroom there were five groups, Tigers, Lions, Crocodiles, Bears and Zebras. The Lions included the most able children, while the Bears were the least able ones. According to the teacher, through the year some children changed their groups and this grouping was only for mathematics and literacy. In fact, some children who were most able in mathematics were not good at literacy and they were placed in a second or third group for certain activities. In a normal day, children would experience a number of grouping arrangements.

During the daily mathematics activities, there was whole-class teaching and introduction of the day's topic to the whole class for a period of time. Then the teacher divided the classroom into five smaller groups and explained what they were going to do. Three of those groups would do adult-led activities; one group would play freely in the toys area; while the last group would play in the subject-oriented play corner and initiate their own activities. The children in those two play groups would be called by an adult, who had completed the activity with the first group, to do adult-led activities, in turn.

In the small-group teaching time the teacher spent roughly ten minutes with each of two groups. She swapped around during the small-group teaching time. Observations showed that the teacher was working with two more able groups most of the time. Less able groups would normally work with the teaching assistant, volunteer adult or SEN teacher, who came to the class for a special needs child.

c) Lesson Structure

In Rural-C School, the teacher organised a fifty to fifty-five minutes daily mathematics lesson (except on Fridays) before lunch-time. All classroom observation visits, showed that she had a whole-class session that lasted between twenty to twenty-five minutes; small-group activities lasting between twenty to twenty-five minutes, and a plenary that session took around eight to ten minutes.

Lengthy whole-class sessions would involve counting activities, introduction of the day's topic as well as some games activities related to the day's topic. For example, one observation visit field notes showed that the day's topic was ordinal numbers (i.e. 1st, 2nd, 3rd… 10th). Firstly, the teacher introduced on the board then the later part of the whole-class teaching involved a toy train and its carriages with passengers. Children in turn drove the train and added a track or a passenger by labelling with an order number (i.e. 1st carriage or 6th passenger). Normally, before children went to work in their small-groups they were already familiar with the day's topic because of the teacher's detailed explanations, as well as several example activities presented on the carpet.

Small-group activities normally took twenty to twenty-five minutes and each planned activity could be done at least by two groups by swapping out. Around eight to ten minutes plenary sessions were well planned and took place on the carpet as a whole class in order to revise the day's topic. For example, during the plenary session of the same lesson (explained above for a whole-class activity) the teacher called out ten children and asked them to line up. Then they discussed who was 1st, 2nd, 3rd…. and who was 10th. She

repeated the same activity with the rest of the children and sent them in small groups to wash their hands.

d) Use of Classroom Assistant (Teaching Assistant)

As well as the class teacher, there was one full-time teaching assistant and an SEN member staff supporting a child with Down's syndrome. Also for three days in a week, a volunteer male adult was helping in the RC as he was intending to study early years education. Additionally, there was a regular parent helper. For the mathematical activities the adult: child ratio was usually 1:7 or even some days 1:5.

e) Objectives/Content of Mathematics Lesson

During the visits to the school the teacher addressed these objectives for the mathematical activities in her classroom:

- In practical activities and discussion, begin to use the vocabulary involved in adding and subtracting;
- Begin to relate addition to combining two groups of objects, and subtraction to 'taking away';
- Use language such as circle or bigger to describe the shape and size of solids and flat shapes;
- Use everyday words to describe position;
- Use developing mathematical ideas and methods to solve practical problems.

f) Patterns of interaction taking place during the lesson

Similar to Rural-H School' RC, the interaction between the teacher and the children in Rural-C School's RC seemed two-way in influence from teacher to children and from children to teacher, although known elicitation questions were still dominant. In this school child-initiated activities were more prevalent than in either schools, Urban and Rural-H. The teacher in Rural-C School had

a warm relationship with the pupils, encouraged them to talk and waited till a child finished her/his speech. After incorrect answers she said: ‘it was good try, good boy/girl’ or ‘try one more time and I will help you’.

Support teacher involvement for the activities in this school was focused on and prioritised child’s active involvements to the activities. Yet, mostly cutting and sticking, painting activities were left to the support teacher or other adults. The field notes indicated that apart from the class teacher the other adults spoke little or rarely asked questions about the activity. During the small group activities when the class teacher finished working with her group she visited other small groups stayed a few minutes to check how they were doing and sometimes she asked questions to the children about their work. Although the adult child ratio was high in this school, it was observed that the in-depth interactions and discussions about the day’s topic were only initiated by the class teacher. During the inside or outside activities the other adults including the support teacher seemed to supervise children focusing on health and safety issues.

8.5. Discussion of Field Notes Findings

a) Classroom layout and mathematical resources/materials

The data from the field notes indicated that in three schools’ RC classrooms the layouts and the use of mathematical resources were different. Physical learning environments, as Siraj-Blatchford *et al*. (2003) suggested, should provide opportunity for the children to be active and to begin to take the initiative to learn. In Rural-H School the large inside area was well-organised

to enhance children's active learning opportunities with a variety of play activities. In the Urban School, it seemed that insufficient space had a negative impact on practical activity, as it meant there was little space for some activities corners, i.e. home corner, water and sand tray, in order to deliver all areas of the Foundation Stage curriculum evenly. On the other hand, although the Rural-C School had a small classroom, too, the teacher organised inside as well as outside area skilfully. Children in this school had chances to be active, initiate their own learning and had plenty of play opportunities.

Moreover, it would appear that use of technological facilities, i.e. computers and interactive white boards was also different from among the schools. Use of technological devices to help children's learning was rarely observed in both Rural-H and Rural-C schools. Yet, in the Urban School, all the computers were in use and children were encouraged to use them on the regular base. Particularly, use of the interactive white board for mathematics games and activities gathered children's attention and made them to join in the activities with enthusiasm.

b) Grouping arrangement for mathematics activities

Setting their class into ability groups for intensive teaching was a typical way of grouping among the three RC teachers. This is a known as a common fact for some curriculum areas in primary schools and in early years settings in England (Hastings & Wood, 2002 and Baines *et al*. 2003). Yet, it should not mean that procedures of grouping as well as the experiences offered in small groups were the same in all three schools. In the Urban School, small-group

teaching time was protracted and seemed exhausting for the children, whilst short and fun activities were provided in the rural schools.

Moreover, in the Urban School and Rural-H School almost all the small-groups with different level of abilities did all the planned activities during the daily mathematics lesson by rotation. Bennett *et al.* (1984) suggested that offering the same or the similar task demands for children at different levels of attainment would disadvantage some children, particularly high or low achievers. In the Urban School, the field notes observations suggested that some tasks and activities small groups carried out seemed very demanding for less able children, as they were planned for the more able ones. Yet, in Rural-H School some small group activities were not challenging enough for high achievers. However, in Rural-C School during the small-group teaching time, only two small groups (most of the time the more able ones) would have a chance to work with the class teacher. The other groups would see and work with their teacher, when she visited their groups and was involved their activities for a couple of minutes mainly for monitoring purposes.

c) Lesson Structure

The field notes suggested that the three teachers' organisations of daily mathematics lessons or activities were varied despite some similarities.

27 Figure 8.1. Lesson structure in three schools

	Introduction or whole-class teaching	Main activities/ small-group teaching	Plenary session	*Total Duration*
Urban School	N/A (instead 25 to 30 min register and phonic activities)	Double small-group teaching/activity time (35 to 40+ 30 to 35= 70 to 75 min)	N/A	*2 hours (including playtime)*
Rural-H School	Counting (10 minutes) and double whole-class act. (10+10 min)	Double small-group teaching/activity times (30+30 min)	Double plenary session after each part of the double lesson (7+7 min)	*2 hours (including playtime)*
Rural-C School	*22 to 35 minutes whole-class counting & teaching*	*20-25 minutes small group teaching/activity times*	*8 to 10 minutes plenary session*	*55 minutes to 1 hour*

Figure 8.1 presents the lesson structures in the three schools and indicates that mathematical activities were organised as distinct/block lessons instead of integrating with other areas, even at the beginning of the year. This was consistent with the data gathered from the RCs teachers as well as the findings of OfSTED (2001). OfSTED indicated that most reception year teachers start teaching a three-part daily mathematics lesson from the beginning of the autumn term. However, the three teachers' lesson observations showed that duration of distinct block lessons was varied: two hours before lunch in the Urban and Rural-H schools and 50 to 55 minutes in Rural-C, throughout the year. Yet, the recommendations and expectations for lesson organisations in policy texts, the NNS and the CGFS, were different.

The NNS booklet for the RC, MAFS/R (DfES, 2002a) expected teachers to integrate mathematics activities with other areas at the beginning of the reception year. By the end of the year, however the teachers were expected to organise the daily mathematics hour which should take 45 minutes and gradually become more like that of lessons in Year 1 to 6.

d) Use of Classroom Assistant (Teaching Assistant)

Field notes suggested that the ratios of adult to children in the three RC classes were high and encouraging, especially during the mathematics lessons/activities. In the multicultural Urban School, bilingual support teachers' main role seemed to be to ease the communication between the staff and the children. Otherwise, they were not involved in intensive teaching/learning activities. In Rural-H school, the support teachers led well organised small-group activities, including the outside activities. However, volunteer adults, who were parents, in all schools were not involved in high-level interactions with the children, but supervising them for the health and safety purposes.

e) Objectives/Content of Mathematics Lesson

In the Rural Schools, the teachers were addressing a variety of mathematics objectives for the RC stated in the CGFS and the NNS. However, in the Urban School, it would appear that the main focus was on numeracy objectives.

f) Patterns of Interactions Taking Place during the Lesson

In the three schools, in order to enhance children's learning as well as their participation in teaching, the teachers used regular questioning but mostly of the closed types. Siraj-Blatchford *et al*. (2003) found out that in RCs most learning episodes initiated by adults and highest proportion of the activities was direct teaching. The findings of the field notes taken in three RCs in this study suggested the same, particularly in the Urban School. It can be stated that in this school, 'shared thinking' that increased sustained learning was rare. Intensively, children were responding to teachers' queries in a non-

verbal or verbal way. As well as answering closed questions, ‘finding’ or/and ‘showing’ what the teacher wanted were common pedagogy. On the other hand, in the Rural Schools, the adult-and the child-initiated learning episodes were in balance as children were actively involved (particularly in the small-group activities) but also in the mathematics lesson and initiated talk or activities.

8.6. Results of Video-recording Transcripts Analysis

8.6.1. Urban School

a) Whole-class Activities in Urban School

On the day when the classroom observation was carried outand the video-recording taken the lesson was as follows. Children were on the carpet and the teacher did the register by reading children’s names. Then she did the dinner register by checking children, one by one, whether they had got packed-lunch or ate school dinner. When the teacher finished with the register books, she asked some closed questions about both registrations, i.e. the number of students in the class and asked children to count 10 by 10 up to 100. During the whole-class teaching time these were the only counting activities.

Setting up the calendar and counting how many days left to Muslim Eid were two other activities. For the calendar, a child was invited to find the day, and the date. The teacher emphasised that ‘the calendar shows it was Friday when we came here last, so which days come after Friday?’ This created a little discussion and two children told their views briefly. When they counted

how many days were left before Eid, one child was invited to count the marbles in a jar and took out one of them for one day, but today he was asked to take out three of them (two for the weekend one for the day).

Before dividing her class for the small-group mathematics activities, the teacher introduced some literacy work (phonics) and asked children to sound out. The children's response to this activity was expected to be choral. Without any introduction of the day's topic or the activities for the mathematics lesson children were sent to their groups for mathematics activities.

In general, the registration activities were directed by the teacher and her initiations were coded by help of the software Nvivo7 presented in figure 8.1 below.

28 Figure 8.2. Teacher questions and initiations during the registration in Urban School

Names of the codes	Frequency
Asking closed question	9
Inviting a child to demonstrate	3
Leading choral counting	3
Explaining	3
Praising	3
Disciplining	1

Figure 8.2 shows that the teacher was mostly 'asking closed questions' (9 references). This was followed by 'inviting a child to demonstrate', 'leading choral counting' 'explaining' and praising (3 references each). The teacher also involved 'disciplining' (1 reference each) unwanted behaviour.

It could be argued that the whole-class introduction activity in Urban School was merely for registration purposes. It did not involve any whole-class teaching, introduction of the day's topic or objectives, open questioning and

mental mathematics activities as they were expected in policy texts for example, the NNS.

b) Small-group Activities in the Urban School

The teacher divided 30 children into three groups: Red group went out for play with a support teacher, Blue group did cutting and sticking with another support teacher and the Yellow group worked with the class teacher during the whole-class time on the carpet. Children in these middle-size groups (as there were at least ten children in each) started their activities without being informed what they were going to achieve or try to achieve during these activities.

The teacher and the Yellow group sat on the carpet and counted how many children they were, how many legs, arms, ears, noses, eyes, hands they had. Then the teacher delivered number fans to the children to do ‘find’, ‘show me’ and/or ’tell me’ activities. The teacher showed a number, asked children what it was, and then asked them to show on their fans. The numbers the teacher asked were less than ten (one digit numbers).

While the first part was easy and involved finding and showing one digit numbers, the last part of the activities seemed more complicated. The teacher threw two dice and asked children to tell the numbers and add them and then she wrote the sum of those numbers on the board. Then the teacher introduced a worksheet to the children and explained the activity. For this activity the teacher threw both dice; children drew the dots on each dice on their worksheet and the numerals, counted them together and put the equals sign, and then wrote the results of the addition. This activity took a long time

to understand for some children. Altogether, small-group teaching time took thirty-eight minutes and then the children were sent to wash their hands for lunch.

Codes emerged from the video-recording transcript analysis by the Nvivo7 are given below (figure 8.2). It shows that through the lengthy small-group teaching activities, the majority of the teacher initiations involved inquiries of 'find and show me' or 'tell me' (14 references), especially during the later part of the small-group activities. For the elicitation purposes, the teacher questioned ('asking closed question') introduced the writing activity ('introducing and explaining the writing activity') and asked children to count ('asking to count') (10 references each).

29 **Figure 8.3. Teacher questions and initiations during the Small-group teaching time in Urban School**

Name of the codes	References
'Find and Show me' or 'Tell me'	14
Asking closed question	11
Introducing and explaining the writing activity	10
Asking to count	10
Leading counting	5
Explaining	4
Praising	4
Asking open question	3
Disciplining	1

These were followed by 'leading counting' (5 references), 'explaining' (4 references) and by 'praising' with 4 references. 'Asking open question' appeared in her practice through the lesson and had 3 references. Lastly, 'disciplining', i.e. warning a child to be quiet, had 1 reference.

It could be argued that small-group activity time in the Urban School seemed very intensive. It involved teacher queries for the pupils, questions (mostly closed) and instruction for the activities.

c) Plenary Session

There was no plenary session after the small-group teaching time the children went to wash their hands and got ready for the lunch-hall.

8.6.2. Rural-H School

a) Whole-class Activities

Before the school assembly and after registration RC were doing mental mathematics and counting activities. They counted in ones, in twos and in tens and then counted backward in tens by starting from one hundred. After assembly, on the carpet the teacher said they would carry on doing 'time' activities they started the day before the videoing. She did not introduce it again, yet, figure 8.3 shows, she briefly explained ('explaining', 4 references) what they needed to do whilst they were making time on a clock as well as introducing some activities that some groups would do during the small group teaching time.

30 **Figure 8.4. Teacher questions and initiations during the first lesson of whole-class teaching time in Rural-H School**

Name of the codes	***References***
Explaining	*7*
Asking closed question	*3*
Asking open question	*2*
Child-initiated discussion	*1*

During the short whole-class teaching time 'asking closed questions' constituted 3 references, 'asking open questions', 2 references. One open

question led to a ‘child-initiated discussion’, it was short but interesting as the child was talking about his daily routine. Both, the open question and child-initiated discussion are given below:

> TEACHER: OK, have a look carefully (referring to a picture of a child). What is he doing here? Is he getting up? Or going to sleep? What is he doing? [*Coded as a ‘asking open question’*]
> SOME CHILDREN: Yawning, he is yawning…
> TEACHER: What do you think he is doing?
> SOME CHILDREN: going to sleep.
> TEACHER: going to sleep.
> ONE CHILD: Mrs L., sometimes I yawn while I am here [coded as ‘*child-initiated discussion’*].
> TEACHER: yes you are, some times you do big yawning.
> ANOTHER CHILD: I do yawn before I go to sleep and in the morning when I wake up (she is saying some other things she does when she wakes up, but it was hard to understand the whole conversation)

It was unfortunate that the teacher invited the researcher for video-recordings the day after she introduced the day’s topic and this limited the opportunity to see her whole whole-class teaching practice. However, it seemed that the children well understood the day’s topic, ‘time’, when it had been introduced as they responded well to the organised activities.

After play-time before the second part of the lesson the teacher called children on to the carpet for a short whole-class talk. Figure 8.4 (below) shows the teacher’s initiations and questions during the second whole-class activities. She recapped the previous lesson, and re-explained the day’s topic and how to make a time on a clock (‘explaining’, 3 references). In this part, ‘asking open question’ constituted 1 reference, whilst ‘child is asking question’ constituted 1 reference. For the first time, a child was asking a question related to the activity.

31 Figure 8.5. Teacher initiations and questions during the second lesson whole-class teaching in Rural-H School

Name of the codes	References
Explaining	3
Asking open question	1
Child is asking question	1

Arranging the second whole-class gathering on the carpet, thus, gave her chance to remind children of the day's topic as well as learning objectives before children starting to do the second part of the lesson. As well as that, she re-explained the activities children would do in their small groups. These were nearly the same activities that took place in small groups during the previous lesson (will be presented below under the small-group activities subheading).

b) Small-group teaching time in Rural-H School

At the end of the whole-class activities on the carpet, the teacher divided the class into small groups and explained what they were going to do in their groups with an adult or without. There were five small groups: one worked with class teacher to complete pieces of a puzzle by throwing dice and sticking them as a whole clock on a paper. The second group worked with the support teacher to play 'clock bingo': the support teacher picked times, i.e. ten o'clock, three o'clock, in a bag and children covered the corresponding area, if they had this, on their card. When they covered all the clocks they would shout 'bingo'. The third group worked with the other adult supporter to cut clocks and stick them on a piece of paper. The fourth group was sent to the home corner to play freely, the fifth group split up and was sent to two different areas: to a table with clocks and to a table organised according to the

day’s topic. All these groups swapped the activities during two hours of mathematics lesson.

The teacher with a small-group (five children) sat around a table. In front of each child there was an envelope and a paper plate (dish). In the middle of the table there was one big dice. The teacher explained the activity: ‘open your envelopes and take out the pieces of clock puzzle and put them into your dishes’. In turn, children threw the dice read the number on it and found the clock puzzle piece with the same number of dots on it and put it on the table. In order to complete the clock puzzle children had a turn to throw the dice and took out the corresponding piece and tried to complete the clock. When a child completed he/she was told to stick it on a paper. When the pieces were put together correctly every child had his/her own clock.

32 Figure 8.6. Teacher initiations and questions during the small-group teaching time in Rural-H School

Name of the codes	References
'Throw the dice'	19
'Find the piece'	19
Explaining	3
Asking closed question	2

Figure 8.5 (above) shows the teacher initiations and questions during the small-group teaching time. The main instructions of the teacher were ‘throw the dice’ (19 references) ‘find the piece’ (19 references). In her initiation ‘explaining’ constituted only 3 references but the duration of explanation was much longer than the total of some other activities, i.e. ‘throw the dice’ or ‘find the piece’ in this part of the lesson. ‘Asking closed question’ was not frequent (2 references), whilst there was no open question.

It would appear that the teacher directed the small-group activities with some instructions (i.e. ‘find this number and show me’) and children’s responses would not necessarily be verbal, but mostly non-verbal and not demanding a high level of thinking. Thus, children’s contributions would rarely be sustained or encourage higher cognitive interactions.

c) Plenary Session in Rural-H School

As was mentioned, the teacher in Rural-H School planned a double mathematics lesson in the morning. After each part of the lesson when the tidy-up was finished the teacher gathered children on the carpet and did a plenary. The video-recorded observation indicated that the first plenary took 6 minutes, whilst the second plenary (after second lesson, before lunch) took 17 minutes including the story and short discussion after.

During the first plenary the teacher asked children to sit in pairs to share a clock. The teacher asked children to ‘make/show’ a time on their clock. For example she asked, ‘can you make two o’clock’, ‘two o’clock’, and ‘show me’. Then the other child in pair had a turn to use the clock to make the next one. After a couple of tries the children were sent to wash their hands for their milk and fruit time before outside play.

During the second plenary, after the second lesson, the teacher asked all children to look at the clock and asked them what the time was. Then they agreed there were 18 minutes to 12 o’clock when they would get ready for their lunches. Then the teacher asked children what would happen if the clock stopped working and they discussed that. The teacher introduced a big size story book and read it. When the story finished she showed the pictures from

the book and opened discussion about what people normally do during the day-time or night-time, what the children would normally do during the night time and so on.

The figure 8.6 shows that during the plenary session in Rural-H School questioning was a dominant initiation (‘asking closed question’ had 10 references, ‘asking open questions’ had 8 references). This was followed by ‘explaining’ with 4 references, meanwhile teacher’s instruction of ‘show me’ had 3 references and ‘disciplining’ had 2 references.

33 Figure 8.7. Teacher initiations and questions during the plenary session in Rural-H School

Names of the codes	References
Asking closed question	10
Asking open question	8
Explaining	4
'Show me'	3
Disciplining	2

It could be argued that the teacher’s closed and open-ended questions increased pupils’ contribution to the lesson. Thus, it seemed that the day’s topic had been reviewed and reinforced in an interactive way by the involvement of the both sides, teacher and children.

8.6.3. Rural-C School

a) Whole-class Activities in Rural-C School

The mathematics lesson in Rural-C School was after PE lesson and before lunch time when the lesson was video-recorded. It took almost one hour. Children were sitting on the carpet and the teacher firstly introduced counting activities for a couple of minutes. The day’s topic was ‘shapes’ including both 2-D and 3-D. In a bag she put some 2-D and 3-D shapes and asked children to sit in a circle. They sang a song ‘What is in the bag? What is in the bag?

Eya, eya, ey' while passing the bag to their next friend. When the teacher told them to stop, the child who held the bag put his/her hand in the bag and felt a shape then described it. The rest of the children tried to guess the described shape. During the whole-class time, all the shapes in the bag were described and taken out one by one.

34 Figure 8.8. Teacher initiations and questions during the whole-class teaching in Rural-C School

Name of the codes	References
Asking closed question	21
Explaining	11
Describing the shape	8
Singing	7
Leading choral counting	6
Asking open question	6
Praising	6
Demonstrating	2
Introducing the day's objective	1

The software program (Nvivo7) analysis has been presented in figure 8.7 which shows that 'asking closed question's' was frequent (21 references) as teacher's initiation during the whole-class teaching. This was followed by 'explaining' (11 references), 'describing the shape' (8 references) and 'singing' (7 references), while passing the bag hand to hand. This mostly play-based whole-class activity also involved teacher's initiation of 'leading choral counting'; 'asking open questions' and 'praising' children's effort (6 references each). Meanwhile 'demonstrating' constituted 2 references and 'introducing the day's objective had 1 reference.

It can be argued that the whole-class activities in the Rural-C School involved very intensive talk, discussion and active involvement of the children. Although the activity time took almost 30 minutes, children's active involvement created a lively environment.

b) Small Group Activities in Rural-C School

While the children were on the carpet, the teacher explained what each of five small-groups would do. On the wall there were some little pockets which belonged to small groups. The children and the teacher were looking at the pockets to see what they were going to do. Below, with the teacher's own words, children's small-group activities were explained:

> Lions, you are going to work on the table with play dough. You are going to cut out some play dough to make some different shapes- those we have talked about.
> Tigers you are going to start on the carpet and you are going to building a Luna park. There are lots of shapes in there, squares, triangles, oblongs and circles.
> Crocodiles you are going to work with Mrs Elton. You are going to do some printing with shapes and some paint with a sponge. It is sponge print which is really good so you are lucky.
> Zebras you are going to start with the graphic area and we will work together. Then you are going to swap and either you will work on the carpet and do some building, or go to the home corner and do whatever you like. On the graphic area, there are a lot of pictures, a lot of brilliant shapes, houses with some pointy roofs and robots etc. You are drawing around them and colouring them.
> Bears you are going to work outside with Chris. I will come and help you, Chris to get the equipment out, and you will get some 3-D shapes - some cubes, some cylinder, cuboids to work with. You are going to do some building with some big spongy shapes. OK, you will have a little swap after about ten minutes,. OK, everybody happy? Off you go.

After these detailed explanations children went to their groups. Adults (support teacher and volunteer adult/s) and the children seemed they knew what they were going to do. The teacher worked with her small-group, Zebras, and she re-introduced some shapes, i.e. square, rectangle/oblong, and circle. On the table there was some daily equipment or objects all were made up of 2-D shapes. For example, a robot was made with a rectangle legs, square body and triangle head. For a few

minutes they talked about the shapes and the teacher showed how they could use some 2-D shapes to draw their own pictures and then she told children to colour them in. While this group was working, the teacher left them and went outside to check how the Bears group was doing.

The group (Bears) was building a house with big sponge 3-D shapes with an adult helper. The teacher involved herself in their activities and started talking to the children.

> TEACHER: who can tell me, who can tell me, Olivia and Ray, what is that shape?
> CHILD 1: it is square
> CHILD 2: it is a cube
> TEACHER: it has got square faces but it is a cube. It is cube well done, because it is a 3-D one isn't it? Ohh, what is it?
> CHILD: outside of the house
> TEACHER: ohh, that one could be the roof, it is like a big cone isn't it?
> CHILD 2: what is that one?
> TEACHER: ohh, I don't know, it is like a ... it is like a, look, it has lots of sides, how many sides are there on that one, let's count…

After this stimulating involvement, she went inside to check her own group (Zebras) talked about their activities and sent them for another activity or free play. Then she went to Lions' table where this group were cutting play dough to make 2-D and 3-D shapes. Part of her involvement with Lions' activity was like that:

> TEACHER: ohh, how lovely. I love it, you are making a cuboid aren't you?
> CHILD: my one is the biggest cuboid.
> …
> TEACHER: is it? Well done, ohh, dear. You can make a sphere Lora, try that one. Yes Lora, well done, it looks great.
> …
> TEACHER: How many faces does a cube have got? Can you remember? Shall we count?
> TEACHER and the CHILD: 1, 2, 3, 4, 5, 6.
> TEACHER: it has 6 faces

In Lions group, two children finished their task and she sent them for another activity on the carpet to build a Luna park. Then the teacher went back to the graphic area called Tigers there, introduced the activity and showed some examples. Before she left them to work by themselves, she explained to them what to do and went to check the free play area, where a few children were playing freely. The teacher did not stay more than five minutes in any group, but moved all the time to check, explain or question the children about their activities. Her involvement seemed supportive and stimulating, as she pulled children's attention to the day's topic, shapes and their properties, while they were playing or doing their activities.

The Nvivo7 analysis counted frequencies of teacher's initiations through small-group activities with all the groups. The results are given below (figure 8.8). As it has already been mentioned, during the small-group-activities time the teacher was moving around and involving herself in groups' activities. Therefore, it seemed that the main strategy was 'asking closed question' when the teacher involved small-groups' activities, as it had 10 references. 'Explaining' the activity constituted 5 references, yet the frequency was higher or took more time than the total of other teacher initiation codes.

35 Figure 8.9. Teacher initiations and questions during the small-group teaching in Rural-C School

Names of the codes	References
Asking closed question	10
Explaining	5

It seemed that the teacher in Rural-C School was very active during the small-group teaching time. By involving herself in children's activities while they

were in small-groups and working with or without an adult, the teacher had a chance to question children, explain further and sustain their learning.

c) Plenary Session in Rural-C School

In Rural-C School, plenary sessions were organised regularly. During the video-recording day, the plenary session also took place to revisit and review the day's topic 2-D and 3-D shapes. After tidy-up time, the teacher invited children to the carpet and told what they were going to do:

> TEACHER: this is a little test time… let me see how many shapes you can remember, you do not need to put hands up. Once I am going to show a shape and you will call out all together but not shouting…

The Nvivo7 analysis in figure 8.9 shows that the teacher showed the shapes, 2-D or 3-D, ('showing a shape/asking closed question', 7 references) one by one and each time waited for a choral response (leading choral response, 7 references). Including the extract above the teacher explained (explaining) the activity 2 times. Thus, she briefly re-focused on the learning objective of the day which was learning the properties of the 2-D and 3-D shapes.

36 Figure 8.10. Teacher initiations and questions during the plenary session in Rural-C School

Names of the codes	References
Showing a shape/Asking closed question)	7
Leading choral respond	7
Explaining	2

In general, it can be argued that Rural-C School teacher was seeking active involvement of the children to any part of the lesson. During the daily mathematics lesson which was almost one hour, she introduced the day's

topic, provided well-organised and stimulating small group activities and revised the topic in the whole-class plenary session.

8.7. Discussion of Video-recording Findings

a) Whole-class Teaching/Activities

The NNS (DfEE, 1999a) and the MAFS/R (DfES, 2002a) emphasised the role of the whole-class direct teaching for the mathematics lessons/activities. The MAFS/R recommended that a whole class activity should almost always include some counting and some teaching of the whole class on the topics of the day. The video-recordings data suggested that the teachers' whole-class practice in three schools RC classes differed completely from each other as well as from the policy texts' expectations.

In the Urban School, although children were gathered on the carpet there was no introduction of or teaching of the main day's topic to the whole class. The short counting activities involved counting numbers of the students present in the classroom and on the school dinner register. It could be argued that these activities were not challenging or demanding enough.

In Rural-H School for counting activities, some time (ten to fifteen minutes) was devoted and took place after register but before the school assembly and involved a variety of counting activities. The introduction of the day's topic took place on the carpet when children came back from the assembly and before the small-group activities. Normally (according to the field notes) the teacher would introduce the day's topic in a detailed way. Yet, video-observation in this class indicated that the teacher reported that she had

introduced the day's topic the day before the observation and did not re-introduce it in detail whilst being observed.

In Rural-C School, whole-class activities were started with some simple counting (counting children in the classroom) which did not seem highly challenging. Then the day's topic was introduced as well as exemplified by the active involvement of the children. The video-recordings transcript suggested that the whole-class teaching time lasted more than thirty minutes, yet it did not seem exhausting for the children as it also involved some games and singing. Thus, it would be argued that although the expectations of policy texts were clear about the mental starter (or counting activities) and introduction of the day's topic, in practice there were a variety of ways for implementation of these in three RCs.

The video-recording transcripts' analysis of the three RC teachers shows that there was little overall variation in the patterning of the teacher exchanges during the whole class teaching. Teacher-directed questioning, mostly closed-ended, and explaining made up the majority of discourse moves in all three schools. This is consistent with what Siraj-Blatchford *et al*., (2003) and Hardman *et al.,* (2003) found. Therefore, teachers asked 'known interaction questions' which were known by the teacher and could be answered by one or two word answers. However, the data from the video-recordings revealed that in rural schools whole-class teaching activities (counting together and introduction of the day's topic) were more interactive and livelier than the ones in the Urban School. In fact, it was hard to suggest there was any whole-class interactive teaching activity in the Urban School.

b) Small-group Teaching Time

Organising small-group teaching activities was common in the three schools despite of some differences in the practice. In Urban School, the video-recording observation showed that each group (ten children in each) was doing more than half an hour of activities. The teacher in this relatively large group intensively taught, asked closed-questions and evaluated children's learning. Some part of the group teaching time in this school was dedicated for writing/recording activities, but it seemed that they were complicated to understand and hard to complete for the children. Without introducing the day's topic or objective of the lesson, the teacher's endless inquiries and questions seemed to create gaps and incompleteness in children's understanding.

The extract given below has been taken from the video-recording transcript of the Urban School. When the teacher introduced worksheets to her pupils in the small-group, some children seemed to be experiencing difficulties to understand the teacher's explanation or her expectation. One of the children who had difficulties to complete the worksheet sought some help from one of the researchers. She went to the researcher and showed her worksheet to check if she was right:

CHILD: (showing her work to the researcher)
RESEARCHER: 4 here and 1 more?
CHILD: 4
RESEARCHER: 4 and 1 more?
CHILD: (thinks)
RESEARCHER: what would be 4 and 1 more? (She points to 4 dots on one dice and 1 dot on another)
CHILD: 5

RESEARCHER: well done
CHILD: (laughs)
RESEARCHER: (points to number 4 to encourage the child to change it into number 5)
Researcher: 4 and 1 more
CHILD: 5
RESEARCHER: so there should be 5 here. (Then the researcher shows the next part) 5 dots and 1 more is?
CHILD: 6
RESEARCHER: yes!

This extract shows that although the activity was shown and explained by the teacher in the group, still some children were having difficulties to complete the decontextualised task and were uncertain about the requirements. It would appear that ten children in a small-group might make a teacher's job difficult as when the number of children increased in a group teacher's support to individual child might decrease. This leaves unanswered the question of whether the recording was appropriate.

On the other hand, it could be argued that in both rural schools, small-group activities with a maximum of five children seemed smooth, lively and playful. In these schools, it would appear that small-group activities were linked to the day's topic; each group had at least two different activities, one of which was play-based, while the other was supported by an adult. In Rural-H School the teacher and the support teacher/s invited small groups (four or five children) in turn to carry out a small group activity on a table, while at least two small groups were playing freely in the home or other dedicated corner. In this school, teacher's initiation involved asking closed questions, evaluating and supporting as well as asking children to take their turn. It seemed that in Rural-C School the teacher organised her role in a different way. Firstly, she spent some time with her own small group then she involved herself in other

small groups' activities by asking questions to get them thinking about the activity or introduced and reinforced the activity. By doing so, she was acting like an opera conductor, as she was supporting adult helpers or support teacher/s and her children's learning during their teaching of small groups.

It would appear that in rural schools children had chances to experience the variety of well-planned practical work and play. Yet, the long exhausting learning experiences offered to groups in the Urban School could be questioned as to their suitability for young children to learn mathematics.

c) Plenary Sessions

The plenary session was the ending and another important part of the daily mathematics activities. The NNS and the MAFS/R have emphasised the value of the session ending particularly for mathematical activities. In the Urban School the teacher missed the opportunity of revisiting or refining the day's topic by not planning a plenary session. In Rural schools the video-recordings observations suggested how well-planned the plenary sessions were and how they helped teachers to reinforce children's learning.

In Rural-H School the teacher organised a plenary session after each part of the double mathematics lesson. The first plenary involved pair works to renew how to make a time on a clock, whilst the second plenary involved reading a story and discussion directed by mostly open questions. This gave children a chance to discuss the activity they had been doing. The plenary session in Rural-C School was well-focused on the day's topic, short and sharp. The teacher showed the 2-D and 3-D shapes and the children gave choral answers.

8.8. Conclusion

This chapter presented, interpreted and discussed the classroom observations data which were carried in two ways, field notes and video-recordings, to capture three RC teachers' classroom practices. The findings emerged from the observations, indicating the RCs teachers took the mathematical learning of the children seriously and organised regular daily mathematics lesson/activities from the first term. Also, they used a variety of methods in delivering the mathematical curriculum in order to enhance learning in their classroom.

However, between the Urban School and both the Rural-H and Rural-C Schools there were apparent differences in practice. The teacher in the Urban School seemed more concerned about reaching curricular expectation and the attainment of certain numeracy targets for the children. She mostly focused on the numeracy side of the mathematics and preferred to work in large-sized groups to do intensive number activities that included recording. In rural schools, Rural-H and Rural-C, the teachers seemed relaxed and flexible about the curricular expectations, and these were observed to arise from mostly play-based mathematics activities particularly during the small-group teaching times. In general, in rural schools the teachers encouraged their pupils to talk, to interact and enjoy the activities, whilst in the Urban school the teacher tended to talk and direct a lot during the any kind of activities with little attempt to make children talk or actively join in the activities beyond recording.

In general, in three schools' RCs the teachers seemed to be interpreting the policy texts and re-constructing them during their practices in the classrooms. The personal interpretation and re-construction seemed to have been influenced by their educational understanding, particularities of their intake (i.e. multicultural or mono-cultural) as well as the resources and the facilities of their classrooms and schools.

In the next chapter target child observations will be introduced and discussed. This will allow closer examination of the RC practice from the child's perspective.

CHAPTER 9: TARGET CHILD OBSERVATIONS

9.1. Introduction

In the previous chapter classroom observations focusing on teachers' practice were introduced, findings were explained and discussed. The target child observations in three RCs also gave a chance to observe what actually happened in the life of an individual child during the mathematics lesson. The main source of child observations was the target child observations technique of Sylva *et al.* (1980). In this chapter, the observation schedules for target children will be analysed in a way that provided some quantitative modelling and presented.

These data will also be triangulated with the teachers' classroom observations, introduced and discussed in the previous chapter. In this chapter two observations a term and one video-recording for each child will be analysed, but this time, from the perspective of the target children in each class during the mathematics activities. Target children's experiences captured by video-recordings will be explained in a qualitative way as the teachers' experiences have been done in a previous chapter.

9.2. Aims

The main purpose of this chapter is to analyse and describe as well as report the findings from target child observations in three RCs. Target child observations aimed to answer the fifth research question:

- How did the RC children respond to the FS mathematics curriculum presented to them?

9.3. Methods

The researcher used the observation schedule of Sylva *et al*. (1980) in order to observe target children in the classroom. One day of classroom video-recordings for each reception class was also used to capture a visual record of target children's behaviour during the daily mathematics activities.

9.3.1. Participants

In three participant schools', RCs where classroom observations were conducted, a total of six target children were observed through the year. Figure 9.1, below, provides detailed information about the target children in three participant schools' RCs.

37 Figure 9.1. Target children observation information

Name of the School	Target Child. 1	Target Child. 2	Total observation time (hours)
Urban School	White British Girl Second eldest in the class Observed 2 hrs	White British Boy Second youngest in the class Observed 2 hrs	4 hrs
Rural-H School	White British Girl Second youngest in the class Observed 2 hrs	White British Boy Second eldest in the class Observed 2 hrs	4 hrs
Rural-C School	White British Girl Second youngest in the class Observed 2 hrs	White British Boy Second eldest in the class Observed 2 hrs	4 hrs
Total observation time in three schools			12 hours

For the selection of the target child the researcher received information from the reception class teachers, for example, their ethnicity, their age, as well as their attainments. The six children observed appeared to constitute a maximum sample variation in terms of age and gender. In two Rural Schools a hundred percent of the children were white British, thus target children in

mixed-ethnicity Urban School were selected from amongst the white British ones for consistency.

9.3.2. Materials

The classroom observation schedule of Sylva *et al.* (1980) was used. This involved four parts to be recorded, these were: ‘activity record’ (general information about the child and where s/he was), ‘language record’ (what the child said and what was said to him/her), ‘task code’ (what the child did) and ‘social code’ (whom the child was with). Except for the ‘activity record’ section (as this was used to understand the general context the child was in) the other three sections were analysed separately and they will be introduced in the results section. Sylva *et al*. (1980) described twenty-five task codes for the target child observation schedule (the schedule can be seen in Appendix C) and these were helpful to name the task carried out by the child.

9.3.3. Procedures

At the beginning the data collection period in the participant schools, consent letters were sent to all the children’s parents in three RCs. The letter included information concerning the ethical considerations of the researcher, the purpose of the study and how the study would be conducted with the children. This letter also included information about use of video-recording, as well as tracking some children’s learning experiences and their respond to the practices. None of the parents disagreed about including their children to the study.

Before target children were being observed, the teachers were informed about target child observations, what the researcher would do and they were assured that the researcher would avoid intervening unless there was a danger to children or property. The researcher sat in a corner and spent several minutes observing children before recording onto the observation schedule. As well as unrecorded pre-observations, 20 or more minutes were spent each time to get a full picture of what the child did. During the 20-minutes observation, 10 samples of observations were recorded. Although Sylva *et al*. (1980) described twenty-five task codes for the target child observation schedule, in the three participant schools a total of only fourteen of those task codes were observed.

9.3.4. Analysis

Each observation schedule was treated in much the same manner for consistency. The first part of the observation schedule provided the context (as Sylva *et al.,* 1980 did). The other three parts of the schedules (language record, task codes and social codes) were counted for the frequencies or duration of the time in order to answer the following questions.

- Who initiated the interactions, how many times and who responded;
- What the child was doing and how long it was taking;
- What the social setting of the child was and how long it was maintained.

The data from target children observations were analysed and coded according to those stated questions. The video-recordings of the target

children were watched several times, also described and analysed in qualitative way. The emerging themes and issues from data gathering will be reported separately below.

9.4. Results of Target Child Observations

In this section the results of six sets of twenty minute target child observations and one day's mathematics activities by video-recordings will be introduced. Target child observation data will be quantified and displayed in tabular form, whilst the themes from video-recordings will be presented and examined.

9.4.1. Results of Target Child Observation Schedules

Language Record: Who initiate the interactions and how many times

The language record section on the observation schedules involved the language and interactions between the target child (TC), adult/teacher (A), another child (C) and other children (CHD). From the left sides of the table (9.2) the direction of arrows between those, target child, another child, and adult show who spoke to whom, whilst frequency means how many times this conversation took place.

38 Figure 9.2. Language code and frequency of speech

	Urban School		**Rural-H School**		**Rural-C School**	
Who initiated the conversation	**Target Child-1 (Girl)**	**Target Child-2 (Boy)**	**Target Child-1 (Girl)**	**Target Child-2 (Boy)**	**Target Child-1 (Girl)**	**Target Child-2 (Boy)**
	Frequency	**Frequency**	**Frequency**	**Frequency**	**Frequency**	**Frequency**
TC →A	7	6	12	14	11	12
TC→C	6	7	13	15	8	8
A→TC	9	5	12	12	9	7
A→TC+CHD	28	25	14	13	20	16
C→ TC	3	4	12	12	6	3

Table 9.2 shows that in the Rural-H and -C schools, target children spoke to the adult nearly twice as many times as those in the Urban School. Target children spoke to another child and adults spoke to target children with higher frequency in the Rural-H School compared to the Urban and Rural-C Schools. In the Urban School, the teacher/adult spoke to children (A→TC+CHD) frequently, whilst children spoke to her infrequently. Other children talked to the target child very little in the Urban School and in Rural-C School, yet it was very frequent in the Rural-H School.

In general, the teachers initiated and talked much in the three schools. Target children in all schools seemed to be speaking to others (another child or adult) very often, particularly in both Rural Schools. In the Rural-H School it seemed that the flow of speeches (from target child to adult, from adult to target child, from target child to another child and from another child to target child) was in balance.

Task Codes: What the child was doing and how long it was taking

The task codes were used to describe the child's behaviour, what s/he was doing during each interval of the observations during the mathematical activities.

39 Figure 9.3. Task codes: what the child was doing during the mathematical activities

	Urban School		**Rural-H School**		**Rural-C School**	
Task Code	Target Child-1(G)	Target Child-2 (B)	Target Child1 (G)	Target Child-2 (B)	Target Child-1(G)	Target Child-2 (B)
	Duration (Minutes)	Duration (Minutes)	Duration (Minutes)	Duration (Minutes)	Duration (Minutes)	Duration (Minutes)
ADM (adult-directed art and manipulation)	90	78	50	42	22	36
ART (art)			14			
PM (purposeful movement)		2	4	4	6	4
MAN (manipulation)	4		12	20	12	
SSC (small scale construction)		10	10			
3Rs (reading, writing, counting)	14	18	10		56	52
DB (distress behaviour)		2		10		6
IG (informal games)				24	4	12
SINP (social interaction non-play)				2		
PALGA Passive adult-led group activities)	12	8	10	8	10	
PRE (pretend)					8	
W (Wait)		2			2	
CR(cruise)						6
DA (domestic activity)			10	8		4
Total(minutes)	120	120	120	120	120	120

Table 9.3 shows children were most frequently doing adult-directed art and manipulation activities; this was particularly the case in the Urban School. However, in Rural Schools, especially in the Rural-C the time children spent on reading and counting (3Rs) activities seemed longer than the other

activities the children engaged in. Apart from these two activities, the other activities the children carried out occupied little time. These were manipulation (total of 48 min but mostly in Rural schools); small scale construction (10 min in Urban and 10 minutes in the Rural-H School); informal games (total of 40 minutes and it appeared in only Rural Schools) and passive adult-led activities (total of 48 min in three schools).

Yet, some of the activities were carried out for a total of 20 or less minutes by all the target children, these were: purposeful movement (20 minutes) and art (14 minutes) distressed behaviour (total of 18 minutes and interestingly only boys in the three schools showed this behaviour, particularly it appeared as a conflict between the target children and another child); cruising (6 minutes), waiting (2 minutes), pretending (8 minutes), social interaction (non-play, 2 minutes). It seemed that, although the total fourteen task codes were observed in three schools, ‘adult-directed activities and manipulation’ and ‘reading-writing and counting’ were the main tasks that the target children experienced most during the daily mathematics activities.

Social Codes: What the social setting the child was in and how long it was taking

In order to categorise the social setting in which the child carried out the activity, some social codes were used. The researcher noted whether the child was interacting with another child (PAIR), was near others but not interacting with them (PAIR/P), or was alone (SOL). As well as setting, the size of the group, small (SG, involved three to five children) or large (LG, involved six or more children), was noted.

40 Figure 9.4. Social settings in which the child was being observed during the mathematics activities

	Urban School		Rural-H School		Rural-C School	
	Target Child-1 (Girl)	**Target Child-2 (Boy)**	**Target Child-1 (Girl)**	**Target Child-2 (Boy)**	**Target Child-1 (Girl)**	**Target Child-2 (Boy)**
	Duration minutes	**Duration minutes**	**Duration minutes**	**Duration minutes**	**Duration minutes**	**Duration minutes**
SG			56	58	30	40
LG	98	78	30	18	56	54
PAIR	12	32	28	30	20	16
SOL				6	10	4
PAIR/P	10		6	8	4	6

Table 9.4 shows that in the Urban School there were no small-group activities. In this school, the great majority of the time of the target children were spent in a large group (a total 176 minutes of both children), whilst both the target children in the Urban School spent a total of 42 minutes in a large or middle-sized group but interacting as a pair. One of the target children in this school spent 10 minutes in a pair activity without interacting (PAIR/P).

In both Rural Schools, it seemed that target children were offered learning experiences almost in all identified social settings in a more balanced way. Yet, they spent more time in small- and large-groups than they did as a pair or alone.

9.4.2. Discussion of Target Child Observation Schedules Findings

The findings from the target child observation gave a limited but clear picture about the target children's experiences and their response to the practice. The language section indicated that in the Urban School, the target children as well as other children in the class talked less and mainly responded to the teacher. The task codes and social codes findings clearly supported the fact

that in this school adult-directed large group activities were dominant and that taking account of language diversity seemed a main reason for less child-initiated talk.

In the Rural-H School, the picture seemed completely different. In the class everybody, adult, target children and other children were speaking, initiating and responding to the interaction in a balanced way. The flow of speech was not only from target child to adult or adult to target child, but also from target child to another child and another child to target child. That was supported by the findings showing what the child was doing (Table 9.3). In the Rural-H School, ‘adult-directed art and manipulation’ was not very high comparing with the Urban School. In the Rural-H School, it seemed that a variety of tasks were organised in a variety of social settings in order to provide the most suitable learning experiences for the children.

In the Rural-C School, although not as much as in the Rural-H School, children- and teacher-initiated talk seemed in balance. Yet, in this school the teacher initiated the talk more often. Also the duration of the ‘adult directed art and manipulation’ task got smaller, whilst ‘reading and counting’ activities were increased, yet writing was not common, while drawing was. The social setting of the children in the Rural-H School seemed in balance and provided a variety of experiences for the children.

In general, children’s learning experiences and their responses to the practice seemed to differ from school to school particularly, there was a big difference between the Urban School and the Rural Schools. In the next section, findings

from video-recordings will be introduced and discussed for each target child separately.

9.5. Results of Video-recordings of Target Children

9.5.1. Target Children in Urban School

Target Child-1 (Girl)

The target child-1 in Urban School was observed for a total of 28 minutes; 5 minutes during the whole-class register activity and 23 minutes during the large-group activities in which there were ten children.

The child was sitting in front of the teacher and waiting. When the teacher completed the register she joined the counting and phonic activities with her friends. Then the child was sent to group activities with another nine children. In this large-group the teacher started with some physical activities, i.e. jumping, hopping, dancing and also counting. The target child joined the activity with joy. The target child sat down and joined the counting ‘how many feet’, ‘arms’ or ‘hands’ and so on that those nine children had. The child responded to the teacher’s questions and queries whenever the teacher asked. While the teacher engaged with other children the target child started looking around, singing and moving. The teacher told her to stop and be quiet. She wanted to get more teacher’s attention yet the teacher seemed very busy with other children.

The teacher showed number ‘5’ and asked her to read it and jump that many times and the child did. The child covered her face, hid behind the teacher and tried not to look at the activity. When she came out and tried to respond to other questions asked by the teacher, the teacher stopped her. It seemed that

the target child was more competent than the other children in this group, as while the other children could not count up to a certain number less than ten the target child was able to recognise all the numbers showed by the teacher and count to more than ten without any help. The target child seemed not to have been challenged by the activity and she wanted to answer all the questions rather than wait for others to count or think. The teacher seemed to recognise that the activity was easy for the child and then she focused on other children and stopped attending to the target child.

The target child showed signs of boredom and looked around, examining the teacher's clothes, hair and face. Then she moved slowly towards the teacher and tried to make body contact with her, looked at her face, smiled and tried to get her attention. Then the child leaned on the teacher. The child insisted on answering the question asked by the teacher to another child. The teacher warned her to be quiet and wait for her turn. The target child was told she had not had a turn yet. The teacher showed a dice and asked her how many dots, the target child responded quickly and the teacher then turned to another child. The target child gave up joining in the activity and looked around.

The teacher and her group moved to a big table to complete some worksheets. The sheets involved some empty dice pictures which should be filled first according to the dots on the dice thrown by the teacher and then with addition of number 1. The teacher threw the dice, asked children how many dots there were and then told them to put this many dots on the empty dice on the sheet and the numeral add 1 and then write the result in numerals after the equals sign. The target child found this activity challenging, she tried

to complete with enthusiasm, asked whenever she was stuck and when she understood, helped her friend who sat next to her. The target child was waiting for the teacher to throw the dice, counted how many dots there were and added 1, then wrote the answer. However, the activity was long with repeating of the same numbers over and over without a new challenge. The target child seemed to lose her interest to the activity but the teacher insisted everyone finished the activity before lunch time.

Target Child-2 (Boy)

Video-recording captured for target child-2 total of 16 minutes: 5 minutes before register time, while he was playing with his friend and 11 minutes while he was working in a large-group. Before registration time, the target child was playing with a friend with the small construction materials. While he was putting small lego pieces together, he was also watching the activity from the interactive whiteboard. He seemed not to have full concentration on either of the activities.

After registration time, the target child was captured by the video while he was doing group activities with ten other children and the support teacher. They were using small bricks for counting. The adult picked up one number brick, showed it and asked children to put out a quantity of many bricks. The child had very little concentration on the activity. The adult picked a number brick (3) and showed him and asked him to put that many bricks together. He put more than the adult required and looked around. The adult particularly warned him to count again, and then asked what the number was that was shown to the child. He did not answer but looked at her, then looked at his friend. Then

the teacher put another number brick (4) in front of him and told him to find that many bricks and put them together. He collected more than the teacher showed and started talking to the friend sitting next to him. The adult came back and helped him to count four bricks by holding his hands and together touching the bricks while counting. When the teacher turned her back to help another child, the target child started playing with the bricks and did not count for the other numbers that the adult showed.

The target child seemed not to understand the activity and he did not know how to count, with one-to-one correspondence. He mostly relied on the adult to complete his task. At the beginning the adult tried to explain over and over again, but in the later part of the activity she showed a number, told him to find that many bricks and went to help other children. Then she came back to check his work without telling him anything and just completed the task. It was hard to state that target child gained much from this activity.

9.5.2. Target Children in Rural-H School

Target Child-1 (Girl)

Video-recorded observation captured target child-1 for a total of 19 minutes: 7 minutes during the whole-class activity, 2 minutes while children were ‘cruising’ about, 10 minutes in a small-group activity. When the lesson began, she was sitting on the carpet and listening to the teacher in an active and quiet manner. She joined in choral answers, looked at teacher and when asked, responded to the question. When the class divided into small groups (maximum five children in each) for the main activity time, the target child was sent to a table for pair work with a friend. The purpose was to pick a clock

card and make the time on a yellow plastic clock displayed on the card. These two children talked to each other, giggled and helped each other. It was hard to hear the conversations of the target child and other child as they talked in a low voice. Then the teacher was involved in their activity for nearly a minute to explain how they should carry out the activity. The children carried out the same activity for a while and then stood up to look for a different activity.

For a while later the target child was captured by the video when she and her friend were joined by other two girls. They cruised around in the class to find some interesting activity. Then they stopped in front of a corner that was decorated with 3-D shapes and talked about them. The target child showed a cube which had eyes, a nose and a mouth. They all touched it and examined all the shapes in the corner.

Before playtime, the target child was called to join an adult-led small-group activity with the support teacher. They cut and stuck the pictures representing the sequence of daily routine activities according to the time of day that normally took place. The child seemed slightly reluctant, as she did not like being separated from her free-play activity group. She did not contribute verbally in this group. Then the playtime was announced, the child stood up joyfully.

After playtime, it was whole-class activity time and the child was sitting on the carpet and working in pairs to demonstrate a time on a round yellow clock. She looked well motivated, helped her partner, and let her take a turn. The target child talked to her partner and to the teacher responded to queries from the teacher but did not ask any questions. After the second whole-class

activity, the child went to work with the class teacher. The group was taking turns in throwing dice and counting dots on them, then trying to find corresponding numbers of dots on clock puzzles in a dish. When all the pieces of puzzles were taken out from their dishes, children put them together to make their own clocks and then they stuck them onto a page to make the whole clock. The target child joined the activity with enthusiasm and joy. She was actively following her turn, taking it and interacting with the teacher in a positive and lively way.

Target Child-2 (Boy)

The video-recorder captured the target child-2 for a total time of around 21 minutes: 5 minutes during the whole-class activity, 6 minutes during the free-play activity and 3 minutes in a play corner, 5 minutes in a small-group activity with an adult and 2 minutes during the plenary session. The target child sat in front of the teacher on the carpet and seemed very quiet at the beginning of the whole-class session. Then he started moving slowly, but he joined the activity actively and attentively. While he was joining in the choral answers or answering teacher's questions by himself, he was also playing with his shoe laces. When children were sent to their small groups, he waited patiently till he was told where to go. He was sent to the free play area (home corner) with a group of children. In this corner children played with whatever they liked but mostly argued about the roles for the play or toys or the clothes in the dressing-up corner. In fact, on two occasions, he showed signs of distressed behaviour because of the conflict between him and another boy. Firstly, children played a hospital game and the target child was a patient taken to the hospital. Then they sat and talked about their fathers' jobs.

When the video captured him a second time he was playing in another corner where there were lots of wooden blocks, trains and wooden railway and toys. He played with a train with another child. They did not talk but somehow interacted in play.

After milk-time and the second part of the lesson's whole-class session started on the carpet, the target child was sent to do a small-group activity with the support teacher. In this small-group, the child was placing numbers on an empty clock picture. He joined in the activity with joy, responded to the teacher's queries and tried to complete his activity with care. Later on, he was video-recorded in the plenary session. He was sharing a plastic clock with a partner and they were making the time asked by the teacher. During the plenary session two open questions were asked by the teacher, the target child was busy with the clock and he did not join the discussion or answer open questions.

9.5.3. Target Children in Rural-C School

Target Child-1 (Girl)

The video-recorder captured target child-1 in Rural-C School for a total of around 24 minutes: 15 minutes during the whole-class activity, 4 minutes outside small group activity with a volunteer adult, 3 minutes small-group activity around a table with the support teacher and 2 minutes plenary in whole-class.

The target child and all other children sat in front of the teacher in a semi-circle facing each other for the whole-class counting activities and the

introduction of the day's topic (that was 2-D and 3-D activities). The target child had been very quiet and well focused on the explanation and introduction made by the teacher. Before introducing and explaining properties of a 2-D or 3-D shapes the teacher asked children what each shape was and how it could be described. The target child tried to answer questions and raised a hand whenever the teacher asked a question. Then the teacher showed a bag full of 2-D and 3-D shapes and introduced an activity that they could play together as a whole class. They would sing whilst passing the bag hand to hand and when the song stopped, the child who held it last would put her/his hand inside it, feel one of the shapes and describe it. The other children would try to recognise what the shape would be.

The target child joined this activity with enthusiasm and once had a chance to feel a shape and describe it (a cube) by saying 'it has 6 faces'. The teacher praised her description and encouraged other children to respond to that question. She did not show any sign of boredom, but she was very quiet (as she usually was).

Later on she was observed while playing outside in a small group under the supervision of an adult. They built a house with big spongy 3-D shapes. The children in this small-group were talking and building their house, they role-played and picked their roles, the target child pretending to be the little girl of the house. The volunteer adult had not been involved in their activity or talked/mentioned about the shapes or the topic. It seemed that he was there to supervise children for health and safety reasons. Twice the wall of the house collapsed and the target child and another child repaired it. Then they

ran to the other side of the garden to do shopping. The target child and other children in this small-group focused on domestic play and never used the mathematics language related to the 3-D shapes that they had learned earlier, as there was no encouragement or verbal input from the adult.

A while later the target child and her small-group were called inside for another adult-led activity by the support teacher. The children put on their aprons for sponge printing. They made patterns with circle, square and rectangle sponges by using three different colours. The target child was very quiet and patient. When the support teacher asked which shape would be next in the pattern the child attempted to answer by putting her hand up. There was no particular discussion about the shapes but only about which pattern should come next. Tidy-up time was announced and the children were rushed to the carpet area for the whole-class activities. The target child sat next to the teacher and listened to her short revision of 3-D shapes. Then the teacher showed all the shapes one by one and the children repeated the name of the shape in a choral way. The child joined in the activity with full concentration and then she was sent to wash her hands.

Target Child-2 (Boy)

The video-recorder captured this target child for a total of around 23 minutes: 14 minutes, while he was on carpet in whole-class, 3 minutes while he was using lego bricks to build a tower, 4 minutes in the graphic area with the class teacher and 2 minutes during the plenary session on the carpet.

He sat on the carpet, faced the teacher and listened to her with enthusiasm. He joined in the activity, with hand up to answer the teacher's queries. All

through the whole-class activities, he looked tired, kneeling and he moved his legs but did not lose his concentration. The day's topic was the same as explained above for the target child-1 and it was properties of the 2-D and 3-D shapes. He answered the teacher's two questions and it seemed that the child was one of the children to receive special praise. The class sang the 'what is in the bag song' and passed the bag hand by hand until the teacher purposefully stopped the song and asked the target child to take a turn by touching and describing a shape. She praised his description and told him to pick someone to get an answer for the question of what this shape could be. The target child seemed to have a lot of confidence in himself and to be proud.

After THEwhole-class activity he was sent to the small construction area to build a tower or Luna Park with lego bricks. He seemed well focused on the activity and was not distracted easily. He was next to another child. They interacted non-verbally but did not talk. Then his group was called by the class teacher to the graphic area. When the teacher explained the activity he listened to her carefully, picked a shape and started tracing the shape onto the paper. Then the class teacher moved to check another group's work. The group carried on working without being distracted, as the children talked little and in a quiet manner, whenever necessary.

Lastly, he was observed for a short time during the plenary session. He sat in the middle of the carpet, listening to the teacher's revision of the day's topic. He joined in choral answers. When the teacher sent children to wash their hands in small groups, he waited patiently.

9.6. Discussion

The findings from the video-recordings of target child observations in the three schools provided qualitative and in-depth data about children's learning experiences and their responses to the practice offered to them. Siraj-Blatchford *et al.* (2002) stated that 'learning is an interactive event, where the child actively constructs his/her own understandings within the social and physical environment' (p. 31). The data in this chapter gave enough information to discuss this statement in the light for the target children's behaviour observed in the three RCs.

In the Urban School, there were particular characteristics. Firstly, the target children spent a great majority of their time in either whole-class or in a large-group. Mostly, being in big-sized groups seemed to reduce children's talk and interaction with their teacher, as well as with their peers. Particularly, the teacher seemed to have limited time for each child. It seemed because of this, children in any observed group were not asked open questions or not asked to express themselves in an open way. Moreover, lack of free-play opportunities inside the classroom made children follow adult initiations all the time without interacting or talking with their friends. Therefore, it was hard to state that children in the Urban School initiated or actively took part in their learning. For the target children in this school, being in a group, doing little, waiting to be directed by the adult seemed not altogether a fruitful learning experience.

In the Urban School it also seemed that the task did not match the capability of the children observed. For example, the target child-1 was in an attainment group of which seemed lower than hers. As a result of that the target child found the activity easy and tried to answer all the questions the other children were stuck with. When the teacher realised that, the target child was stopped or ignored whenever she attempted to respond. Then the child lost her interest in the activity for a long time.

On the other hand, the target child-2 in the Urban School, seemed did not understand the task but found the activity they carried out hard. It seemed that the task demand was higher than the child's capacity (as suggested by Bennett *et al.,* 1984). When the teacher realised that she did not alter the task but started completing it for the child. From nearly half an hour of activity, the target child-2 seemed to gain little. Moreover, activities carried in large groups took too long and that created boredom of both target children. Target child-1 found the activity easy and had to do it over and over without further challenge. Target child-2 found the activity hard and also had to do the same activity over and over without getting enough explanation. Overall, in the Urban School, it can be stated that there seemed an ill-match between the abilities of the groups, as well as the level of the challenge of the activities.

In the Rural-H School, the activities and free-play corners were well organised with stimulating learning materials and the children seemed to gain more from these. Being in small-sized groups (a maximum of five) provided valuable opportunities for children to talk and interact more while they were doing group activities with an adult. Adult- and child-led activities seemed in balance

and each child could get at least one free-play and one adult-led activity through the daily mathematics lesson. However, it also seemed that long free-play activities without adult presence did not add much input in children's learning. During these times particularly boys experienced conflicts with their friends and had a tendency to action play or domestic games rather than engage in the activities organised/planned by the teacher to reinforce the day's topic. Another point arising in Rural-H School was that if a child first played freely and then was called for an adult-led activity, while she/he was in the middle of her/his play, it seemed, they started the activity with a bit of reluctance. Particularly target child-1 in Rural-H showed that sign of annoyance when she was called in the middle of her free-play.

In the Rural-C School, both target children were very quiet and showed very mature behaviour. When they were sent to play or carry out an activity with or without an adult they always acted as if there was someone directing their activities. This was actually a case for all of the children and it seemed that there were no behavioural problems encountered during the activities. However, the support teacher and other adults in this school had a tendency not to talk much about the activity, or interact with the children. Especially volunteer adults seemed to be only supervising children for health and safety. The teacher tried hard by moving from one group to another, by involving herself in their activities and by asking questions related to the activity and the day's topic.

In general, it seemed that children in the Rural Schools were offered direct and immediate learning experiences in different social settings in an

interactive way with and without adult presence. Yet, some of the free-play and child-initiated activities consumed a lot of time of the children and in fact some part of it could be seen as less focused in extending children's learning. In the Urban School, it seemed that there was no minute without adult-directed activity. Yet, it can be argued if these intensive and long activities were intended to add an input to children's learning these were not successful in this. Across the three schools the match of task to learner was variable. In one case the child was unable to meet the challenge of the task. In the case of the other five, there are some grounds for questioning whether children were challenged enough.

9.7. Conclusion

In this chapter, two sets of data about target children's learning experiences in three schools' reception classes clearly indicated that there was a big difference between the learning opportunities children experienced in three schools during their mathematical development.

In the Urban School, it seemed that intensive adult-led activities provided bare, procedural knowledge rather than spontaneous and informal investigation in practical activities. Children had less opportunity for free-play and child-initiated activities and had to be directed by an adults during any kind of activity. Moreover, it seemed that in the Urban School, the tasks the children were doing were not well-matched to children's capabilities. Duration of the activities normally was more than 30 minutes and children seemed tired or bored by doing the same activity over and over.

In Rural-H and –C Schools, it seemed that there was a range of planned and free-play opportunities. Children were introduced to the day's topic and to the learning objectives, as well as mental mathematics and counting activities before the middle part of the lesson. During the small group activities children had the chance to be in a various social relationships (pair, small group with adult, and pair with adult and free-play with peers) and carried out a variety of tasks (adult-directed activity, adult-structured but child-initiated activity, and free-play). Although some free-play activities had some problematic aspects (i.e. caused conflicts especially between boys), they seemed to support children learning. In general, in Rural Schools children seemed more relaxed with confidence and levels of advantage and cultural experience, as well as levels of competency in the language. Target children (as well as other children), in these schools, enjoyed the activities and learned in an active way. In organisational and pedagogical terms, however, observational data reveals the complexity of the FS play pedagogy and the challenge to teachers of providing meaningful, practical investigations that sufficiently challenged children concerned.

In the next chapter, the teacher interviews will be introduced and discussed.

CHAPTER 10: TEACHER INTERVIEWS

10.1. Introduction

In the previous chapter (chapter 9) target children's observation findings were introduced and discussed. This chapter will introduce the three RC teachers' views and opinions about FS planning and practice of the mathematics curriculum for the reception-aged children. In chapter 7, RC teachers' survey findings were introduced and discussed. Interviewing three RC teachers (who also participated to the classroom observations) was intended to provide an in-depth, as well as first-hand account of what the RC teachers thought about important issues related to the mathematics curriculum and the practice in the FS.

10.2. Aims

The main purpose of the chapter is to report the findings from the teacher interviews which addressed the research question of:

- What are the RC teachers' views and understandings of the FS mathematics curriculum?

10.3. Methods

10.3.1. Participants

The three RC teachers from the participant schools were interviewed after classroom observations took place but before analysis were completed. The participant teachers from the schools have already been described in chapter

8 under the title of participants. They were Mrs Crown from Urban school, Mrs Lesley from Rural-H school and Mrs Cheri from Rural-C school.

10.3.2. Materials

15 questions (can be seen in appendix D) from the teacher survey were adapted for the teacher interview. Some of these questions were in a semi-structured form, whilst some of them were in an open-ended format in order to obtain three RC teachers' views in more depth.

10.3.3. Procedures

Access had already been negotiated with the three primary schools in order to carry out classroom observations through the year. During the initial meeting with the RC teachers, the intention of conducting an interview at the end of the data collection process was mentioned and all three teachers agreed. Prior to the interview, the interview questions were given to the teachers and an exact date for the interview meeting was arranged. The participant teachers had already been informed during the classroom observations about the ethical and technical issues, but they were reminded again at the time of the interviews.

10.3.4. Analysis

In order to analyse the teacher interview findings a qualitative analysis was employed. This process involved three flows of action suggested by Miles and Huberman (1994) for the analysis of qualitative data and was briefly explained for the élite interview's analysis in chapter 6. Firstly, the data were reduced

which was a part of the analysis that sharpens, sorts, focuses, discards as well as organises data. Secondly, the data were organised into tables according to the question in order to make the response clear and accessible. Then, the last step was drawing conclusion and checking verification which was easier when drawing from the organised data as Miles and Huberman (1994) indicated.

10.4. Results

Teacher interviews started with obtaining background information about the teachers and this information has been fully reported in chapter 8.

Figure 10.1 (below) presents the benefits and problems that had been experienced by the teachers as a result of implementing the FS mathematics in their RC classes. The teacher-1 and -3 expressed the view that the FS was particularly appropriate for young children. It had set achievable, child-friendly goals by considering child development. Teacher-2 meanwhile emphasised its flexibility. It seemed that the problems caused by the FS mathematics were less than its benefits and the main problem stated by teacher-2 and -3 was resourcing for outdoor mathematics learning, meanwhile the teacher-1 underlined that there were no problems.

41 **Figure 10.1. Benefits and problems of implementing the FS in their RC**

Teacher-1	Teacher-2	Teacher-3
Benefits: Nursery and RC children have been seen as comprising a Key Stage of their own, not young K.S.1	Benefits: Flexibility in the way the curriculum is taught.	Benefits: using outdoor as a learning area; setting achievable, child-friendly goals as well as acknowledgement of child development.
Problems: No difficulties or problem.	Problems: some problems with resourcing, especially for the outdoor play area.	Problems: Resourcing it to implement an active learning environment and planning schemes of work and topics, particularly in mathematical development area.

The teachers were asked if the RC work in mathematics has changed since implementation of the FS and if so how and how much. Figure 10.2, below, shows that teacher-1 believed it had changed just ‘a little’ but did not give details of how. The Rural School teachers, teacher-2 and -3, thought the work in these classes had changed ‘a lot’.

42 **Figure 10.2. If the work has changed as a result of implementing the FS in RC**

Teacher-1	Teacher-2	Teacher-3
I do not think a lot, but just a little.	It has changed a lot, especially after 2000 when the FS was implemented. Before the FS mathematics children in RC were asked to do KS1 work, now we work as we did prior to the introduction of the National Curriculum. Integrating all the areas through the day is the most important change.	It has changed quite a lot. Especially, planning for and implementing work outside as well as facilitating a more active learning environment.

Teacher-2 stated that before the FS mathematics was introduced children were doing KS1 (for five to seven year-olds) work, but after this FS was introduced they integrated all the learning areas, including mathematics. For teacher-3 using outdoor area for children’s learning was a very big change. Moreover, she thought that the FS facilitated a more active learning environment which demanded children to take more initiative in their own mathematics learning.

Figure10.3 shows that all three teachers had had training on the CGFS and the RC numeracy. The Teacher-2 and -3 expressed a positive attitude towards receiving some more training in RC mathematics, whilst the teacher-1 thought she had sufficient training and did not need more.

43 **Figure 10.3. Teachers' training in the FS mathematics in RC**

Teacher-1	Teacher-2	Teacher-3
I had training about the CGFS and the FS, in FS numeracy. Beginning of this year I also had another short training in FS mathematics. I believed I have had enough training.	Yes, I had training on CGFS, in RC and numeracy. However, still I can say that some more training would be helpful.	I had a variety of early years courses, e.g. phonics, outdoor play, drama as well as training on the CGFS and RC numeracy. I think I had nearly enough training, but I always love to update myself.

The three teachers assessed parents' involvement and the understanding of the curriculum in different ways (figure 10.4).

44 **Figure 10. 4. Views about parents and their involvement in the curriculum**

Teacher-1	Teacher-2	Teacher-3
The parents of my pupils have very 'low' understanding of the FS and the learning areas, particularly in numeracy. As school we invite them to school on the regular basis and inform them about how to teach some learning areas to their children. A course offered, but not taken up by many parents.	Parental understanding of the six areas of learning, I can say 'moderate'. I tried to encourage their involvement in an unstructured way.	Understanding of the six areas of the learning areas of the FS among the parents is 'very high'. On the regular basis I have invited parents to the school and talked/explained how they can help their children's literacy and numeracy learning. They attend regularly and this is very good.

The teacher-1 from the Urban School believed that parents had 'a very low understanding', particularly in numeracy. At the school although there was a constant encouragement of parents to attend a course to learn how they could help their children's mathematical learning, in general parents did not show interest to the course. Teacher-2 stated that parental understanding of the curriculum was 'moderate', but she did not describe how she might encourage parents to be more involved. Teacher-3 thought parents of her current class had 'very high' understanding of the six areas of the learning areas of the FS. On a regular basis she offered talk and explanation in literacy and numeracy to the parents and they took up the offer to learn how they could help their children's learning in these areas.

The three teachers were asked who was involved in the mathematics curriculum planning and their answers were interesting. Figure 10.5 below, presents that teacher-1 stated except for the head and deputy head teachers, all teachers of the FS (other RC teacher and Nursery Class teachers) KS1 and KS2 were involved not only in long-term planning but also in short-term planning. Teacher-2 and -3 were the only FS teachers in their schools and there was no involvement from the KS2 teachers in either school.

45 **Figure 10.5. Who are involving long and short-term planning?**

Teacher-1	**Teacher-2**	**Teacher-3**
For both planning Nursery teachers, other RC teacher, K.S.1 teachers, classroom support staff and most of the time K.S.2 teachers involved. In general head or deputy head do not involve planning but see the final draft.	In this school we have only one RC and there is no Nursery attached to the school. For long-term planning K.S.1 teachers and deputy head involved, but for the daily or weekly planning only I and the support teacher involved.	There is only one RC and there is no Nursery class. For the long-term planning only support staff involved and I do daily or weekly planning by myself without any involvement from other staff.

For teacher-2's long-term planning, the KS1 teachers and deputy head were involved, but short term plans were made by her with the support teacher's involvement. However, teacher-3 had made all the planning, particularly daily or weekly ones by herself without any involvement from other staff.

46 **Figure 10.6. Teaching community's level of commitment to the FS**

Teacher-1	**Teacher-2**	**Teacher-3**
The level of commitment to the FS seemed very high among the teaching community.	I cannot say high, but moderate.	Among the teaching community as a whole… I think high, but not very high.

After finding out who was involved in teachers' planning, the teachers were asked about the level of commitment to the FS among the teaching community. Figure 10.6 above, presents that the teacher-2 found moderate

commitment, the teacher-3 found high commitment but the teacher-1 indicated very high commitment. The positive view of teacher-1 might result from high involvement of the other teachers to RC long- and short-term planning.

47 **Figure 10.7. Classroom support teachers' involvement in evaluating the lesson**

Teacher-1	Teacher-2	Teacher-3
A great deal, I do appreciate their involvement and input. All support staff but in my class particularly Mrs S. (full-time support teacher) does a big job.	Definitely, quite a lot. I have two part-time support teachers; they know what they need to do.	Not much really! You might have observed I am doing everything; she only sets up the tables, tidies up and helps children's activities. The others are parents and they were not trained to do this job, but provide good support.

Classroom support teachers' involvement in evaluating lessons afterwards seemed varied for three teachers (figure 10.7). The teacher-1 seemed very pleased and accepted that her support staff were involved a lot. This was nearly the same for the teacher-2, yet teacher-3 seemed to be getting less support from her support staff and expressed this clearly.

The teachers' timetabling of six learning areas through the reception year seemed similar to each other (table 10.8). They all reported that they integrated all learning areas during the first term. Teacher-1 also reported that as well as integration she planned a daily mathematics lesson in all three terms. Teacher-2 integrated all areas in term 1 and 2, then planned daily mathematics lesson during term 3, meanwhile teacher-3 started planning daily mathematics lesson in term 2. It seemed that the point of introducing daily mathematics lesson was slightly different among three teachers.

48 **Figure 10.8. How do you timetable six areas of learning in term 1, 2 and 3?**

Teacher-1	Teacher-2	Teacher-3
All three terms I integrated all learning areas, but also plan daily mathematics and literacy lessons at least three to four days in a week.	The first and second terms I integrated all learning areas and be very flexible, during the last term I plan some areas as distinct blocks, i.e. daily mathematics lesson.	During the first term I integrated the six learning areas, in second term I start planning daily literacy and numeracy lesson.

The teachers were asked to estimate what the percent of the mathematics lesson classroom time was spent on whole-class mathematics work (figure 10.9). Teacher-1 spent very little time (5%) on whole-class mathematics activities. In order to clarify, she emphasised that only 5% of the daily mathematics lesson was normally spent in whole-class activities as most of the time children were taught in groups. Teacher-2 spent 16% of the mathematics lesson for whole class activities and the rest in group work. Yet, teacher-3 could not give an approximate time she spent on whole-class instruction.

49 **Figure 10.9. Percentage of the classroom time spent on whole-class mathematics activities**

Teacher-1	Teacher-2	Teacher-3
I spend nearly 5% for whole-class activities. Children are taught for much longer in smaller groups.	I think roughly 16% in three terms I spend on whole-class work and 22% of small group works, rest of the time is spent on mental mathematics, plenary or other kinds of class activities.	About 40 to 60 minutes of daily mathematics lesson. I do not know what the percentage would be, I am not sure.

Figure 10.10 shows that all three teachers were planning opportunities for children to engage in or explore informally mathematics activities on a daily basis. Yet, frequencies as well as duration of the activities were varied among the teachers.

50 **Figure 10.10. How frequently children were engaging in informal exploration of the numeracy?**

Teacher-1	Teacher-2	Teacher-3
Up to 2 hours in a week and 10 to 15 minutes in a day children have a chance to engage in spontaneous activities.	They have daily opportunities. Up to 15 hours in a week, but do not know how many hours daily, it changes.	I can say daily and approximately 10 hours in a week, or 2 hours in a day children are initiating or engaging in spontaneous activities.

Teacher-1 devoted far less time for children to initiate their own activities or engage in spontaneous activities. She stated a total 2 hours per week. Teacher-2 devoted more time for those activities, she stated 15 hours per week. The teacher-3 was also specific; she reported a total of 10 hours in a week.

51 **Figure 10.11. How well the FS was addressing the number of areas**

Teacher-1	Teacher-2	Teacher-3
I think the FS addresses all these areas. Has got it 'right'.	The FS puts too much emphasis on 'written skills' but for the rest of them, I can say it is doing right	I believe that the FS has addressed all these areas good, I mean right.

Question twelve enquired about various skills in the FS curriculum. Figure 10.11 presents that the teacher-1 and -3 believed the FS has addressed all areas (formal learning, play, written skills, verbal skills, taking developmental approach to learning) appropriately. The teacher-2 reported that all areas were addressed appropriately except 'written skills'; she believed that the FS put 'too much emphasis' on these.

Figure 10.12, below, shows that the teachers were asked to express their views about which skills were important for young children to gain during the FS. The teacher-1 found all skills of: concentration, working with others,

motivation, active independence, physical development, literacy, numeracy, personal and social development were absolutely vital.

52 **Figure 10.12. What are the important skills for young children to acquire during the FS**

Teacher-1	Teacher-2	Teacher-3
For me all the skills children need to acquire during their early years are absolutely vital. It is wrong to say some skills are important some are not. Concentration, working with others, motivation, active independence, physical development, literacy, numeracy, personal and social development, All of them are absolutely vital.	'Motivation', 'working with others', 'concentration', 'active independence', and' enthusiasm' are definitely vital skills for young children to acquire during their early years. Literacy and numeracy development are important but not vital.	Motivation, working with others, creative development, active independence, personal and social development, and enthusiasm are definitely vital skills to gain during the FS.

The teacher-2 found motivation, working with others, concentration, active independence and enthusiasm definitely vital. Then she added that literacy and numeracy were as necessary skills but not vital to acquire during the early years. The teacher-3, meanwhile, believed motivation, working with others, creative development, personal and social development and enthusiasm were vital or very important skills to gain during the FS. It seemed that Rural Schools' teachers prioritised other skills rather than literacy and numeracy during the early years.

The teachers were asked how they monitored and assessed their students' mathematics progress. Their answers are presented on figure 10.13 (below). It shows that all three teachers were using typical ways and methods of assessment. All three of them received children's records from their preschool providers and used the Foundation Stage Profile (FSP) (QCA, 2003). They carried out general observation while children were working on a variety of

tasks and annotated samples of work, as well as asked children's own views about their learning. Alongside these methods, teacher-2 and teacher-3 used photographic evidence, but the teacher-1 did not.

53 **Figure 10.13. Monitoring and assessing mathematical progress of children**

Teacher-1	Teacher-2	Teacher-3
I received children's records from their early years providers, use the FSP assessment information, observed children and record on the regular basis, collect samples of work, and ask children's own views of their learning.	Firstly, if possible, received children's nursery records, utilised my own FSP assessment, carried general observations, ask children's opinion about their learning, use photographic observation evidence, and annotate samples of work children carried through the year.	I try to use all the ways to assess my students in an as effective a way as possible. I normally received children's preschool records, use the information from the FSP and fill it, observe children while they are working on different tasks through the day, take children's photos, collect samples of work, talk with children about their own progress.

The teachers' personal views were also asked about the FS, CGFS and NNS. In general, figure 10.14 (below) presents that the teacher-1 and teacher-2 expressed only positive opinions about all three of these, yet teacher-1 indicated that implementing the NNS in mixed-age classes' young children might be a problem.

On the same table the teacher-3 expressed her positive views as well as her concerns in a more open way. First of all, she reported the FS was good and implementing it to young children was right. She also stated that the FS did not provide a clear guidance; some of the goals in it were a bit broad and needed to be more specific. Yet, she believed although the NNS had a clearer guidance, it was not suitable for the younger children in the FS. Her suggestion was that practitioners should use their own professional judgements to use both documents creatively and to deliver an appropriate curriculum for children's mathematical development. This is very important as

she underlined the vitality of the teachers' knowledge and understanding in a various areas, for instance knowledge about the learners and about the curriculum.

54 **Figure 10.14. Teachers' view about the FS, CGFS and the NNS**

Teacher-1	Teacher-2	Teacher-3
The FS is a very good thing. It fits with the NNS and both have clear guidance. Implementing them together is not a problem, yet implementing the NNS to very young children in mixed age classes seems slightly problematic.	The NNS and the FS have very clear guidance and their joint implementation in RC is not a problem, I think they fit each other.	The CGFS seemed good and implementing it to young children is right, I cannot say its guidance is clear enough. Comparing to the CGFS, the NNS has clearer guidance. Yet their joint implementation in the RC for children's mathematical development, especially to young four year olds is a bit problematic. I welcomed the introduction of the CGFS as an early years' practitioner. However, some of the goals for mathematics are a bit broad not specifying enough in numeracy and need to be supplemented with another scheme. NNS has objectives that are not appropriate for all children in reception. Both documents need to be used creatively and with professional judgement in order to best deliver an appropriate numeracy curriculum to a range of different ages and abilities in reception.

10.5. Discussion

Findings from teachers interviews reported above gave in-depth and direct insight into the three RC teachers' views and understanding of the mathematics curriculum in the FS.

The findings indicated that the three teachers had ample experience in teaching in the RC with appropriate teaching qualifications, but one participant (teacher-1) was trained to teach five to 11 years. All three participant teachers had had short training courses related the FS, its curriculum, CGFS, and the

mathematical development. It seemed that these short training courses increased their understanding and as well as their self confidence in mathematics teaching in RC class.

From the way the participant teachers reported it seemed that the FS had more benefits than problems for the RC classes. They agreed that the FS was child-friendly, flexible and encouraged children to become involved actively in their own learning. Williams report (DCSF, 2008a) emphasised that teachers' positive ethos might affect their practice, as he stated that:

> It is widely recognised that a teacher's own enthusiasm for, and knowledge of, mathematics, as well as their beliefs about teaching and learning, will impact on their classroom practice, regardless of the external constraints on curriculum and lesson design (p.63).

Moreover, the teachers also believed it was well-judged in a number of areas, i.e. play, written skills, verbal skills, formal learning and taking a developmental approach to learning. Those answers naturally led the way to the idea that teachers might think that the mathematics work in RC classes had changed a lot since the introduction of the FS. For teacher-2 and -3 this was the case, yet teacher-1, interestingly, indicated that the work in RC classes had not changed much. In their study Moyles *et al.* (SPEEL, 2003) underlined the fact that FS teachers had contradictory ideas about the FS and related issues. In this study, participants' views revealed discrepancies between their answers as well as commonalities.

The teachers' view of parental understanding of the curriculum and their involvement in their children's learning was also showing a difference between the Urban and Rural Schools. Teacher-1 (from the multicultural Urban School)

underlined that although the school and herself offered courses to parents to involve more in their children's mathematics learning, they seemed reluctant to take these courses. On the other hand, in rural areas it seemed that the parents had more understanding about the curriculum and were involved more in their children's learning, particularly in teacher-3's school. The research findings (Desforges with Abouchaar, 2003; Evangelou and Sylva, 2003; DCSF, 2008a) underpinned the fact that parents have had a vital influence in a child's early learning. In this sense, it might be argued that parents in Urban School appeared to have less impact on their children's mathematical learning.

However, the other staffs' or teachers' involvement to the RC long- and short-term planning definitely showed a different pattern between the Urban and Rural Schools. Teacher-1 (from the Urban School) reported that there was full involvement of teachers from all stages to her planning stages, meanwhile the Rural Schools teachers did all the planning alone without or with little involvement from other staffs. This also reflects their views about the question of other teachers' commitment to the FS. Obviously, teacher-2 and -3 believed there was not very high commitment, meanwhile teacher-1 indicated a very high commitment. This could account for downward pressure towards formality in teaching in the Urban School and the observed greater emphasis on numeracy that was not supported by practical investigation.

Teachers timetabled the six areas of learning in a similar way integrating all areas during the first term was a common practice among three teachers. During the second and third term there was a tendency towards to planning

daily lessons, particularly in numeracy and literacy as well as integrating the other areas through the day. In general, this was what the NNS expected from the RC teachers.

Teachers' attitudes towards planning or offering informal or spontaneous mathematics activities for children to initiate their own activities were varied. Teacher-1, in the Urban School, seemed to be devoting a little amount of time for these activities and this matched observation data. Yet, the Rural School teachers offered much opportunity, particularly teacher-2. For assessment and monitoring purposes the teachers seemed to be using a number of conventional methods that contributed to the FSP. Nevertheless, employing digital devices, i.e. video- or audio-recordings, seemed less common.

As was found by Quick *et al.* (2002), all three teachers believed that the FS and the NNS matched each other well and implementing them in the RC class for children mathematical development was not a problem. However, the teacher-3 underlined an interesting point. She thought that the FS was child-friendly, yet had no clear guidance; meanwhile the NNS had clear guidance but it was not particularly appropriate for young children. She suggested that these documents needed to be used creatively and with the professional judgement of the RC teachers. Her suggestion was in line with what the Primary National Strategy (DfES, 2003) recommended to the primary schools and teachers. The strategy tried to encourage primary schools and the teachers to take control of their curriculum and to be innovative; in this sense the early years teachers can be seen to have taken more control and flexibility their own curriculum.

10.6. Conclusion

Through this chapter, in general the three participant teachers were positive about a number of issues related to their practice and policy documents for the mathematical development of the children in the RC classes. Their affirmative responses to the certain challenges seemed encouraging. Despite some difficulties they reported, the FS was seen as a unique stage for early years education, and teachers believed it is doing right for a number of areas and skills for young children's development and learning. Overall views expressed were compatible with observed practice.

In the next chapter the general conclusion of the thesis will be introduced.

CHAPTER 11: CONCLUSIONS

11.1 Introduction

This chapter will consider the main findings of the research, and then analyse these findings within the context of the changing discourse of early years education. As we have seen, early years education has, since the late 1990s, undergone a profound shift in emphasis, from open-ended, child-centred play, to the introduction of a goal-oriented national curriculum, with standards to be attained, and the close monitoring of a child's educational progress (Sylva and Pugh, 2005; Wood, 2007). Nowhere has this shift been more starkly demonstrated than in the teaching of mathematics.

Furthermore, it can be argued that, as a result of the recent economic emergence of heavily-populated nations such as India, Korea and China - and the consequent global reshaping of market forces - mathematics is increasingly being seen as one of the most crucial elements in a child's education. The research findings in this thesis focus on the implementation of the early years policy for mathematics in England, over the period 1999-2008, specifically for the transition into school in the reception class (RC) which caters for children in their first year of schooling, aged four to five.

The research questions will now be revisited and addressed in the light of the findings, one by one.

11.2 Research Questions

The research questions were as follows:

1. What is the relationship between policy and practice in the early years mathematics curriculum for RC in England?
2. What does the policy for early years mathematics require RC teachers to do in their classrooms in terms of curriculum implementation?
3. What are the RC teachers' views and understanding of the FS mathematics curriculum?
4. How did the RC teachers implement the early years mathematics policy in the context of actual classroom practice?
5. How did the RC children respond to the FS mathematics curriculum presented to them?

Each question will, where appropriate, be analysed in terms of the literature and the empirical findings. While revisiting the research questions a change will be made: the first and the most general research questions will left to the end, as it is covering all the stages of the policy making as well as other questions, leaving it to the end will give a chance to combine the findings.

11.2.1 What Does The Policy For Early Years Mathematics Require Reception Class Teachers To Do In Their Classrooms In Terms Of Curriculum Implementation ?

This question concerns the demands made on RC teachers, via the policy documents, as to the way they are expected to implement the mathematics curriculum. Certain obvious features of the instruction can be remarked upon, while at the same time looking for concepts which would characterise the

implementational instructions in broader terms. All policy texts related to the mathematical development of the children in RC and published between the period 1999 and 2008 - especially the CGFS and the NNS - were described and analysed in detail in Chapter 5.

Recognising the FS as a distinct stage for children aged three to the end of the RC and purposefully bridging the move from preschool to school were two important developments in early years education in England. Crucial to the teaching of mathematics was acknowledgment that children in the FS were capable of learning some simple mathematical ideas, from counting to calculation, making patterns, shape and space as well as problem solving. Children's capabilities have been well-established in the research literature (Clements and Serama, 2007; Gelman and Gallistel, 1978; Ginsburg *et al.,* 2008; Griffin, 2004; Sophian, 1998).

The context in which this new educational strategy was formulated is very much top-down. Decisions were made at governmental level and then handed down to teachers as a fait accompli. Early years pedagogy formed part of a wider governmental 'National Childcare Strategy', which sought to capitalise on the idea of the importance of early years learning itself based on a growing body of research, as documented by Sylva and Pugh (2005).

A top-down approach - ie one which does not rely on an interaction between policy makers and teachers - invariably places the weight of expectation on teachers themselves, when it comes to implementation. Teachers are expected to give flesh to ideas which, at the policy stage, are only theoretical constructs, and have yet to be tested in the classroom. This is especially true

of the early years mathematics policy which, even if it was found in research evidence, still constituted a new educational template.

A shift then takes place in any RC from open-ended play towards the imposition of a clearly articulated curriculum. As noted in *Researching Effective Pedagogy in the Early Years,* REPEY, (2002) there is a move from treating learning as a indefinite and undirected process, to 'the kind of interaction traditionally associated with the word "teaching"' (cited in Gifford, 2004: 99), with its implications of transmission and imposition. According to Gifford (2004) for some RC teachers, this would require a change of mindset, and a return to ways of thinking more associated with traditional and antiquated systems; anathema to some, and even characterised by others as verging on 'abuse' (Bruce and Bartholomew, 1993, p.14 cited in Gifford, 2004: 100).

In all, it can be understood from this that the early years mathematics policy in England has been characterised by a marked shift in thinking, and by the weight of expectation it places on teachers themselves. As shown in chapter 1, this reflects a growing world recognition of the educational benefits of high-quality pre-schooling in a context of changing views of early childhood, early learning and pedagogy. At the same time, the most dominant discourse has been instrumental and driven by the idea that social and economic ills will be resolved through delivery of effective early years services.

11.2.2. What Are The RC Teachers' Views And Understanding Of The FS Mathematics Curriculum And Related Texts ?

Any possible change of mindset notwithstanding, it should be said that the early years curriculum was positively received by the RC teachers surveyed, and that they approved the changes in the mathematics curriculum for the years covering the period between 1999 and 2008. High levels of commitment to the implementation of the FS were also reported, as was the fact that the majority of teachers [and support teachers] took part in formal short- and long-term planning for their classes, substantiating an active involvement.

In teachers' views the mathematics curriculum for the FS as well as for RC class created a balance between child-initiated and adult-led activities, initiated more cross-curricular links, and involved more practical activities. There was less formal learning, and a more child-centred, play-based curricular approach. However, there was some equivocation with regard to detail. For example, some teachers criticised FS mathematics for putting too little emphasis on formal learning, while some teachers regarded the implementation of a policy such as the NNS at the FS as misguided, or even wrong.

There was a range of views as to how to organise mathematics lessons in the RC. Half of the respondents took to integrating the learning areas - including mathematics - from the beginning of the academic year, and then shifting to a dedicated block lesson, or daily mathematics lesson, in the last term, as duly instructed to by the CGFS and the NNS. The other half of the respondents organised their time differently: some integrating all the learning areas

throughout the year, without any specific mathematics component; others having a daily mathematics lesson from the beginning.

There was general agreement that the CGFS and NNS provided a more structured approach to the teaching of mathematics, by the inclusion of both clear guidance, as well as detailed prescriptions. However, a dissenting voice criticised the guidance provided by the CGFS, and stated that:

> 'Although the CGFS seems good and implementing it to young children is right, I cannot say its guidance is clear enough. Comparing to the CGFS, the NNS has a clear guidance. Yet their joint implementation in the RC for children's mathematical development, especially to young four-year-olds is a bit problematic… I feel that some of the goals for mathematics [in the CGFS] are a bit broad and not specifying enough numeracy and need to be supplemented with another scheme. The NNS, however, has objectives that are not appropriate for all children in reception. Both documents need to be used creatively and with professional judgment in order to best deliver an appropriate numeracy curriculum to a range of different ages and abilities in reception.'

In this view, the top-down approach has clear limitations, and needs - if it is not to remain half-formed - to be integrated with the expertise of the professionals, and to allow them to exercise their own individual creativity.

Furthermore, the two policy documents themselves were seen as based in differing approaches:

> 'Fitting the demanding mathematical activities in the NNS into a play-based curriculum, the CGFS, is sometimes hard.'

A third of respondents were concerned that the objectives in the CGFS and the NNS were incompatible, despite the fact that careful documentary analysis showed that the 'learning objectives' in the NNS and the ELGs in the CGFS

are essentially the same, the only difference being their names (QCA, 1999). This would have to count as a shortcoming of the texts themselves, for failing to have made this clear.

Teachers were also surveyed as to their training and educational background and were shown in general to be well qualified and confident in early years practice. The élites however expressed the view that at least part of the difficulties faced in FS practice arose out of teachers' inadequate understanding of children's learning, the curriculum and in a deficiency in their levels of early years training, a view endorsed by Williams review (DCSF, 2008a).

11.2.3. How Did The RC Teachers Implement The Early Years Mathematics Policy In The Context Of Actual Classroom Practice?

As might be anticipated, actual classroom practice differed widely according to context. Variables ranged from teachers' understandings and interpretations of the texts, to the availability of resources, and the organisation of the classrooms themselves, also the involvement of other school staff.

The CGFS and NNS provided guidance as to how practical activity could be incorporated, for instance, familiar household objects - such as boxes, measuring jugs, chopsticks and coins - could be used to stimulate learning opportunities. In the Urban School studied, however, the teacher encouraged children to use computers by themselves, either for listening to stories or for mathematical activities. Outdoor mathematical activities in this school however were very rare, as was the organising of a home corner, or a shop corner, or a topic orientated free play area. The opposite was true for the

Rural Schools, as they both regularly organised outdoor mathematical activities, and had an abundance of materials to make use of. They also organised a topic-orientated free play area, home corner, shop corner, as well as encouraging a variety of games. Computers were not seen being used for mathematics or for any other kind of activity. Classroom organisation and resourcing, however, did not necessarily contribute to appropriate challenge in learning tasks that teachers took great pains to situate in familiar contexts.

Grouping children for curricular purposes in early years is a common organisational strategy for any learning area. In the CGFS there are no specific criteria as to how to group children, while in the NNS there are some examples of grouping, such as ability grouping, mixed ability grouping and so on. The three-part daily mathematics lesson demands the organising of whole-class and small group activities, and the dominant form of grouping is that of ability. As the NNS makes clear, 'All pupils gain from working in groups, in pairs or as individuals from time to time' (p.18). Teachers in all three target schools made regular use of various groupings for mathematical activities, using differing criteria to divide the class up. There were also a wide variety of responses from the children, ranging from active involvement to boredom. As noted by Alexander *et al.* (1992) in organisational strategies for group work there is often a mismatch at collaborative class setting and individual learning tasks . As was observed in the target schools, however small group activity was more intensive than whole class teaching, and gave the teacher a chance to focus on individuals.

It is clear from observations in all three schools that the numeracy objectives were being acknowledged. Mathematics ELGs specified counting, recognising numerals, and being able to use mathematical language to describe shapes. The Urban School teacher, for example, laid great stress on numbers and on numeracy, whereas less emphasis was placed on this particular aspect in either of the Rural Schools.

One of the key concepts implicit in early years education - and formalised in both the CGFS and the NNS - centres on the idea of 'transition'. Early years education, particularly in the RC is about preparing children, through a series of graduated introductions, so that they are able to participate successfully in the more formalised patterns of learning they will later encounter in primary schooling in KS1. In this way, they are able to make the transition from relatively unstructured play, to lessons based around a curriculum. Introduction of the daily mathematics lesson towards the end of the RC aims at a smooth transition to the daily mathematics lesson in Year 1.

All three target schools had regular daily mathematical sessions and activities, in a variety of situations. From the beginning of the reception year, all teachers organised daily mathematics sessions as distinct activities, without integrating them with other learning areas. This was despite the fact that it was contrary to the instructions laid out in the policy texts particularly the CGFS. Furthermore, the duration of the daily mathematics lesson varied from school to school as well: in Urban School and the Rural-H the lessons took place four days a week, with a lesson taking up an entire morning before lunch with only a playtime break in the middle. In the Rural-C School, on the

other hand, the mathematics lesson - also four days a week from the first term of the year - lasted fifty to fifty-five minutes a day. All three schools were clearly engaged in implementing the early years mathematics policies, but each in their own way, and according to their own priorities.

11.2.4. How Did RC Children Respond To The FS Mathematics Curriculum Presented To Them?

A striking difference between the Urban and Rural schools emerged when it came to the mathematical component of teaching concerned with the flow of interactivity. Lessons in the Urban School were adult-initiated and directed, and instruction consisted largely in a one-way flow, from teacher to children. In the Rural schools, however, the flow was and questions was more open, and could be from child to teacher, or from child to child. Target child observations showed much more individual expression, choice and independence in the Rural schools, whereas in the Urban School children were more constrained by didactic teaching and closed questions. The observations showed clearly the influence of teacher strategy on children's response, interest, and talk.

In the Rural schools, whole class activity was balanced with other groupings, from solo, pair, small group [four to six children] to large group, whereas in the Urban School activity was confined to large groups [nine to ten children], with less opportunity for the children to talk, interact, or even ask the teacher a question. As Tharp and Gallimore,1988 (cited in Gifford, 2004) have noted, teachers supervising large groups may use the language of control more than they would with smaller groups. The difference in interactivity between Urban

and Rural may in part be attributed to differences in the homogeneity of the classes themselves. Social and ethnic mix, together with differing levels of ability and expectation, might contribute to making it difficult for an Urban School teacher to allow a large group to disperse into smaller groups. This would be the case even if, as was observed, children were denied the opportunity to ask questions for tasks they did not understand, or if they became bored with the repetitive tasks they were set. It was characteristic of observations in the Urban School that hardly a minute passed without the children being closely supervised, and that there was no opportunity for free play. The context was one of intensive instruction.

The children in the Rural schools, on the other hand, were given more opportunities for free play, and their play was observed to shift from mathematical learning activities into quite unrelated domestic-style games, which on occasion developed into conflict. The Rural schools children were noticeably happier in their classes, and were clearly having more fun learning, even if a smaller portion of their time was spent on the mathematical tasks they were set. The atmosphere could be characterised as relaxed. Yet their more complex classroom organisation did not always enhance task matching and pupil learning.

All of which is to say that children's responses to the mathematics component of their learning varies greatly with differing contexts. The intensity of the closely-supervised Urban School setting appeared to produce a less positive response from the children, whereas the relaxed Rural schools produced a more positive one. It then becomes a question of looking for ways to improve

teaching in both settings, while acknowledging the realities of the differing contexts. As noted by Alexander *et al.* (1992) effective teaching, regardless of strategy used required a range of techniques meanwhile Hardman *et al*. (2003) recognising the importance of explaining and questioning.

11.2.5. What Is The Relationship Between Policy And Practice In The Early Years Mathematics Curriculum For RC Children In England?

This question underpins the entire thesis. The theoretical framework has been based on the policy trajectory model described by Bowe *et al*. (1992), which depicts the interplay between three primary contexts, that of influence, of policy text production and of practice. And in order to address the question directly, it is necessary to analyse the three primary contexts in the light of the empirical findings as well as a review of the relevant literature.

As regards the context of influence, the period in question is that between 1999 and 2008, which covers the early years in office of a recently-elected Labour Government. This period was characterised by a variety of national and international pressures on policies for early years education. The previous decade has seen the publication of an increasing number of research findings - from around the world - into early years education (Kagitcibasi, 1991 and 1997; Engle *et al.,* 2007), as well as longitudinal studies (Schweinhart *et al.*, 1993; Barnett, 1996; Schweinhart and Weikart, 1997; Sylva *et al.,* 2001; Siraj-Blatchford *et al.,* 2003 and Sylva *et al*., 2004; Schweinhart *et al*., 2005). All emphasised the importance of early child development for later outcomes in school and beyond. A particular example - Abecedarian early childhood education in the US - had shown that even children of poor parents with low

educational levels and poor intelligence test scores, were able to achieve standards similar to children from more privileged backgrounds (Campbell and Pugelli, 1999). Schweinhardt's (2005) famous longitudinal High/ Scope study demonstrated the lifelong benefits of quality preschooling, from an improved school readiness, to an improved school completion rate. Other benefits included a reduced use of health and social systems, an increased ability to earn money as well as pay taxes, and a reduced likelihood of criminality. More recently, the Lancet (Engle *et al*., 2007) reported a study on children under five with the conclusion that those who were not given the chance to develop their early potential ended up with an economic cost to society in terms of adult income, continuing poverty, and an overall negative impact on national development.

Primary school policy in England has similarly been influenced by international studies into science and mathematics. The findings by the Third International Mathematics and Science Study (TIMSS-R) (Keys *et al.,* 1996 and Ruddock, 2000) revealed that in 1995 Year 9 pupils from England came 20th out of a group of 38 in mathematical ability; and in 1999 the same group came 25th out of 41. England's low position in the table caused concern among English politicians, academics and teachers (Kyriacou and Goulding, 2004).

The NNS was introduced in 1999 after some promising results from the National Numeracy Project (NNP) which had been running in some inner city areas since 1996, expressly designed to address low standards of numeracy (Straker, 1999). The NNP also dealt with an overemphasis in teaching practice of standard written rather than mental methods, and in the lack of

direct teaching by the classroom teacher The NNS and its Framework for Teaching Mathematics from reception to Year 6 aimed to improve standards in mathematics by setting a national curriculum target that, by 2002, 75% of 11 year olds ought to be able to reach. The desire to raise standards in mathematics in the later stages of the primary schools has had a trickle-down effect on mathematics policy in the RC and even the FS and élite participants in the interview section of this thesis also underlined the fact that international comparison studies had an important influence on early years mathematics policies by creating - from the late 1990s onwards - top-down pressure on the English educational system.

There have also been a number of other national influences on early years education in general, and on early years mathematics in particular. The DfES (until recently called DCFS) sponsored a longitudinal study, the Effective Provision for Preschool Education (EPPE),(Sylva *et al.,* 2001; Siraj-Blatchford *et al.,* 2003 and Sylva *et al*., 2004), collecting data on over 3000 children who had entered early years schooling at the age of 3 plus. The picture that emerged was that early years education could provide a significant improvement in a child's capacity to learn, and would be of great benefit in later schooling (Siraj-Blatchford *et al.,* 2003) . Aubrey *et al.*, (2000) argued that the main assumptions of policy makers drawing up early years policies were that starting early would lead to a raising of standards, and this in turn would be linked to economic development and future prosperity. Politicians as well as economists saw early years education as enhancing human capital (Stephen, 2006) and benefiting society in the long term by preparing children for school and by preventing later academic failure (Heckman & Masterov,

2004; National Audit Office, 2004 cited in Stephen, 2006). This was the context of influence.

As regards the policy text themselves - the policy text production stage, resulting from the context of influence - the two most important were the CGFS (QCA/DfEE, 2000), which covered all six learning areas in the FS; and the NNS (DfEE, 1999a) which focused specifically on mathematics developed but not substancially changed by PFLM (DfES, 2006).

A surprising and interesting feature of text production, as identified by Bowe *et al* (1992) is the fact that some of the key forces shaping policy can be lost in the transition from ideas to text. These forces remain as influencing factors, but somehow fail to get reflected in the policy text themselves. This can be clearly seen with regard to the CGFS and NNS, in terms of their overall presentation. Throughout this thesis, élite participants and practitioners drew attention to the tension between the two documents, between two curriculum and two opposing pedagogies that when scrutinised in depth showed strong complementarity.

Relevant literature (Brown *et al.,* 1998; Thompson, 2000; Brown *et al.,* 2003) has shown that the NNS was not sufficiently grounded in evidence-based research into the teaching and learning of mathematics; and ended up being hastily introduced without waiting for the research findings of its own Numeracy Task Force. Further, Brown (1999) concluded that the values reflected in the NNS were strongly political - rather than educational - and represented 'Government values deriving from a view that mathematics education existed to serve only manpower needs of the economy' (Brown,

1999:3). Additional evidence to this effect came from the Government's own chosen evaluators: Fullan and Earl (2002), academics at the University of Toronto and contracted by the British Government to monitor the implementation of both literacy and numeracy strategies between 1997 and 2001, noted that the implementing of large-scale reforms like the NNS could not be done without top-down pressure, meaning that political authority would have to be given priority over educational. The policy texts present one line of argument, while having been shaped by hidden others.

The most important feature about policy to practice, as relevant to this thesis, centres on the question of interpretation. Classroom observations and interview data clearly show that policy implementation is by no means uniform, and very often wholly dependent upon the teachers' understanding of what it is they are required to teach. Moreover, the tensions in the texts, were reflected in mixed and ambivalent views by élites as well as mixed and contrasting practices among teachers.

There were, for example, discrepancies between what teachers claimed they did, and what actually took place in classrooms; and in some cases teachers were not following the required curriculum closely enough. Similar findings have been substantiated by Adams *et al.,* (2004). According to Earl *et al*. (2002) some teachers are not sufficiently aware of deficiencies in their own training, and may not fully understand the underlying principles of the literacy and numeracy strategies. Further, when the teachers were not conversant with the pedagogy which enhanced and accelerated learning, they were likely to adapt the required curriculum in inappropriate and ineffective ways. This

being the case, it can be argued that a teacher's training background, understanding and knowledge has an important bearing on practice. As this study has shown, RC teachers were not simply receiving and implementing policy expectations, but bringing their own values and understandings into practice. Bowe *et al*. (1992) summarised this by saying that, when it came to practice, teachers were re-contextualising the policies given them.

11.3 Limitations Of The Study

For this study it was necessary to bring together a macro-level analysis of an early years education system and early years mathematics policies - by means of document analyses - with micro-level investigations that took account of people's perceptions and experiences in the course of social activity (Ozga, 1990, cited in Ball, 1993). In this way, case studies were analysed in the light of an interpretive theoretical framework, as a means of answering a series of interrelated research questions.

As was outlined in Chapter 4, this was a relatively small-scale study with a single researcher. There were limitations on time and financial resources, so it was necessary from the outset to use a case study approach to triangulate results and eliminate bias, wherever possible. Ethical issues - and sensitivity to the wishes of the subjects - were a concern throughout the data collection process. Children, for example, were not individually questioned as to their thoughts and responses, as they were only ever observed unobtrusively classroom setting, and their responses recorded via schedules; adult interviewees validated their own responses via transcripts, or were responding in writing to questionnaires. This affords the resulting data a higher level of

objectivity than would be the case if the researcher was required to interpret the data before recording it.

Any study which attempts extrapolation and generalisation from limited sampling will necessarily require additional means of substantiation, and this thesis has sought that from previously-published literature in the field. The findings reported here are broadly in line with those of similar studies, although the detail obviously varies, and it is this qualitative difference which gives this thesis its particular character.

Finally, the period of planning and data-gathering over a period from 2004-2008 saw many changes and refinements to the numeracy policy context that were a challenge to report.

11.4. Implications Of The Study For Policy And Further Research

This research has focused on the process of the implementation of an early years mathematics curriculum. As a case study, the findings need to be set within a wider context, that of the emergence of a new educational paradigm, brought about by globalisation and the effects of powerful market forces. The speed with which these globalised forces have developed, coupled with the urgency of political responses to them, have resulted - initially, at least - in a top-down approach to educational policy generation and implementation, and all these changes have been taking place in a radically new context.

Bowe *et al.*'s (1992) policy trajectory model provided an appropriate framework to explore this fast-changing and unpredictable context. Moreover,

it serves to illuminate the degree of interplay between policy and practice and the need for a continuous flow between the two. In terms of evidence the study provides on the delivery of the FS and RCs, it does point to the challenges faced by teachers in attempting to develop organisational strategies and teaching techniques to suit a play-based pedagogy as shown in the Rural schools. At the same time, well-intentioned strategies to narrow the gap in performance of less advantaged Urban School children was leading to a less holistic and balanced curriculum to meet goals that were not all appropriate to children. As stressed by survey teachers establishing positive attitudes to learning and gaining necessary language skills will be crucial to longer-term attainment. There has been vast investment in early childhood education over the last ten years in order to lay foundations for later learning. In the case of RC mathematics, the challenge as ever for RC teachers is to build upon and extend the range of informal strategies at children's disposal so that their natural inventiveness is not undermined by a struggle to find a narrow and formal response.

The thesis started out by showing that RC occupies a space between the FS and KS1 curriculum, between an early years pedagogy and the requirements of a national curriculum to raise standards of achievement. At the same time, it is located within a context of international discourse, values and early childhood educational practices. It thus has global, national and local dimensions. Early years mathematics knowledge in turn reflects the wide-spread international impact of Western developmental theory.

The thesis illustrates an interplay between the local and global in the diverse ways of conceiving and enacting the same FS curriculum that it reveals. The FS curriculum in RCs, in turn, is selectively adopted and reinterpreted in accordance with local concerns that exposes a tension between global concerns, national policy and observed practices. This process is both historical and contextual. It has a horizontal dimension in the different interpretations of FS curriculum across different settings that are portrayed and a vertical dimension in the change over time, historically, that is reported as policy evolves.

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APPENDICES

Appendix-A: Élite Interview Questions

A.1. Main Questions for Élite 1, 2 and 3

Introduction to the interview

1. In which ways do you think the views and definitions of early years mathematics education for 3- to 5- year-olds have changed over the last eight to ten years (if at all)?

Context of Influence

1. What do you think have been the major catalysts for change in the early years maths curriculum policy over the last eight years?

2. Why do you think these policy changes came about, and which groups in particular, influenced them?

3. What do you think, at this point in time, will be the impact of the Williams Report (DCSF, 2008) on policy and practice?

Context of Policy Text Production

1. In your opinion, do you think there have been tensions and contradictions between the National Numeracy Strategy and Curriculum Guidance for the Foundation Stage?

2. What is your view of the Early Learning Goals for Maths?

3. Given that the Government has agreed to review the Early Years Foundation Curriculum after two years, do you anticipate that this will lead to change in the numeracy goals?

Context of Practice

1. How, in your opinion, have Reception class teachers responded to changes in the Foundation Stage Curriculum Guidance over the eight years?

2. What (if anything) has been the impact of the current Foundation Stage Profile on teaching early years maths?

3. What would you say have been the successes in terms of early years maths practice over the last ten years?

Concluding the Interview

1. What are the challenges for early years maths (for the future)?

A.2. Alternative Questions for Élite 4

Introduction to the interview

1. In which ways do you think the views and definitions of early years mathematics education for 3- to 5- year-olds have changed over the last eight to ten years (if at all)?

Context of Influence

1. Do you think there is a need for children aged 3 to 5 years to have a basic understanding of mathematics? Can you say why?

2. Given that the Scottish curriculum for 5- to 6- year-olds is different from the English Foundation Stage curriculum, what is your view of a National Numeracy Strategy for Reception classes?)

3. What do you think have been major catalysts for change in the early years maths curriculum policy over the last ten years in the UK?)

Context of Policy Text Production

1. Why do you think these policy changes came about and which groups in particular, influenced them (for example, changes for P1?)

2. In your opinion, do you think there have been tensions and contradictions between the primary mathematics curriculum and the pre-school curriculum for 3 to 5 years in Scotland?

3. How would you describe the major policy changes in the maths curriculum in the 3 to 5 year age range over the last eight or nine years?)

Context of Practice

1. How have early years practitioners responded to these changes, do you think?

2. What in your view should be the goals for mathematics for children 3 to 5 years in nursery schools?

3. What (if anything) has been the impact of the policy changes across UK on teaching early years maths, would you say?

Concluding the Interview

1. What are the challenges for early years maths teaching (for the future)?

Appendix B: The Questionnaire For Reception Class Teachers

Dear respondent,

I am a research student at the University of Warwick, under the supervision of Professor Carol Aubrey. As a part of my study I have designed this questionnaire in order to gather reception class teachers' (RCs) opinion about the Foundation Stage (FS) and National Numeracy Strategy (NNS). I very much hope you will agree to take part in survey, which should not take longer than 20 minutes to complete. I would also like to assure you that all responses will be treated in the strictest confidence.

Thanking you in advance.

Research student

Dondu Durmaz

1- How many years teaching experience do you (personally) have in total? Please tick the appropriate box.

0-2 years	☐	1	11-15 years	☐	4
3-5 years	☐	2	16-20 years	☐	5
6-10 years	☐	3	Over 20 years	☐	6

2- How many years have you been teaching in a Reception Class?

0-2 years	☐	1	11-15 years	☐	4
3-5 years	☐	2	16-20 years	☐	5
6-10 years	☐	3	Over 20 years	☐	6

3- What was your original teaching qualification?

BA (QTS) or BEd	1	☐
PGCE	2	☐
Teaching Certificate	3	☐
Other (specify)	4……	☐
No formal teaching qualification	5	☐

4- What age group was your initial training for?

Early Years/ Primary 3 to 7 or 8 years	1	☐
Early Years/ Primary 3 to 11 years	2	☐
Primary 5 to 7 or 8 years	3	☐
Primary 5 to 11 years	4	☐
Primary 7 to 11 years	5	☐
Other (specify)	……	☐
Secondary		☐

5- Since your original teaching qualification, have you completed or are you working towards any additional qualifications which will help you deliver the Foundation Stage curriculum?

	(a) Completed		(b) Working on		
Advanced Certificate	☐	1	☐	5	
Advanced Diploma	☐	2	☐	6	
MA (Masters Degree)	☐	3	☐	7	
Others (please specify)	☐	4	☐	8	……

6- Do you have any of the following additional responsibilities within the school? Please thick if you are currently ‘acting’ in the role of

Early years Co-ordinator	☐	1
Foundation Stage Co-ordinator	☐	2
Key Stage 1 Co-ordinator	☐	3
Subject Co-ordinator (please state the subject)	☐	4……
Deputy Head	☐	5

7- Do you have any general classroom support staff or not? (Please exclude anyone who work only with specific children).

Yes ☐ 1 N☐ 2 (if no, go to question 9)

8- If yes how many are part-time and how many are full-time?

1 _____ Part time _____ working hours per week

2 _____ Full time

9- Is your class comprised exclusively of reception year children, or does it include either older or younger children? (please choose the suitable responses)

Reception year only	☐ 1
Reception year and younger preschool children	☐ 2
Reception year and older children	☐ 3

10- What age is the youngest child in your class, in years and months?

_____Years _____ months

11- What age is the oldest child in your class, in years and months?

_____Years _____ months

12- The Foundation Stage was introduced in September 2000. What benefits, if any, have you seen as a result of implementing the Foundation Stage in your Reception class?

What have been the good things about it?

13- And what problems, if any, have there been in implementing the Foundation
Stage mathematics in your Reception class?

What have been the difficult things about it?

14- How much would you say that the work in your Reception class has changed overall, as a result of the Foundation Stage? (Please respond only if you have more than 5 years teaching experience). Would you say that it has changed …

A great deal ☐ 1
Quite a lot ☐ 2
A little ☐ 3
Not at all ☐ 4

15- If you agree that the introduction of the Foundation Stage has changed the way you teach in your Reception class, how would you describe these changes?

_____

_____

16- For each statement please choose the appropriate description below.

Not a problem 1
A small problem 2

A big problem 3

1. Implementing the National Numeracy Strategy with a more flexible approach for reception children. 1 ☐
2. Implementing both the National Numeracy Strategy and Foundation Stage Curriculum Guidance for reception children. 2 ☐
3. Teaching from both the Curriculum Guidance for the Foundation Stage and the KS1 Programme of Study (ignore if class has no older children). 3 ☐
4. Teaching reception-aged children and younger children in the same classroom (ignore if the class has no younger children) 4 ☐

17- Excluding any general training for early years teaching, have you had any training specifically in the Foundation Stage? Have you had (please choose):

Training on Curriculum Guidance for the Foundation Stage 1 ☐
Training in Reception class literacy 2 ☐
Training in Reception class numeracy 3 ☐
(No training for Foundation Stage) 4 ☐

18- Since your original teaching qualification, have you attended any short courses which help you to teach this age group?

YES ☐ 1 (please specify in which area(s)

_____

NO ☐ 2

19- Did any of the courses taken in the last 12 months cover National Numeracy Strategy or 'mathematical development' in the Foundation Stage? (please specify these cources).

YES ☐ 1 _____
NO ☐ 2 _____

20- Do you feel that you have received sufficient training to help you to deliver the Foundation Stage mathematics? Would you say that you have had…?

Enough training ☐ 1

Nearly enough training – but a bit more would be helpful ☐ 2
Not nearly enough training ☐ 3

21- I would now like to find out a little bit more about the admissions process to your Reception class. Below there is a short list of types of contact that teachers may have had before children begin in Reception class. For each one, please circle the option that best describes the contact, whether always (4), usually (3), sometimes (2), occasionally (1) or never (0).

	Always				Never
1 Firstly, receiving written records from the child's nursery or pre-school provider(s)?	4	3	2	1	0
2 Meeting with the child's pre-school provider(s)?	4	3	2	1	0
3 Meeting with the child's parent(s) / carer(s)?	4	3	2	1	0
4 Meeting the children themselves?	4	3	2	1	0
5 Meeting with parents and children in their own homes?	4	3	2	1	0

22- How often do you discuss the progress of the individual child with their future Year 1 teacher before they move on?

End of the reception year ☐ 1
Every term ☐ 2
Sometimes ☐ 3
Never ☐ 4
(Also teach Year 1) ☐ 5

23- How often do you discuss the progress of the individual child with their parent(s) or carer(s)?

On entry ☐ 1
Annually ☐ 2
Termly ☐ 3
More than once a term ☐ 4

24- Do all children at your school enter Reception class in September?

Yes ☐ 1 (go to question 26)
No ☐ 2 (go to next question)

25- At how many points during the year are children admitted to Reception class?

Twice a year ☐ 1
Three times a year (once a term) ☐ 2
Whenever it is most suitable for the individual child ☐ 3
Other frequency (please specify) ☐ 4

26- Please specify which of the following are involved in medium and long term mathematical planning- that is planning for the whole term or year.
(For 'yes' put 'Y', for 'no' put 'N' into the small boxes)

1. Nursery / early years teachers ☐ 1
2. Other Reception class teachers ☐ 2
3. Key Stage 1 teachers ☐ 3
4. Other classroom teachers (e.g. Key Stage 2) ☐ 4
5. Classroom support staff ☐ 5
6. Head teacher / deputy head ☐ 6

27- Who is involved in short-term mathematics planning – that is planning at a daily or weekly level?
(For 'yes' put 'Y', for 'no' put 'N' into the small boxes)

1. Nursery / early years teachers 1☐
2. Other RCs teachers 2☐
3. Key Stage 1 teachers 3☐
4. Other classroom teachers (e.g. Key Stage 2) 4☐
5. Classroom support staff 5☐
6. Head teacher / deputy head 6☐

28- Please respond if you have classroom support staff.

How much involvement does your classroom support staff have in evaluating lessons afterwards?

A great deal	☐ 1
Quite a lot	☐ 2
A little	☐ 3
Not involved at all	☐ 4

29 – Regarding timetabling the six areas of learning in your Reception class, how do you timetable Term 1, Term 2 Term 3? (Please circle the correct response).

		Term 1	Term 2	Term 3
1	The areas of learning in distinct blocks	1	1	1
2	Integrate the six areas of learning	2	2	2
3	Or, as a mixture of the two	3	3	3

30- For approximately how many hours per week is the Reception children engaged in spontaneous activity or activities that they have either initiated or chosen for themselves?

Up to 1 hour	☐ 1	Up to 10 hours	☐ 6
Up to 2 hours	☐ 2	Up to 15 hours	☐ 7
Up to 3 hours	☐ 3	More than 15 hours	☐ 8
Up to 4 hours	☐ 4	All the time	☐ 9
Up to 5 hours	☐ 5	Do not know	☐ 10

31- In each term (Term 1, 2, 3) approximately what percentage of classroom time is spent on whole class mathematics work as opposed to other types of work.

	Term 1	Term 2	Term 3
1 Whole class work	%.....	%.....	%.....
2 Other (specify) ……..	%.....	%.....	%.....

32- I would like you to assess how well you think the Foundation Stage addresses a series of issues. For each area specified below, please circle

whether you think the Foundation Stage has got it ‘about right (1)’, ‘puts too much emphasis on it (2)’, ‘puts too little emphasis on it (3)’

	Right	too much	too little
1 Formal learning	1	2	3
2 Play	1	2	3
3 Written skills	1	2	3
4 Verbal skills	1	2	3
5 Taking a developmental approach to learning	1	2	3

33- In general, how frequently in your Reception class are there opportunities for children to engage in informal exploration of numeracy?

Daily ☐ 1
At least weekly ☐ 2
Less frequent ☐ 3
Hardly ever ☐ 4

34- Do you introduce all elements of the National Numeracy Strategy flexibly across the day, or as a daily maths lesson? In each term how do you implement the National Numeracy Strategy (please circle the appropriate one/s)?

		Term 1	Term 2	Term 3
1	Flexibly	1	1	1
2	Daily Maths lesson	2	2	2

35- How important do you personally feel it is for children to acquire each of the following skills during the Foundation Stage? Please use a scale of 1 to 10, where '1' means 'Not at all important and '10' means absolutely Vital'. (This is a randomised list)

	1	2	3	4	5	6	7	8	9	10
1) Concentration										
2) Motivation										
3) Working with others										
4) Active independence										
5) Enthusiasm										
6) Literacy										
8) Numeracy										
9) Physical Development										
10) Creative development										

36- I am interested in the ways you monitor and assess the mathematical progress of pupils in the Reception year. Please check the methods given below, for each one, tick the box under Yes if you use that method, or under No if you don't.

	YES	NO
Records from the nursery / early years provider	1 ☐	10 ☐
Utilising your own Foundation Stage profiles assessment information	2 ☐	11 ☐
General observations	3 ☐	12 ☐
Photographic observations	4 ☐	13 ☐
Observations by audio recording	5 ☐	14 ☐
Observation by video recording	6 ☐	15 ☐
Annotated samples of work	7 ☐	16 ☐
Reports / diaries from parents	8 ☐	17 ☐
Asking children's own views of their learning	9 ☐	18 ☐
Other (please specify)	☐	☐

37- How do you perceive the level of commitment to the Foundation Stage among the teaching community as a whole?

Very High	☐ 5
High	☐ 4
Moderate	☐ 3
Low	☐ 2
Very Low	☐ 1

38- Taking everything into consideration, do you personally think that the Foundation Stage is a:

Very good thing	☐ 1
Quite a good thing	☐ 2
Neither a good nor a bad thing	☐ 3
Quite a bad thing	☐ 4
A very bad thing	☐ 5

49- Please let me have your opinion on the Foundation Stage (FS) and National Numeracy Strategy (NNS) by circling the scale of 1 to 5, where 1 means ‘absolutely wrong’, and 5 means ‘absolutely right’.

	1 wrong -------->5 right
1 They complement one other	1 2 3 4 5
2 NNS has a very clear guidance	1 2 3 4 5
3 Foundation Stage has a very clear guidance	1 2 3 4 5
4 Implementing Foundation Stage Curriculum to young children	1 2 3 4 5
5 Implementing NNS to young children	1 2 3 4 5
6 Implementing those two curricula to mixing age class children	1 2 3 4 5

40- And finally, are there any issues regarding the FS and NNS you feel have not been addressed in this questionnaire?

Appendix C: Target Children Observation Sheet

CHILD'S INITIAL: SEX: AGE: DATE:

TIME:

ACTIVITY RECORD	LANGUAGE RECORD	TASK	SOCIAL
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
OPINIONS:			

Appendix. D: Teacher Interview Questions

1. Teachers background (experience in teaching and in RC, original qualification and age group for which trained)

2. What benefits and what problems, if any, have you encountered as a result of implementing the Foundation Stage mathematics in your reception class?

3. How much and in what way would you say that the mathematical work in your reception class has changed overall, as a result of the Foundation Stage mathematics?

4. have you had any training specifically in the FS and in the 'mathematical development' for the FS, and do you feel that this training is sufficient to help you to deliver the FS mathematics?

5. On the whole, how would you assess the understanding among the parents of your current class of the six areas of learning of the Foundation Stage? Do you encourage parental involvement in the curriculum?

6. In your school, who is involved in either long term mathematics planning- that is to say, planning for the whole term or year – or in the short-term mathematics planning – that is to say, planning at a daily or weekly level?

7. How do you perceive the level of commitment to the Foundation Stage among the teaching community as a whole?

8. How much involvement does your classroom support staff have in evaluating lessons afterwards?

9. Regarding timetabling the six areas of learning in your reception classes, do you integrate the learning areas altogether or separate them into distinct blocks, or a combination of the two? And how do you timetable them over the three terms?

10. In each term (Term 1, 2, 3) approximately how much classroom time of a mathematics lesson is spent on whole-class teaching as opposed to other types?

11. Approximately how often were there opportunities for children in your reception class to engage in informal exploration of numeracy? Could you tell me how many hours per week are children in reception engaged in spontaneous activity, or in activities that they have either initiated or chosen for themselves?

12. How well you think the Foundation Stage addresses a number of topics, for example, ‘formal learning’, ‘play’, ‘written skills’, ‘verbal skills’, ‘taking a developmental approach to learning’. Do you think the FS has ’got it right’ or ‘puts too much (or too little) emphasis’ on them?

13. Which skills do you personally feel children need to acquire during the Foundation Stage. (If possible give name of the some skills, i.e. concentration, motivation, working with others, active independence, enthusiasm, literacy, numeracy, personal and social development, physical development)

14. Which methods do you use to monitor and assess the mathematical progress of pupils in the reception year?

15. Taking everything into consideration, what do you personally think about the FS, CGFS and NNS? Do you they complement one other? Has implementing them in RC have caused problems? Do they have clear guidance?)