An Exploration Into The Validity Of Claims Made By One Junior School As To The Perceived Benefits Of Target-grouping For Mathematics.

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ABSTRACT

In the British government's quest to improve educational standards they have supported the introduction of target grouping in schools [DfEE, July, 1997]. Target grouping, or homogeneous ability grouping, is the grouping of pupils by ability for part of the week for a specified subject. It is claimed that target grouping :

a. is a positive experience for those involved;

b. is easier for teachers to manage;

c. boosts pupils' self-esteem and the experience of success;

d. and raises pupils' levels of achievement.

As target grouping is a relatively new concept and there has been "virtually no research on this" [Bennett, 1995], this research aims to begin to address this omission.

The research considers the validity of the above claims from the perspectives of both the pupils and the teachers of Rosemary School, a large junior school which introduced target-grouping for mathematics across the whole school in September 1997. This was mainly achieved through the analysis of questionnaires and interviews. As a teacher within Rosemary School, the researcher used a journal and reflection to consider her own perspective on target grouping for mathematics.

With respect to Rosemary School the research concluded that target grouping for mathematics:

1. is a positive experience for those involved except for those children, especially in the lower ability groups, who have low self-esteem;

2. is easier for teachers to manage;

3. boosts pupils' self-esteem and experience of success, especially for the brighter pupils.

4. The research was inconclusive as to whether target grouping for mathematics raises pupils' levels of achievement.

ACKNOWLEDGEMENTS

"But ere we did arrive at the point propos'd,
Ceasar cried, 'Help me, Cassius, or I sink!'"
[William Shakespeare - Julius Ceasar, Act 1 Scene 2]

Poor old Ceasar! It was lucky that Cassius was there to save him. Just as I have been very lucky with friends and colleagues who have supported me on this long five-year journey towards a doctorate.

The biggest thank you must go to Professor Morwenna Griffiths of Nottingham Trent University. Her expert knowledge and guidance was the driving force that enabled me to realise my dream. I cannot thank her enough for her contribution.

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My colleagues from the Master of Education course, who were interested and supportive every step of the way;

Friends and colleagues who stood in for me when the going became tough;

The staff and pupils of Rosemary School who patiently and freely gave of their time to answer questionnaires and to be interviewed.

Finally, of course, I must thank my family: for their forbearance when I became disillusioned and tetchy; their understanding when I was glued to the computer; and their support, both cajoling and bullying, to make sure that I did arrive at "the point propos'd"

CONTENTS

CHAPTER 1

INTRODUCTION - OR BENNETT'S BOMBSHELL

"It's good news week.
Someone dropped a bomb somewhere,
Contaminating the atmosphere,
And blackening the sky."
[Jonathan King, 1965]

There it was. Dropped like a bombshell. Bennett's bombshell in black and white and waiting to be read.

"Head teachers are looking around to see what kinds of classroom organisation give the best results and are experimenting with setting. Whether or not it's successful is another matter. There's virtually no research on this" [Bennett, TES, 27.1.95. p.8].

The Headteacher of Rosemary School, the school where I work, had been "*looking around to see what kinds of classroom organisation give the best results*" for mathematics, and had, with the support of the school governors, the school management team, and the mathematics co-ordinator, just persuaded the staff who taught the oldest junior pupils, to implement setting, or as it renamed, 'target-grouping', for mathematics. So could Bennett's call be the answer to my quest for an educational phenomenon to research? Would, "*whether the innovation was a success or not*", matter? Would my efforts add to knowledge? Yes. Yes. Yes. For as Bennett noted, research into the new form of setting had been addressed by very few researchers.

"*Although there is little recent research on the subject, it seems that Dr Winkley [Headteacher of Grove Junior School] is not alone in his enthusiasm for setting and that 'target-grouping' as he prefers to call it, may be back in vogue.*" [TES ibid]

Why then had the term 'target-grouping' become the vogue or 'juste-mot' at this time? Target- grouping, setting, homogeneous ability grouping are synonymous and are used interchangeably within the research. However target -grouping is the preferred term for the type of setting under consideration, for within target-grouping pupils are grouped by ability for only part of a day and only for certain subjects. Setting on the other hand has become synonymous with inflexibility and stereo-typing, whereas target-grouping is considered to be a flexible, non-stigmatised form of grouping. As will be seen, both

national and international forces have lent credence to the reintroduction of a modified form of setting that has not been in educational favour since the early 1960s.

"*The key to Grove junior's success, Dr Winkley claims, is "setting", or grouping children together for certain subjects according to ability rather than age, a concept which has failed to find favour in primary schools since the 1960s and the advent of mixed-ability teaching*". [ibid]

As a firm believer in the propensity of time and place, I believe that, for setting by targeting pupils' strengths and weaknesses, NOW, is the time and place, especially for Rosemary School. By 'now' I mean, 'at this point in the school's development', for as will become apparent [see chapters 1-7] it is only at this point in time that both external and internal factors have come together to enable Rosemary School to even consider implementing 'target-grouping' for mathematics as a teaching/learning strategy.

The Place

For ethical reasons, the name of the school has been changed, and will be referred to as Rosemary School. [see chapter 8's section on Ethical Issues]

Rosemary School is a very pleasant school in which to work. The school building and grounds are well maintained, whilst the interior is bright, airy and well resourced. The pupils are generally well behaved and motivated, which adds to the school's reputation, whether deserved or not, of being a 'good' school. The staff, are long standing. They believe in, and are very supportive of, the school. This manifests itself in that half the staff have sent their own children to be educated at the school.

The Time

A new class, a new mathematics scheme, a new form of grouping, a pending OFSTED inspection, and a new piece of research, gave me pause for thought, and reflection. One of the hardest and most emotional parts of the research was preparing for and delivering my seminar on my findings to date. Preparation for the seminar gave me the opportunity to reflect on the events that had happened during my life, especially my school life, which had helped to shape the person and teacher that I am. "*When a writer writes a biography, he or she writes him- or herself into the life of the subject written*

about...Along the way, the produced text is cluttered by the traces of the life of the "real" person being written about." [Lesser, 1988, p.26]

I will tell you the story.

It was another school day and the little girl, her two plaits secured tightly with brown elastic bands, sits bent over a maths workcard. The little girl knows she will get the sums right as she is on the 'top table' with another girl and two boys by the big red classroom door.

Soon the little girl had to leave the school. The school where there was a wooden playhouse with a door you could close, in the corner of the room. The room that had a large blazing coal fire which burned brightly during the winter months. The school where the little girl had done so well. The little girl's new school was much larger, and she no longer sat on the 'top table'. However, she soon moved into the A class, and although spelling tests were a nightmare to her, she still did quite well at maths.

The little girl grew up and moved school again, but still to an all girl's school, with female teachers, of course. The girl improved her English and writing skills. In fact she improved so much, one teacher refused to believe that the work belonged to the same girl, but it was still in mathematics that the girl felt most at ease.

Top class, top set, reasonable G.C.E results - the girl continued to do well. She didn't shine, but her abilities were not to be sniffed at. But then the girl faced her nemesis - A-level mathematics. It seemed so different to all that had gone before. Without her trusty friend by her side, guiding her, helping her, and even doing her homework for her, the girl would have sunk under the morass of unintelligible signs and symbols.

The help and support worked. The girl passed her final A-level mathematics. And the friend? The friend failed. The unfairness of it all, the sense of betrayal and treachery, the unworthiness of success, haunted the girl forever more.

Life carried on and the girl continued to use the education system, accepting what it had to offer but always trying trying to be worthy of the one reward that she felt she had never earned.

The research

If that was my destiny, then it had led me to the research into target-grouping for mathematics within Rosemary School.

"*Most schools are capable of managing their own destinies. The key challenge for the future is to develop this capacity. I do not want inspection, any more than I want local education authorities or university education departments, to draw schools into the culture of dependency, an over-reliance on the supposed wisdom of the outside expert*" [Woodhead, TES, 14.5.99. p.17].

I did not, and do not, consider myself wise nor an expert, but I was, in the case of researching the claims made by Rosemary School for target-grouping for mathematics, possibly an 'inside' expert, with access to knowledge that may be denied to an outside researcher. Being an 'insider' could also mean that the staff and pupils would speak more freely to me than an 'outsider' as we shared the same experiences and 'school language' [Hammersley, 1993]. On the other hand they may feel threatened and vulnerable in sharing their thoughts and experiences with a colleague and teacher. Only time would tell, and the time was now.

When target-grouping for mathematics was introduced in Rosemary School a number of benefits were cited.

These were as follows:

Benefits for Pupils

1. Children can be extended en masse with teaching focussed on a narrower range of ability than is possible in a mixed ability class

2. A more structured approach makes it easier to monitor progress and ensure pupils remain on task.

3. Less able children are not constantly over shadowed; experience in schools that use setting regularly is that it boosts their self-esteem and experience of success

4. Some children benefit from a change of teacher.

Benefits For Teachers

1. Planning of work for a narrower band of ability is more straightforward and timesaving.

2. Exposition is easier to focus on an appropriate level of ability.

3. Teachers can develop relationships with pupils of other classes.

Benefits for the School

1. Evidence from HMI and Ofsted suggests nationally, that ability grouping for mathematics has a positive effect on pupil achievement. [School memos, 1996, see Appendix A].

These cited benefits led to the following hypotheses, which became the cornerstones of the research;

a. Target-grouping boosts children's self-esteem and experience of success.

b. Less able children are not constantly over-shadowed

c. Target-grouping for mathematics raises pupils' levels of achievement in mathematics,

d. Target-grouping enables teachers to focus on the appropriate level of ability for that group.

e. Target-grouping is easier for teachers to manage than mixed ability classes.

f. Those involved in target-grouping perceive it to be a positive experience.

An outline of the research into the validity of claims made by one junior school of the perceived benefits of target-grouping for mathematics.

The research may be loosely divided into four main sections: the wider education scene; the context of the research; a discussion on the findings of the research into target grouping for mathematics within one junior school; and personal reflections on the research and on the Doctorate of Education course that has been followed. In many ways it is like a train journey that starts at a large, impersonal terminus; travels along main routes before turning off onto the Rosemary branch line; then coming to rest at a red stop sign. But it is only a stop sign - a pause- before the journey continues into unknown

territory. But let us hurry as the train is waiting at Chapter 2.

Chapter 2 aims to secure the research project within the field of education. It argues that the purposes of education are: to socialise the individual into society; to contribute to the economic growth of the society; and to develop the skills and understanding of the individual. "*The school curriculum should aim to: provide opportunities for all pupils to learn and to achieve; prepare all pupils for the opportunities, responsibilities and experiences of life.*" [QCA, 1999, p.4]. To assist understanding of the wider picture this chapter considers just a few aspects of the vast subject which is encapsulated in the question, 'What is education?'

Mathematics as a discipline addresses both social and cultural inventions, and yet its timeless mathematical truths allow creativity and discovery. Numeracy will be seen, in chapter 3, not only to reflect the social and cultural development of a society, but to hold unalienable truths which are constant across all societies.

Target-grouping is just one form of grouping open to the teacher to facilitate teaching and learning. But how to group pupils to promote learning is the question. As indicated, mixed ability groupings have been the norm in most primary classrooms since the early 1960s, However, "*David Blunkett revealed his unhappiness with standards in primary schools and praised a setting experiment in Nottinghamshire....The experiment was put in motion after tests revealed that many inner city primary pupils were under-achieving.*"[TES, 27.1.95. p.8] Chapter 4 therefore considers different methods of meeting the needs of individuals within group situations, and the 'push' by central government to encourage schools to implement those forms of grouping that the government deems, at that time, to be the most effective in the quest to raise educational standards. This leads to chapter 5, which, forms the link between the wider general picture and the research situation. Not only does chapter 5 consider the external forces within education that are working towards change yet homogeneity within the education system of Britain, but it also begins to address the question of 'why Rosemary School changed from mixed ability teaching for mathematics to homogeneous ability grouping.'

In order to set the research within a contextual framework, census data is used to broadly portray the catchment area of Rosemary School. The main stakeholders - the Head, the teachers, the governors, the parents and the pupils - are described in chapter 6. However, why did Rosemary School change from mixed ability teaching for mathematics to homogeneous grouping, initially for the older children and then for the whole school? What were the contributing 'forces' that led the staff to make this decision at that time? Chapter 7 discusses the individualistic circumstances, which finally led to a dramatic change within Rosemary School in the way mathematics was organised, whilst chapter 8 briefly, describes the methodology and data collection methods used within the research into the change. [See Coherence and Integration Report]

"*I make no apology for the personal tone that I hope comes through on these pages. Although my words were prepared on a computer, they were created by a person.*"[Eisner, 1998. p.4] This is particularly true of this chapter, chapter 9, and later, chapter 15, which are reflective chapters on my own personal experiences. The role of past experiences and the perception of self-worth which underpin my responses are explored, as are my responses to the the demands of implementing target-grouping for mathematics with a year 6 top ability group.

Chapter 10 considers the effect that the change to setting by ability for mathematics has had on the teachers of Rosemary School. Data for this chapter was collected through the teacher's written responses to an open-ended questionnaire, and through discussion with individual teachers. This chapter therefore, considers the teachers' responses to the innovation, and is based on the teaching experiences of the Head, 12 teachers and a classroom assistant. The perceived benefits of target-grouping for teachers and pupils has been outlined above, which led to both teachers and pupils being asked the same three questions;

1. How do you feel about maths?
2. How do you feel about being in a maths group?
3. What will you try to do better next year?

One purpose of the questions was to elicit information on the pupils' motivation and

sense of self-worth. One benefit of target-grouping is cited as: " *Less able children are not constantly over shadowed, experience in schools that use setting regularly is that it boosts their self-esteem and experience of success*" [see Chapter 7's section on The Change], but is this true? First however consideration is given to the theoretical background that underpins how pupils perceive themselves and how this affects their motivation, and the role of the teacher in developing pupils' self-esteem and motivation.

"*Target grouping was introduced because other schools have found that it works well and raises pupils' levels of achievement*"[School memo, 1998, see appendix A]. To add to knowledge chapter 13 first discusses how achievement in mathematics may be measured, before analysing empirical data collected within Rosemary School, in order to consider the question as to whether, within the school under consideration, grouping according to ability in mathematics does raise pupils' levels of achievement in mathematics. Chapter 14 then considers how the perceived situation in the 'field' compares with the theoretical context, and thus explores the validity of the claims made as to the perceived benefits of target-grouping for mathematics.

The red signal on the branch line is finally reached in chapter 15. As with chapter 9, this chapter is written in a different style to the main body of research as it reflects upon my own personal learning process from embarking on the journey called a Doctorate in Education. Therefore this is my journey, my story and my research."*My ideas are candidates for others to entertain, not necessarily as truth..., but as positions about the nature and meaning of a phenomenon that may fit their sensibility and shape their thinking about their own inquiries*. "[Peshkin, 1985, p.280]

CHAPTER 2

A CONSIDERATION OF WHY CHILDREN SHOULD BE EDUCATED

Introduction

This chapter aims to place the research project within the field of education. In order to assist understanding of the wider picture the chapter considers just a few aspects of the vast subject which is encapsulated in the question, 'Why should children be educated?'

It will be argued that receiving an education is not the same as 'going to school', but that in economically developed countries receiving an education at school has been seen by governments as the most socially and economically expedient way of developing 'good' citizens.

What is Education?

Education is a social activity. If children were born physically, intellectually, and socially mature, there would be no education. *"Education exists only when, but always when, childhood is experienced in society."* [Bernfeld,1925,p.32]

A Social View of Education

A child is reared by a mother-figure, who in tending to the child's needs, initiates the child into the 'mother's' social sphere. Through social interaction the baby will be educated into the norms of its immediate society. However the adults within this small society are part of a larger society, which through need, experience, custom or political directive, has shaped the small family group.

The education of the young is perceived to be primarily the role of the female, administered in age groups, with the initiation of young males into the world of men being conducted later by adult males [Bernfeld,1925; Peters, 1965; Gordon & White, 1979]. The child, born into a tribe or social group, grows up with the mother or women

of the tribe, and is the recipient of uninhibited love [Bernfeld ,1925]. This comes to an end in non-industrial tribes between 7 and 13 years when the boys are taken by the adult males and initiated into the life of men, leaving the girls with the adult females to be initiated into the life of women. Through these initiation rites the gravity of parricide and incest is indelibly impressed upon the younger generation, thus ensuring the survival of the tribe. The first stage of education, therefore, is in a pair group; the mother and child, or at least carer and child, whereas the second is collective education in a majority group, organised in and by society.

Learning to fit into the norms of society is one aspect of education [Bruner, 1996, Nunes & Bryant, 1996]. Through education however some of these norms may be changed, but it depends on whether these norms are 'sacred' or 'profane' [Corbett et al, 1987]. Profane norms are positioned in the day-to-day world and can be changed through improved knowledge, whereas, sacred norms, or 'systems of belief', are relatively immutable in that any attempt to change them will be met by strong resistance." *Education consists essentially in the initiation of others into a public world picked out by the language and concepts of a people and structured by rules governing their purposes and interactions with others."* [Peters, 1965, p.26] , Sacred norms are at the very heart of the individual and sense of self, so that any attack on the sacred norms represents an attack on the individual's construction of reality [Corbett,1987]. An education therefore is not the formal education that a school or teaching establishment provides, although that may form part of it, in fact, education is much more than school.

A Utilitarian View of Education

Education does not only take place in an educational establishment. One could question whether this is the best or the worst way to educate people. Non industrialised tribes educate their young people through example and the teaching of essential survival skills. These learnt skills are not only for the benefit and survival of the individual but for the tribe or society as a whole [Peters, 1965].

In 'developed' societies the socialising of the individual is carried on in the home until adulthood, but not fulltime. Once the child begins to leave the mother-figure and spends

time with members of a wider society differences in expectations may occur particularly when the child enters full-time education. Some governments have tried to address this disparity by introducing a common curriculum for their schools. *" The statutory curriculum secures for all pupils, irrespective of culture, social background or gender, an entitlement to access areas of learning and to develop skills, knowledge and understanding necessary for their self-fulfillment and development as active and responsible citizens"* [Education Act, 1996, Section 351. p.5]. Although these aims seem worthwhile and socially just, the following discussion will consider whether this version of education addresses the needs of the individual or whether it aims to satisfy the political and economic needs of the state.

This externally imposed utilitarian version of education sees the education system as a means of promoting economic growth through the development of marketable skills and the exposure of the population to new consumable sources of satifaction. Although a country's economic growth may depend on a reliable source of workers and consumers, there is more to life than work and the consumption of goods and services.

A utilitarian view of education is not only, however, about fitting pupils for positions in the division of labour, it is also about maximising individual satisfaction for the greatest happiness of the greatest number, of which the role of worker and consumer is just one part [Gordon and White, 1979]. An individual who feels fulfilled and worthwhile is more likely to contribute positively to society than one who is discontented.

The notion of the maximisation of individual happiness suggests that every person requires an individual programme of education to meet their needs. But education *"is a complex pursuit of fitting a culture to the needs of its members and of fitting its members and their ways of knowing to the needs of the culture"* [Bruner,1996 p.43]. So if education aims to reproduce the culture that supports it and further its economic, political and cultural ends, an industrial society, which requires willing labour at all levels, risks stagnation if individuals are not free to pursue new lines of thought or action. On the other hand, if one of the functions of education is to enable individuals to operate at their fullest potential, and to equip them with the tools and the sense of

opportunity to use their skills and passions to the fullest, then there is the risk of social unpredictability as individuals pursue their own satisfaction. The expansion of understanding for its own sake could therefore be said to divorce education from social responsibility.

The Development of Understanding

As the expansion of understanding is a mental activity, then it could be argued that learners must rely on their own intelligence and motivation to make the most of educational opportunities, including schooling. An educated person is one who pursues an activity not only for what it is but what it may lead to, who delights in things for their own sake and continues with something even when there is no pressure to [Peters, 1973]. If this is the case then educational institutions should cultivate those who are best endowed to benefit the most from such schooling. However, narrow specialised knowledge and understanding is not education, as an individual needs to be able to function on many levels.

The responsibility for developing an individual's mental capacity does not rest entirely with the individual. Although children are born with different mental capacities it has been shown that mental activity is situated and supported by a more or less enabling setting, in that the quality of teaching can make a difference to the degree of an individual's mental development [Klaus & Gray, 1968; Zigler & Valentine, 1979; Schweinhart & Weikart, 1980]. When forms of meaning have been constrained by what has previously been experienced and by a predisposition to think and interpret the world in a particular way, teaching can expand the mind [Bruner, 1996]. Similarly Vygotsky [1962] considered that humans have a capacity to recognize ways beyond that endowment if given the *toolkit* to go beyond their natural constraint. He called this capacity the 'zone of proximal development' which enables humans to develop by thinking about thinking. Constructivist thus view education as helping young people to learn to use the tools of meaning making and reality construction to better adapt to the world and to help in the process of changing it as required. *"Human learning is best when it is participatory, proactive, communal, collaborative and given over to constructing meanings rather than receiving them"*[Bruner, 1996, p.85]

The meaning of anything is relative to the terms in which it is construed. However this may create discord if it is contrary to a more common understanding. Any particular individual's idiosyncratic interpretations of the world are constantly subject to judgement against what are taken to be the canonical beliefs of the culture at large. These beliefs are reflections of time and place. For example in the eighteenth century theorists preached that children should become accustomed early to discipline [Bernfeld, 1925]. Whilst in the twentieth century, 'modern' theorists proclaim the rights of children to love and understanding.

During the nineteenth century education was perceived as part of the Divine purpose, whose goal was self-knowledge, and thought about thought. Since God is embodied in the world, thought must be embodied too. As men's minds developed so they became vehicles through which God could come to realise his intrinsic purpose. The divine purpose could be forwarded in two ways, by raising the consciousness of particular individuals to higher and higher levels, and by enlarging the numbers of individuals whose consciousness was raised. Education therefore was for one and all.

Not only was a formal education to be for everyone, it was to be in a wide sense a 'religious' education. This theme still holds today. The 1996 Education Reform Act requires that the curriculum for a maintained school is balanced and broadly based and promotes the spiritual, moral, cultural, mental and physical development of pupils at the school and of society. It also requires that the curriculum prepares pupils at the school for the opportunities, responsibilities and experiences for adult life [Section 351].

What If There Were No Schools?

It has been shown that even if there were no schools education would still take place within society to enable each individual to fit into that society and play a role within it. Skills and knowledge would be passed on from one generation to the next. However although sacred norms are still maintained in this way the modern world is no longer made up of insular communities but is now a developing global community.
Within this global community the rights of children to a formal education have been laid down.

"All the rights are to be enjoyed by children regardless of race, colour, sex, language, religion, political or other opinions, national, ethnic or social origins, property, disability, birth or other status." and that one of these rights was *"the right to an education which prepares him/her for an active responsible life as an adult in a free society which respects others and the environment"* [The United Nations Convention on the Rights of the Child, Article 2,1989]. So on a global level education is seen as preparing the individual for adulthood.

Education therefore has a two-fold purpose, namely; to develop individual and social skills and knowledge necessary to function occupationally and socio-politically in society, and to develop cognitive skills and knowledge [Bowles and Gintis, 1976; Sarason, 1990; and Fullan, 1991]. Education can provide the means to social mobility, a degree of professional competence and satisfaction, the acquisition of skills to make a living and the knowledge and perception to make that living worthwhile. Education is, therefore, a life-long process where schooling is just one vehicle in providing educational opportunities. In Britain schooling is a form of education that is sanctioned and generally funded by the government.

Conclusion

Education is essentially the initiation of others into a public world picked out by the language and concepts of a people and structured by rules governing their purposes and interactions with others.The social function of education therefore consists in the preservation of the biopsychic and the socio-economic structure of society along with its cultural and intellectual attainments. One of the economic structures of a society is that its members should be numerate, which is seen as a powerful tool in preparing young people for later work and study.

CHAPTER 3

A CONSIDERATION OF WHY CHILDREN SHOULD BE NUMERATE

Introduction

In Chapter 2 the role of education in socialising the child into society together with the utilitarian and self-development aspects of education were discussed. In this chapter consideration is given to the place of numeracy within education. It will be argued that to be numerate is insufficient. Mathematics as a discipline addresses both social and cultural inventions, and yet its timeless mathematical truths allow creativity and discovery.

The Place of Mathematics Within Education

Mathematics may be discovered or invented. If mathematics can be discovered then it must exist in the real world [Coles and Price, 1998]. This positivistic view perceives mathematics as a body of knowledge which exists outside the learner who it is to be transmitted to or discovered by. Such mathematics is seen as infallible, objective, logical, provable and fixed, and even utilitarian. On the other hand the view that mathematics is invented means that it does not have to exist in the real world. The constructivistic view that mathematics may be approached from a creative and inquiring viewpoint means that the mathematics involved are not fixed but can change so that new ideas and uses may be developed. Personal experience suggests that these are two ends of continuum, for within mathematics there is a place for both fixed and creative structures. *"The usefulness of particular branches of the subject are totally dependent upon social, cultural and historical contexts but enjoyment of the subject is not governed by the same constraints."*[Owen, 1987, p.17]

In mathematics learning there are logical principles and cultural inventions, so that children have to master both aspects. This general versus the specialised aspect of mathematics fits in with the particular versus universal view of education where *"what education has to impart is an intimate sense for the power of ideas, for the beauty of*

ideas, and for the structure of ideas, together with the particular body of knowledge which has peculiar reference to the life of the being possessing it."[Whitehead, 1929, p.227]

"The life of the being possessing it" is a social being. Mathematics is a school subject but it is also part of everyday life. A person needs to understand their culture's numbering system and have a basic understanding of number, measurement and time to function within their society. Mastery of these skills will manifest itself in different ways as a person will attempt the same problem in different ways according to the social situation [Nunes et al,1993]. The social learning situation in schools as a 'didactic contract', that is the tacit, unspoken, agreement between teacher and pupils on what knowledge and learning of mathematics, will be in their classroom [Brousseau, 1987]. Another social convention of mathematics is that language plays an essential part in the formulation and expression of mathematical ideas. *"Mathematics should enrich childrens' aesthetic and linguistic experience, provide them with the means of exploring their environment and develop their powers of logical thought, in addition to equipping them with the numerical skills which would be a powerful tool for later work and study"* [Cockcroft Report, 1982, p.4]. This supports the earlier claim that one purpose of education is to prepare young people for the world of work.

Numeracy and Mathematics

Numeracy involves thinking mathematically about situations. To think mathematically, it is necessary to know mathematical systems of representation that will be used as tools. These systems must have meaning, that is they must be related to situations where they are applicable and can be used. It is not enough to learn procedures, it is necessary to make these procedures into thinking tools. This fits with the constructivists' view of education that the mathematics curriculum should be designed to help young people to learn to use the tools of meaning making and reality construction in order to better adapt to the world and to help in the process of changing it as required.

"Numeracy means knowing about numbers and number operations. More than this, it includes an ability and inclination to apply numerical understanding and skills to solve

problems, including those involving money and measures. It also includes familiarity with the ways in which numerical information is gathered by counting and measuring, and is presented in graphs, charts and tables" [L&NNP, 1998, p.5].

The National Numeracy Project's framework for numeracy covers three related strands: numbers and the number system, which are culturally based; calculations, which support the economic function of education; and making sense of number problems which require logic and lend themselves to social activity. Although fairly wide ranging, numeracy, within the definition proposed, does not cover all aspects of mathematics. Therefore being numerate is not the same thing as being mathematical, although being numerate does involve thinking mathematically about situations.

"We would wish the word 'numerate' to imply the possesion of two attributes. The first is an 'at-homeness' with numbers and an ability to make use of mathematical skills which enable the individual to cope with the practical mathematical demands of everyday life. The second is an ability to have some appeciation and understanding of information which is presented in mathematical terms, for instance in graphs.....Taken together, these imply that a numerate person should be expected to be able to appreciate and understand some of the ways in which mathematics can be used as a means of communication. "[Cockcroft, 1982, para.34]

Thus the Cockcroft definition of numeracy makes some concessions to accomodate both the constructivist and the positivist views of mathematics, in that mathematics can be both 'real' and 'creative'.

However, out of eighteen aims for the present school curriculum only one mentions numeracy:

"The school curriculum should equip pupils with the essential learning skills of literacy, numeracy and information technology, and the skills to enquire and make connections across areas of learning. " [QCA, 1999, p.4]

At the turn of the twenty-first century the British Government is expending time, money and effort to promote numeracy through the National Numeracy Project. But how does numeracy fit the purposes of education?

Bruner's Nine Tenets of Education

Chapter 2 concluded that education has a two-fold purpose, namely: for the individual to develop skills and knowledge necessary to function in society, and to develop the individuals own cognitive skills and knowledge. Bruner has developed these aims into nine tenets of education. These may be loosely divided into tenets on: the construction of reality (the perspective, constraints and constructivism tenets); the role of the individual in society (the interactional, externalization, instrumentalism and institutional tenets); and the development of self (the identity and self-esteem, and narrative tenets). But where does mathematics and numeracy fit into education, and in particular into Bruner's nine tenets of education?

Subtle links can be made between Bruner's tenets [1996] and the purposes of mathematics as outlined in the government document Mathematics from 5 to 16 [1985].

1. The Perspective Tenet or the making of meaning

The meaning of anything is relative to the perspective in terms in which it is construed. If the perceived meaning is at one with the commonly held view then the individual's belief is reinforced, but discord may be created if any particular individual's idiosyncratic interpretations of the world are constantly subject to judgement against what are taken to be the canonical beliefs of the culture at large. An understanding of mathematics is based on an understanding of commonly held views and concepts. For example, the signs and symbols of mathematics, such as +, =, % and >, hold no meaning until the 'novice' is initiated into an understanding of their perceived and commonly held meaning.

2. The Constraints Tenet

As was noted earlier, forms of meaning may be constrained by what has previously been experienced. However Vygotsky's zone of proximal development gives the individual the capacity to to recognize ways beyond that endowment if given the toolkit to go beyond the natural constraint. With an empowering tool-kit the individual is able to think about thinking. The ability to think beyond the obvious thus enables the individual to become aware of the fascination of mathematics.

3. The Constructivism Tenet

Education helps young people to learn to use the tools of meaning making and reality construction to better adapt to the world and to help in the process of changing it as required. One of the tools open to the individual is a facility and understanding of mathematics.

4. The Interactional Tenet

As has already been indicated, education is a social process. The passing on of skills and knowledge involves a subcommunity in interaction: not a one-way interaction but one where teachers and learners help each other to work as members of a group to learn. Mathematics offers opportunities to work cooperatively in solving problems and learning new concepts.

5. The Externalization Tenet

Externalizing thought processes either through discussion or the written word enables the sharing of ideas. As noted in tenet 4, mathematics is an ideal vehicle for developing communication skills.

6. The Instrumentalism Tenet

The economic aim of education, especially in industrialised societies, is to prepare young people as the future work force. Education provides skills, ways of thinking, feeling and speaking that later may be traded for distinctions in the institutionalised markets of society. Mathematics offers the opportunity to develop basic marketable skills, such as the ability to count, and development of the intellect to work in a systematic way.

7.The Institutional Tenet

Individuals belong to different institutions or groups. Each institution constructs its own reality, and each has its own form of 'distinctions', Most of these institutions, such as home and school and the work force, are reliant on each other. The appreciation of relationships, patterns, and links especially between different aspects of mathematics are

central to a full understanding of mathematics.

8. The Tenet of Identity and Self-esteem.

Bruner divides this tenet into two parts. The first is an agency or a belief that one can initiate and carry out activities on one's own. Mathematics can be and is often worked at independently. The second is evaluation or how we evaluate ourselves and how we perceive others evaluating us and our efforts. The degree of confidence individuals perceives themselves to possess to deal with mathematics is crucial if they are to develop their potential to develop their mathematical ability to the full.

9. The Narrative Tenet

As, in my opinion, mathematics is seated within both the positivist and costructivist paradigm, then it offers opportunites for both logical-scientific thinking and narrative thinking. Mathematics is concerned not only with structures, algorithmic constants and reliability, but with imagination, initiative and flexibility of the mind.

Conclusion

There has been a deliberate policy in the above discourse to concentrate on the positive links between education and mathematics. It would have been possible to counter each positive link with a negative statement, but generally these have been touched upon in the overall argument. If it is accepted that "*the social function of education consists in the preservation of the biopsychic and the socio-economic structure of society along with its cultural and intellectual attainments*" [Bernfeld, 1925], then I believe that mathematics fits not only Bruner's nine tenets of education but also fits this social function well.

Whitehead [1929] supported the social function of education as he considered that there was only one subject matter for education and that was Life in all its manifestations. He considered that the essence of education is that it be religious. A religious education is, according to Whitehead, one which inculcates duty and reverence: duty to bring knowledge to an issue. The acquisition of mathematical knowledge and skills could thus be said to fulfill this criteria. Whitehead continued by attesting that " *the foundation of*

reverence is the perception, that the present holds within itself the complete sum of existence, backwards and forwards, that whole amplitude of time, which is eternity"[p.272]. For me, mathematics is like that. It is a wonder and a fascination. Its time-honoured truths and cultural inventions have evolved over thousands of years, and yet its possibility for creativity makes it as relevant to our own world as it has been to others in the past and will be to those who come in the future.

Some perspectives can thus hold true over time. One example of this is the imparting of cultural knowledge through teaching. Although a long established profession, the means and methods of teaching seem to be cyclical, as different modes and methods come in to and out of favour. The cyclical quality of educational innovation with special regard to grouping is considered in more detail in the next chapter.

CHAPTER 4

A CONSIDERATION OF THE CYCLICAL QUALITY OF EDUCATIONAL INNOVATION, WITH SPECIAL REGARD TO METHODS OF GROUPING

Introduction

In Chapter 2 it was argued that the purposes of education are: to socialise the individual into society; to contribute to the economic growth of the society; and to develop the skills and understanding of the individual. Chapter 3 considered the role that 'numeracy' plays in contributing to a person's education. Numeracy was seen not only to reflect the social and cultural development of a society, but to hold unalienable truths which are constant across all societies. The concept that mathematics may be both discovered and invented may also be seen to contribute to the development of self; as an individual and as a member of a group. This chapter considers different methods of meeting the needs of individuals within group situations. It also considers the historical perspective of different forms of grouping, and the 'push' by central government to encourage schools to implement those forms of grouping that the government deemed, at that time, to be the most effective in the quest to raise educational standards.

Coping with Mixed Ability Pupils

Government directives for the organisation of the delivery of education are not new. For example, in 1931 the government was recommending that primary schools should make suitable arrangements for specially bright children and retarded children [Primary School Report, 1931]. Although at the turn of the 21st century educationalists balk at the term 'retarded children', we still label children whose rate of learning differs from the perceived 'norm' as 'pupils with special educational needs'. However, whatever a child's ability the school must find ways to address the learning needs of each individual.

The 1944 Education Act ensured that County Councils provided free education for all young people up to the age of 15, and that different types of schools e.g. secondary modern, technical and grammar schools were to be provided to meet different children's

needs and abilities. Although most primary schools continued to follow the guidelines endorsed in 1931, educational research [Piaget,1952; Blandford, 1958; Vygotsky, 1962; Bruner, 1985] began to indicate that streaming might be detrimental to the learning process. Mixed ability groupings became favoured, where 'weaker' pupils would be supported by more able pupils, and the emphasis would be on self-discovery and 'concrete' experiences [Piaget, 1952]. Learning through self-discovery became the accepted method of teaching. By 1972 it was endorsed by the Schools Council even though they acknowledged that this approach required children to acquire learning at a slower pace

"But although discovery methods take longer in the initial stages [between the ages of five and eight or nine years] far less practice is required to attain and maintain efficiency in computation when children have been enabled to make their own discoveries." [School's Council, 1972, p.xi]

What was not taken into consideration at the time was that Piaget's view of learning, as a scientist, was epistemological whereas Vygotsky took a more pedagogical approach. Vygotsky considered teaching and learning to be a social process where the support and guidance of the teacher enabled the learner to achieve a level of understanding that they would not achieve alone. The concept of 'scaffolding' to describe how a teacher, through dialogue and careful structuring of the learning situation, can enable a child to make sense of a difficult task has been developed [Bruner, 1986]. It is this notion of scaffolding that the National Numeracy Project is based upon.

The Spiral of Change

By the 1990s the effectiveness of discovery based learning was being questioned. In both Key Stages 1 and 2 more subject teaching was called for to ensure that each programme of study of the newly developed National Curriculum was covered effectively, and that primary schools should teach discrete subjects with specific subject orientated teaching objectives [Alexander et al,1992]. This would be the way forward as there was a powerful belief that instructional teaching was associated with academic success as manifested in public examination results [Ruddock, 1991].

The concern that educational standards in literacy and numeracy had fallen was based on the International Mathematics and Science Studies which rated the mean scores of English children [506] below that of Asian and North American children, with the top score by Singapore of 643 [1997 figures]. The study concluded that although English children were able to think more creatively, their general lower ranking was due to less time being spent on practising computational skills [Glennerster, 1998] and homework set less frequently than was the case in high scoring countries. Despite cultural differences and questionable reliability of the data across countries, Barber [1996], whose opinion was highly regarded, especially by the British Labour party leaders, considered that as the results were consistent across studies with different methodologies, it could be concluded that either British eleven year olds are innately less good at mathematics than children in other parts of the world such as Korea and Switzerland, or that there were things about our education system which needed changing. These findings are discussed in greater depth in chapter 5.

One of the perceived outcomes of the changes that were to be introduced was to be a rise in educational standards.

"When David Blunkett, the Education Secretary, came into office, [May 1997] 58 per cent of 11 year olds were achieving level 4 or above in English, 54 per cent in maths. He said that by 2002 the figures would be 80 per cent and 75 per cent respectively"

[Wilby, TES, 13.2.98, p.22]

Ruddock [1991] noted that teachers as a whole are committed to improving the quality of education that they deliver, but that it must be a 'delivery' that they own. It is the quality of teachers themselves and the nature of their commitment to change that determines the quality of teaching and the quality of school improvement, and that teachers are, on the whole, poor implementers of other people's ideas. On the other hand, teachers are willing to adopt change, especially at the individual class level, but generally they do not have the access to information, time or energy to adopt innovations other than their own. [Fullan, 1991]

One of the changes that were being recommended in an attempt to improve standards was how could a reconsideration of the grouping of pupils within a classroom be best

utilised to improve educational standards.

Grouping as Part of Classroom Practice

"The practical pedagogical issue facing the class teacher is that given that she has limited and finite resources of attention, time, and energy, how can she best organise her class so as to balance the requirement to sustain and manage order in the classroom and at the same time attend to and promote children's learning, and do so in the light of her own educational values and beliefs." [Alexander, 1991, p.44]

Grouping is a complicated classroom organisational tool, especially if different groups are used for diffferent activities. However, classroom practice is more effective if teachers:

* have the skills which whole class teaching, group teaching, and one-to-one work with individuals demand
* exploit the potential of collaborative group work
* use a combination of these strategies, according to the purposes of the task in hand. [Alexander et al, 1992, p.35]

Group Dynamics

Research is not conclusive on the best group dynamics to promote learning. The Plowden Report [1967] advocated different groupings for different purposes; because with each learning task a particular group size and structure will better enable some groups to work together more effectively than others. This was further supported by McNamara and Waugh [1993] who considered that where the purpose of the lesson was incremental and restructuring, that is learning or relearning step by step, then dyad groups [pairs] were beneficial.

Other research has considered the effect on learning of putting children into groups where their ideas differed as compared with groups in which ideas were similar. Howe [1990] found that children in groups where their initial predictions differed progressed more than children in groups who had made similar predictions. Aronson et al [1978]

developed the jigsaw approach, where each member of a group was allocated a sub-task contributing to the group's main task. Then members with the same sub-task worked together before returning to teach their group. Aronson [1978] & Johnson [1987] found that this approach increased academic achievement when compared to normal classes, along with more positive attitudes to school and improved self-esteem. Slavin [1991], on the other hand, used a similar scenario to the jigsaw approach. After pre-testing each member of the group was given a sub-task to learn which he or she then taught to the rest of the group. Slavin found that there was greater academic achievement in cooperative classes and increased pro-school attitudes.

Slavin believed that those groups who improved their scores should be rewarded. Sometimes though praise and the giving of unsolicited help can, especially for older children at the end of key Stage 2 and upwards, function as low-ability cues and thereby invite helpless or self-worth protecting behaviour [Graham and Barker, 1990]. However the product of the group's efforts must be suitably acknowledged by the teacher as a meaningful learning experience, but the style of reward, should vary according to the age of the pupils.

Grouping by Ability to Address Pupils Needs

Target-setting for individual pupils where 30+ children have individual needs is too onerous a task for teachers to do and to do well [Galton et al, 1980]. Simon [1994] considered that the Plowden Report over-stressed the needs of the individual, thus placing a burden on the teacher, and that it is more worthwhile to identify general needs common to all pupils. Through assessment, pupils present achievements and their future needs, can be identified and targetted, and thus, small groups of children with a common need may be effectively taught together.

HMI reports [1989] found that there were good learning practices in such homogeneous ability groups especially in the core subjects. However in earlier reports [HMI, 1978] it was found that mixed ability teaching in secondary schools maintained academic achievement and increased pro-school attitudes, whilst Bossert et al [1984] found that homogeneous groupings polarised attitudes and became self-fulfilling. Webb [1989,

1991] concluded that within homogeneous groups high ability pupils prefer to problem solve on their own, whilst low-ability groups find problem solving difficult and therefore tend to be off task more. McNamara and Waugh [1993] considered that homogeneous ability groups or cooperative friendship groups may be discriminitive as groups may be similar in social class background, ethnicity, or gender, and that to force mixed gender groups may be counter productive. They also believed that homogeneous groups based on ability were insufficient as pupils differ according to subject and motivation within subjects. However, although pupils were aware of their status within the ability groups they would use more able classmates in place of the teacher . Finally, in 1992, grouping according to ability became favoured as it "*is a more flexible device in that it allows the teacher to place a pupil in a particular ability group for a particular purpose.*" [Alexander, Rose and Woodhead, 1992, p.25]

As noted above, Simon [1994] considers that it is more worthwhile for the teacher to identify and address needs common to a group or a whole class of pupils than the individual. [see chapters 9 and 10 on teachers' responses to target-grouping for mathematics] The question, however, seems to be not how the common need is addressed, whether it be by mixed ability or homogeneous ability groupings but, the effect that such groupings have on pupils. Webb [1989] highlights how homogeneous ability grouping may not be appropriate for the most and least able, whilst McNamara and Waugh [1993] highlight the discriminatory nature of such groupings. [Homogeneous grouping by ability for mathematics and pupils' self-esteem and motivation are considered in chapter 12]. Despite the fact that grouping by ability can be a sensitive issue it is still advocated as an organisational tool, "*It is best if groups are formed by attainment: perhaps two groups in the middle range, one group of high achievers and one group of those who find mathematics more difficult*" [National Numeracy Project, Draft, 1.11.97]. This refers to grouping within a mixed ability class, whereas target-grouping takes this idea one step further so that all children of similar mathematical ability are taught together in one class, but they are only in this class for mathematics and return to their mixed ability class for other lessons. Neither approach addresses discrimination but they are seen as methods to enable the teachers to spend 100% of their time in direct teaching and "*to secure good progress in the class as a*

whole and to prevent a wide gap forming between the most and least capable pupils" [ibid]. The third statement could be interpreted as anti-discriminatory, or, depending on one's viewpoint. it could be considered detrimental to the educational welfare of the most able.

However, as setting by ability fell out of favour in the 1960/70s to be replaced by mixed ability groupings, which in its turn began to fall out of favour, especially for core subjects, in the 1990s, will the new form of homogeneous grouping by ability i.e. target-grouping for a specific subject, fall out of favour too? Little is known, as yet, on the effects of target-grouping, for as Bennett [1995] noted "*there's virtually no research on this*". This research therefore aims to begin to address this short fall by adding to knowledge through an examination of the validity of claims made by one junior school as to the perceived benefits of target-grouping for mathematics.

Conclusion

We have come full circle in this educational debate from streamed whole class teaching, through mixed ability groupings attempting to address individual needs, to ability target-grouping for individual core subjects. However, target-grouping by ability, the new form of streaming, is not inflexible, neither is it for all subjects with the critical notion of fitness for purpose. The main difference, between target-grouping for a specific subject and streaming, is that streaming is a once and for all assessment of ability that applies to all subjects, whereas target-grouping acknowledges that pupils' abilities across subjects varies, and that there is a place for both homogeneous grouping by ability for some subjects and for mixed ability groupings for others.

Rosemary School has come to believe that grouping for mathematics fits its purpose and that it is consistent with the conditions and objectives of the school. It appears to provide opportunities for all children to learn and achieve, and offers an alternative learning environment where children may develop social skills. The question is though 'how was this decision made?' Was it just the school that made the decision to change the mode of teaching from mixed ability groups to homogeneous groupings for mathematics or were there, as suggested in chapter 3, external forces directing the change?

CHAPTER 5

A CONSIDERATION OF THE POLITICAL CLIMATE WHICH ENCOURAGED SCHOOLS TO REVIEW THEIR STRATEGIES FOR THE TEACHING OF MATHEMATICS

Introduction

This chapter considers the external forces within education that are working towards change yet homogenity within the education system of Britain. It also begins to address the question of 'why did the school under consideration, change from mixed ability teaching for mathematics to homogeneous grouping?'

Maths Year 2000

During the Year of Mathematics, or Maths Year 2000, educational emphasis would be given to the introduction within primary schools of the Numeracy Hour - a daily lesson of up to one hour on numeracy - and outside education, the utility and 'fun' of mathematics would be stressed.

"Maths Year 2000 will give a national focus to our drive to raise numeracy standards in this country. Together, we can help people of all ages develop the maths skills they need. Maths Year 2000 is designed to support schools, parents and businesses in making maths relevant, accesible and enjoyable." [Blunkett, 1999, p. 2]

What has happened that there should be this emphasis on the teaching of numeracy and mathematics, when they had been part of the school curriculum for hundreds of years?

The International Perspective

Recent years have seen increasing international concern with the measurement of school performance. To enable these comparisons to be made there has been considerable investment in the development of school performance indicators by both national governments and international agencies. The most common kind of performance indicator is that based upon measured student achievements in the form of exam

or test results.

As was noted in chapter 4, low scoring by English children on international tests in mathematics [Prais, 1995; TIMSS, 1997] have led educationalists to look to the rest of the world for inspiration on how to improve English childrens' standing in these tests, especially those children who are perceived to be underachieving.

"What has amazed us in our visits to Continental classes, particularly those in Switzerland, is that this group of under-achievers is of dramatically smaller proportions there. These observations bear out the international tests in mathematics carried out over thirty - five years which have consistently revealed an unusually large share of low attainers in England, combined with a respectably large share of high attainers."[Luxton and Last, 1998, p.1]

Figures for 1990 affirm this belief.

Table 5.1 Scores in international mathematics tests of 13 year-old pupils (percentage averages and extreme deciles), comparing England with four other countries in1990.

	England	France	Italy	Switzerland
Arithmetic				
Average	60	64	64	71
Highest decile	89	89	88	93
Lowest decile	32	37	37	51

Source: Prais,S.J. [1995] p.82

The Swiss result reflects not only a high average performance, but also that its lowest tenth of pupils scored distinctly higher than the lowest tenth in any other country. Although England's average score and lowest decile score were significantly lower than Switzerland, thus tending to reinforce Laxton and Last's claim that English children were underachieving in mathematics, the table failed to uphold the statement on two counts. Firstly the differences between England, France and Italy, especially in the lowest decile were only small. And secondly the information could be biased as scores for only four European countries were recorded. It should also be noted that England has

one of the second highest scores for the highest decile band, thus indicating that a tenth of those tested - size of population unknown - were high mathematical achievers.

International comparisons [TIMSS, 1997] suggest that in mathematics, where comparisons are easiest to make (because cultural factors have least impact), eleven year olds in this country fall some distance behind continental and Far Eastern competitors. Although 'cultural factors' may have least impact on the acquisition of mathematical skills and knowledge, there is the suggestion that culture does make a difference. This is supported by Noble, when comparing mathematics teaching in Hungary and Britain, who stated that, " *teaching in Britain is organised in a dramatically different way.*" [TES, 17.10.97. p.16]. However this should not detract from the findings that British school children performed less well on international mathematics tests than children in other parts of the world. Barber concludes that the deficiency is not in the children's lack of ability but in the education system, for if we accept these results" *we can either conclude that British eleven year olds are innately less good at mathematics than, say Swiss or Korean eleven year olds - which seems improbable- or that there are things about our education system and /or culture which are in need of change"* [Barber,1996, p.24]

Such reports as outlined above have led many countries, including Britain, to take steps to address what they see as deficiences within their education systems. Policy issues across different country situations, show a similarity in: the manner of posing issues; the policy alternatives being suggested; and the role that the state wishes to retain for itself in implementing such alternatives.

The Role of the State

Government action constitutes a key part of the work of any state apparatus, but it does not account for all of it, for even when a government falls the State continues to function. It could therefore be deduced that it is not the government that holds the power but the State and its attendant State funded bodies, for although the government passes the laws of the land, including education acts, it is the unseen 'mandarins' who formulate their text. [Hutton, 1999]

The 1944 Education Act attempted to answer the question of how to extend the benefits of education to a larger proportion of the population by extending the period of compulsory education, largely as a question of quantity. During the 1950s and 60s in countries such as Britain, there was rapid Government-funded educational expansion which was based on the belief that it would result in economic progress through the achievement of higher educational standards [Partington, 1996]. Money was spent on increased: building of schools; length of teacher training; and the resourcing of schools. Since the 1970s, however, there has been reduced confidence that greater investment in education automatically results in higher educational achievement.

1977 - 1988 The Debate on Education

The emerging theme of the years 1977-88 was the Central government's dissatisfaction with a laissez-faire approach to education and a desire to develop economic awareness and related skills into the school curricular debate. The 1944 Education Act had been scrupulous in insulating the Minister of Education from the work of schools, as there was a general agreement that education was too important to be left to politicians. The government's job was to ensure the framework through which that transaction between teacher and learner could be achieved - not influence the transaction itself. By the 1980s however, the prevailing view of the 1950's and 60's, that education automatically represented a national investment, was being questioned.

The Cost of Education

The cost of education amounts to £16 billion [Pring, 1996]. It is a very expensive service.With the State investing so much money in education and believing that there should be a connection between that investment and economic performance, it feels that it has the right to change the nature of the transaction between teacher and learner so that it serves a different set of purposes. *"The emphasis now is very much ... on the cost-effective achievement of standards of performance, implying some overshadowing of considerations of knowledge and theory, and this, of course, has consequences for how teachers are viewed as being accountable."* [Twigg, 1995, p.viii]

It was felt that standards, especially when international comparisons were made, were in decline and that those who professed education were failing in their duty [Pring, 1996].

The State therefore felt that it could not remain indifferent to the content and character of education.

The 1988 Education Reform Act

The 1988 Education Reform Act ensured that the Government was in a position to impose its collective will in a way that had hitherto been unprecedented. No longer was there to be a reliance on the provision of opportunities without compulsion. As a consequence the pace of change quickened, as too did the scale of change [Goldstein, 1988]. The Act ensured that the Secretary of State for Education arrogated to himself, or herself, the power to determine the detailed content of the educational process.

Before the 1988 Education Reform Act schools were in a position to mainly set their own agenda for change. Schools had quite a degree of automony, but as a result of the Act there was now sustained pressure upon educational institutions to improve performance, to become more efficient and more effective. Such was the pressure that in 1993 schools were faced with the eighteenth Education Act in fourteen years [Ribbins and Burridge, 1994]. The view in Britain seemed to be that education was too important to be left to teachers.

Prior to the 1988 Education Act the key players had been the teachers and the local education authorities, with the government playing a reserved, overseeing role. The gradual changes in power bases and general lack of confidence in the education system led to the education reform years. Power now resided with the government, with respected input from industry and to a lesser degree some input from parents and finally teachers. The role of the LEAs was marginalised as real power had been diverted to central government.

It has been noted that in Britain education is considered by the state as too important to be left to teachers. Although The Secretary of State for Education has assumed massive powers some of this power has been delegated to educational bodies, such as The Qualifications and Curriculum Authority [QCA] which has the mandate from the government for ensuring the development of the National Curriculum, but which takes

advice "*by working with subject task groups, primary and secondary phase task groups, the Preparation for Adult Life Group, and through joint work with colleagues from Ofsted, the Teacher Training Agency, other curriculum councils and DfEE. To inform the development work, QCA staff have met with teachers, subject associations, teacher associations, Local Education Authorities, faith groups and professional associations.*" [QCA,1999, p.2]

Although low down on the list of educational bodies that have been consulted, it is the teachers that have to implement the body of the reforms. It is a matter for schools, and even individual teachers, if educational innovations are actually implemented in the way the goverrnment envisage. *"Teaching in a mass education system is intrinsically inimical (though not necessarily impervious or successfully resistant) to attempts at bureaucratic routinization and it is this that is the basic source of whatever classroom autonomy teachers have."*[Dale, 1989, p.36] In other words it is in the classrooms of Britain that the state directives are adhered to or quietly discarded. In an attempt to pre-empt such covert approaches the state has introduced testing and inspections whose results and findings are publically advertised. The state has now taken centre-stage in the field of education, and teachers are expected to 'toe the line'.

Conclusion

The links between education and economic prosperity have already been discussed in chapter 2. Low educational standards are perceived to link with future low economic growth as new, young, work-forces lack the skills and knowledge to perform well in the global economic markets. This chapter has shown that within these global trends Britain is perceived to produce more pupils who are underachieving. To improve Britain's global standing in education, the government has introduced a succession of wide-sweeping Education Acts over the last decade in order to address the problem.

Thus the political climate has been set to encourage schools to review their strategies for teaching and learning, including the teaching of mathematics. As has been noted it is in the schools and classrooms that state directives succeed or fail. so that each school must develop its own strategies in order to provide the 'best' education for its pupils. The next

chapter considers the conceptual background of the school under consideration which enabled the implementation of target-grouping for mathematics to take place in the light of the new political climate.

CHAPTER 6

A REVIEW OF THE CONTEXTUAL BACKGROUND OF THE SCHOOL UNDER CONSIDERATION

Introduction

This chapter will review the background of the school under consideration, in order to set the research within a contextual framework. Census data will be used to broadly portray the school's catchment area. The chapter will also describe the school and the main stakeholders within it: the Head, the teachers, the governors, the parents and the pupils.

The Catchment Area

Rosemary School is situated in a semi-urban dormitory town on the periphery of a large Midland city. The town, Marwell, which at present is surrounded by fields, was a thriving mining town, but suffered economically from the closure of the local mines and associated industries during the late 1980s. Service industries and light industries are now the main economic activities within the town. However the number of houses has increased reflecting the dormitory status of Marwell.

Census returns for 1991 give a broad picture of Marwell.

Table 6.1	% adults with higher education	% children in high social class households	% minority ethnic children	% children in overcrowded households
MARWELL	5.5	23.5	0.85	7.2
ENGLAND	13.5	31	10.1	10.5

Based on 1991 Census returns as quoted in the school's PANDA Report, 1998, [Ofsted, p.2]

From the data the broad picture that emerges is that compared to the average statistics for England Marwell is predominantly white, with levels of poverty below the national average. Also there are fewer households considered to be of high social class, which the general situation of medium to cheap priced housing, in the area, supports. There are fewer adults, than the national average, who have followed a tertiary education, thus reflecting again the area's middle/working class status. The school is situated therefore, in a predominantly all-white middle/working class area. It must be noted though that *"when interpreting the census information you should remember that your school may draw its pupils from a wider catchment area.....Also, the pupils attending your school may not always come from families representative of the wards where they live."* [PANDA Report, 1998, p.2]

As the school under consideration, is a church voluntary-aided school its catchment area is wider than its immediate environment (although less than 10 children actually come from outside the town). Voluntary-aided status means that parents have to apply to send their children to the school, which is often oversubscribed. It is the school's perceived status as a '*good*' school i.e. the pupils are considered to be well behaved and the school is perceived to be effective academically, rather than its religious connections which attract parents to send their children to the school. [Discussion with parents, 1999]

The School

Rosemary School was initially built as a secondary school in the 1950's, but by the mid 1980's new building plus reorganisation and refurbishment enabled the junior school to move into the vacated building. The school has ten classrooms on two floors, around a central courtyard. Four classrooms are situated on the ground floor and six on the first floor.

The school's admissions policy of a maximum of 75 new pupils per year and the layout of the school has led to difficulties in classroom organisation. The number of children in each year has meant that there are eight single-aged classes and two mixed-age classes; one for years 3/4 and the other for years 5/6. This situation led to organisational problems when target-grouping for mathematics was introduced.

The Teaching Staff

The Head Teacher mainly fulfills a management role and has no regular teaching commitment. The teaching staff, not including the Head - 10 females and 3 males - consists of a 9 full-time teachers and 3 part-time teachers; one of whom provides staff with regular non-contact time i.e. half a day once every two weeks to a month, and also covers staff absence. There is also a part-time classroom assistant who supports literacy and numeracy. Two of the male staff form the management team with the Head, and hold senior positions within the school.

The Head Teacher takes positive action to ensure the school and the staff are kept abreast of, and are seen to be implementing, current educational trends. Time and effort, such as attendance on courses and INSET, are expended to facilitate staff in implementing new ideas and trends. As will be seen in chapter 7, time for discussion, consultation and scaffolded support were provided to enable the introduction of homogeneous target-grouping for mathematics. These supports were available as the Head believed that the introduction of the scheme would raise educational standards within the school.

The staff are long established members, as there is little staff turn-over except for reason of retirement. Overall, in my opinion, the staff are supportive of one another, and cope with innovations well. To facilitate planning and collaboration between teachers, years 3 and 4 are known as the lower school, and years 5 and 6 as the upper school. However dividing the school into two parts has tended to polarise the teachers so that they are orientated towards supporting 'their' half of the school. Even in whole school issues there tends to be a ' them and us' approach to the effect of the proposed issue. This supports Day's [1985] notion that teachers approach changes with the sub-text of 'how will this affect me?' or in this case 'how will this change affect our half of the school?' He also considers that teachers weigh up the balance of rewards and costs before they sanction any innovation. These teachers are no exception. However, the staff are open to persuasion, so that change, such as the implementation of target-grouping for mathematics, does take place.

As in any school, each member of the teaching staff has their own area of expertise, whether it is a preference for teaching the younger or older pupils, or greater knowledge and skills within a discipline. Within the school under consideration, over half the staff are secure and confident maths teachers. At times they do have doubts about their ability, or times when they need to seek advice, but overall they are confident teachers of mathematics. This has been a significant factor in the implementation of setting by ability for mathematics, for it has meant, for some of the staff, that they can teach maths at a level that they feel reflects their skill and expertise [See chapter 10].

The School Governors and the Parents

Within the terms of the instruments and articles of the school representatives from the local churches have to form the the majority of the governing body. In reality this tends to mean that these governors are parents of present or past pupils, and therefore have a vested interest in the welfare of the school. As a governing body they are supportive of the school and interested in new school initiatives. They are kept informed of current educational trends through curriculum based governors' meetings, discussion with staff, attendance on relevant courses, and input from the Head. However, I know from experience as a teacher governor that the Head is selectively informative on the information passed to the governors, and that they play a monitoring role, as opposed to an active role, in the running of the school.

Although bounded by the confidential nature of governorship, the fact that a number of governors are also parents means that a wider sphere of parents are kept informed of the school's philosophy and progress than may be the case in other schools. The parents of the pupils of the school are perceived by the teaching staff to be generally very supportive. This manifests itself in that the pupils have a positive attitude to school, and that parents attend school functions. A case in point is the attendance at the Annual Parent-Governor Evenings which, on average, 30 parents attend. Although this does not make the meeting quorate, compared with other schools within the town who struggle to reach double figures for their annual meetings, it reflects a significant interest in the welfare of the school by the parents.

The Pupils

There are 300 pupils within the school aged from 7 to 11 years. As will be seen in chapter 13 educational attainment within the school tends to fit the normal distribution curve, with 68% of the pupils scoring between the 'average' standardised scores of 85-115, and with 16% of pupils scoring above and 16% scoring below these mean scores. However there tend to be more pupils [4%] within the school scoring very low standardised scores [-70], than pupils [0.4%] scoring very high scores [+130].

[These results are based on Rosemary School's 1997 NFER mathematics test results]

The schools PANDA Report for 1998 sums up the school's situation.

"Your school is bigger than other primary schools; the percentage of your pupils known to be eligible for free school meals [an indication of low family income] is below the national average; the percentage of your pupils identified as having special needs is broadly in line with the national average." [p.1]

Conclusion

In some ways Rosemary School appears to be an 'average' school, where: the pupils are generally of 'average' intelligence, with some 'slower' pupils and some who advance more rapidly than their peers; teachers who are conscientious; and parents and governors who are supportive. But every school is unique in some way, and Rosemary School is no exception.

In Rosemary School the Head, the governors, the teachers and the parents work together to support initiatives that are perceived to work towards enhancing the standards of teaching and learning within the school. The pupils, backed by the confidence their parents have in the school and the sense of order and stability that the teachers offer, seem to take new initiatives in their stride.

The desire to enhance the teaching and learning within a school is one thing - to implement it is another. As Fullan [1991] notes; *"Change may come about either because it is imposed on us (by natural events or deliberate reform) or because we*

voluntarily participate in or even initiate change when we find dissatisfaction, inconsistency, or intolerabilty in our current situation." [p.31]. Chapter 7 will therefore consider the factors that led to the initiation of homogeneous ability target-grouping for mathematics, within Rosemary School.

CHAPTER 7

CONSIDERATION OF THE INTERNAL FACTORS WHICH LED TO THE INTRODUCTION OF SETTING BY ABILITY FOR MATHEMATICS IN ONE JUNIOR SCHOOL

The Question

Why did Rosemary School change from mixed ability teaching for mathematics to homogeneous grouping, initially for the older children and then for the whole school? What were the 'forces' that led the staff to make this decision at that time? This chapter will discuss the circumstances within Rosemary School, which finally led to a dramatic change within the school in the way mathematics was organised.

Initially the term 'target-grouping' for mathematics will be used, as this was the term used for the introduction of the change. However the term 'target-grouping' is synomymous with 'setting by ability' and 'homogeneous ability groupings', and is used interchangeably.

The Change

'Target Grouping' was introduced for mathematics, in Rosemary School, in November 1995. It was introduced for the 5 classes that make up years 5 and 6. Years 3 and 4 continued to be taught, for all subjects, in mixed ability classes, as at this stage the movement between classes was considered to be too unsettling for younger children to cope with.

One reason given for the introduction of target-grouping for mathematics, for the older pupils, was that other schools had found that it worked well and had raised pupils' levels of achievement. A number of other benefits of the scheme were cited for both pupils and teachers namely:

1. *"Less able children are not constantly overshadowed. Experience in schools that use*

setting regularly is that it boosts their self - esteem and experience of success.
2. Exposition is easier to focus on an appropriate level of ability." [unpublished memo to staff, Sept 1995]

What was my response to this school initiative?

As a teacher of Year 6 pupils I had mixed feelings about the initiative. Setting for mathematics had been tried before, but it had been abandoned mainly because it proved difficult for class teachers to keep track of their pupils' progress in mathematics. [This is still a problem, but has been mainly overcome through improved recording strategies.] Setting also meant that the class teacher was entrusting part of the pupils' education to someone else. It also challenged the profane norm [see fuller discussion under "What is education" in Chapter 2] of primary teaching that the class teacher is the main education provider for the pupils within the class. Also, if, as in my own case I felt that I had the expertise, knowledge and interest, to deal with mixed ability setting then a change to the status quo could be difficult to accept. On the other hand I considered it could a good idea, as long as I took the top set, for I considered that a 'top set' would generally mean that the children would be motivated and would be mathematically able, and it would be easy and a pleasure for me to teach. This of course supports Day's [1985] notion of 'what is in this for me?'

I have found it a pleasure to teach maths to this group but I sometimes have wondered if it was making the best use of my ability. It is rewarding moving forward in knowledge and understanding an able group of pupils, but would it be more a more efficient use of my skills if I taught the less able? On the other hand as noted in chapter 6, every teacher has an area of expertise and preferment, and teaching mathematics to the older more able pupils within the school I consider to be mine.

Although the numeracy hour, introduced in September 1999, seemed to be aimed at mixed ability classes, with its emphasis on differentiated work and teacher led group work, setting for mathematics also seems to be in favour with curriculum developments. As Ireson, [1998] noted;

"Setting by ability appears to be back in favour again. In the drive to raise standards,

schools are being encouraged to adopt this tactic by both the government and the Office for Standards in Education....

The type of grouping favoured by the Government is setting, which means that pupils are grouped according to their attainments in each subject, so a pupil may be in a high set for one subject, and a lower one for another.

Streaming was common in the 1960s, but its popularity decreased when it was found to alienate young people in the lowest groups.....

Low-ability groups tend to include disproportionate numbers of pupils of low socio-economic status, ethnic minorities, boys and those born in the summer." [TES, 9.1.98. p.24]

Therefore setting by ability had the backing of the government, but would this resurrected form be successful within Rosemary School as measured by the criteria [see also chapter 1];

a. teachers find it easier to focus on a particular level of ability

b. teachers find that it works well,

c. it boosts pupils' self-esteem,

d. less able children are not over shadowed,

e. it raises pupils' levels of achievement.

On the other hand why introduce 'target-grouping' in the first place?

The Initial Stage

The initial decision to implement Target-Grouping for mathematics in the school where I teach was taken by the Head. The decision was not taken lightly, as the development of alternative practices is excluded by the habitual nature of teaching [Sparkes, 1991] As noted in chapter 2, profane norms are positioned in the day-to-day world of the teacher and can be changed through improved knowledge, whereas sacred norms, or 'systems of belief ', are immutable in that any attempt to change them will be met by strong resistance. Sacred norms are at the very heart of a teacher's rationale and sense of self. Any attack on the sacred norms of teaching represents an attack on professional raison d'etre and on the cornerstones of teachers' constructions of reality [Corbett et al,1987] .

The implementation of target-grouping or setting for mathematics in the school would challenge both the sacred and profane norms of teaching. The sacred norm was vested in the notion that all children whatever their ability should be treated equally, whereas target-setting ranked children according to ability. The profane norm was vested in the notion that the status quo worked well and that a previous attempt to introduce setting had failed due to the lack of the commitment to overcome the management problems that target-setting poses.

Although it was the Head's decision to implement target-grouping within the school, it was external forces that had helped form his resolve. Conferences for headteachers; circulars and directives from central and local education departments exhorting the drive for improved effectiveness as measured by Standard Assessment Test [SAT] results; an impending OFSTED [Office for Standards in Education] inspection; and the continuing need for the school to be seen by governors and parents as performing well in the local SAT league tables all helped form his decision.

Although the school's OFSTED inspection did not take place until July 1998, the school was in 'OFSTED standby' mode for over three years. Significantly an early OFSTED Survey [1995] recommended target grouping in primary schools. The positive features of target grouping that the survey highlighted included: that it narrows the range of ability so that questionning can be more focused; that children generally feel secure; and that setting seemed to be having a positive impact. On the other hand the negative features of target grouping included: that the class teacher may lose an overview thus resulting in difficulties in reporting. [This was the main difficulty that we had found during the first trial]; that the less able are not exposed to high level questioning; and that there was generally poorer teaching in the bottom maths set. If one purpose of introducing target-setting is to raise the achievement of the less able, then this is a damning part of the report.

Research on Homogeneous Ability Grouping

Research on homogeneous ability grouping has tended to conclude that it does not

support those who are underachieving but that it does support the more able as long as it is for part of the day and is subject-based [Kulik and Kulik, 1982; Slavin,1987; Allan 1991]. In one school that had implemented target grouping for mathematics it was reported that; "*the standard is absolutely spectacular. These children are highly motivated, they love maths, and other children compete against each other to get into the top group.*" [Winkley,TES 27.1.95. p.2] It does not record however how the children who do not get into the top set feel and that for the majority of students homogenous groupings have been considered 'damaging ' [Slavin, 1991; TIMMS,1996]. However even more important than the question of setting is *"how mathematics is taught in school, the quality of professional life of the teachers, and what the pupils do for homework (and how this is supported).*" [TIMMS, 1996]

Despite these negative features of homogeneous grouping for mathematics, the reasons to implement target-grouping outweighed any misgivings that the Head may have had. He now had to act as an agent of change in order to persuade the staff to accept and implement the idea.

The Expertise of the Change Agent

When change is being implemented, the aims of the innovation, the degree of personal vunerability, have to be identified [Buchanan and Boddy, 1992]. The Head, together with the senior management of Rosemary School, had identified a need for the school to improve the effectiveness of maths teaching within it. Effectiveness would be measured quantitively by an improvement in SAT results and qualitatively through a positive Ofsted report on the teaching of mathematics within the school. The original ownership of the scheme was the Head's but it was envisaged that success - which eventually would be measured in a variety of ways, but initially would be the acceptance and trialling of the scheme - would spread ownership to the staff, pupils, parents and governors. As the scheme had been tried before and abandoned, the staff involved felt personally vunerable. However before deciding to throw their energies into a change effort (or before deciding to reject it) the teachers needed to consider several issues; "*First, if the change is from outside, does it address an important internal need? And, is there evidence that the practice has worked elsewhere?"* [Fullan, 1991]. To address the

question of personal vunerability teachers from a school within the Nottingham Inner City Achievement Contract project, where the implementation of target-grouping for maths had been successful, were invited to talk to the staff involved. The three teachers who came to talk to the staff of Rosemary School were candid in their explanations and explained both the benefits and the drawbacks of the scheme as they perceived them.

The Inner City Achievement Contract - Building on Achievement

The Inner City Achievement Contract [ICAC} involving four inner city Nottingham primary schools was initiated by Nottinghamshire County Council after tests revealed that many inner-city primary pupils were underachieving, especially in reading and mathematics."*We realised that within one classroom there were perhaps five or six different ability groups which the teacher had to get round. It was pretty inefficient. Now, there's much more direct teaching rather than worksheet supervision*" [Botham, TES 27.1.95. p.2]. After introducing setting the schools involved in the project believed that in addition to improving outcomes, target grouping had improved the quality of teaching, raised teacher morale and ensured much more intellectually challenging teaching and learning.

Perceived benefits of target grouping

The perceived benefits of target grouping for all children were considered to be that there was more of an opportunity for childen to realise their potential with teaching being pitched at the right level. This of course assumes reliable diagnostic testing and relevant teacher planning and expertise. However as the teachers were planning for a narrower band of ability they could be more specific about the level of teaching required. The narrower focus of teaching meant that the brighter children could be extended. The ICAC teachers also reported that for some teachers it was refreshing to be given the opportunity to extend brighter childen and subsequently themselves.

The use of target grouping gave lower ability children more opportunity to shine at their own level as they are not overshadowed by the brighter children around them. They were therefore able to develop self-esteem and experience success on a regular basis. The teachers from ICAC had found that when work is very structured it becomes harder

for childen to go off task and the work ethic improves as the children get into the routine of target grouping. The development of a work ethic fits the belief that one of the purposes of education, as outlined in chapter 2, is to prepare children for adult, economically orientated, life [Gordon & White, 1979]. Moreover, being taught by different teachers is considered to be socially beneficial to both the childen and teachers. This belief fulfills Bruner's [1996] interactional tenet that the passing on of skills and knowledge involves a subcommunity in interaction.

Drawbacks to Target Grouping

The drawbacks to target grouping as cited by the ICAC teachers were mainly associated with the initial stages of implementation when both pupils and teachers were unsure of routines. Other drawbacks included: the devolvement of the bulk of a child's learning in the targetted subject resulting in patchy knowledge by the teacher; problems associated with absenteeism in a group moving along together; marking overload, particularly with top groups; and under-resourcing.

Rosemary School did subsequently face all these drawbacks but they were resolved to greater or lesser degrees. At the time of the above discussions though this was in the future. The present problem was to decide whether the staff of Rosemary School had the expertise and commitment to implement the change. On the other hand teachers do have control over their ability to change their present direction and become more efficient and effective agents of pupils learning [Hopkins, 1990]

The Way Forward

The Head of Rosemary School had formulated a vision that the introduction of target grouping would improve the effectiveness of mathematics teaching within the school and he had facilitated the teachers' understanding of that vision through discussion and written information. He continued and continues his support both verbally, by involving interested parties in discussion e.g. staff, parent, and governor meetings, and practically, through financially resourcing the scheme. The perceived effectiveness of the scheme (e.g. improved SATs results and satisfied stakeholders) means that target grouping for mathematics within the school where I teach is legitimised and owned by the

stakeholders. The vision was accepted and initiated in September 1995.

The Head therefore exhibited the characteristics of effective leadership. He believed in his inspired mission and involved others in the change. He was a skilled communicator who listened and responded to fears and worries but who did not give up his resolve. He put the emphasis on teacher quality and held an enthusistic but judicious approach to innovation [Newton and Tarrant, 1992]. Do not think, however, that I am positively prejudiced in his favour, for there have been a number of instances when we have begged to differ, but in the cited case, in my opinion, he met the criteria that Newton and Tarrant recognised as effective leadership.

Conclusion

It has been described in this chapter and in chapter 5 how schools in Britain, at the turn of the twentieth century, are being exhorted by central government to become more effective, especially in raising standards for those pupils perceived to be underachieving. How schools achieve this is, within certain parameters, has been left for them to decide, but with the advent of the Literacy and Numeracy Hours and their associated plans of work, much decision making and ideas of what constitutes 'good practice' is being centrally prescribed. One such method of good practice which is being promoted is target setting.

Although at this time schools are being bombarded by external forces to change former practices in order to meet present state directed initiatives and demands, each school has to make its own internal decision on which objective to meet first, and to prioritise its resources in order to meet those demands which will benefit the individual school the most [Dale, 1989]. I have a strong personal belief in the significance of time and place. For the school where I teach it was the right time and the right place to introduce target-grouping for mathematics, but as that is a personal belief then other teachers within the school may feel differently.

So what were the fears, hopes and opinions of the teaching staff and the pupils as target grouping for mathematics was introduced into Rosemary School? And, how were these feelings and opinions to be revealed?

CHAPTER 8

A SHORT CONSIDERATION OF METHODS USED FOR DATA COLLECTION

Introduction

"The function of research design is to help us obtain clear answers to meaningful problems." [Oppenheim, 1968, p.7]

This chapter briefly describes the methodology and data collection methods used within the study in an attempt to clarify the claims made as to the efficacy of 'target grouping' for mathematics within one junior school. It is a small scale study, as it focuses primarily on one mathematic's group, within one particular junior school. The methodology and data collection methods used within the research were commensurate with the need of the school to reflect upon the innovation of grouping for mathematics, as well as the demands of the research. A fuller discussion on methodology appears in the Coherence and Integration Report Year 3, submitted as part fulfillment of the requirements of the awarding university.

The Question

'Target Grouping', or as it was previously known, setting, was introduced for mathematics, in Rosemary School, in November 1995. As noted in chapter 1 the Head of Rosemary School had been "looking around to see what kinds of classroom organisation give the best results" for mathematics, and had concluded that target-grouping for mathematics was the solution. Reasons given for the introduction of 'Target grouping', as discussed in chapter 7, included that: other schools found that it works well; exposition is easier to focus on an appropriate level of ability; it raises pupils' levels of achievement; less able children are not constantly overshadowed; it boosts pupils' self-esteem and experience of success.

Research for the project was therefore based, as stated in chapter 7, on the hypotheses;

a. That those involved in target-grouping perceive it to be a positive experience.

b. Target-grouping enables teachers to focus on the appropriate level of ability for that group.

c. Target-grouping is easier for teachers to manage than mixed ability classes.

d. Target- grouping boosts children's self-esteem and experience of success.

e. Target-grouping for mathematics raises pupils' levels of achievement in mathematics.

But as Oppenheim [1968] suggested it is how to obtain 'clear answers' that poses the researcher the problem.

Qualitative data versus quantitative data

Qualitative Data

The hypotheses above are generally qualitative in nature as they seek to gather individual's perceptions of a situation. These perceptions are individualistic in that they reflect the individual's own construct of reality. [see C&I, 3, p.10 for a fuller discussion] To simplify the gathering of information [Brown & Dowling, 1998] and in an attempt to access individual perceptions of the situation, an open-ended written response questionnaire was used [see C&I, 3, p.20]. However, the reliability [C&I, 3, p.24] of the responses i.e. the consistency of the responses, could not be ensured for although some statements were followed up with individual interviews, time and opportunity did not allow for more structured checks on the reliability of the responses made [Davidson, 1970; Hammersley,1993]. Although the whole school repeated the questionnaire at the beginning and at the end of the academic year under consideration, the purpose of repeating the test was not to highlight its reliability, but to discover any change in the responses given at the end of a year when all the school had been involved in target-grouping for mathematics [Hage & Meeker, 1993]

The validity of a survey is the degree to which the survey measures what it claims to measure [C&I, 3, p.23]. Personal constructs, such as self-esteem, are difficult to measure as they have no concrete frames of reference. Oppenheim [1966] considered that:

"the most valid way to obtain an estimate of a respondent's attitude.... would be to ask him some free-answer questions and let him take his time and state his views in his own way." [p.76]

This was what I tried to do by asking the following three questions:

1. How do you feel about maths? [See hypothesis a]

2. How do you feel about being in a maths group? [Hypotheses b, c & d]

3. What will you try to do better in maths next year? [Hypothesis e]

Qualitative data may be turned into quantitative data [Kitwood, 1977; Cohen & Manion, 1994] but as assumptions have to be made in interpreting unclassified responses then bias on the part of the researcher may occur in the interpretation [see C&I, 3, p.2, 17 & 21]. For example, how can the following responses to the question to "What will you try to do better in maths next year" be quantified?

A "I will try to write in pen neatly"

B "I will work better in pairs"

C "I will try to be kind"

Kitwood [1977] considers that when analysing responses to questionnaires consideration may be given to:

1 The total pattern of choice.- The frequency of choice of various items, or the similarities and differences of those choices, permits some surface generalisations about the participants, taken as a group, to be made.

2. The grouping of items together - It may be convenient for some purposes to fuse together categories that cover similar subject matter.

3. The categorisation of content - The content of all items is considered in order to develop categories into which all the material will fit.

The final solutions, therefore, were as follows: response A came under the category skilled based responses - neatness, whilst the other two did not appear in the final tabulated analysis as they were isolated individual responses which did not fit an overall pattern.

"Inevitably, some of the richness is lost when the answers are classified later, but it is useful to report a few such answers in full in the final report to give the reader some of

the flavor of the replies."[Oppenheim, 1966, p.41]

This has been done.

[See C&I, 3, p. 20 for a fuller discussion on the analysis of a questionnaire]

Other qualitative data used included; interviews and discussions with individuals, pairs and small groups, of pupils and staff - this was usually to clarify certain points or where an issue only involved a small number of people; and the keeping of a personal journal , which gave me the opportunity to reflect on incidents, and also served as an aide-memoire.

Quantitative Data

Does target grouping raise pupils' levels of achievement? Towards answering this question quantitative data [see C&I, 3, p.11] needed to be collected on the pupil's levels of achievement before the setting of target groups. This could then be compared with comparable data towards the end of the research.

In Rosemary School standardised tests are used to set pupils in 'homogeneous ability' target groups for maths. These standardised tests have been developed by NFER and Nottinghamshire County Council for use in the Nottinghamshire Framework for Achievement Project. One of the aims of the project, which the school has joined, is: "*to provide all participating schools with measures of the starting points and relative progress [the value-added], of their pupils relative to all other pupils in the county and nationally.*" [Everett,1997. p.27]

Participating schools have been provided with NFER standardised tests in mathematics, English and non-verbal reasoning, so that pupils' progress can be tracked through the junior and early secondary years of their education. However this tracking data will take time to develop long-term profiles of pupils' achievement. Over the years, aggregated data will be available to all participating schools and will include data on gender, parental occupation, ethnicity, (although these are difficult to ascertain with any certainty as parents are not obliged to give this data to schools) and the numbers of pupils with special needs, as well as test results.

Another source of readily available quantitative data within the school are the SAT [Standard Assessment Test] results and the school's PANDA [Performance and Assessment] Report. SATs results are usually available towards the end of June, and can be compared with previous years' results, whereas the annual PANDA Report only considers the previous year's SAT results.

The NFER standardised scores and the SAT results [see C&I, 3, p.12] are a measure of what the pupils can do now. Although they cannot measure what a child will do in the future they may be predictive of future outcomes and trends [Everett, 1997].

Ethical Issues

Within the context of research ethics are the moral issues that a researcher must resolve when considering how the research is to be conducted and reported [see C&I, 3, p.18]. To this end the subjects of the research should be assured of anonymity, confidentiality and consideration to the feelings and sensitivities of those being evaluated [Strike, 1990]. Anonymity and confidentiality means that only the researcher is able to identify participants and that there is no obvious way for connections to be known publically [Frankfort-Nachmias & Nachmias, 1992]. To this end the name of the school has been changed and individuals are referred to through their initials, so it is unlikely that anyone not connected with the school could identify individuals and as time goes by recognition will be even less likely. I have not reported anything that individuals did not say to me, nor write for me. If I have misrepresented their views when analysing their responses, I apologise, but as indicated above, this is one of the problems when using qualitative data.

It should be noted that the researcher has the full support of the Head of Rosemary School. Although the Head has open access to the ongoing and full research findings, past experience has shown that he shows a supportive interest and not an invasive one, and therefore this access cannot, in my opinion, be considered as a breach of confidentiality. On the other hand as anonymity cannot be totally ensured permission to name interviewees, however obliquely, has been sought and given. School governors, teachers, pupils and parents were informed of the nature of the research and given the

opportunity to withdraw their support if they wished. Fortunately they have all been very supportive.

Conclusion

To summarise: data has been collected through questionnaires, interviews, pupil's written responses to open-ended questions and incidents recorded in my own journal, It has been analysed with reference to pupils' and teachers' perceptions of the teaching and learning of mathematics, pupils' self-esteem and pupil motivation. Although much of the data collected refers to the top year 6 mathematics group, responses from all the pupils and all the teachers in the school has also been collated.

The next two chapters use collected data to examine the teachers' views and perspectives on the introduction of target-grouping for mathematics within Rosemary School. Chapter 10 analyses the teachers' responses to the questionnaire mentioned above. Chapter 9, on the other hand, is a personal response, to the change from mixed ability grouping for mathematics to homogeneous 'target-grouping', and is therefore written in a different style to the rest of the research.

CHAPTER 9

A PERSONAL RESPONSE TO THE CHANGE TO SETTING BY ABILITY FOR MATHEMATICS

Introduction

At a seminar to present my findings I boldly announced, with apologies to the original poet, that:

"I know where I'm going
I know who's going with me.
I know who I love
But the De'il knows who I'll marry.

I do know where I'm going. I do know who is going with me. I know what I love doing, but the journey there is quite unknown . So I'd like to take you on my year long journey of discovery."[June, 1998]

At the time I did feel that I knew where I was going, but what I did not realise was how past experiences had shaped the way.

The academic year in question, 1997-98, had been a journey into the unknown. The biggest unknown, as I sniffed the air and felt the wind of change, had been the 'numeracy hour'. Some of my efforts, during that year, had been to prepare myself for the change to the numeracy hour, such as: trying to use a common format for lessons; more formal teaching and yet more interaction with the pupils, whilst even more effort had been expended on coming to terms with the introduction of target grouping for mathematics. Also, during the year's journey, as with any unknown journey, I had followed different footpaths. Sometimes I had made a wrong turning, whereas other routes had opened up new vistas of understanding.

This chapter takes the opportunity to reflect on my own responses to the implementation of target-grouping within Rosemary School. The role of past experiences and the perception of self-worth which underpin my responses are explored. Consideration is then given to three tenets of target grouping for mathematics, namely:

a. target grouping for mathematics is perceived by the participants as a positive experience;

b. target grouping for mathematics enables the teacher to focus on the appropriate level of ability for that group;

c. target grouping for mathematics is easier for the teacher to manage than mixed ability classes

The Role Of Past Experiences In Forming One Teacher's Perception Of Reality

As stated earlier in chapter 7, my initial response to the suggestion that target-grouping, or setting, for mathematics should be introduced into the school where I teach, was that it was fine as long as I could take the top year 6 ability group. The reasons that I gave for this response were, that this would generally mean that the children would be motivated and would be mathematically able, and that it would be easy and a pleasure for me. I have indeed found it a pleasure to teach maths to this group. It has been rewarding moving forward in knowledge and understanding an able group of pupils, However, why did I feel the need to take the top ability group as opposed to another group?

Taking the top group did indeed satisfy a personal need. Also, as the pupils were able, keen and well motivated, it was relatively undemanding. This stress-free situation gave me the opportunity to reflect upon my own mathematical experiences and how they had led me to fulfil my personal need of taking the top ability

The model of teacher expectancy of behaviour considers that when forming opinions about pupils' behaviour, teachers use their own experiences and beliefs to categorise them [Carlson, 1998]. The way in which messages from teachers are received and interpreted by pupils affects their motivation, performance, attitude and social behaviour. This however is a two-sided blade, for all teachers have themselves been

pupils so that the messages that they themselves received from teachers when they were pupils will affect their own motivation and performance.

The notion that our past experiences colour our perceptions of the present was highlighted in a journal entry that I made;

"*At least Cambridge Maths has made me think more about providing practical activities to reinforce abstract concepts. Spent two days on practical area activities, which I have not thought of doing in the past. I would have started by counting squares, but quickly moved on to using the formula for finding the area of a rectangle*". [6.11.97]

This, I feel, reflects the way that I was taught, especially as I had the same teacher for three years at primary level, and once setted at secondary level, the same teacher for over five years. As I considered that these teachers were competent at their job, and as I had had very little other experience of styles of teaching maths, then I sought to emulate them. Fullan [1991] suggests, "*There are some deep changes at stake, once we realize that people's basic conceptions of education and skills are involved. - that is, their occupational identity, their sense of competence, and their self-concept.*" [p.133] It could be therefore, that my style of teaching is based on the belief that if I copy these role models then I will be a competent teacher too.

One teacher's perception of her self worth

Self-esteem, or self worth, is the value we put on our perceptions of our abilities, our bodies, our feelings and our social interaction. Self-appraisal is powerfully related to how we feel. Children and many adults find it hard to build on failure. [The concept of self-esteem, particularly in pupils, is discussed further in chapter 11]. If a person feels failure strongly via the messages from others they may well begin to believe that they are a failure. Conversely success breeds success and high self-esteem [Rogers, 1991]. This may account as to why I am so concerned with the results that my pupils attain in tests, as I perceive the results as a reflection of my teaching.

A sense of self worth (the degree to which we value ourselves) and a sense of self confidence (the energy we draw upon when we need to assert ourselves or feel in

control) are important parts of the contextual framework for understanding the concept of self-esteem. As adults we are often able to pride ourselves, whereas children thrive on the recognition and praise of significant adults and their peers [Boddington and Wetton, 1998]. It would seem however that this adult still requires the praise and recognition of significant peers.

During the 'journey' of the planning, reflecting and writing of this dissertation, I have come to realise that past perceived personal failures have made me doubt my self worth. I can remember in Infant school realising that although I was in the top math's group for that class, there was another 'higher' class that I could not access. Similarly throughout my own schooling I never achieved the ultimate highest accolades of success, and this always seemed to matter to me. So instead of celebrating what I had achieved, and in retrospect there were pleasing successes, I felt that I needed to be seen to achieve, but I didn't.

Target Grouping for Mathematics is Perceived as a Positive Experience.

Notwithstanding the fact that once I finished my teacher training course the first thing that I did was to throw away all my maths notes as a gesture of finality with the subject, I have taught and enjoyed teaching mathematics throughout my teaching career. As has already been noted, working at a level where success is assured boosts self-esteem and drives motivation. I enjoy playing with numbers and wonder at their fascinating properties. Mathematical investigations can be absorbing just for the mathematics involved, not because the solution is useful in any way. I noted this pleasure in 'playing with numbers' when I was involved in a mathematical investigation called 'Happy Numbers'.

"*This is true of the mathematical investigation, into 'happy numbers' involving the cyclical properties of squaring and totalling digits. There could have been any number and any operations and the results would not have changed the world, but the questionning, hypothesising, rationalising, practicing of number bonds and being inspired by an idea were all worthwhile activities and outcomes for an investigation.*" [Rose, 1991 p.52]

I enjoy sharing my knowledge with children and having the opportunity to 'play with

numbers'. I rationalise this by considering that I am helping my pupils, but in many ways it is addressing the issue 'What is in this for me?' - the identification of personal benefits [Day,1985; Fullan, 1991]

My journal observations seem to reinforce the notion that, for me, mathematics is a form of pleasure. "I'll do it (the investigation) for something to do." [24.10.97] and "I enjoyed doing my own investigation." (11.2.98) However I consider that my own personal enjoyment in maths acts as a role model for my pupils:

"*The interest and pleasure you express as you work with the class will also play a part in building their confidence.*"[Straker, 1994, p.4]

A comment in my journal takes up the theme;

"*After spending time helping the children to understand the investigation and to sort out their own ideas I decided to do the investigation myself. Most of the children seemed to become as engrossed in their work as I did, and I could empathise with their efforts when I did talk to the children about their work. I also realised that those children who did not have a facility with factors and multiples would find the search for patterns more difficult.* " [11.2.98]

There were other outcomes than a search for a pattern. There was "*a sense of achievement and order. A sense of knowing and a facility with numbers. A sense of superiority 'I can do it, you can't'*" [11.2.98]

Overall, therefore, for me target-grouping for mathematics has been a positive experience. As I stated earlier, I welcomed the introduction of target grouping (setting) for mathematics as long as I took the top ability group. Taking this group has fulfilled my expectations. They are interested and motivated. The pace is brisk and there is a constructive rapport between the teacher and the members within the group.

Target Grouping For Mathematics Enables The Teacher To Focus On The Appropriate Level Of Ability For That Group.

Within any teaching group, but particularly within a mixed ability group, there is a very

small amount of individual time and attention that a teacher can give to a pupil [Galton, Simon and Croll, 1980]. Target grouping by ability means that exposition by the teacher may be aimed at a more homogeneous band of ability and therefore be more time effective, relevant and appropriate to more pupils [Alexander, Rose and Woodhead, 1992]

Although target-grouping does allow the teacher to focus upon a narrower band of ability, within that band there are still relatively wide and individual levels of mathematical facility. As I noted in my journal,

"*Need to revise/teach multiplication and division by a single digit - bound to be a widespread of can and cannot do - not thought this through.*"[14.10.97]

This reflection supports the claim of the Numeracy Project [Nov, 1997] that work should be differentiated and that the pupils should spend 60% of their time in a direct teaching relationship. However, as Fullan says:

"*The psychological process of learning and understanding something new does not happen in a flash (or for most educational changes, in several flashes). The presence or absence of mechanisms to address the ongoing problem of meaning - at the beginning and as people try out ideas - is crucial for success, because it is at the individual level that change does or does not occur.*" [Fullan, 1991, p.45]

This need for mechanisms to aid understanding and time to assimilate new information is pertinent to pupils' learning. The understanding of division is a case in point. Even though the children are taught division in Year 4, many find it hard to assimilate and understand, and are still struggling with the concept in year 6. *"Division is the most difficult process of all for the child*". [Gagg, 1960, p.110] I noted in my journal that if the pupils were finding a basic operation such as division by a single digit difficult then "*how will they take to the leap to decimals? They do not understand 'whole ones' in decimals - the idea of 'units' marginally better. Last year I would push on to decimal places and possibly confuse some of the children.*" [14.10.97] This not only supports the notion that learning does not happen in 'a flash' - both the children's and my own - it also highlights the range of ability within what is considered an 'homogeneous' ability group.

Thus it may be seen that target-grouping does not fully address the problem of the spectrum of pupils' ability. So although target-grouping means that teaching can focus on a narrower band of ability there are still 'extremes' within the context of that group. This realisation led me to consider that the brighter pupils needed the opportunity to extend their knowledge and understanding outside the constraints of the main group.

Target-Grouping for mathematics is easier for the teacher to manage than mixed ability classes

I was concerned that the more able children were not being given the opportunity to extend their learning, as learning takes place mainly when the individual is challenged and begins to fail [Casey and Koshy, 1995]. To this end I introduced what became known as 'Extra Maths', an extra-curricular session where the emphasis was on the demands of mathematics at National Curriculum level 6, as opposed to levels 4 and 5 within the main lessons.

The core of pupils who stayed for the whole course were generally those who enjoyed maths anyway, and therefore enjoyed the extra challenge.

LP - "*I have been to them all. I liked the sessions and I like maths. The first time I came just to try it out. It's good because I learnt things that I didn't know. The teacher was able to help us more when we didn't know. We got more individual attention. It was difficult when we did the level 6 paper because it was a lot harder than I've ever done.*"

ND [A year 5 boy, who transferred from a year 5 set to the top year 6 set]- "*I've been since I've been in the group. Its quite good, fun and it helps in maths lessons. I'm not keen on algebra. I found the work difficult to start with before I settled down, but now I keep up with most things. I've started to enjoy maths now because it is more of a challenge. I'm not hanging around doing extension sheets.*"

The children enjoyed the challenge and the fact that within a small group the teacher could give them the individual attention that they needed. From a personal point of view

I enjoyed working with a group of children who wanted to learn and with whom I could therefore have a more relaxed relationship with and share a common enjoyment of power and wonder of numbers.

However the notion of extra maths raises a number of questions, most pointedly the fact that 'extra maths' is a form of target-grouping itself. From this premise, on the one hand it counters the claim that target-grouping allows teachers to focus on the appropriate level of ability as another group has had to be formed to cater for the brighter pupils. On the other hand this extra group was formed with the very purpose of concentrating on a 'single' level of ability. Similarly the extra group supports the idea that target-grouping is easier for teachers to manage than mixed ability classes. Conversely this extra group counters that claim for it is implying that the 'main' group is of mixed ability, which the above discourse has already indicated is the case. Target grouping also claims to boost children's self-esteem and experience of success. The pupils who attended the extra lessons soon considered themselves an 'elitist' group, especially as some children were invited to come. This did boost their self-esteem but those who did not come and those who dropped out because they found the work too difficult did not experience the sense of success that those who stayed did.

This leads me to consider that forming an 'extra' group outside the main maths class may not be the answer to addressing pupils' needs. One aspect of my teaching that I feel that I should address in future is the exposition by the teacher. Until now I have been too aware that I teach the top ability maths group and that within the group there are a few very mathematically able children. Exposition has been primarily aimed at their level, so that they do not become bored, which has meant that the 'less' able have found new concepts difficult to grasp. The fine balance of attempting to meet all the children's needs within the exposition section of the lesson needs careful thought and consideration. One solution may be to address the pupils' needs in small groups as proposed by the Numeracy Project; another may be to instruct the class in two, or more, larger groups, which is the method I favoured when I taught maths to a mixed ability class.

A Personal Conclusion

Target-grouping lends itself to a formal style of teaching: tables in rows; whole-class teaching; and a common curriculum with perhaps some differentiation. This is the style that I most favour, as it is the style that I am comfortable with and can manage. When I can focus on one level of ability and develop a rapport with pupils who respond well to the enthusiasm that I have for mathematics, I feel in control of the teaching/learning situation. Davies [1994], however, equates this need to be in control with a lack of self confidence.

"*The fear of losing control is a very common one, and we cope with it by being excessively ordered and trying to prepare for every eventuality.....Anxiety about control.. can undermine self-confidence....A preoccupation with control is to do with structuring and ordering events and people so as to avoid chaos, at all cost. As far as possible, we want to ensure how things will turn out. We see ourselves as having sole responsibility for being in control.*" [p.35]

I would not say that I am excessively ordered nor prepared for every eventuality - although the friend who lent me Davies' book thought of me immediately she read the above. As personal constructs help us decide how we see the world, I can identify with most of Davies's concept of a person who needs control to construct their world.

The main outcome of the reflection on my perspective of target-grouping has been the revelation of the part that my own experiences have had on forming my beliefs and motivations. Acceptance of these forces have enabled me to begin to understand my individual pedagogical stance and style, and how these can be better understood and utilised in further developing my role and skills as a teacher.

CHAPTER 10

A CONSIDERATION OF WHETHER THE TEACHERS RESPONSES AGREE WITH THE ORIGINAL RATIONALE FOR HOMOGENEOUS GROUPING FOR MATHEMATICS IN THAT TARGET-GROUPING ENABLES TEACHERS TO FOCUS ON THE APPROPRIATE LEVEL OF ABILITY FOR THAT GROUP AND THAT TARGET-GROUPING IS EASIER FOR TEACHERS TO MANAGE THAN MIXED ABILITY CLASSES.

Introduction

This chapter considers the effect that the change to setting by ability for mathematics has had on the teachers in one school. Data for this chapter was collected through the teacher's written responses to an open-ended questionnaire, which was administered at the beginning and at the end of the academic year 1997-1998, and through discussion with individual teachers. This chapter therefore, considers the teachers' responses to the innovation, and is based on the teaching experiences of the Head, 12 teachers and a classroom assistant, teaching mathematics to homogeneous ability mathematics groups within one middle/working class. semi-urban, Church of England junior school primarily over one academic year, but with some reference to other years.

Setting the Scene

Day et al [1985] considered that in order for an innovation to be successful, a range of factors come into play to ensure effective implementation. The factors that they considered to be important were:

1. that teachers need to see the need for a change and to feel a shared responsibility for implementation;
2. the need for staff cooperation;
3. good, clear communication;
4. positive support from the Headteacher; positive messages to all involved both in and outside school and to provide resources:
5. positive support from the co-ordinator;

6. time to implement, monitor and evaluate. To introduce one change at a time, so that one success can lead to another, rather than being swamped;
7. the identification of the personal benefits of the proposal - 'What's in this for me?'

Day's list of factors for the implementation of change could be divided into two: the role of the providers, and the role of the implementers. In the change to homogeneous groupings for mathematics from mixed ability groupings, the Head and the Mathematics Coordinator played the roles of providers. Together they were able to provide; good, clear communication to all parties involved i.e. the teachers, the governors and the parents [The pupils were informed at a later date by their teachers and parents]; clarification of the need for change; time to consider its implications; and opportunities for the staff to work together.

It could be argued, that despite the beliefs of politicians who have siezed upon the alleged failure of the education system in order to take control of the process of change [Macdonald, 1991], it is the teachers who through their own experiences, beliefs and methods, set the tone of teaching and learning within the individual classroom [Ruddock, 1991].Thus, notwithstanding the forces that were at work as outlined in chapter 5, it was the staff, led by the Head and the Mathematics Cooordinator, who made the conscious decision to implement the changes in the delivery of mathematics within Rosemary School.

Despite the fact that two changes were being implemented at the same time i.e. a new teaching structure for mathematics and a new mathematics core scheme, the staff accepted the need for change and were willing to share the responsibility to ensure its successful implementation. The need for the changes were perceived as two fold. The old core scheme books had become tatty and outdated, so the need for a new scheme was accepted by all the staff. Secondly as a year's trial run of homogeneous grouping in years 5 and 6 had been perceived as a success, then the time was right to implement similar groupings across the whole school. Success was indicated by the fact that the teachers involved in the year's trial had enjoyed the experience; the pupils had also seemed to enjoy the experience; governors had supported the experience; and no parents

had complained. This did not mean that the introduction of two new changes were easy and uncomplicated to implement.

Just as no two individuals are exactly the same, then neither are two schools nor two teachers. Schools, teachers, and pupils differ in their age, background, interests, ability and experiences [Feiman-Nemser and Floden,1986] Thus, not only each school will have its own culture, but as a result of their total experiences so will each teacher. These differing perspectives and ideaologies can be a source of resistance when innovations are introduced.

A simple illustration of this occured when we were trying as a school to decide on a new published mathematics scheme to use throughout the school. Numerous publishers were invited to display their wares, but each was rejected by one member of staff or another. But why were they rejected? If I am a typical example then my decisions were made primarily on my own personal experiences, and not just as a teacher. If a layout of a book did not appeal to me as it reminded me of books that I did not like it was not just for the pupils' sake that I rejected it but for my own reasons as well. As a dozen individual preferences could not be accommodated the final decision had to be a compromise, but on this occasion as everyone perceived the need for a new scheme this was accepted. As Hargreaves [1980; 1982], and Berlak and Berlak [1981] confirm, despite individual differences all teachers engage in activities that are recognisable as teaching.

This ontological culture defines what is in the world of teaching, and what is not. It structures how teachers think about their school, the pupils, and the teaching and learning that takes place there. So that over time they become persistent behaviours and are used by both pupils and teachers to structure the classroom and school. These structures do not determine how teachers behave but reflect *"a compromise between teacher values, ideologies, and the press of school culture*" [Gitlin, 1987, p.107]. Change therefore challenges these behaviours.

In an attempt to identify the teachers' perceptions of the change within the teaching of

mathematics, and to see whether the teachers' responses agreed with the original rationale for homogeneous grouping for mathematics in that target-grouping enables teachers to focus on the appropriate level of ability for that group and that target-grouping is easier for teachers to manage than mixed ability classes, the teachers were asked three questions:

1. How do you feel about maths?
2. How do you feel about being in a maths group?
3. What will you try to do better in maths next year?

Question 1: How do you feel about maths?

Mathematically speaking the school is fortunate that the majority of the staff are mathematically able, they enjoy maths - even "Love it!"- and are confident in their mathematical ability. The three members of staff who are not so secure in their mathematical ability reported that they had grown in confidence since the introduction of target-grouping for mathematics as they came to terms with the needs of their group and the demands of the new core scheme. These teachers felt more confident taking the lower ability groups and welcomed the support that the published core scheme gave them.

Three teachers reported that they were more confident now in mathematics since they started teaching, than when they were at school. On the other hand two other teachers reported that although secure in their own mathematics they found some concepts difficult to teach. The teacher of the 5/6 low ability group summed up the situation when he stated,

"*I like maths most of the time, but I find it frustrating when knowledge appears not to be retained after even a short time. However it is very rewarding when I see little glimpses of light dawning with some children.*"

The teachers' own perceptions of mathematics fit two of Bruner's [1996] tenets of education; the institutional tenet in which individuals belong to different institutions or groups, so that each institution constructs its own reality, and each has its own form of

'distinctions', In this case 'the institution' is the mathematics target group. This leads to the interactional tenet, for as has already been indicated, education is a social process, in which the passing on of skills and knowledge involves a subcommunity in interaction. That is, it is not a one-sided interaction but one where teachers and learners help each other to work as members of a group to learn.

Question 2: How do you feel about being in a maths group?

All the teachers stated that they enjoyed teaching mathematics in homogeneous groupings.

"Love my group."

"I think the idea of maths groups is brilliant."

The classroom assistant, who assists pupils in the lowest groups, qualified this by saying that although she enjoyed it she found it stressful, as the retention in learning of new skills and concepts by the pupils was minimal. Two other teachers commented that they missed teaching the 'brighter' pupils. This is understandable as I have already commented on the pace of lessons with brighter mathematically able pupils and the rapport that can develop between the brighter pupils and teacher.

A third of the teachers considered that they taught target groups better, as they had a clearer understanding of the needs of the pupils within the group and therefore knew more clearly what to teach.

"*I'm usually better prepared than for some other lessons.*"

All the teachers commented that targeting the work to the ability of the pupils was easier in homogeneous abilty classes than in mixed ability classes. They liked the idea that the children were of the same ability or of a narrower range of ability within the group than within a mixed ability class.

"*I like the fact that I can target the work within a narrower band of ability.*"

"I like it better because the ability range is more focussed."

"I feel that I target the children's needs much better. I enjoy the structure and routine."

However a quarter of the teachers commented that although the groups were perceived

to be of homogeneous ability in reality there was a wide difference of ability between those children considered by their work and level of understanding to be at the top of the group and those considered to be at the bottom.

"Much easier to teach although in my group there is a big gap between the top and lower end."

Once again the above discussion supports Day et al's [1985] criteria for successful innovation in that the teachers have identified the personal benefits of the scheme i.e. this scheme makes teaching easier for me and I gain satisfaction from teaching in this way. Thus, in the case under consideration, the teachers, through experience and support from the mathematics coordinator and Head, have successfully implemented the change from mixed ability groupings for maths to homogeneous grouping and have thus reinforced their motivation and self-esteem.

Six aspects of school learning contexts have been identified as being related to motivational orientation : task, authority, recognition, grouping, evaluation and time, and developed into the TARGET programme [Epstein, 1989; Ames, 1992]. Although developed to reinforce pupil motivation it can be seen to hold true for the present discussion on teachers' perceptions on an innovation.

1. Tasks - the purpose of the task should be made clear so that goals can be set within which to experience progress. If any classroom grouping is to work to its best ability there must be clear relational guides and task differentiation to ensure that the activity is appropriate to the desired ends and the activity must be clear.

2. Authority - Where there is responsibility for managing their own work the impact is positive on a number of outcomes. Although most of the teachers work collaboratively, as each group has different needs each teacher has a degree of autonomy on what and how each module is taught.

"This is so good for the children as we're better able to meet their needs."

3. Recognition -Praise or reward in a competitive context fosters a performance/ ego orientation, whilst praise to acknowledge progress is likely to support task/learning orientation. Both types of reward are evident for teachers within the context of grouping for mathematics.

4. Grouping - Well organised collaborative group work can help develop task-

orientation but poorly prepared group work leads to uncertainty and task avoidance. Homogeneous grouping for mathematics allows the teacher to be better prepared as the planning is more focused

5. Evaluation - "*There is a strong tendency for people to adjust to the 'near occasion' of change, by changing as little as possible - either assimilating or abandoning changes that they were initially willing to try, or fighting or ignoring imposed change.*"[Fullan, 1991, p.36]. In the present case, though, the teachers have evaluated the change and seen that it works for them.

6.Time - Learning and progress entail change over time. As was noted above the teachers at Rosemary School have grown in confidence in teaching homogeneous ability target groups for mathematics.

"I feel I am teaching better since maths groups and am better teaching to the children's abilities."

Finally in this section it should be noted that a quarter of the teachers considered that homogeneous ability teaching for mathematics raised the level of pupil's achievement. As one teacher commented,*"The improvements in their achievements is very noticeable"*. However this teacher teaches one of the top ability groups, whereas, the pupils in the lowest groups do not make such rapid improvements in their skills and understanding, but when they do it is 'very rewarding' for the teacher.

Question 3: What will you try to do better in maths next year?

The teachers' responses to this question could be categorised as a desire to improve their own personal mathematical knowledge and skill, and a desire to improve their teaching skills. This could be further subdivided as follows:

A desire to improve :	responses
the teacher's knowledge of mathematics	2
the implementation of the Numeracy Hour	5
the skills of teaching	6
the degree of differentiation / extension of pupils	8

As identified in the previous chapter, these responses have a historical/personal context. Where concepts had not occured within the teacher's own informative experience he/she felt insecure and inadequate in teaching or implementing these areas of mathematics.

"*Occupational identity represents the accumulated wisdom of how to handle the job, derived from their own experience and the experience of all who have had the job before or share it with them.*"[Marris, 1975, p.16]

Marris's comment is particularly valid when considering the implementation of the Numeracy Hour. This innovation, involving an oral/mental maths section, whole class instruction, differentiated group work and a final plenary, does not require teachers to develop skills and knowledge that they do not already possess, but it does constrain the way in which they teach. From the responses concerning the introduction of the Numeracy Hour, it is obvious that this imposed external change is causing a sense of insecurity in the teachers' ability to perform their role. However Fullan [1991] recognises this as an important stage in the implementation of change.

"*Things get worse before they get better and clearer as people grapple with the meaning and skills of change (Joyce & Showers, 1988). We see then that the relationship between behavioural and belief change is reciprocal and ongoing, with change in doing or behaviour a necessary experience on the way to breakthroughs in meaning and understanding.*" [p.91]

The meanings and skills that the teachers identified as needing "grappling" with were: clearer explanations of new concepts and skills; more informative record keeping; a better understanding of the core mathematics scheme; and to increase the fun element in the teaching and learning of mathematics. Although Fullan [1991] and Day [1985] consider that these changes will only take place if the teacher can perceive the benefits of the change, Doyle and Ponder [1977-78] consider that teachers are governed by the 'practicality ethic'.

"*The essential features of this ethic can be summarized briefly as follows. In the normal course of events teachers receive a variety of messages intended to modify or improve their performance. If one listens carefully to the way teachers talk about these messages, it soon becomes clear that the term 'practical' is used frequently and consistently to*

label statements about classroom practice." [p.1-2]

In other words the changes cited by the the above teachers will only take place if they prove or are deemed to be practical.

A quarter of the teachers commented that although the groups were perceived to be of homogeneous ability in reality there was a wide difference of ability between those children considered by their work and level of understanding to be at the top of the group and those considered to be at the bottom.

"*Much easier to teach although in my group there is a big gap between the top and lower end.*"

"*I wonder if I have failed some of the children this year e.g. top and bottom of group?*"

Interestingly it was the teachers of the top ability groups who considered that there was a need to extend the more able, whilst the teachers of the lowest groups saw the need for greater differentiation in the work that they gave their pupils.

"I will try to extend the children [top year 5 group] even more."

"Better grouping of year 3 and 4 [lowest year 3/4 group] according to ability and preparing work to match."

Lortie [1975] in his extensive study into what teachers do and think summed up the situation. He recognised that one of the main feelings that characterise the psychological state of teachers and teaching is uncertainty. Intangibility, complexity, remoteness of learning outcomes, external influences on pupils, all make the teacher's assessment of his or her impact on students uncertain. However Lortie recognised that the greatest rewards mentioned by teachers were the 'psychic rewards' i.e. "*the times I reached a student or group of students and they have learned*" [p.104]. This, as one teacher above concurred, is, in my opinion, what makes teaching so worthwhile.

Conclusion

"Target Grouping" or homogeneous ability grouping was introduced for mathematics, in Rosemary School, in November 1995. It was introduced for the 5 classes that make up

years 5 and 6. Years 3 and 4 continued to be taught, for all subjects, in mixed ability classes. In September 1997 the scheme was extended to cover the whole school.
A number of benefits of the scheme were cited for both teachers and parents including
"*Exposition is easier to focus on an appropriate level of ability.*"[unpublished memo to staff, Sept 1995]
"*Target Maths Groups allows teachers to focus the lesson on a narrower range of pupil ability than in mixed ability classes.*" [Information leaflet to parents, 1999]

This led to the hypotheses that;
1. Those involved in target-grouping perceive it to be a positive experience.
2. Target - grouping enables teachers to focus on the appropriate level of ability for that group.
3. Target-grouping is easier for teachers to manage than mixed ability classes.
This chapter has clearly shown that the teachers at the school under consideration do indeed perceive target-grouping for mathematics to be a positive experience. The teachers also find it easier to manage than mixed ability classes as they do not have to prepare for too wide a range of ability, and as a result planning is more focussed. However it would seem that homogeneous ability grouping is a misnomer, for within each ability group the teachers still experience a wide range of ability that has to be catered for through differentiated and extended work.

The final comment in this chapter should go to the 'relief' teacher who on a monthly basis experiences every math's group.
"*I think math's groups are far more focussed, far more fulfilling for the children. I have seen every level group become far more confident and develop a love of maths. I also feel the middle, quiet child is not ignored or allowed to coast between the demanding bright or slow child.*"

The relief teacher has thus identified the perceived benefits of homogeneous target grouping for mathematics within Rosemary School for both teachers and pupils. It is, therefore, to the pupils, and the possible effects that the introduction of homogeneous

grouping for mathematics has had on them, that I wish to turn to next. In the following chapters both theoretical constructs of pupils' perceptions of mathematics, pupil self-esteem and motivation, and research data will considered in an attempt to confirm, or otherwise, that pupils find the experience of homogeneous grouping for mathematics a positive experience.

CHAPTER 11

A CONSIDERATION OF THE LITERATURE ON PUPIL SELF -ESTEEM AND MOTIVATION

Introduction

This chapter builds on the earlier discussion on self-worth and self-esteem begun in chapters 4 and 9. It reviews some of the literature on pupil self-esteem and pupil motivation, in order to give a contextual framework to the research discussed in the following chapters. Consideration will be given to the theoretical background that underpins how pupils' perceive themselves and how this affects their motivation. The role of the teacher in developing pupils' self-esteem and motivation is also considered. Finally it will be argued that grouping by ability for mathematics may play a positive role in developing pupil self-esteem and motivation.

How Pupils Feel About Themselves

A belief in one's self and in one's abilities is linked to: goals individuals set themselves; heredity and past history; and social pressures [Dweck and Leggett, 1988; Berndt and Keefe, 1992; Galton and Williamson, 1992]. However this is of only partial help to the educator and educated as it implies that there is little that can be done to improve the situation. Also to protect their sense of self-worth pupils use a range of tactics to avoid damage to their self-esteem. To the educator such behaviour often becomes equated with ability - to be able is to be valued but to do poorly is evidence of inability [Covington, 1992].

The classroom or the group environment can have a positive or negative effect upon the behaviour and motivation of an individual within the school context [Berndt and Keefe, 1992], although the benefits or otherwise obtained by one teacher with a group are not always obtained by another [Galton and Williamson, 1992]. This implies that it is not just grouping that affects a pupil's motivation but the whole environment. Motivation can be understood in terms of the particular perceptions which pupils have of their

current circumstances and their own position within them [Rogers and Kutnick, 1990]. Their own position includes a perception of the nature of the abilities which they have which are relevant to the task in hand, and the level of confidence they have in their ability being sufficient to meet the demands of those tasks [Ames, 1984; Dweck 1991].

As has already been stated, a belief in one's self and in one's abilities is linked to the performance and learning goals individuals set themselves [Dweck and Leggett, 1988]. With performance goals, an individual aims to look smart, whereas with learning goals the individual aims at becoming smarter. With a learning goal orientation there is a belief that effort pays off, and an associated conception of ability as not being static and fixed, but as being susceptible to development through the application of effort. In contrast, learners with a performance orientation, seek to avoid failures as they invite an inference of low ability.They are concerned with attributions to ability which they take to be a fixed entity, which are not affected by experience and effort. However some effort can be maintained as long as sucess is the general outcome and the ego is being flattered [Dweck, 1991].

On the other hand attribution theory [Weiner, 1985; Rogers, 1987], accounts for motivation in educational settings in terms of the learner's beliefs about the extent to which they have control or influence over learning outcomes. If they believe that effort makes a difference to the outcome then they will expend it; if they feel that whatever they do will make no difference to the outcome then they will make no or very little effort. A person who believes that they lack ability and that effort is irrelevant is described as having learned "helplessness" [Seligmen, 1975].

Self-efficacy theory [Bandura, 1991] focuses on the individual's beliefs about the possession of a particular competence and its relation to outcomes. If a person believes that they do not possess the relevant skill or knowledge to fulfill a task (whether they do or not is irrelevant) they will take steps to avoid doing it. Failure attributed to a lack of effort preserves self-worth as opposed to being considered lacking in ability. On the other hand, someone who believes they do have the required skills and knowledge will persevere for longer in the face of difficulty. In other a words self-efficacy is a belief in

one self and one's abilities. A belief in one's self and one's abilities may also be a gender issue. Girls tend to be more predisposed to be "*hard-working, organised and have a greater sense of their individual progress than boys.*" [Downes, TES, 2.5.97. p.6]

The Gender Gap

According to Wragg [1997] the most pressing problem, for the immediate future, is not the need to prepare pupils for work, although this does have its place if a country is to continue to provide for itself, but the perceived underachievement of boys.

" *If we want to improve significantly the overall national level of achievement for the 21st century, then it is the massive under-achievement of boys that must be tackled vigorously. It is causing a major headache to those who educate them, and the evidence of their relatively low performance is now overwhelming at all stages of education.*"[Wragg, TES 16.5.97 p.4]

Wragg supports his claim with the statistical evidence that in 1983-84 there was less than a 1 percent gap in the number of boys [26.3%] and girls [27.2%] who obtained five high grade G.C.S.E. A to C. By 1995-96 the gap had become, according to Wragg 'a gulf' with the boys on 39.8% and the girls on 49.3%. What he fails to mention is that both boys and girls had improved their performance over the 12 year gap, although admittedly the girls had improved more significantly than the boys. The improvement in the girls' scores may be attributable to educators' response to the Cockcroft Report [1982] which found that in mathematics girls performed less well than boys.

Several explanations for these differences have been offered. One considered that girls and women simply mirrored a dominant perception in our society, that females were less able and therefore their successes were rightly attributed to hard work and compliance [Heilman and Stopek,1985], It has also been suggested that the exercise of intellectual ability may be seen by many females as less role appropriate [Nicholls, 1975]. A third explanation was that males privately make the same attributions for their successes and failures as do females theirs, but males are simply more defensive in their public statements owing to societal pressures to maintain an image of assertiveness and competency [Zuckerman, 1979].

This is interesting, as more recent research [MAPS, 1998], reported that Somerset LEA has found boys respond better to firm deadlines, strict homework checks, and consistently applied sanctions. The research concluded that boys favour silent classes and a large proportion of teacher-led work. Also Woolford and McDougall [1998] have suggested that girls benefit from the role model provided by the female teacher, which is generally the case in primary schools, but not necessarily so in secondary schools. The problem of low achievement in mathematics by girls was addressed through: the consideration of teaching techniques; in some incidents, single- sex lessons; and more careful consideration given to textbooks that were used. In fact it has been addressed so well that it is now boys who lag behind the performance of girls in mathematics.

Role reversal, the insecurity of the job market, and a conscious effort to raise the self-esteem of women, has led some boys to cover their lack of competency in basic skills with indifference. Thus the quality and amount of study is not so much a matter of attributions as the motives that drive individuals [Covington, 1992].

What, therefore, is motivation?

One perspective of achievement motivation is that it is a drive. That it is, an internal state, need, or condition that impels individuals toward action. The motives-as-drive approach views motivation as an enabling factor - a means to an end - resulting in improving status, better performance, or an increased sense of security. A second perspective considers motivation in terms of goals or incentives that draw, not drive, individuals toward action. Motive-as-goal theorists focus on noncompetitive, intrinsic reasons for learning, and see goals, that by their very nature, beguile and entice individuals into action rather than push or drive them. However these perspectives are not exclusive but complementary, for personal motivation is the key to all noteworthy achievement [Findley and Cooper, 1983].

Three motivational styles have been identified, namely: mastery orientation, self-worth motive and learned helplessness. Mastery orientated pupils [Dweck, 1985, 1991; Elliott and Dweck, 1988] are concerned with working towards mastery over a particular task - even if they do not attain it. They see a clear link between the effort expended and the

outcome obtained. These pupils will maintain confidence in their eventual success and will face difficulties in a positive and productive manner. Their approach to work most closely parallels that espoused by the school system.

The self-worth motivated pupil [Covington, 1992] has an overriding concern with their own level of ability. It becomes important for their own sense of self-worth to be able to perceive themselves as an able person. When these pupils' perception of their self-worth is challenged by work in which they may fail, the pupils will adopt avoidance tactics. Effort may be reduced so that it is because they have not tried that they have failed, not because they are not competent. Or, according to Covington, they may choose a difficult task, so that the choice of task is the reason for failure, not themselves, or they may procrastinate and never begin the task. These behaviour patterns are not well suited to teacher expectations.

The learned helplessness pupils [Seligman, 1975; Dweck and Wortman, 1982; Covington, 1992] give up trying very quickly when faced with difficulty. They have low aspirations and thwart any encouragement from the teacher by believing that no amount of effort will change their situation so the effort to achieve or improve is not worth even trying.

These findings tend to suggest that some pupils' motivational styles are not suited to a school environment.

"*Pupils who encounter difficulties and poor results are led to believe that they lack ability, and this belief leads them to attribute their difficulties to a defect in themselves about which they cannot do a great deal. So they 'retire hurt', avoid investing effort in learning which could only lead to disappointment, and try to build up their self-esteem in other ways.*" [Black & Wiliam, 1998, p.9]

Students employ many ruses and artful dodges in their 'primordial' struggle to preserve a sense of dignity in school, with the end result that many students are prepared to sacrifice good grades for the sake of appearance [Covington, 1992]. However it may not be more 'effort' that many of these pupils need but a clearer understanding by the teacher of styles of motivation.

The Role of the Teacher in Motivating Pupils

Covington's message is that competition together with further emphasis on academic achievement will in the long run be counter-productive. This implies a reduction in all forms of competition. Whenever teachers believe that their role is to ensure high test scores rather than to help students learn, they pressure themselves, and in the process use controlling autocratic teaching techniques [Boggiano and Barret, 1987]. Control often means emphasizing extrinsic rewards (particularly when they are dispensed competitively), allowing students little choice for how they go about learning, and threatening to withdraw emotional support as a means of punishment [Maehr and Stallings, 1972]. Such a regime, perpetuated in the name of efficiency, forces teachers to de-emphasize topics not covered on standardised tests [Shepard, 1989], so that the content and depth of instruction is negatively altered. With increased standardisation and greater accountability comes superficial coverage, and the possibility that teachers may be simply teaching children a series of "tricks" that enable them to perform well on standardised tests yet leave them deficient in basic understanding [Cunningham, 1990; Cassidy, 1998].

When forming opinions about pupils behaviour teachers use their own experiences and beliefs to categorise them. The model of teacher expectancy of behaviour argues that there are three components to the process:

1. Forming impressions - Teachers form impressions about pupil behaviour on the basis of our understanding of how they should behave and are behaving. Certain traits are central to forming impressions from which they infer a whole range of other traits or behaviours. These models have two dimensions: mental ability and sociability, and within each dimension they hold 'good' and 'bad' examples. It is against such a model that teachers measure other children and predict their likely academic or social behaviour.

2. Communicating beliefs - through what is said, how it is said, and the postures and gestures that accompany the language i.e. body language.

3. Effects on others - The way in which messages from teachers are received and interpreted by pupils effects their motivation, performance, attitude and social behaviour. Those who think their successes are due to their ability and their failures to lack of effort are likely, if repeated over time, to develop effective motivational styles. Conversely, those who think their failures are caused by their lack of ability and put their successes down to luck are likely to develop ineffective motivational styles [Seligman, 1991].

To help overcome these difficulties and develop a more effective motivational style requires intervention at three levels [Ruddock, 1991]. The first is the need to teach and encourage pupils to think differently about their reasons for their successes and failures- to reconsider their understanding of the relationship between ability and effort. The second relates to the classroom organisation or, more specifically, the use of non-competitive learning structures. And thirdly the effects of constant grading of pupils. In an Israeli research project 11 year-olds were given either written feedback on their tests, a graded mark, or both. The performance of the group who received only comments increased by one third, whilst that of the other two declined [Black and Wiliam, 1998]. Similarly English OFSTED inspectors [1996] have noted that the day-to-day marking of work in maths to be commonly unsatisfactory and fails to guide pupils on how to improve. The inspectors recommended that: schools review their assessment policies to make sure that pupils get effective feedback; that teachers monitor pupils' progress; and that teaching staff are clear about what evidence they need to support their end-of-key-stage assessment. The report argues that consistent use of 'formative assessment' in which teachers use regular tests to identify children's learning problems and offer high-quality feedback to help them overcome them, is the most effective way to improve achievement.

"*Improvements in formative assessment which are within reach can contribute substantially to raising standards.*" [Black & Wiliam, 1998, p.15]

So once again there seems to be a conflict between procedures that the government wishes to impose and the reality of what teachers need and /or are willing to adopt. The suggestion seems to be that pupils require individual programme to support their needs. This would not only be time consuming for the teacher but may be counter productive

for as was noted earlier, Vygotsky and Bruner advocate the social aspects of learning and the importance of the teacher in supporting and scaffolding work for pupils to gain new knowledge. However, if two of the learning styles mentioned above 'are not well suited to teacher expectations', then the resulting pupil underachievement needs to be addressed.

Addressing Pupil Underachievement

The underachievement of some pupils is a concern to all who have an interest in education. One project aimed at reversing the negative attitude and lack of motivation and self-efficacy in those deemed to be underachieving has been The Attunement Strategy [van Werkhoven, 1990]. This strategy is an approach to reawaken the processes of prediction and self-review in poorly motivated children. Teachers ask children to think about their own performance and competence, to make predictions and to evaluate the implications of the outcomes for their beliefs about themselves. How difficult is the work going to be? How long will it take? How are you getting on? How did you cope with the hard part? How long did it take you? Why do you think you did so well? By retaking responsibilty for learning the pupil begins to regain a sense of competence and efficacy by facing the evidence of their own achievement. The teacher 's role is to try to get the child to define the task, specify the outcome and, subsequently, assess the work.

Another strategy to develop pupils' motivation for learning has been the TARGET programme. Formerly mentioned in connection with teachers' perceptions of innovations [see Ch10] the TARGET programme was initially related to motivational orientation: task, authority, recognition, grouping, evaluation and time [Epstein, 1989; Ames, 1992].

1. Tasks - the purpose of classroom tasks should be made clear to pupils so that they can set themselves goals within which to experience progress. If there is too much ambiguity within the activity, insecurity will enter the group interaction and pupils may feel threatened [Doyle, 1983]. If threatened, pupils are likely to provide simple, low order and corrective responses amongst themselves or opt out of discussion [Galton and Williamson, 1992].

2. Authority - Mortimer et al [1988] found that where pupils had responsibility for managing their own work over a short period of time the impact was positiveave to contend with a diffferent form of dominance.

3. Recognition - Praise or reward in a competitive context fosters a performance/ ego orientation, whilst praise to acknowledge progress is likely to support task/learning orientation [Schunk, 1987]. Older children, however, perceive praise given for effort as an indication of low-ability.

4. Grouping - Well organised collaborative group work can help develop task-orientation [Nicholls et al. 1990], but poorly prepared group work leads to uncertainty and task avoidance. Children work best in groups when they undertake clear cut assignments which are closely monitored by the teacher [McNamara & Waugh, 1993]. Older pupils - over the age of 7 years - prefer to work in same gender groups, [Bennett & Dunne, 1990], although an equal number of boys and girls in a group achieves balance in discussion and successful problem solving [Webb, 1991; Slavin, 1991]. Webb also noted that friendship groups limit achievement in problem solving tasks, whereas Azmitia and Montgomery [1993] found that when children were paired with friends they did more explicit 'scientific' reasoning through language and so solved the problem more successfully. Collaborative group work involves, by its very nature, that the pupils should talk, but there should be a reason and purpose to talk,

5. Evaluation - Where a teacher evaluates an activity in a competitive context then performance/ ego orientation is fostered, but where evaluation relates to change and progress then learning is fostered.

6. Time - Learning and progress entail change over time. Children who are poorly motivated seem to experience no time structure when engaging with classroom tasks.

Grouping for grouping's sake seems ineffectual as a teaching and learning strategy. On the other hand within any school day a number of learning tasks may be undertaken, and for each learning task a particular group size and structure will better enable some groups to work together more effectively than others: where the purpose of the lesson is incremental and restructuring, then dyad groups are beneficial; for enrichment work, small groups of equal standing; whilst for practice and revision , whole class and individual work are deemed to be more effective [Plowden Report, 1967; McNamara and Waugh, 1993].

Conclusion

Within Rosemary School the teachers have come to believe that grouping for mathematics is non-threatening to the pupils. They believe that the pupils enjoy mathematics and that they are motivated to learn and are self-confident in their mathematical ability. Homogeneous ability grouping for mathematics seems able to address the motivational needs of the pupils in that :

1. Tasks are clear as there is little diversity in instruction.
2. Authority may be devolved to pupils, although this is not a significant feature of homogeneous groupings as it can occur within any grouping.
3. Recognition may appear more significant as the praise, especially in the lower abilty group, is more likely to acknowledge progress and effort. However, personal experience indicates that performance/ego orientation is quite marked in higher ability groupings.
4. Various groupings may still take place within a homogeneous ability group.
5. Evaluation depends on the teacher's style of evaluation as to its effectiveness, but it is used to monitor and evaluate progress and guide future teaching and learning.
6. Time for homogeneous grouping for mathematics is allowed for once a day within Rosemary School. This effectively limits the time available for mathematics work to be completed and brings focus to the lesson.

This reflects the teachers' perception of the motivational value of homogeneous ability grouping.

The question is though - How do the pupils themselves perceive the situation? Through an analysis of data collected from all the pupils within the school, but with particular reference to the top Year 6 mathematics group, the next chapter attempts to clarify the pupils' perspective of, what is known within the school as, target-grouping for mathematics.

CHAPTER 12

AN ANALYSIS OF THE EMPIRICAL DATA, WITH PARTICULAR CONSIDERATION OF THE PUPILS' PERCEPTION OF MATHEMATICS, THEIR SELF ESTEEM, AND THEIR MOTIVATION AFTER A YEAR OF TARGET-GROUPING FOR MATHEMATICS

Introduction

'Target Grouping' was introduced for mathematics, in Rosemary School, in November 1995. It was introduced for the 5 classes that make up years 5 and 6. Years 3 and 4 continued to be taught, for all subjects, in mixed ability classes. However at the beginning of the academic year under consideration 1997/98, target-grouping for mathematics was extended to cover all four junior years.

One reason given for the introduction was that "*other schools have found that it works well and raises pupils' levels of achievement*" [unpublished memo to staff, Sept 1995]. A number of other benefits of the scheme were cited for both pupils and teachers e.g. "*Less able children are not constantly overshadowed. Experience in schools that use setting regularly is that it boosts their self-esteem and experience of success.*" "*Exposition is easier to focus on an appropriate level of ability.*"[ibid]

As has previously been noted in chapter 7, the research is based on the hypotheses that target-grouping for mathematics raises pupils' levels of achievement in mathematics, and that those involved in target-grouping perceive it to be a positive experience. The second statement may be sub-divided into the following hypotheses:

a. Target-grouping enables teachers to focus on the appropriate level of ability for that group;

b. Target-grouping is easier for teachers to manage than mixed ability classes;

c. Target-grouping boosts children's self-esteem and experience of success;

d. Less able children are not constantly over-shadowed;

e. Target grouping works well.

Statements a and b primarily concern the teachers and were addressed in chapter 11.

This chapter aims to consider the affect of target grouping on:

1. The pupils' perception of mathematics - do the pupils perceive mathematics to be a positive experience?

2. The pupils' self-esteem, and the perceptions of the lower ability children that they are not over-shadowed by more able pupils;

3. The pupils' motivation to raise their level of achievement within mathematics.

As outlined in chapter 8 empirical data has been collected, through questionnaires and interviews. In this chapter the data will be analysed with particular reference to pupils' perceptions of the teaching and learning of mathematics, pupils' self-esteem and pupil motivation. Much of the data collected refers to the top year 6 mathematics group; as this was the group that I taught; was the group that I was most interested in; and was, as there was daily contact, the easiest to collect, but responses from all the pupils in the school have also been collated.

1. The Pupils' Perception Of Mathematics - Do They Perceive Mathematics To Be A Positive Experience?

Introduction

This section aims to ascertain whether pupils perceive mathematics, and being taught mathematics in groups, as a positive experience. The results are based on a simple open questionnaire where the pupils were asked to respond in writing to the question: 'How do you feel about maths?'

TABLE 12.1

Percentage Results, For Each Mathematics Group, Of Whole School Questionnaire On Pupils' Views On Maths At The Beginning And End Of The Academic Year 1997/98.

HOW DO YOU FEEL ABOUT MATHS?										
Group*	3.1	3.2	3/4	4.1	4.2	5.1	5.2	5/6	6.1	6.2
N=	30	30	26	34	30	32	30	25	34	29
Like maths (%)										
Begin	88	70	74	91	89	94	80	67	77	83
End	87	89	90	94	81	90	50	54	76	81
Dislike maths (%)										
Begin	12	26	26	9	4	3	13	13	3	3
End	-	-	5	-	8	-	4	15	3	3
O.K. about maths (%)										
Begin	-	4	-	-	-	3	-	13	13	7
End	16	7	5	6	12	10	43	31	21	16
Unsure about maths (%)										
Begin	-	-	-	-	7	-	7	7	7	7
End	-	4	-	-	-	4	4	-	-	-

* maths groups by years and ability e.g.
3.1 = year 3 group 1 (good mathematical ability group)
3.2 = year 3 group 2 (average mathematical ability group)
3/4 = year3/4 group 3 (mixed years 3 and 4, low mathematical ability group)

The data indicates that the younger pupils, in particular, have gained in confidence and a liking for maths. However, the most striking difference between the two sets of data - one recorded at the beginning of the academic year and the other at the end - was the increased number of children who recorded that maths is OK. This may be that at the end of the year they felt more confident to record a less than enthusaistic response, in fact their second response may reflect a truer picture, as they may not only have gained in confidence and therefore be more reflective. They may also remember having seen the questionnaire before and thus felt less intimidated by its questions. On the other hand at the end of the school year they may feel tired and looking forward to a break where maths lessons are not a daily concern. This may be especially true of the older pupils who will be leaving the school and are looking towards pastures new.

TABLE 12.2

Percentage Means On Pupils' Views On Maths At The Beginning And End Of The Academic Year 1997/98, Together With An Indication Of Significance (t-test Of Significance)

HOW DO YOU FEEL ABOUT MATHS?

	Beginning Mean	End Mean	*t-test score	Significance
Like	81	79	0.37	Not significant
Dislike	11	4	2.34	Significant at 0.05 level
O.K.	4	17	2.86	Significant at 0.05 level
Unsure	4	1	0.8	Not significant

N=300

* t-test of significance used to estimate the standard error of the difference between the means of two small population

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Although the mean for liking maths is lower at the end of the year (79%, compared with 81% at the beginning) this small change is not significant. The overall impression is that the pupils enjoy mathematics, but it is not the introduction of target grouping that has brought this about.

The older pupils in the low ability group have reinforced the notion that those children who find maths difficult will not enjoy learning about maths. At the beginning of the year they deviated by 2% above the mean of 11% who disliked mathematics, but by the end of the year they deviated by 11% above the new mean of 4% who disliked mathematics. However the general trend has been that after a year of target grouping for mathematics fewer pupils disliked mathematics [significant at the 0.05 level]. Similarly by the end of the year more pupils considered mathematics to be O.K than at the beginning of the year [significant at the 0.05 level].

An attempt to explain why the pupils, on average 80%, generally perceive mathematics as a positive experience may be made from an analysis of responses from the average abilitygroup 6.2. This group was chosen as it exemplified the general trend and highlighted the following:

a. At the beginning of the year 83% liked maths. The main reasons that were cited were;"*I like it when it is hard*" and "*I like to play with numbers*";

b. Those who disliked maths found it boring or considered that they were not good at it. This would reinforce the notion that those who find maths difficult will not enjoy it, thus creating a vicious circle of failure. This is borne out by the statistics, for those groups deviating below the mean at the beginning of the year of 81% for liking maths, and for those with a fairly large deviation, are the two low ability groups. However another group showing a relative dislike for maths is the average ability group 3.2, but as this was at the beginning of an academic year, this may be: either a reflection on the teaching and experiences within the infant school and new junior school; it may be that the teacher did not explain the questionnaire fully enough; it may be that the children were insecure in a new environment; or it may be that the children in that group really do not like maths as much as the other second-level groups.

Further analysis reveals that the older pupils are less likely to dislike maths, reflecting a generally positive experience in their mathematical experiences within the school, but neither are they as likely to show an overwhelming liking for the subject. It seems more generally, with the older pupils, to be a subject that they tolerate. Pupils in the middle of their junior schooling seem to obtain greater enjoyment from maths, but this may be a

reflection on the teaching as well as the maturity of the pupils.

TABLE 12.3

Actual Numbers And Percentage Results, For Each Mathematics Group, Of Whole School Questionnaire On Pupils' Views On Being Grouped For Mathematics, At The Beginning Of The Academic Year 1997/98.

HOW DO YOU FEEL ABOUT BEING IN A MATHS GROUP?

Group	3.1	3.2	3/4	4.1	4.2*	5.1	5.2	5/6	6.1**	6.2
N=	30	30	26	34	30	32	30	25	34	29
Like Maths Groups										
Number	27	21	12	29	19	31	28	20	12	25
%	90	81	80	88	58	100	93	77	60	86
Dislike maths groups										
Number	1	3	3	4	1	0	1	6	0	0
%	3	12	20	12	3	-	3	23	-	-
Feel O.K. about maths groups										
Number	2	0	0	0	1	0	0	0	2	4
%	7	-	-	-	3	-	-	-	10	14
Unsure about maths groups										
Number	0	2	0	0	12	0	0	1	6	0
%	-	7	-	-	36	-		4	20	-

*The class teacher influenced the pupils' responses as she stressed that if the children did not know how they felt, as it was early in the year, that they should put unsure.

** based on written responses, not on questionnaire. Only 20 children mentioned how they felt about being in a maths group in their writing

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As has been noted above the results reflecting the numbers of pupils who like being in a maths group are skewed, but the overall impression still holds that most of the children do like being in a maths group.

I considered that group 5.2 could be used as an example of how the children responded to the question, "how do you feel about being in a maths group?" This group was chosen

for although grouping for mathematics was new to the children within the group, thus linking them to the younger children, their reponses, as they were older maybe in line with the older children. Within this group, except for one child who did not like grouping and one who was unsure, 28 out of 30 did like being in a group for maths. Reasons cited were;

"I like to make new friends."

"You can do more difficult work."

"We get to see our friends who are in different classes."

"I think it is brilliant to be in this teacher's maths group."

"I think it is a good idea and I like working with other teachers."

but the main reason given was that the children were all of a similar ability and were working on the same page at the same time. This seems to me that grouping is able to build children's confidence and self esteem as a degree of competition has been removed and the children within the group feel that they can be seen to achieve - thus building their self esteem.

The teacher agreed with the group as she commented;

"*I feel it is much better having a group of children together; that they are of similar ability.*" This therefore agrees with the hypothesis that 'target grouping enables the teacher to focus on the appropriate ability for that group'.

The children seemed to like the idea of grouping for maths, although the younger children were more nervous about grouping as this was a new experience for them. The older children are more aware of their ability and the ranking of the groups, as they said that they liked being in the 'top' maths group. Three children in the lowest group said that they did not like their maths group and felt that they should be moved up.

Summary and Conclusion

Overall it would appear that the majority of the pupils find 'target-grouping' for mathematics a positive experience. On the other hand, the older pupils are more ambivalent about the experience, and more of the pupils in the lowest ability year 5/6 group stated that they did not enjoy mathematics, and by implication that it was not

positive experience for them. Both pupils and teachers however agreed that generally target grouping enabled the teacher to focus on the appropriate level of ability for that group.

2. The Pupils' Self-esteem And Experience Of Success, And The Perceptions Of The Lower Ability Children As To Whether Or Not They Feel Over-shadowed.

How Do You Feel About Being In A Maths Group? - A Consideration Of Pupils' Self-esteem

Introduction

This section considers the possible effect that grouping by ability for mathematics has had on the self-esteem of pupils within the school and in particular pupils in the top year 6 ability maths group. Also, if one reason cited for introducing target-grouping within Rosemary School was to boost children's self-esteem, what were the children's opinions on grouping for mathematics at the end of the academic year in which target-grouping for mathematics had been introduced?

Within the top year six maths group, 6.1, those who said that they were unsure about being in the top year 6 maths group cited as their reasons;

"*Last year I was in Miss C's maths group and to get moved up was a big shock.*"

What the child had not realised was that due to reorganisation the hierarchy of the groups had changed. However the statement still reflects a lack of faith in the pupil's own ability or self-worth. Similarly another child wrote,

"*I think I get worried sometimes, it could be about nothing, but sometimes I think I'm not good enough. I need to get used to being in this group more.*"

TABLE 12.4

Percentage Results, For Each Mathematics Group, Of Whole School Questionnaire On Pupils' Views On Being In A Maths Group At The Beginning And End Of The Academic Year 1997/98.

HOW DO YOU FEEL ABOUT BEING IN A MATHS GROUP?

Group	3.1	3.2	3/4	4.1	4.2	5.1	5.2	5/6	6.1	6.2
N=	30	30	26	34	30	32	30	25	34	29
Like Maths Groups (%)										
Begin	90	81	80	88	58	100	93	77	60	86
End	97	100	75	94	85	100	83	71	85	77
Dislike Maths Groups (%)										
Begin	3	12	20	12	3	-	3	23	-	-
End	-	-	15	3	-	-	11	15	6	3
O.K in a Maths group (%)										
Begin	7	-	-	-	3	-	-	-	10	14
End	-	-	10	3	7	-	3	7	6	14
Unsure About Maths groups (%)										
Begin	-	7	-	-	36	-	4	-	20	-
End	-	-	-	-	4	-	3	7	3	3
Feel No Different (%)										
End	3	-	-	-	4	-	-	-	-	3

By the end of the year the pupils appeared to be definitely more settled and confident about being taught in ability groups, as the mean was 87% and the mode 100%. An analysis of the positive responses from group 3.2, reflect the opinions of many of the children in the school. 33% of this group reported that they "felt good" being in a maths group. This equates with Boddington and Wetton's [1998] concepts of self-worth and self-confidence, and with Bruner's tenet [1996] that viewing one's own efforts positively is essential if learning is to take place. Some of the older pupils equated this feeling with

ability. They were more conscious of the hierarchy of the groups as they perceived that they did 'harder' work.

TABLE 12.5

Percentage Means On Pupils' Views On Being In A Maths Group At The Beginning And End Of The Academic Year 1997/98, Together With An Indication Of Significance (t-test Of Significance)

HOW DO YOU FEEL ABOUT BEING IN A MATHS GROUP?

	Beginning % Mean	End % Mean	*t-test score	Significance
Like	81	87	1	Not significant
Dislike	8	5	0.69	Not significant
O.K.	3	5	0.7	Not significant
Unsure	7	2	1.2	Not significant

N=300

The t-test of significance indicates that there is no significant difference between the scores on pupils' perceptions about being in a maths group between the beginning and the end of the year in question. This suggests that target grouping for mathematics has had no impact on how pupils feel about how they are grouped and by implication on their self-esteem. What it may suggest is that pupils have a fairly clear view of their own and others ability in mathematics, and that is what affects their self-esteem, no matter how they are grouped. However this is only my own interpretation of the data and further research would be needed to verify or refute it.

Pupils do have a perception of their own and others ability and the level of work they are given. The perceived level of work was noted by 33% of group 3.2;

"*If there were different people it would be hard for them.*"

This could support the statement that target-grouping means that the lower-ability pupils are not over-shadowed. However, this was the perception of the situation by a pupil not

in a low-ability set. The question is therefore' how do the pupils of the lowest ability mathematics set perceive themselves?'

Less Able Children And Self-esteem

The school supports the concept of homogeneous grouping for mathematics as it believes that the "*less able children are not constantly overshadowed. Experience in schools that use setting regularly is that it boosts their self - esteem and experience of success*" [School memo, 1995]. This belief presumes that the lower ability children will have more of an opportunity to shine at their own level as they are not overshadowed by the more mathematically able children around them. They are therefore able to develop self-esteem and experience success on a regular basis. Does the above survey have any grounds to support this belief?

An initial analysis reveals that at the end of the academic year the two low-ability groups 3/4 and 5/6 have fewer childen recording that they like being in a maths group than the other groups, and that at both the beginning and at the end of the year the low-ability groups have more children stating that they dislike being in a maths group. However closer analysis shows that although fewer children stated that they liked being in a maths group at the end of the year, the number of children saying that they disliked maths groups also fell. So there was a shift of feeling from enjoying to accepting, and from not enjoying to accepting. Although there were twice as many boys than girls in these two groups, the boys seemed to like being in the group. "*I like being in this group. You learn more.*"

Closer analysis of the pupils within the low-ability groups reveals that although most of the children in the low-ability groups enjoy being in that group - they find it fun, and they like being with their friends - those who do not are quite expressive in their feelings, especially the older children, and that it can be demoralising and a blow to their self-esteem, being in these groups.

"*I don't like being in a maths group because everyone calls you names like chicken and other nasties and they pick on you if you get it wrong.*" [Year 5, girl]

"*I would like to move up but I can't because I am thick.*" [Year 5, girl]

"*Maths groups is good because you separate clever people from not clever people.*" [Year 5 girl]

"*I think that maths groups are good because you work with your own ability. But I think I have been put in the wrong group.*" [Year 5, boy. Two Year 4 pupils also said the same.]

According to Rogers [1991]"*Self-appraisal is powerfully related to how we feel. A child (and many adults) find it hard to build on failure. If a child feels failure strongly (via the messages from others) he may well begin to believe he is a failure.*"[p.166]. So as Alexander, R. Rose, J. And Woodhead, C. [1992] noted,

"*Research into the effect of streaming on pupils undertaken in the 1960s showed that streaming could benefit the achievement of some pupils, notably the most able, but that there could be a significant and negative impact on the self-image of those pupils, who, placed in lower streams, came to see themselves as failures. But the fundamental problem with streaming is that it is a crude device which cannot do justice to the different abilities a pupil may show in different subjects and contexts. For this reason, grouping according to ability is a more flexible device in that it allows the teacher to place a pupil in a particular ability group for a particular purpose.*" [p.25, pp.85]

According to Alexander et al, there is a difference between streaming and grouping according to ability. The main difference being that streaming is a permanent state of affairs and covers all subjects, whereas grouping by ability is only may only be for one or two subjects and therefore pupils will be in different groups for different subjects. In theory this sounds fine, but the reality of the situation, within my experience, often means that pupils of low educational ability are in the 'lowest' group however grouping is arranged. The advent of the literacy and numeracy hours have exacerbated the situation, even within mixed ability classes, for after whole class instruction, the teacher is expected to give differentiated work to the different ability groups within the class. As has been noted above, pupils are quick to appreciate the nuances of discrimination of various grouping methods.

Summary and Conclusion

Overall the pupils like being in ability groups for mathematics. They perceive both

learning and social benefits from such groupings. Although the pupils are aware of the hierarchy of the groups, this seems to work in a positive way as the childen feel that they are in the right group and that they will perform better at their own level, thus helping to develop their self-esteem. However, as a school, we must not be complacent for there are still some children, even if they are the minority, whose self-image is adversely affected by being in a low-ability group. On the other hand Allan [1991] found that homogeneous groupings allowed lower ability children more of an opportunity to shine at their own level as they are not overshadowed by the brighter children around them, he considered that children of lower ability benefitted from heterogeneous grouping. Whilst Bossert et al [1984] found that homogeneous groupings polarised attitudes and became self-fulfilling. The evidence above tends to support Bossert's notion that homogeneous groupings do become self-fullfilling.

3. That target-grouping for mathematics raises pupils' levels of achievement in mathematics.

What will you try to do better in maths this year? A consideration of pupils' motivation to raise their level of achievement within mathematics.

Introduction

Children were asked what they would like to improve upon in mathematics lessons over the forthcoming year. The question was asked both at the beginning of the academic year under consideration, and at the end. As the pupils responses were diverse, the responses for improvements in mathematical concepts have been aggregated.

As there were clearer responses as to the skilled based improvements that the pupils would like to make, these are reported in full.

What will you try to do better in maths this term?

There was a variety of responses to this question, but they can be categorised into improving basic operation skills - in particular divison and multiplication, to developing learning skills such as listening more carefully and working harder. The responses were a reflection of the development of the maths curriculum over the four years of the junior school, where the younger pupils were concerned with number and subtraction, compared with the older pupils who were concerned with improving their skills in

multiplication and division.

TABLE 12.6

Numerical Results, Comparing Lower [years 3/4] And Upper School [years 5/6], Of Whole School Questionnaire On Pupils' Views On Areas Of The Mathematics Curriculum, At The Beginning And End Of The Academic Year 1997/98.

WHAT WILL YOU TRY TO DO BETTER NEXT YEAR?

Mathematical Concept	lower school [years3/4] number of responses	upper school [years 5/6] number of responses
number		
begin of year	20	_
end of year	3	_
subtraction		
begin	9	2
end	5	1
multiplication		
begin	18	30
end	18	28
division/long division		
begin	_	9
end	17	26/[6 long]
fractions		
begin	_	8
end	1	9
'/.		
begin	_	25
end	_	_
mental		
begin	_	4
end	1	10

Conceptual responses

Table 12.6 reveals that within Rosemary School certain patterns emerge. Difficulties with mathematical concepts reflected by the statement that the children want to do better in them, generally reflect the stage of the pupil's mathematical conceptual development. For example the younger pupils wish to improve their knowledge and understanding of

number and subtraction, whilst the older children wish to improve in fractions and percentages. Multiplication is an area that pupils throughout the school wish to improve. 16% of the pupils indicated that this was an area in which they would try to do better. However this bare statistic does not reflect the conceptual development of multiplication throughout Key Stage 2. For instance pupils in year 3 would be concerned with times tables up to multiples of 5 or 6, whereas the pupils in year 6 would be concerned with all the times tables plus squares and square roots. The same applies to the concept of division, with the pupils in the top older maths ability groups wishing to improve in long division compared to simple 'sharing' by the younger children.

In general the number of pupils concerned about a mathematical concept decreased over the year. It would be pleasant to think that this is the result of excellent teaching. The more likely scenario though is that the children concern themselves with the topic in hand and sometimes forget former concerns. This conclusion is borne out by the concern of the older children about improving in mental maths. The mental maths that the pupils are referring to is that required for the SAT tests taken in the final term. The style of the questions and the limited time to answer questions caused some children concern.

Other areas of the mathematics curriculum cited as concepts that the pupils "will try to do better in" were time, graphs, shape and data handling. Algebra was mentioned by five year 6 pupils,

"*I will work harder on division, multiplication, addition and subtraction. The four main targets to help me work at others (equations).*"

"*Maths is a good subject, as it prepares you for future use. I'm particularly good at maths and approve of learning it. I'm good at algebra, as last year Mrs Rose taught me how to do it.*"

It would seem therefore that these children disagree with Whitehead [1929] who considered that many aspects of maths, especially "higher maths" such as algebra and quadratic equations, offer pupils nothing as they do not lead to anything useful.

Skills responses

It has already been suggested that one perspective of achievement motivation is that it is

a drive. That it is, an internal state, need, or condition that impels individuals toward action. The motives-as-drive approach views motivation as an enabling factor - a means to an end - resulting in improving status, better performance, or an increased sense of security. How do the pupils responses fit this perspective?

TABLE 12.7

Numerical Results, Comparing Responses Of Mathematics Groups, Of Whole School Questionnaire On Pupils' Views On Learning Skills That They Wish To Improve, At The Beginning And End Of The Academic Year 1997/98.

WHAT WILL YOU TRY TO DO BETTER IN MATHS THIS TERM?

Group	3.1	3.2	3/4	4.1	4.2	5.1	5.2	5/6	6.1	6.2
be neater										
begin	6	-	-	9	-	7	-	-	2	-
end	6	4	-	12	2	9	6	-	4	2
be quicker										
begin	-	-	-	-	-	-	-	-	1	6
end	5	4	1	-	7	5	1	-	-	2
work harder										
begin	-	-	-	-	5	-	-	-	6	-
end	4	4	3	-	1	3	4	3	3	6
obtain correct answers										
begin	-	-	-	-	-	-	-	-	-	-
end	2	1	2	1	4	1	-	-	1	1
improve everything										
begin	-	4	7	-	-	-	-	2	2	-
end	3	-	3	-	3	-	2	-	2	3

As has been noted the responses to the question on what to improve generally reflected the topic that was being covered at the time. The pupils not only mentioned increasing their knowledge of mathematical concepts and skills but they also mentioned other educational objectives such as neatness and speed. However it is unclear whether these objectives are the pupils or a reflection of the 'pet' concern of their teacher. This is particularly noticeable in class 4.1 where the teacher is known, as well as her skill as a maths teacher, for the emphasis she puts on neatness and presentation.The meaning of anything is relative to the perspective in terms in which it is construed. Any particular

individual's idiosyncratic interpretation of the world are constantly subject to judgement against what are taken to be the canonical beliefs of the culture at large. These beliefs are reflections of time and place but are constrained by what we have previously experienced and by a native predisposition to think and interpret the world in a particular way [Bruner,1996]. According to a school's inspector's report on the teaching of English within the school in 1997, the school lays too much emphasis on neatness at the expense of pace of work and lessons. So the ethos of the school encourages the pursuit of neatness. On the other hand within the two low-ability groups learning, not neatness, is the issue. This is most probably because the teachers of these two groups deem the learning of mathematical concepts to be more important than the presentation of work. This coheres with the notion that although children are born with different mental capacities, learning may be supported by a more or less enabling setting [Klaus & Gray, 1968; Zigler & Valentine, 1979; Schweinhart & Weikart, 1980]. In other words the quality of teaching and instruction can make a difference to the degree of an individual's mental development.

Working more quickly and 'getting the right answer' seem to be of greater concern to the younger pupils than the older pupils. This, together with the above comment about the top ability groups, reflects what Dweck and Leggett [1988] identified as performance goals and learning goals. With performance goals, an individual aims to look smart, whereas with learning goals the individual aims at becoming smarter. The more general comment recorded by 10% of the pupils that they will try to work harder supports Dweck [1991] suggestion that with a learning goal orientation there is a belief that effort pays off, and an associated conception of ability as not being static and fixed, but as being susceptible to development through the application of effort.

TABLE 12.8

Percentage Means On Pupils' Views On Skills To Improve In Mathematics At The Beginning And End Of The Academic Year 1997/98, Together With An Indication Of Significance (t-test Of Significance)

WHAT WILL YOU TRY TO DO BETTER NEXT YEAR?

	Beginning % Mean	End % Mean	*t-test score	Significance
Be neater	2	5	1.27	Not significant
Be quicker	1	3	1.9	Not significant
Work harder	1	3	2.2	Significant at 0.05 level
Correct answer	0	1	3.5	Significant at 0.01 level
Improve	2	2	0.87	Not significant

N=300

Despite the small number of responses it would seem that the introduction of target grouping for mathematics has motivated some children to work harder. One reason for working harder would be to get more answers correct. This supports the claim that target grouping boosts children's self-esteem, and that pupils are motivated to raise their level of achievement in mathematics.

Summary and Conclusion

It would seem therefore that for Rosemary School the second perspective of motivation which considers motivation in terms of goals or incentives that draw, not drive, individuals toward action, fits the pupils' aspirations more closely. Motive-as-goal theorists focus on non-competitive, intrinsic reasons for learning, and see goals, that by their very nature, beguile and entice individuals into action rather than push or drive them. Believing oneself to be in personal control of events is the key to all noteworthy achievement [Findley and Cooper, 1983]. Even if these children are reflecting the culture of the school, and may wish to impress their teacher by their response, it would seem that they have internalised them and made them their own.

The Mathematically Able Child and Motivation

My perception of the reality around me has led me to believe that those who have ability perform tasks well and with ease, whilst the rest of us struggle. This has led to the situation where I have found it difficult to understand the actions of pupils who obviously, through their test results and/or through discussion, have ability and yet do not perform well in the classroom situation. They attribute helplessness to themselves despite evidence to the contrary.

If pupils believe that making effort makes a difference to the outcome then they will make the effort. If, on the other hand, they feel that whatever they do will make no difference to the outcome then they will make no or very little effort [Weiner, 1985; Rogers, 1987]. Other children believe that failure attributed to a lack of effort is preferable to being considered lacking in ability and thus being perceived as foolish. On the other hand pupils who believe that they lack ability and that effort is irrelevant have learned 'helplessness'. They consider themselves worthless and unable to do anything correctly, and therefore should not bother to try at all [Seligmen, 1975].

CB, a year 6 girl, who had shown through tests and her classwork that she was mathematically able and was in the top maths set, fits Seligman's description of 'helplessness' perfectly. At the beginning of the academic year she wrote,

"*I don't like maths, I have never liked maths. I'm terrible at addition and algebra, and a dead donkey does better multiplication than me.*"

It seems that the 'anger' within herself develops the more she thinks about her perceived lack of ability. Her initial statements are acceptable and understandable, but her qualifying statements are worrying as they reveal her depth of self-worthlessness.

During the year I noted that within the top ability maths group there were those pupils who had high self-esteem in their mathematical ability who will accept and meet the challenge of more demanding work, whilst other children, possibly just as mathematically able, but lacking in self-esteem, need the reassurance of work set within their capabilities. DB and CB illustrated these two extremes. DB would tackle whatever he was given with enthusiasm and a strong belief in his own ability to succeed. CB, on

the other hand, was just as mathematically able, but had learned 'helplessness' and had very low-esteem of her abilities. If she considered that the maths involved in a question was beyond her abilities she would steadfastly refuse to even attempt the question for fear of getting it wrong and looking foolish.

The children of the top ability group were asked to comment on an investigation into number pattern. CB wrote;

"*I think this investigation was O.K. I didn't really enjoy the investigation because I found it hard to find any patterns, then again I'm the most stupid person in this class so it doesn't surprise me. In my opinion the investigation wasn't that bad.*"

At the end of the year she wrote;

"*I don't like maths. I find it boring and pedestrian. I stink at mental maths, I suck at investigating, and stress every time I find something hard or do something wrong.*"

I found her low self-esteem and lack of motivation difficult to comprehend as she was, according to mathematic test results, a girl with above average mathematical ability. This has led me to question how often do we fail our pupils due to our own lack of knowledge and expertise? On the other hand though, there are times when a problem is too complex for a teacher to resolve. CB's lack of self-esteem is deep seated and as teachers we cannot be responsible for our pupils' past history nor take on the sole responsibility for the complex support a child may need. [Boddington and Wetton, 1998] But neither does it mean that it can be ignored.

In an attempt to address the problem of learned helplessness Van Werkhoven [1990] has developed an 'Attunement Strategy', an approach which aims to reawaken the processes of prediction and self-review in poorly motivated pupils. The child is encouraged by the teacher to consider how hard the task will be, how much effort it will require and to predict how much the child thinks she can achieve within a certain time. At the end of the time the teacher encourages the child to reflect on the outcome and to identify success. The intention is to stimulate effort and foster a sense of competence. Unfortunately for CB I was not aware of this strategy at the time.

Two Year 5 Boys

At the positive end of the spectrum of motivational learning styles were two year 5 boys who joined the top year 6 mathematics set. Their teacher had commented that they were very able and completed all that she gave them to do, including extension work, very quickly. Although they had been given extension work to do, it was considered appropriate, as they had the ability, to transfer them to the top Year 6 group. The boys transferrred at the end of the first half term and settled in quickly.

These two boys epitomised believing in one's self and one's ability, and the effectiveness of learning goals [Dweck & Leggett, 1988]. After half a term I asked the two year 5 boys how they were feeling about the move:

RG -"*In the other class we were not told about average and algebra. Now I know. I thought algebra was counting letters [a = 1, b = 2 etc], but now its O.K. Mental maths is hard.* "

ND - " *I've started to enjoy maths now because it is more of a challenge. Before we had extra maths out of other books, but now we are not hanging around doing extra sheets. Now there is not enough time to finish.*"

The question of giving extra work seems a difficult one. Extension work must be perceived by the learner as a true extension - challenging and relevant. Similarly the level of work must fit the ability of the puils within the group, so that they can see that they are being asked to raise their standards, but that the standard that they are being asked to achieve is achievable.

By Easter I had decided that the two year 5 boys needed to return for a while to their own year group. There were two main reasons for the decision:

1. I felt that the two boys were not working as hard as they could. Although I had not discussed it with them I felt that their level of work had diminished as their efforts were no longer reinforced by being 'top of the class'. At one stage I was concerned that ND was not showing his working out. However rather than a mathematical issue this is a legacy from how I was taught myself, although I rationalise this with the knowledge that in some test situations credit is given for showing how a problem is worked, so this aspect of ND's work concerned me. However Casey and Koshy [1995] found that able

children " *have an unusual resistance to put pen to paper...They often do not see the point of recording their methodology.*" [p.8]

In reality who can blame them if they can hold the information and resolve the problem in their head.

2. I wished to spend time practicing SATs papers with the class. Although the two boys would cope well with the papers - I even believe that they could have completed them successfully - I did not feel that it was an efficient use of their time. They returned to their former group with the proviso that they could return to the top year 6 group after the SAT exams.

Later I asked them how they felt about the experience:

RG - " *I was disappointed [that we went back] as before I found it quite easy.* "

ND - "*I wondered what it would still be like.*"

RG - "*It took time to get used to the class. Then it got easy again. You have to change seats in the other class not sit in the same place all the time. The teacher explains the work in a different way to Mrs Rose.*"

ND - "*The work was harder when we got back. We were not used to the standard. It was not easy, but we got used to it.*"

[The teacher commented later that she had changed her pace of teaching as otherwise she would not have completed the published scheme by the end of the year}

ND - "*I'm looking forward to coming back, because the other class do not do mental maths. I want to improve.*"

RG - "*I like mental maths. You use your brain because you do it in your head.*"

Moving children from one group to another is unsettling for them, but if grouping is to meet pupils' needs then there must be movement between groups.

The two boys' responses are synomynous with the doubts created by change. The change from a year 5 group to a year 6 group was a boost to the boys' egos, and once they found that they were competent enough to cope with the work proved to be a satisfying experience. To move down a group however, even though it was a temporary arrangement and for a reason, was a blow to the boys' self-esteem.

"*Change can be very deep, striking at the core of learned skills and beliefs and conceptions of education, and creating doubts about purposes, sense of competence, and self-concept*" [Fullan, 1991, p.45]

However the two boys comments do support the notion that target-grouping for mathematics does raise pupils' levels of achievement, as they found the work a challenge and yet achievable.

Steps had therefore been taken to address the needs of these two mathematically capable boys by placing them with older pupils. The question was how to address the needs of the oldest mathematically able pupils.

Extra Maths

As learning takes place mainly when the individual is challenged and begins to fail [Casey and Koshy, 1995] I decided to hold maths lessons during the lunch hour when the work would be aimed at Level 6, which is not normally within the primary curriculum. This time was called 'Extra Maths'.

"*The children seemed to cope with step-by-step but found actual level 6 questions difficult*" [Journal,11.2.98]. In other words they found dealing with a number of new concepts at once rather demanding.

Eventually the number of children attending halved. It also became apparent that none of the pupils had the mathematical maturity to deal with level 6 work, so the session became a revision session open to anyone in year 6 who felt that they would benefit from extra tuition. The children who stayed enjoyed the extra challenge and were generally those who enjoyed maths anyway.

LP - "*I have been to them all. I liked the sessions and I like maths. It was difficult when we did the level 6 paper because it was a lot harder than I've ever done.*"

It would seem therefore that the children enjoyed the challenge of harder work and the fact that within a small group the teacher could give them the individual attention that

they needed. On the other hand there may be an element of positive bias in the responses, as I, their teacher, was asking the questions. From a personal point of view I enjoyed working with a group of children who wanted to learn and with whom I could have a more relaxed relationship with and share a common enjoyment of power and wonder of numbers.

Pupils' Perceptions Of Mathematics, Their Self-esteem, And Their Motivation After A Year Of Target Grouping

The research has indicated that the children of Rosemary School are motivated to work hard in mathematics in order to improve their understanding of a mathematical concept or to improve a skill. The similarity of responses would indicate that the children have internalised the ethos and culture of the school as promoted by the teaching staff. This fits the belief that education should reinforce the cultural norms of society and Bruner's first tenet of education, that one of its purposes is to make 'meaning'.

Whatever age of the pupil they believed that making an effort to work harder would result in increased understanding. Thus Attribution theory [Weiner, 1985 Rogers, 1987] accounts for motivation in educational settings in terms of the learner's beliefs about the extent to which they have control or influence over learning outcomes. If they believe that effort makes a difference to the outcome then they will expend it, However although young children believe that making an effort can make a difference to outcome, older children feel that it makes no difference [Nolen and Nicholls, 1993] This is sad for research has shown that by year 8 some pupils whose motivation is fragile have turned away from learning [Ruddock et al, 1997]. The brighter pupils are motivated when they perceive that they are learning something new and that there is a purpose to their learning.

Target grouping therefore does seem to have motivated many of the pupils within Rosemary School to endeavour actively to improve their levels of achievement in mathematical skills and concepts. However, although there is a perception that the pupils have raised their levels of achievement has this been supported by summative externally set assessment?

CHAPTER 13

DOES THE EMPIRICAL EVIDENCE,WITH SPECIAL REFERENCE TO THE 1997-8 COHORT OF YEAR 6 PUPILS, SUPPORT THE CLAIM THAT THE CHANGE TO TARGET-SETTING FOR MATHEMATICS RAISES THE PUPILS LEVEL OF ACHIEVEMENT IN MATHEMATICS, WITHIN THE JUNIOR SCHOOL UNDER CONSIDERATION?

Introduction

This chapter aims to address the claim made at the beginning of chapter 7, that when the pupils in the school under consideration were to be homogeneously grouped by ability for mathematic, it was claimed that 'other schools have found that it works well and it raises pupils' levels of achievement'. Within the experience of the teachers within the school we did indeed find that 'it works well' as discussed in chapter 10, but whether homogeneous grouping for mathematics raises pupils' levels of achievement is another question.

This chapter will first discuss how achievement in mathematics may be measured. Then it will analyse empirical data collected from one junior school, in order to consider the question as to whether, within Rosemary School, grouping according to ability in mathematics does raise pupils' levels of achievement in mathematics. Particular emphasis will be given to the top year 6 mathematics group for two reasons. Firstly, as this was the group that I taught I had a particular interest in the findings. Secondly, and similarly, these results were the easiest to obtain. Personally I do not consider that in any way does this emphasis invalidate the findings, as this group represents the ultimate that this cohort of pupils could and did achieve.

The empirical data used included NFER-NELSON Mathematics 7-11 Test Series for Mathematics, School Standard Assessment Test results [SATs], the school's Performance and Assessment report [PANDA] and school data collected for internal assessment purposes and for the Nottinghamshire Tracking Project. The majority of the data was collected during the academic year 1997-98, but data from other years was also

referred to. The Nottinghamshire County Council and the school gave permission for the data to be used for this research project.

What Is Achievement?

Achievement may be defined as "*a success, a distinction*" [The Nelson Contemporary English Dictionary, 1977, p.5], or as "*something which someone has succeeded in doing, especially after a lot of effort*" [Collins Cobuild New Students Dictionary, 1997, p.6]. Usually I prefer to work with the second definition as it reflects the majority of the attitudes of the pupils within my mathematics group, However as was discussed in Chapter 12 the degree of effort exerted by a pupil is a reflection of their past experiences, their sense of motivation and their perception of their self-esteem. Overall, and based on personal experience, I believe that achievement may be defined as a measure of progress where a pupil has mastered a new skill or concept which they did not know or have mastery of before.

The very notion of grouping by ability admits that pupils progress and learn at different rates. This is reinforced by the core mathematics scheme used by the school which states,

"*Section A is intended for all children and care has been taken to make it easily accessible...This structure ensures that all children can follow a basic course of mathematics, covering all the concepts at whatever stage is appropriate to them.....as all sections cover the same topics but at increasing breadth*" [Edwards,1991, p.1-3]. But how can this progress be measured?

There are a number of assessment tools and strategies open to a teacher in the quest to ascertain a pupil's progress and level of understanding of new concepts and skills. The teacher may: observe the pupil; listen and talk to the pupil; participate with pupils in group activities; consider written outcomes; or set tests, either written by the teacher or commercially produced. From this battery of data the teacher may form an impression of the pupil's progress. However the type of assessment used will depend on the purpose of the assessment.

Through formative assessment, that is the day-to-day continuous assessment a teacher makes as outlined above, the teacher forms a picture of where the child is now in their level of learning and thus informing the teacher of the next step the child needs to address to progress. Formative assessment therefore informs teachers' planning. Although formative assessment recognises where the child is now it does not give a long-term view of a child's development.

Summative assessment, which tends to be made at the end of school years and terms, is an assessment of each child's progress and attainment to date. It is a summary of a child's attainment as it recognises what a child has achieved. Although teachers may make summative assessments based on the child's classwork, in Rosemary School these teacher-summative assessments are supported by norm-referenced and criteria-referenced testing.

Norm-referenced assessment relates individual performances against the average for their age group and gives them a rank within that group. Norms are developed through pilot testing of a large number of children. Norm-referenced testing is the basis for NFER 7-11 Test Series, used in my school. For the 1994 NFER test 2,710 pupils were used in piloting the test and standardising the scores.

Criterion-referenced assessment is curriculum led. Assesssment is based on the objectives of the learning programme. These objectives are the criteria for determining the pupils' mastery of the skills and concepts of that programme. Criteria referenced assessment can be norm related. The Standard Assessment Tests [SATs] are set against the criteria of the demands of the National Curriculum and developed through norm-referencing for set age groups and abilities.

If 'target-grouping' or setting for mathematics is considered to 'raise pupil's levels of achievement' how can these levels of achievement be measured using the data available?

How Can Achievement In Mathematics Be Measured?

The Nottinghamshire Framework for Achievement

As outlined in Chapter 5 developments within schools are often externally driven. Assessment, the tracking of pupils' development, and the setting of targets for improved school performance are not only a school's concern but are driven by government directives. In July 1997, the Department for Education and Employment [DfEE] set out an agenda for school improvement, as one of the roles of the DfEE is to ensure that LEAs and schools set appropriate targets and develop plans capable of delivering the national improvement in standards that the Government have set out. Schools and LEAs are expected to conform to these agendas, and are inspected on a rolling programme to monitor their progress in addressing standards.

Nottinghamshire County Council responded to this drive by developing the Nottinghamshire Framework for Achievement, which ultimately plans to track pupils' progress from age 3 years to age 16.

"The goal of the Framework is to unify the strands of assessment, recording and monitoring of pupil progress into a single system which is capable of providing schools with the important information needed to enable the recording, reporting and analysis of pupil data over time." [Everett, Farnsworth & Michell, 1997, p.26]

The data will not therefore be fully relevant until a full cohort has passed through the system.

The Nottinghamshire Framework for Achievement has been developed on the premise that the root of school effectiveness lies in the progress and attainment of pupils in literacy and numeracy. Although the scheme accepts that no single type of assessment can fully describe pupils' progress it is considered that for pupils, from Year 3 onwards, norm-referenced assessments provide the clearest picture.

"In Key Stage 2 and 3 however, standardised measures are an important source of objective, empirical information about relative achievement across an age group." [Everett et al, 1997, p.26]

Norm-referenced standardised assessments assess core skills and understanding. The tests are not changed each year, and are considered to be precise, reliable and can

detect small shifts in performance over time. However as the content is known then there is the possibility that pupils can be 'coached' to perform well on the tests. [In the school where I teach, apart from the fact that we consider that it is unnecessary to coach for these tests, as we feel that the tests provide an objective assessment of the pupils progress, there is insufficient time to coach for these tests, due to the demands of the National Curriculum.] The Nottinghamshire Framework for Achievement considered the use of criterion referenced assessment in the form of SATs but disregarded them for although closest to the taught curriculum, their content and format have changed a number of times and therefore the data that they would provide would not be comparable over time. The Framework uses continuous teacher assessment for the assessment of younger children as formal testing seemed inappropriate, but the disadvantage of teacher assessment is its perceived subjectivity and the difficulty of connecting judgements over time [Fitz-Gibbon, 1995]. The Nottinghamshire Framework for Achievement summarises its decision to collect empirical data through NFER norm-referenced assessment as follows;

"*Standardised measures are an important source of objective, empirical information about relative achievement across an age group. Standardised measures of attainment can be repeated year-on-year with each successive cohort and can therefore yield measures of progress over time that may be especially valuable. Annual measurement of this sort overcomes three of the principal design weaknesses of national curriculum assessment, its non-standard nature, its infrequency [every 2 to 4 years], and its very broad level descriptions.*" [Everett, Farnsworth &Michell, 1997, p. 26]

However this presupposes that all pupils, and by implication all schools, are equally endowed when they enter the system. That this is not the case and that both pupils and schools need to measure progress from different starting points is now beginning to be accepted.This form of analysis of data is called value added.

Value Added

Value added is a measure of the educational progress made by pupils in a school, relative to that made by similar pupils in other similar schools. Data on pupils' gender, age, and home environment e.g. parental occupation, is collated alongside assessment results. However Tymms and Henderson [1995] reported a correllation of only 0.45

between schools' raw results in Year 6 attainment criteria -referenced tests and their results after controlling for pupils' developed ability and gender, and the average developed ability of the intake. On the other hand, Strand [1998], who took a wider view of factors influencing pupils' backgrounds i.e. gender, social disadvantage, primary language, special educational needs, reasoning ability and ethnic origin, against the effectiveness of the school, as measured by SAT results, concluded that:

1. Although 17% of test scores may be attributable to the effect of the school, some schools were more effective with the more able pupils, whilst others were more effective with the less able pupils. Similarly some schools were more effective teaching literacy than numeracy. Where the teaching within the school was considered effective, then overall, pupils attain higher grades than schools where the teaching was considered less effective. On the other hand, Strand found that the composition of the intake to the school was an important factor in the final KS2 scores;
2. Pupils with Special Educational Needs and bilingual pupils who were not fluent English speakers achieved lower SAT scores than other pupils;
3. Girls performed less well at mathematics than boys;
4. The most significant factor was the average age of the year group. The attainment of a pupil of average age was lower in a school where there were more older children in the year group than in a school where there were more younger children. [Strand, 1998, Thomas, 1995]

These findings are supported by the the Nottinghamshire Framework for Achievement [1997] project which found that ;

a. Pupils do not enter the education system similarly prepared and able to benefit from what schools have to offer. [p.57]
b. 19% of the of the variation between pupils is currently accounted for by the four factors - gender, parental occupation, Free School Meals and Home language.[p.50]
c. Most schools did as well as could be predicted, given some knowledge of their intake [p.50]

It has already been noted above that criterion referenced National Curriculum Standard

Assessment Tests are not useful in creating profiles for year-on-year levels of progress. Strand [1998] endorses this claim when he states that, "*Raw scores will therefore have a misleading impression of the effectiveness of many schools.*" [p.132] Despite this the government uses SAT results together with census returns, OFSTED reports and 'value-added' data on the composition of schools to inform schools of their effectiveness. These reports are called PANDA reports [Performance and Assessment Reports]. Schools are expected to analyse their report and develop strategies to address any shortcomings, however none of this bank of data is relevant if schools do not use it to identify their strengths and weaknesses and act upon their findings.

"Even when all this is in place, it will remain true that the best quality data and insight available is still of little use if what it suggests by way of action is never applied." [Everett et al, 1997, p.67]

The Collection Of Empirical Data

Empirical data was collected in an attempt to answer the question as to whether, within the school under consideration, grouping according to ability in mathematics does raise pupils' levels of achievement in mathematics. Particular emphasis was given to the collection and analysis of data relating to the top year 6 mathematics group, as I had a vested personal interest in the findings, and these results were the easiest to obtain.The primary data collected included norm-referenced NFER-NELSON Mathematics 7-11 Test Series for Mathematics, norm and criteria referenced School Standard Assessment Test results [SATs], and school data collected for the Nottinghamshire Tracking Project and for internal assessment purposes. As indicated above norm-referenced data produces a clearer picture of pupils' progression over time than criteria referenced data.

The main function of the NFER Mathematics 10 and 11 tests is to give an assessment of the overall mathematics attainment at a particular point in a pupil's school career. The tests are intended for group administration to rising ten and eleven year olds, most particularly during the second half of the academic year, when the content and skills within the tests would be expected to have been covered.

NFER [1994] claim that standardized scores are more useful measures than raw scores

as they enable comparisons to be made between a school's population and a large, nationally representative sample that took the test prior to publication. Standardised scores are used for three reasons. Firstly standardised tests follow a common format in that the average standardised score comes out to 100, irrespective of the difficulty or otherwise of the test. The spread of standardised scores for educational attainment and ability tests is usually set at +/- 15, called the standard deviation so that the frequency distribution of the standardised scores fits the normal distribution curve where the mean score is 100.

Secondly standardised scores make allowances for the different ages of pupils. It has already been noted that younger pupils within an academic year sometimes do not perform as favourably in tests as older pupils within the year. Standardised scores take this difference into account by comparing a pupil only with others of the same age in years and months. Hutchinson and Sharp [1999] found that summer-born children in their primary years are usually outperformed by older classmates. However while birth date remains a significant factor in performance during the primary school phase, the gap narrows significantly when the pupils begin secondary education. Hutchinson and Sharp also considered that,

"*Age-related difference in the primary years could also be perpetuated by the early age at which UK children start school, setting by ability, and national tests which do not take age into account.*" [TES, 20.8.99. p.6].

Thirdly, scores from more than one test can be meaningfully compared or added together, if the scores have been standardised.

However within this study only short-term data, over one academic year has been used Long-term data as covered by the Nottinghamshire tracking project will not be available until early in the next decade. Therefore the conclusions drawn from the data can only be relevant to that population at that moment in time, so that generalisations cannot reliably be made. More data, collected *over time*, will be needed before the question 'does grouping by mathematical ability raise levels of achievement in mathematics?' can be more clearly answered.

An Analysis Of Collected Data

NFER Standardised Scores For Mathematics

The purpose of this section is to consider whether it is possible to identify a rise in the level of mathematical achievement of one group of pupils over an academic year, through an analysis of NFER mathematics standardised scores. For reasons stated above the data in this section refers mainly to the top year 6 mathematics group. As the pupils within the group are considered to be the most mathematically able within the school then their scores, by implication, should reflect the summit of achievement in mathematics for that cohort of pupils. As the Nottinghamshire Framework for Achievement notes,

"*For all groups, Year 6, the final primary year and the key stage 2 SATs year, is the year of highest attainment.*" [Everett et al, 1997, p.3]

Although the number of pupils within the group varied throughout the year, there was always a minimum of 31 pupils in the group. The group included nearly all pupils with above average standardised scores [S score] in mathematics, but was limited by class size of around 30 pupils.

Since the inception of the Nottinghamshire tracking project, NFER tests in Mathematics and English are taken by all the pupils in the school, annually. The mathematics standardised results are then used by the school to group pupils according to ability for mathematics.

TABLE 13.1

NFER standardised mathematics scores for May 1997 and 1998 [group size 31 pupils]

YEAR	SCORE RANGE of top Yr 6 group	MEDIAN of group
1997	134 -102	111
1998	127 - 97	113

The table shows the scores the pupils gained in 1997 in the term prior to joining the top year 6 mathematics group, together with the same group's results in May 1998

1997

As would be expected, the median for the top group of 111 was higher than the average standardised score of 100. However the range of the standardised scores within the group in 1997 was from 102 to 134, which is 32 standardised points. This reflected that although this group contained the most mathematically able pupils, according to the NFER norm-referenced test, there was within the group a wide range of ability. In order to fulfill the quota for the class, the cut-off score for the group was quite arbitrarily dedided. Thus between groups there would be little difference between pupils who scored 101 and 102, but the pupil with 102 standardised score would be in the top group. This range of ability within the top group becomes even more marked when the final SAT levels are considered at the end of year 6 for nobody who attained less than 111 S-score gained a level 5 in the SATs. It may also be noted that although within the top group there were more girls than boys [13 boys : 17 girls] more boys scored above the median for the group, of 111, than the girls [9 boys : 6 girls]

1998

In 1998 although the spread of scores 30 standardised points was similar to the 1997 S-scores, the numerical span of the S-scores had fallen. On the other hand the group median had slightly risen from 111 to 113. However the t-test of significance of 0.32 indicates that there was no significant difference between the two sets of results.

Despite the lack of significance between the two sets of results, when individual scores were considered pupils who gained the highest standardised scores in the 1997 tests had nearly all reduced their scores, on average by 5 points, whereas those children who scored on or below 115 [a score of +115 is considered above average] in the 1997 test have gained, on average, 4 points. This tentatively suggess that the teaching has not addressed the needs of all the pupils, especially the brighter children who have not been extended sufficiently to maintain their progress as measured by the NFER standardised scores. It also suggests that the teaching has been aimed at the middle of the group as the scores have tended to regress to the median of the group. It could be said, although very cautiously due to the limited data, that for the most mathematically able children in year 6 in Rosemary School for the academic year 1997/98 setting by ability for mathematics did not appear to have raised the level of achievement of these pupils.

SAT Levels

Standard Assessment Tests in mathematics, English and science are sat by all year 6 pupils towards the end of their final year in primary education. The tests are norm and criteria referenced summative assessment and give an indication of a pupil's progress since an earlier assessment at age 7, and an indication of that pupil's abilities within the three subjects. One weakness of these tests is that they only indicate what the pupil can achieve on the day that they sit the test. Another is that the levels awarded from W [working towards the beginning of the scale for those children who have exceptional difficulty learning] to level 6 for the exceptionally bright children, do not reflect the grades of ability within one level. For example pupils gaining marks of 55 and 79 would both be awarded a level 4 [considered the mean for a year 6 pupi], whereas a pupil who gained 80 marks would be awarded a level 5. Other weaknesses of considering SAT levels as a measurement of achievement has already been discussed; namely their infrequent nature and lack of consideration of value-added progress.

Within the group of pupils under consideration the two brightest boys gained Level 5s as expected, but there seemed no clear reason why other pupils who gained a level 5 should do so, as their NFER scores gave no clear indication that they would or would not gain a level 5. According to Bishop, Everett and Farnsworth [1998] pupils who gain

NFER S-scores of 115-119 have a 55% chance of gaining a level 5, whereas those pupils who score 120-124 have a 76% chance, whilst those gaining less than 115 have a 25% chance of gaining a level 5. My findings support this trend but only fully support the trend that pupils whose NFER S-scores are 125 or more can be fairly confident of gaining a level 5 SAT.

Within the town where I teach the local schools have since 1996 collated their SAT results. The percentage of Year 6 pupils attaining level 4 or more is recorded as a percentage of the number of pupils within each school taking the exam. The aim of the scheme is to track the relative progress of each school compared to others in the area, and to keep on track for achieving the Government's target that 75% of year 6 pupils will attain Level 4 or higher by the year 2002.

TABLE 13.2

END OF KEY STAGE 2 RESULTS FOR MATHEMATICS 1996-98 COMPARING, THE PERCENTAGE OF PUPILS GAINING A LEVEL 4 OR HIGHER IN ROSEMARY SCHOOL WITH LOCAL, COUNTY AND NATIONAL FIGURES

Figures in %

Number of schools within the town 10

YEAR	1996	1997	1998
SCHOOL [position within town]	53 [4th]	75 [2nd]	68 [1st]
COUNTY AVERAGE	49	58	57
NATIONAL AVERAGE	53	61	58

[Source - School memo, 1998]

As the table indicates Rosemary School has improved its standing within the cohort of schools within the town. The school also performs better than the County and National Averages. The 'dip' in pupils attaining Level 4 or higher in 1998 is a general trend and not isolated to individual schools. However these results, although encouraging and

indicative of the school raising the level of achievement for its pupils, can only be accepted tentatively as schools in the table are not considering like with like. Analysis that does consider like with like is called value added

The School's PANDA Report

Value added analysis, or as Strand [1998] calls it 'fair analysis' [see discussion on value added in this chapter], of performance tables between schools, means taking into consideration the ability of the pupils and the environmental factors affecting the school population in order to compare the relative effectiveness of each school in regards to the progress that the pupils have made.

"*From autumn 1997, the Qualifications and Curriculum Authority will provide all schools annually with benchmarking data to enable them to compare their overall performance with schools broadly similar in type nation-wide. In early 1998, OFSTED will send to all schools a PANDA, a Performance and Assessment Report, which will summarise their key stage scores, contextualise their last inspection report and contain local census information.*" [Everett et al. 1997, p.66]

The local census information is included in order that the school has some knowledge of the environment from which their pupils come. For Rosemary School the census information was described in wards, but as the school is a Church-Aided school this is unhelpful as the pupils are attracted to the school from a wide catchment area. This is one reason why comparing the school under consideration with other schools within the town does not reflect the fuller picture. Similarly despite the perceived wealth of data available and the notion that the school will be compared with "*other schools situated in similar contexts*" the school was placed "*in a benchmark group on the basis of the percentage of your total pupils on roll "known to be eligible for free school meals.*"" [PANDA Report, 1998, intro] As some parents do not wish to confirm that their child is eligible for free school meals, then notion of 'fair' comparisons is based on flawed data.

The school's PANDA report [1998] supports the claims already made in the discussion on the results of the NFER tests taken by the top year 6 mathematics group, as the report for Rosemary School stated that:

In Key Stage 2 the average levels for mathematics were broadly in line with the national

average and the average for similar schools. [p.5]

In mathematics the percentage of pupils reaching level 4 or above - 68%- was above the national average of 59%. [p.7]

In mathematics the percentage of pupils reaching level 5 or above - 10%- was below the national average of 17%. [p.5]

Their performance in mathematics was close to the national average: it exceded the national average for their age group by the equivalent of 0.04 levels. [p.9]

Taking the three years together [1996-98] their performance in mathematics was close to the national average: it exceded the national average for their age group by the equivalent of 0.04 levels. [p.9]

Boys performed slightly better than the girls by 0.07 of a level but both sexes performed better than the national averages for their sex. [p.11]

Pupils' performance in the mathematics tests was close to the average for schools with pupils from similar backgrounds [PANDA Report, 1998, p.14].

Although this data adds to the school's understanding of its relative effectiveness, the report is retrospective as the pupils concerned have passed through the primary school system, and cannot therefore benefit from any action taken as a result of an analysis of the report. Whether future cohorts will benefit is also arguable, for as has already been stated each pupil, each group, each school and each test are all different and will have different needs. Neither does the report answer, for the school under consideration, whether setting by ability raises the level of pupils' achievement in mathematics.

Conclusion

No firm conclusions can be made to address the question as to whether homogeneous grouping by ability for mathematics raises pupils' levels of achievement. To answer this question, data, including value added data, needs to be collected over time. Norm referenced data seems to be the most useful form of assessment for this purpose as the standardised scores may be compared year-on-year, with a degree of reliability. Although used for this purpose by government agencies criteria-referenced assesssment i.e. the SATs are too infrequent and the content of the criteria has changed too frequently to allow year-on-year comparisons.

Value-added attempts to address the problem that pupils have different social backgrounds and thus have different advantages and disadvantages associated with their home circumstances. On the other hand the above analysis suggested that different teachers and different schools also have an effect on the progress and achievement of pupils.

Within Rosemary School there were too many variables to isolate the effect of homogeneous grouping by ability for mathematics. These variables were namely; a new core scheme which resulted in a new scheme of work and changes in delivery; the introduction of mental tests within the SATs, which, as noted above, caused a national 'dip' in the SAT mathematics results; and new mathematic groups i.e. single year groups as opposed to groups formed from two year groups. Thus any comparison with former years was invalid.

Analysis of the data did confirm that the school gains results in mathematics above the national average, but that the more able pupils within the top mathematics group in the academic year 1997/98 did not fully realise their potential. Whether this is an effect of setting, a comment on the motivation and ability of the pupils, or the teaching is unclear. It does however lend weight to the argument that each year is different, for in the following year with a different cohort of pupils, 66% of the pupils in the top mathematics ability group gained a level 5 compared to 42% of the pupils in the group under consideration, and three pupils were four marks short of level 6.

CHAPTER14

AN EXPLORATION INTO THE VALIDITY OF CLAIMS MADE BY ONE JUNIOR SCHOOL AS TO THE PERCEIVED BENEFITS OF TARGET-GROUPING FOR MATHEMATICS.

Introduction

This investigation into the validity of claims made by Rosemary School as to the perceived benefits of target grouping for mathematics has reviewed literature on the theoretical framework that underpins the concept of target-grouping for mathematics and has analysed primary data on the perceptions, of both teachers and pupils, as to the perceived benefits of target-grouping for mathematics. This chapter considers how the perceived situation in the 'field' compares with the theoretical context, and thus explores the validity of the claims made. To this end significant parts of the report are summarised and brought together in an attempt to address Bennett's call for research on the success or otherwise of setting. or in this case target grouping for mathematics.

When target-grouping for mathematics was introduced in Rosemary School a number of benefits were cited. To restate from chapter 1 these were namely as follows:

Benefits for Pupils

1. Children can be extended en masse with teaching focused on a narrower range of ability than is possible in a mixed ability class
2. A more structured approach makes it easier to monitor progress and ensure pupils remain on task.
3. Less able children are not constantly over shadowed. Experience in schools that use setting regularly is that it boosts their self-esteem and experience of success
4. Some children benefit from a change of teacher.

Benefits For Teachers

1. Planning of work for a narrower band of ability is more straightforward and timesaving.

2. Exposition is easier to focus on an appropriate level of ability.

3. Teachers can develop relationships with pupils of other classes.

Benefits for the School

1. Evidence from HMI and OFSTED suggests nationally, that ability grouping for mathematics has a positive effect on pupil achievement. [see appendix A]

These cited benefits led to the following hypotheses, which have been the cornerstones of this research;

a. Target-grouping enables teachers to focus on the appropriate level of ability for that group.

b. Target-grouping is easier for teachers to manage than mixed ability classes.

c. Target-grouping boosts children's self-esteem and experience of success.

d. Less able children are not constantly over-shadowed

e. Target-grouping for mathematics raises pupils' levels of achievement in mathematics,

f. Those involved in target-grouping perceive it to be a positive experience.

Each of these hypotheses will now be considered in the light of relevant context for the research and the research findings of the investigation into target grouping for mathematics in Rosemary School. Each section will conclude with a comment on the validity of the claim made.

a. Target - Grouping Enables Teachers To Focus On The Appropriate Level Of Ability For That Group.

Context For The Research

If, as discussed in chapter 2, one aspect of education is the organised transmission of a certain body of knowledge required by society then education could be said to enable us to take our place within society as responsible citizens [Peters,1965; Bruner, 1996; Nunes & Bryant, 1996; Education Act; 1996] This begs the question as to where this socialising process should take place. Within 'western' cultures schools have been

perceived by the state as the most convenient place to educate children en masse. The state needs economic security to function well and promote stability within its population and one way that it perceives that this can be achieved is through education.This utilitarian version of education sees the education system as a means of promoting economic growth through the development of marketable skills within a new young consumer market.

A utilitarian view of education is not only about fitting pupils for positions in the division of labour, it is also about maximising individual satisfaction [Gordon and White, 1979]. An individual who feels fulfilled and worthwhile is more likely to contribute positively to society than one who is discontented. The notion of the maximisation of individual happiness might suggest that every person requires an individual programme of education to meet their needs. But fitting the needs of the members of a society and their ways of learning and understanding to the needs of the culture is a complex process [Bruner,1996]. Education therefore is deemed to have a three-fold purpose, namely: to develop individual and social skills and knowledge necessary to function in society; to develop cognitive skills and knowledge; and to promote the enjoyment and happiness of the individual [Bowles and Gintis,1976; Sarason, 1990; Fullan,1991].

Thus in preparation for adult life children need to be numerate in order, as noted above, to fulfill their role as a worker and consumer within the society within which they live. To be numerate is both an 'at-homeness' with numbers and an ability to make use of mathematical skills, plus an ability to have some appeciation and understanding of information which is presented in mathematical terms [Cockcroft, 1982]. However the former argument suggests that individuals have differing needs and that the teaching of mathematics should focus on the appropriate level of ability for each individual. However to utilise a teacher's time effectively focusing on a a group of individuals with similar needs and similar levels of abilities would seem to be more appropriate. [Plowden, 1967]

Research Findings

The research, amongst the staff of Rosemary School, revealed that a third of the teachers considered that they taught better in classes that had been set by ability for mathematics, as they had a clearer understanding of the needs of the pupils within that group and therefore knew more clearly what to teach. All the teachers in the survey commented that targeting the work to the ability of the pupils was easier in homogeneous ability classes than in mixed ability classes. This supports Day's [1985] criterion for successful innovation in that the teachers have identified the personal benefits of the scheme as they have found that target grouping for mathematics makes the process of teaching easier for them and that they gain satisfaction from teaching in this way.

Chapter 10 clearly showed that the teachers at Rosemary School perceived target-grouping for mathematics to be a positive experience. The teachers found homogeneous grouping for mathematics easier to manage than mixed ability classes as they did not have to prepare for too wide a range of ability, and as a result planning was more focused. However it would seem that homogeneous ability grouping is a misnomer, for within each abilty group the teachers still experienced a wide range of ability that had to be catered for through differentiated and extended work.

"*Much easier to teach although in my group there is a big gap between the top and lower end.*"

The teachers of Rosemary School agreed that they focused the class work to the perceived level of the group, but it could be argued that they may be reinforcing preconceived views of the ability of their group and therefore their claims that there are 'extremes' within the group may partly be due to their own preconceived notions of the ability of the target-group that they teach.

'Fair'grouping according to ability i.e. grouping so that there is no doubt about the final outcome, is difficult to achieve. Within Rosemary School pupils are assigned to each maths set on the results of an NFER test. To maintain manageable class sizes of approximately 30 there are bound to be borderline cases where it is questionable as to which set a pupil should be assigned. As one pupil commented *"I think that maths*

groups are good because you work with your own ability. But I think I have been put in the wrong group."

Chapter 11 highlighted the fact that overall the pupils in Rosemary School liked being in ability groups for mathematics as the pupils perceived both learning and social benefits from such groupings. Although the pupils were aware of the hierarchy of the groups, this seemed to work in a positive way as most of the childen felt that they were in the right group and that they would perform better at their own level,

Conclusion

Does target-grouping for mathematics enable teachers to focus on the appropriate level of ability for that group?

The evidence of this research suggests that target grouping enables teachers to generally focus on the appropriate level of ability for that group, but as class sizes have to be maintained work still has to differentiated to address the needs of the less and more able pupils within the group.

b. Target Grouping For Mathematics Is Easier To Manage Than Mixed Ability Groups.

Context of Research

During the early 1990s the effectiveness of discovery based learning was being questioned. A discussion paper suggested that primary schools should teach discrete subjects with specific subject orientated teaching objectives. It also gave credence to the notion of target-grouping, i.e. homogeneously grouping children by ability for a targeted subject or for a targeted time or outcome, and could be an effective management tool for teachers to use. [Alexander, Rose and Woodhead, 1992; McNamara and Waugh, 1993].

Although this concept of ease of management fits easily into Day's [1985] fundamental notion for change "What's in this for me?", it does not give credit to the ontological culture of teaching, that it is the needs of the pupils that comes first. If however a

change in management strategy means that teachers have more time and energy to commit to improving the quality of instruction then target grouping is worth pursuing.

However, it is not just grouping that affects a pupil's motivation but the whole environment for if teachers perceive that homogeneous groupings for mathematics is easier to manage then this will positively affect their teaching [Galton and Williamson, 1992; Findley and Cooper ,1983]. On the other hand teachers tend to promote strategies that support their own cultural beliefs and as a result homogeneous groupings tend to be socially biased [Sparkes, 1991; McNamara and Waugh, 1993]. Such groupings will facilitate the management of those groups which more closely reflect the teacher's own beliefs and aspirations.

Research Findings

All the teachers in Rosemary School stated that they found teaching mathematics in homogeneous groupings easier to manage than mixed ability classes. They liked the idea that the children were of a narrower range of ability within the group than within a mixed ability class and found that they could target the work more easily. They also considered that they were better prepared and could be more focussed in their teaching as they had a clearer understanding of the needs of the pupils within the group and therefore knew more clearly what to teach. This was summed up by one teacher who stated, "*It is easier grouping year 3 and 4 according to ability and preparing work to match.*"

Although the teachers agreed that target-grouping for mathematics was easier to manage there were aspects of target-grouping that suggested that the system did not completely fulfill their needs. The teacher of the 5/6 low ability group found it frustrating when knowledge did not appear to be retained after even a short time. Similarly some teachers commented that they missed teaching the 'brighter' pupils.

In chapter 7 the management drawbacks of target-grouping were cited and included the problem of the devolvement of the bulk of a child's learning in the targeted subject

resulting in patchy knowledge by the class teacher. Despite the development of report forms to enable the class teacher to be better informed about their pupils mathematical progress the class teachers consider that there is still a gap in their understanding of the whole child.

Other problems often cited by schools using target grouping are associated with: absenteeism in a group moving along together; marking overload, particularly with top groups; and under-resourcing. However in Rosemary School these have not been deemed as problematical. This is because absenteeism is not a problem within the school and neither is resourcing, and there are ways, such as the pupils self-marking some of their work to address the problem of marking overload.

Conclusion

Is target-grouping for mathematics easier to manage than mixed ability groupings for mathematics?

The teachers, within Rosemary School, do find target-grouping for mathematics easier to manage, as they can focus on a narrower spectrum of needs within the group. This is supported by the National Numeracy Project which commented that, "*The smaller the gap between the highest and the lowest attainers in your class, the easier it is to teach the class as a whole.*" [DfEE, Draft Nov.1997, p.41] However, easier management is not equated with less work, for consideration still has to be given to differentiation in order to meet the needs of the spread of ability within the group. On the other hand ease of management is counter-balanced by the lack of fulfilment some teachers experience when they teach the 'lower' ability sets, and the lack of overview of pupil progress for the class teacher.

c. Target- Grouping Boosts Children's Self-esteem And Experience Of Success.

Context of the Research

Homogeneous groupings not only evaluate pupils by ability, but also indicate this evaluation to others. It could be considered that to assist the individual in taking his or

her place in society, then the experience of different groupings formed for different purposes including homogeneous-grouping may be beneficial for the individual [Peters, 1965]. This fits with the utilitarian view of education which is about fitting pupils for positions in the division of labour and maximising individual satisfaction. On the other hand the constructivist views education as helping young people to learn, to improve and to adapt to the world [Bowles and Gintis, 1976; Gordon and White, 1979; Sarason, 1990; Fullan, 1991]. How we evaluate ourselves and how we perceive others evaluating us and our efforts, are crucial in the development of self-esteem.

"Maths groups is good because you separate clever people from not clever people."[Year 5 girl]

This pupil's response recorded in chapter 12 makes it clear that pupils are aware of the ranking of homogeneous groupings and concurs with the discriminative nature of homogeneous groupings mentioned in section b.

Research Findings

Target-grouping for mathematics may be seen to fulfill both the utilitarian and the constructivist views of education. Firstly it offers pupils the opportunity to develop social relationships with a different teacher and a different group of pupils in the process of which the child has to make meaning and thus construct the reality of a situation which they may not otherwise experience. Secondly target grouping for mathematics allows pupils the opportunity to make meaning of mathematics within their capabilities as the level of mathematics offered within the group is targeted at their level of understanding. It could be argued however, that once again it is the 'lower' ability pupils who 'suffer' as their construction of the reality of mathematics is, by definition, limited as they are not offered the opportunity to experience 'higher' level mathematics.

Within the teaching and learning environment an individual's reality of a situation develops through their perception of the level of confidence they have in their ability [Ames, 1984; Dweck 1991]. By the end of the academic year within Rosemary School over 87% of the pupils and 100% of the teachers expressed confidence about being taught, or teaching, in ability groups. Some of the older pupils equated this feeling with ability. They were more conscious of the hierarchy of the groups as they perceived that

they did 'harder' work;

"*If there were different people it would be hard for them.*"

The children in the low-ability groups, especially the younger pupils, enjoyed being in that group as they found it fun, and they liked being with their friends. Some of the older children, however, found homogeneous grouping demoralising and a blow to their self-esteem.

"*I don't like being in a maths group because everyone calls you names like chicken and other nasties and they pick on you if you get it wrong.*" [Year 5, girl]

If pupils believe that effort makes a difference to the outcome then they will expend it, however if they feel that whatever they do will make no difference to the outcome then they will make no or very little effort [Dweck, 1991; Bandura, 1991]. A person who believes that they lack ability and that effort is irrelevant is described as having learnt 'helplessness' [Seligmen, 1975]. This form of helplessness was exemplified by CB, who although she had mathematical ability had no belief in her own ability, and steadfastly refused to believe otherwise. I mentioned at the time that I felt that her problems were too deep seated to be tackled by one teacher, but on the other hand it could be suggested that target-grouping for mathematics had not boosted her self-esteem neither had it given her the perception of experiencing success.

Conclusion

Does target-grouping for mathematics boost children's self-esteem and experience of success?

As has already been noted target-grouping for mathematics has, within Rosemary School, resulted in more focussed and targetted setting of work within the capabilities of the pupils within that group. For many of the pupils this has resulted in greater opportunities for experiencing success, thus boosting the pupils' sense of self-esteem. However it is the pupils' perception of their 'self' and their perception of the outcomes of personal effort that has determined whether they benefit or not from these opportunities.

d. Less Able Children Are Not Constantly Over-shadowed

Context of Research

It was stated in chapter 2 that the purposes of education are; to fit the individual into the society within which it lives; to contribute to the economic growth of the society; and to develop the skills and understanding of the individual. On the one hand it could be argued that homogeneous groupings allow the less academically able to flourish in a less competitive atmosphere thus developing their skills and understanding and at the same time boosting these pupils' opportunities of experiencing success. On the other hand it could be argued that this sense of achievement is mis-placed as within Western societies credit is given to high educational achievement.

No two people are the same so there will always be within a society those who learn and understand new skills and concepts easily and those who do not [Farnsworth et al, 1997]. To enable a child to make sense of a difficult task Light [1994] argues against Bruner's suggestion of academically weaker pupils working with a 'more competent peer', as the dominant peer will dominate the decision making. He considers that pairs of equal ability seem to learn better, which lends tentative support to the notion of target grouping. However over the past twenty years successive reports have been unsupportive of homogeneous groupings as they deemed them to polarise attitudes; become self-fulfilling; and may be discriminitive, [HMI Report, 1978; Bossert et al, 1984; McNamara and Waugh, 1993]. On the other hand homogeneous groupings allows the teacher to place a pupil in a particular ability group for a particular purpose, and that one of these purposes is that the less able child should not be over shadowed by more competent peers [Alexander, Rose and Woodhead, 1992].

Research findings

When asked whether they liked maths or not, more of the younger pupils gave a more positive response than the older pupils. On the other hand more pupils within the low ability groups were less likely to like maths as they found mathematics difficult to do and understand and therefore did not like maths. The questionnaire revealed that less children in the low-ability sets liked maths [71% compared to more than 83% in the higher groups] and more children in the low-ability sets disliked maths [15% compared

to 11% in the higher groups]. This may be that although the work is targeted for the ability of the group, there is, as has already been noted, still a broad spectrum of ability within a 'homogeneous-ability' group, so that within the group there will be pupils who find the work difficult. It could be considered therefore, that although in the low-ability target-group the pupils are not overshadowed by brighter pupils, it is still possible within the group for children to feel over-shadowed by those with greater ability in basic mathematics than themselves.

Conclusion

Does target grouping for mathematics enable the less able children to feel that they are not constantly over-shadowed by more competent peers?

It would seem that for most children within the low ability groups [75%] that target grouping for mathematics is a supportive strategy to enhance their learning. It gives children within these groups the opportunity to not be over shadowed by their more competent peers. However within the low-ability group there is still a differentiation between individual abilities, so that some children may still feel overshadowed by those 'more' competent than themselves even within a 'homogeneous ability' group. Similarly the older pupils are more aware of their lack of mathematical ability, and therefore it could be argued that the concept of target-grouping for mathematics does little to boost their self-esteem and that they are 'over-shadowed' by the knowledge that they are not mathematically able.

e. Target-grouping For Mathematics Raises Pupils' Levels Of Achievement In Mathematics,

Context of the Research

In chapter 13 'achievement' was defined as "*something which someone has succeeded in doing, especially after a lot of effort*" [Collins Cobuild,1997, p.6], and from this it was considered that achievement may be defined as a measure of progress where a pupil has mastered a new skill or concept which they did not know or have mastery of before. However as was discussed in Chapter 12 the degree of effort exerted by a pupil is a reflection of their past experiences, their sense of motivation and their perception of

their self-esteem. On the other hand, if, as argued in chapter 2, an education at school has been seen by governments as the most socially and economically expedient way of developing 'good' citizens, then raising pupils' levels of achievement could be considered to be tantamount to producing more socially concerned and more economically productive citizens. As the 1996 Education Act established, " *The statutory curriculum secures for all pupils, an entitlement to access areas of learning and to develop skills, knowledge and understanding necessary for their self-fulfillment and development as active and responsible citizens.*" [Section 351. p.5]

If self-fullfilment means that one of the functions of education is to enable individuals to realise their potential, then it must equip them with the tools and offer opportunities to do it. it could therefore be argued that achievement is a measure of the degree to which individuals not only develop their potential but how they use it for the benefit of society.

These were not new notions. In the nineteenth century it was considered that education should include instruction in morality, citizenship and knowledge as part of the Divine purpose which could be achieved by raising the standard of education and byincreasing the numbers of individuals who received it. This concurs with present government directives that levels of achievement in literacy and numeracy must be seen to rise, as measured through (a.) Standard Assesssment Test results, and (b.) through international comparisons in literacy and numeracy.

International comparisons [TIMSS, 1997; Luxton and Last,1998] suggest that in mathematics, eleven year olds in this country fall some distance behind their continental and Far Eastern contemporaries. Also, despite Britain's respectably large share of high attainers there is an unusually large share of low attainers. In an attempt to improve educational standards in Britain the government has spent time, money and effort in introducing both the literacy and numeracy hours in primary schools.

The strategies are designed to reach our targets for 2002, of 80% of 11 year olds reaching the standard for their age in English, and 75 % in mathematics." [Barber, 1999]

These prescribed percentages suggest that raising standards in mathematics is more difficult than in English, and that prior to the Literacy/Numeracy hours primary teachers

were not effectively teaching these subjects. It could be argued that teachers were not teaching these subjects in a way that resulted in high achievement in tests, but as the TIMMS Report [1997] found, British children had well developed reasoning skills compared to other countries covered within the report. The standard, that the government expects pupils to achieve by Year 6 is a Level 4 or above in Standard Assessment Tests [SATs] as indicative that both teachers and pupils are working effectively. However it is possible to teach pupils a series of 'tricks' that enable them to perform well on standardised tests yet leave them deficient in basic understanding. [Cunningham, 1990; Cassidy, 1998]

Measuring educational achievement is only possible if data is collected over time, and will not be fully relevant until a full cohort has passed through the system. Standardised norm-referenced assessments however do offer an important source of objective, empirical information about relative achievement across an age group [Everett et al, 1997]. However this presupposes that all pupils, and by implication all schools, are equally endowed when they enter the system. This is not the case as four factors - gender, parental occupation, free school meals and home language have been identified which may affect a child's educational endowment [Thomas, 1995; Everett et al, 1997; Strand 1998].

Research Findings

The above factors were taken into consideration in Rosemary School's 1997/98 PANDA [Performance and Assessment] Report which found that;

"*The average levels for mathematics were broadly in line with the average for similar schools.*" [p.5]

In mathematics the percentage of pupils reaching level 4 or above (68%) was above the national average of 59% [p.7].These two statements reflect the level of ability of the pupil population within the school. However the percentage of pupils reaching level 5 or above (10%) was below the national average of 17% [p.5]. This indicates that within Rosemary School the brightest children are not achieving their full potential, and that by implication target setting for mathematics has not raised the level of achievement for these pupils. This was tentatively supported when NFER scores for 1997 and 1998 for

mathematics of the top Year 6 maths group were considered. Although there was no statistical significance in the slight change in the two sets of data, a decrease in the 1998 standardised scores was noted for all the pupils who had attained the highest scores in 1997

Conclusion

Does target-grouping for mathematics raise pupils' levels of achievement in mathematics?

For Rosemary School no firm conclusions can be made to address the question as to whether homogeneous grouping by ability for mathematics raises pupils' levels of achievement.

f. Those Involved In Target-grouping Perceive It To Be A Positive Experience.

Context of Research

Learning is a life-long processs [Bernfeld ,1925]. The responsibility of developing an individual's capacity to learn does not rest entirely with the individual but also with those who are responsible for the quality of teaching and instruction provided [Vygotsky, 1962; Klaus & Gray, 1968; Zigler & Valentine, 1979; Schweinhart & Weikart, 1980]. If learning is to be a life-long process it should be a positive experience [Education Act, 1996]. As the learning of mathematics is not governed by social, cultural and historical contexts, it can therefore be relevant and enjoyable [Cockcroft, 1982; Blunkett,1999]. However pupils' notions of the relevance and enjoyment of mathematics depends on their perspective of their experience [Bruner's first tenet, 1996] and the degree of confidence they possess to deal with mathematics [Bruner's eighth tenet].

Research Findings

As part of the teaching staff of Rosemary School, I have found: that target-grouping for mathematics has been a positive experience; the pupils are interested and motivated; the pace is brisk; and there is a constructive rapport between the teacher and the members

within the group. In addition I have gained personal enjoyment and satisfaction from the maths that I teach and from working as a model for my pupils [Straker, 1994]. For me mathematics is a wonder and a fascination of time-honoured truths and cultural inventions which I enjoy sharing with my pupils.This personal scenario could be considered self-indulgent, as it fulfills my personal need that teaching should be a positive experience. [Day, 1985]

The fulfillment of a personal need seems to be a strong motivational force, especially amongst the teaching staff of Rosemary School. All staff reported that they had grown in confidence in teaching mathematics as they have come to terms with the needs of their group and the demands of a new core scheme. A sense of fullfillment was particularly marked amongst the teachers who took the top mathematics group in each year. On the other hand the teachers who taught the lower ability groups reported that they felt frustrated when knowledge appeared not to be retained by pupils after even a short time. All the teachers stated that they enjoyed teaching mathematics in homogeneous target groupings.

"*I think the idea of maths groups is brilliant.*"

The teachers found target grouping for mathematics a positive experience. As has already been stated target grouping for mathematics enabled the teachers of Rosemary school to:

1. have a clearer understanding of the needs of the pupils within the group;
2. know more clearly what to teach;
3. target the work to the ability of the pupils more easily
4. to appreciate that the children were of a narrower range of ability than within a mixed ability class, even though some of the teachers commented that the groups were not truly homogeneous.

"*Much easier to teach although in my group there is a big gap between the top and lower end.*"

From the pupils perspective the overall impression is that the pupils enjoy mathematics.

The main reasons that were cited were;"*I like it when it is hard*" and "*I like to play with numbers*" reflecting a generally positive experience in mathematical experiences' within the school. Pupils in the middle of their junior schooling seem to obtain the greatest enjoyment from maths.

Although most of the children in the low-ability groups enjoyed being in that group and considered it to be a positive experience, those who did not, especially the older pupils, perceived it as a demoralising experience. This was especially so when their peers called them derogoratory names for being shown to be of a lesser ability in mathematics. If these children feel failure strongly enough they may well begin to believe that they are failures [Rogers, 1991].

One purpose of target setting is to enable a pupil to be taught within a class of pupils of homogeneous ability. It has already been shown that the term 'homogeneous' is a misnomer in that even within homogeneous groupings there are 'extremes' of ability within the range. It has also been shown to be discriminative in that it may be socially biased, and that it is evaluative of ability. However, the whole concept of target-grouping presuppposes that there will be movement between groups of those pupils on the extreme ends of the 'homogeneous' group. For those who move upwards this may be a daunting, yet positive experience. It will be daunting in that any change, creates doubts about purposes, sense of competence, and self-concept [Fullan,1991]. It will be a positive experience in that it is a recognition of worth. As one boy noted,

"*I've started to enjoy maths now because it is more of a challenge.*"

Conversely, for those who are moved down, it may be a 'fatal' blow to their self-esteem, unless they find the change a more rewarding and positive experience than being in their former group within which they continuously had to struggle.

Conclusion

Do those involved in target grouping perceive it to be a positive experience?

Despite some reservations on the part of some pupils, the experience of target-grouping within Rosemary School, has been perceived by the pupils and the teachers to be a positive experience.

Summary of Conclusions

This research has attempted to explore the validity, or otherwise, of the claims made by one junior school, as to the value of teaching mathematics through target-grouping.

The evidence of this research suggests that:

a. Target grouping enables teachers to generally focus on the appropriate level of ability for that group, but as class sizes have to be maintained work still has to differentiated to address the needs of the less and more able pupils within the group.

b. Target-grouping for mathematics is easier to manage, as teachers can focus on a narrower spectrum of needs within the group. On the other hand ease of management is counter-balanced by the lack of fulfillment some teachers experience when they teach the 'lower' ability sets, and the lack of overview of pupil progress for the class teacher.

c. Target-grouping for mathematics has meant more focussed and targetted setting of work within the capabilities of the pupils within each group. For many of the pupils this has resulted in greater opportunities for experiencing success, thus boosting the pupils' sense of self-esteem. However it is the pupils' perception of their 'self' and their perception of the outcomes of personal effort that has determined whether they benefit or not from these opportunities.

d. Target-grouping for the less mathematically able is a supportive strategy to enhance their learning. It gives children within these groups the opportunity not to be over shadowed by their more competent peers. However within the low-ability group there is still a differentiation between individual abilities, so that some children still feel over shadowed by those "more" competent than themselves. The older pupils are more aware of their lack of mathematical ability, and therefore target-grouping for mathematics does little to boost their self-esteem as they are 'over-shadowed' by the knowledge that they are not mathematically able.

e. For Rosemary School, the limited data indicates that target-setting for mathematics has not raised the level of achievement of pupils. However, further data needs to be collected over time for a clearer picture to emerge.

f. Target grouping for mathematics, within Rosemary School, has been shown to be a positive experience for both teachers and pupils. This was found to be especially true for the teachers and pupils of the top-ability groups. On the other hand, those teaching and learning within the lower-ability groups found the experience less positive.

This research has tended to validate most of the claims made by Rosemary School as to the value of teaching mathematics through target-groups. However if the school is to continue using this form of grouping for mathematics it needs to consider whether the positive aspects of using target-grouping for mathematics outweighs the negative aspects, especially for the pupils and teachers of the lower ability groups.

CHAPTER 15

REFLECTIONS ON VIEWS I NOW HOLD AS A RESULT OF DOING A DOCTORATE IN EDUCATION

Introduction

This chapter reflects upon my own personal learning process of doing a Doctorate in Education. This chapter is like a train journey, which begins once the train has left the station and reflects upon the beginning of the journey. First a purpose for the journey has to be established, but once embarked upon the train then calls at the stations along the way which have been significant areas of learning, namely; ways of seeing, the dynamics of change and research methods, and the branch line, theory and practice.

'Ways of Seeing' was a strange, unknown station to visit. It was like arriving at a place in the dead of night, where everything seemed part of another world, but with the dawning came the clarity and beauty of a place worth visiting. The pinnacle of the visit was the consideration of Utopia. This summed up my views on teaching: that the perfect class and the perfect lesson are there just beyond my reach, but worth striving for. The next stop was The Dynamics of Change a banal, industrial station with little to cheer and inspire. Until, one day the train approached from a different direction. From this perspective the relevance and importance of an understanding of the dynamics of change, not only to management but to other walks of life, become apparent.Then we arrived at Research Methods, a familiar, friendly station where old, yet some times difficult, friends were visited. A place to recap and extend past knowledge on statistics and research methods. Although not on the main line, the station 'Theory and Practice had to be visited. At this station there is a carousel, which is forever turning, but with each slow revolution there is a change, sometimes subtle and at other times quite dramatic. In education, theory and practice are forever being worked upon, developed and up-dated. Finally the train pulls into its destination and reflects on how the journey began. However, like all train journeys, the train's destination is not the final destination, but carries on with the hope that other travellers will sometimes join along the way.

The Beginning of the Journey

At the beginning of the Doctorate of Education course my critique of 'Unlocking the Will to Learn: Identifying a Student's Learning Combination' [Johnstone, 1994] was quite condemning about the article's claim to knowledge. However, over the intervening time I have found myself returning and reconsidering the value of the claims that Johnstone made about the tri-partite conceptualisation of the interactive process of learning; conation, affectation and cognition. In fact during my own research I have commented on the interactive effects that motivation [conation], self-esteem [affectation] and intelligence [cognition] have on a pupil's willingness to learn. The initial hesitance to give credence to Johnstone's claims was not suprising for I found it difficult then to understand some people's reluctance to learn when I have always enjoyed learning. What I did not appreciate were the many interrelated factors that had led to this belief and that any challenge to this strong belief that I held would initially be rejected out-of-hand.

"This is because living systems strive to maintain an identity by subordinating all changes to the maintenance of their own organisation as a given set of relations. ....A system cannot enter into interactions that are not specified in the pattern of relations that define its organisation." [Morgan, 1986. p.236]

I have come to realise that how individuals perceive and construct their worlds are based on the many facets and sum of all their experiences, so that although a society holds many experiences and beliefs common - the celebration of the Millenium being a case in point- no two people interpret the experience in the same way. We are all individuals, and every pupil is an individual with their own needs, personal experiences and perceptions. And yet within the classroom situation, and in society, this individuality is expected to be supressed in the search for a common outcome; be it better school grades, or a numerate and literate workforce.

What is the purpose of education?

I have read educational books, documents, articles and memos and can quote the expected responses. For instance:

"The statutory curriculum secures for all pupils, ...an entitlement to access areas of learning and to develop skills, knowledge and understanding necessary for their

fulfillment and development as active and responsible citizens" [QCA,1999,p.5]
In other words 'sow today, in order to be able to reap tomorrow', which I can fully understand and appreciate as the economic development of a country requires a numerate and literate population. But I am left with the niggling doubt as whether the education that is offered to the populace is the right one. I have no alternative to offer. Without an education I would not have been able to access the higher realms of learning that I have. But it seems to me in my everyday teaching life, that there must be a ' better' and more fulfilling way to educate the young as opposed to the en-masse method used. Some thought is given to those who find learning difficult with extra one-to-one teaching etc. but as a teacher I know that however hard some of these children strive to learn they will never be as intellectually competent as their peers, so should they perhaps spend their time in a different, less stressful way? Even less thought, it seems to me, is given to the extension of the brighter pupils. It could be argued that target-grouping is one method of grouping that gives these children the opportunity to extend their thinking through interaction with those with a common need and interest, but as has been shown by this study target-grouping only has a limited application in addressing the diverse needs of pupils. So although I concur that a society neeeds citizens who are fullfilled, active and responsible and that to provide a state-funded education for all citizens may be the most expedient way of achieving this, I still wonder if this is the 'best' way. However my perspective on the situation, may not be that of others.

Ways of Seeing

The construct of reality and the development of our 'window on the world' has been a fascination to me. The work on 'ways of seeing' has helped me realise that my view is not the only view, and that my view has developed through my own individual experiences and the significance or otherwise that I have attributed them. Although I have chosen not to record some of the significant educational moments in my life the very act of mentally unpeeling them has been a revelation into 'who I am', and 'how I am'. This, at times, has been a painful process as the light dawns that one's perception of the world has been self-constructed through everyday experiences that at the time one felt that there was no control over. On the otherhand, this self-realisation of 'who' and 'how' one is, has been empowering, as I have become more aware of how I behave and

why, and thus I have been in a stronger position to accept or take action to reject and reshape the 'I' that I am.

Similarly the above reflections have made me more aware of my actions towards pupils, and to the possibilities and outcomes of the unknown experiences that have moulded them. The realisation of the deep effect that the unknown side of my pupils' lives may have on my pupils' behaviour has made me more tolerant of their foibles, perspectives and motives that do not fit with my own values. Conversely I am more aware of my own actions and words, and of the possible effect that the experiences that I can offer may have on my pupils perspective of learning and their construct of their world. Utopia it is not, but it has led to a more tolerant working atmosphere within the class. Similarly, in my dealings with adults I am aware that their construct of reality will not be the same as mine, and that if I wish to begin to change their perspective, the change must have meaning and relevance to them.

The Dynamics of Change

Change! The diet of teachers. Change for breakfast, dinner and tea, or so it has seemed over the past ten years. The government - and it hasn't seemed to matter which government during this time- has had the will and the power to implement the many educational reforms and initiatives that it has thought necessary in its drive to improve educational standards in Britain. However for these initiatives to have worked, and many of them seem to have been effective in raising standards as reports seem to indicate, it takes more than government directives, however powerfully enforced, to bring about the many changes that have taken place. As Fullan [1991] notes *"Change may come about either because it is imposed on us (by natural events or deliberate reform) or because we voluntarily participate in or even initiate change when we find dissatisfaction, inconsistency, or intolerability in our current situation."* [p.31] I believe that teachers themselves have recognised the need for reform, and that without their support - despite the aggressive reporting and inspection tactics of the government - these initiatives would have failed. People will resist change and cling to the 'status quo' unless they perceive the relevance of the change; they are ready for the change; and there are available resources to support the change. This can be summed up in the phrase 'What's

in this for me?' On the other hand teachers are 'servants' in that they must consider and address the needs of their pupils. Teachers therefore perceived that acceeding to the government directives would, despite the extra workload entailed, raise educational standards both in content and outcome and thus increase the inherent, yet unquantifiable, rewards in the teaching of young people - the citizens of tomorrow.

Initially, as I do not hold a managerial teaching post, and as many examples of change seem to be taken from secondary and tertiary educational forums and, of course, from business, the concept of the dynamics of change seemed to hold little relevance to my own situation. The turning point came when I took on a management role outside teaching. The relevance of what I had learnt and read now became clearer, applicable and significant to my new situation. Through experience, I now realised that the implementation of change is multi-faceted, and that many aspects e.g. readiness, degree of involvement, motivation, sustainability etc. have to be considered and 'moved along' together. It is the role of the agent of change to facilitate these aspects of change. I have been described as ' driving force with a vision', but unless my colleagues are ready to be 'driven', and share the vision, then change that I have envisioned does not take place. Similarly, within teaching I have come to realise that as a member of staff I do have a role to play in the management of change: not in the planning stage, but in the implementation and maintenance stage where I can support colleagues and the school by being part of the corporate development of initiatives. Target-grouping for mathematics is a case in point. As part of a collegiate effort, my contribution has been to support the initiative and to bring to fruition the school's vision for the top ability Year 6 mathematics target group.

Something that did surprise me was that I found myself using some of the strategies for the implementation of change with my pupils. Surprising, for as noted above, change was what managers did, not teachers. Children will not change unless they are ready and see the value to themselves of the proposed change. They need time, encouragement and reinforcement if the change is to be maintained. And their goals need to be SMART goals - specific, measurable, achievable, relevant and trackable [ILAM, 1994] So now, instead of saying 'do this ' I try to stop and think of why that child should do it and give

a personal reason as to why the required effort should be put into making the change.

Research Methods

The language of research has been a challenge to me: Words that seem specialised to the field of research and do not occur in the daily interactions of a primary school such as paradigms and epistemology; Words that are specific and yet reflect shades of meaning such as ethnography and ontological; Words that describe not only ways of thinking but the development of thinking and perspective such as positivism and post-modernism. But despite being a challenge that is sometimes lost and other times won - constructivism I have had no problems with - it has been the opportunity to engage in a breadth of reading and exposure to ideas that has been so stimulating. How else would I have come across Whitehead [1929] who summed up so beautifully my own feelings when he attested that *"the foundation of reverence is the perception, that the present holds within itself the complete sum of existence backwards and forwards, that whole amplitude of time, which is eternity"* [p.272].

I first came across the researcher Winter at the beginning of my master's degree. His written style I found difficult to access but re-reading of this first text has led to a useful understanding. Winter [1989] has developed six principles for action research. Although this research is not action research, some of his principles apply to small-scale, classroom-based research such as this, and which has been a vehicle for self-reflection. He states that most statements in action research inquiries are reflexive, as they reflect the speakers subjective system of meanings which must be analysed so that the full meaning becomes apparent. In fact, for me, the whole experience of post-graduate research has been a journey of discovery and reflection on practice. Secondly the researcher must seek for what is significant in the data collected. This can be difficult for as indicated above my own constructs of reality have guided my thinking and decision making, not only in the analysis but as to what to reflect upon in the first place. Thirdly that all viewpoints must be considered. These principles seem to me to indicate that language can inform but it can also cloud meaning and truth, and that it is a role of the researcher to tease out and consider all possible outcomes through discussion and working with other stakeholders, in an attempt to discover the whole picture. This idea is

developed in Winter's fifth principle - [the fourth is the risk that action inquiry can upset the status quo, which has already been discussed above] - that reporting should have a plural structure so that all viewpoints may be considered. The sixth principle is the relationship between theory and practice.

Theory and Practice

The meeting and divergence of the theory and practice have been the basis for this research. How has the theory of target-grouping for mathematics in order to improve standards within one school been delivered in practice, and what have been the outcomes of the actual practice from the perspectives of the main stakeholders? Has the research addressed different forms of validity in that the methods used have really identified the claims that have been made? Has the research been reliable in that if replicated the same results would be achieved? I would like to be able to say yes to both, but in terms of reliability this research has been both set in time and place and yet has developed up to the last written fullstop of the dissertation, and while the school continues to use this form of setting it will continue to develop, so that conclusions cannot be reliable and generalisations made only tentatively.

Conclusion

The impetus for this research was an article in the T.E.S. which reported Neville Bennett, Professor of Primary Education at the University of Exeter, as saying; *"Headteachers are looking around to see what kinds of classroom organisation give the best results and are experimenting with setting. Whether or not it's successful is another matter. There's virtually no research on this."* [TES, 27.1.95] Despite at times wondering whether my small, singular research project was adding to knowledge this article kept me going. My research is a singular piece of research but it is one more piece of the enormous jigsaw that forms our understanding of education. It is set in time and space, but if Whitehead can call to me across three-quarters of a century, then if my research, which has given me food for thought over the three years that we have travelled together speaks, at some time, to someone other than myself then it will have fulfilled its role in adding to knowledge.

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APPENDIX A

School memoes to staff [1996]

citing the perceived benefits of

'target-grouping for mathematics'

Target Grouping in Primary Schools

OFSTED Survey based on : 400,000 lesson observations
: 900 questionnaires
: 100 school interviews

Findings

- ☐ 70% of junior schools and 40% of primary schools used some form of setting.
- ☐ The proportion of 'setted' lessons observed is small, but increasing.
- ☐ Setting is most commonly used in schools with high levels of disadvantage and low attainment.
- ☐ 25% of maths lessons and 10% of English lessons were setted in Yr 5 and Yr 6.
- ☐ Communication with parents about rationale and placement was important.
- ☐ Monitoring strategies need to be in place.

Positive features	Negative features
Narrows range of ability.	Not appropriate for youngest children
Should ensure collaborative planning.	Class teacher may lose overview.
Children generally feel secure.	Less able not exposed to high level questioning
Questioning can be more focused.	Opportunities to link work in sets to rest of curriculum limited.
Narrower range of tasks/resources.	Difficulties in reporting.
Good quality teaching observed in top maths and top and bottom English sets.	Poorer teaching in middle English and bottom maths set.
Flexibility of set size.	Overuse of individual work or ability grouping within a set not successful.
Where analysis had taken place, setting seemed to be having a positive impact.	

Benefits for children

Undoubtedly there are distinct benefits for the majority of children involved in a Target grouping programme. Below is a list of perceived benefits, but you may well be able to identify others in your own operation.

- brighter children can be extended en masse with focussed teaching.
- providing extra support is available lower ability children can have their needs met by focussed teaching.
- the 'hidden' element of 'middle of the road' children can be identified and supported appropriately.
- there is more of an opportunity for children to realise their potential with teaching being pitched at the right level.
- lower ability children have more of an opportunity to shine at their own level as they are not overshadowed by the brighter children around them. They are therefore able to develop self-esteem and experience success on a regular basis.
- because work is very structured it is harder for children to go off task. It is easier to monitor their progress and identify any children who are 'coasting' or who have particular problems in grasping a skill.
- the work ethic improves as the children get into the routine of Target grouping.
- the children are able to experience being taught by a range of teachers.
- the children, particularly those with behavioral problems, can establish a different relationship with their Target grouping teacher which gives a fresh dialogue and provides a 'breathing space'.

Benefits for Teachers

Not surprisingly one can also identify a range of benefits for teachers and these are outlined below,but the list is by no means exhaustive.

- teachers are able to develop relationships with other children which gives them a wider perspective.
- such a lot of emphasis can be placed on educating children with lower ability that it is refreshing for some teachers to be given the opportunity to extend brighter children and subsequently themselves.
- a much narrower band of children is being taught in a Target grouping situation and so teachers can be specific about the level of teaching required.

Target Maths Groups
General Comments for Parents' Evening.

- Target Grouping was introduced because other schools have found that it works well and raises pupils' levels of achievement.
- The initial grouping was based on a maths test and teacher knowledge of pupils.
- There are half-termly tests of work covered and some movement of pupils between groups based on results.
- There is an overall plan for maths covered, including number; maths topics like area and fractions and investigations.
- Each teacher is able to plan and teach a more specific level of ability.
- Grouping is likely to continue next September. The present Yr.5 children will be re-grouped.

T.A.Ts. & S.A.Ts. General information - see leaflets to be distributed.

1995 Results :	Teacher Assessment :	Level 1	1 Pupil
		2	6
		3	28
		4	33
		5	3
	Tests	Level 3	25
		4	31
		5	4

N.B. 11 pupils did not take all or part of the tests.

- The % of children achieving level 4+ was higher than the National average

A. Year 6 Children

Group 1 - - There are 25 / 77 Yr.6 children in this group.
It is the top group made up of the more able children, in maths. This ability is a measure of speed and understanding. The work planned uses N.C. Level 4 as a base to work from. Teacher Assessment is L.4+/

Group 2 - - There are 19 / 77 Yr.6 children in this group of average+.
The work is planned around N.C. L.4. Individual achievement varies from topic to topic.

Group 3 - - There are 13 / 77 children in this group.
The children work at a N.C. Level 3/4, performance is about average for the age group. They cover similar ground to Group 2.

Group 4 - - There are 7 / 77 Yr. 6 children in this group.
The children sometimes find understanding difficult. The children benefit from work planned for a group of similar ability, enabling more relevant direct teaching.

1995

RECOVERING ACHIEVEMENT - FROM MICHAEL BARBER EVALUATION

The most significant feature under this heading was what the schools described as target grouping. All the participants we spoke to in the project schools were powerful advocates of target grouping. Unlike traditional setting or streaming, target grouping was only used for part of the school week and in the case of at least one school only for part of each school year. There appeared to be two main features of it. The most common was for a year group to be split into ability groupings in the National Curriculum core subjects for a part of the school week. Head Teachers claimed that this had beneficial effects in allowing a better match of teaching to the pupils' capabilities without the detrimental effects of traditional setting and streaming. The evidence of pupil outcomes, the careful measurement of which was a striking feature of the project, confirmed their case.

The second aspect of target grouping was the targeting of specific groups chosen on the basis of evidence of noticeable underachievement. For example some schools had targeted Moslem girls as a group in Science, a subject in which they appeared to be underperforming. In these cases the target group were taught for a particular period in the week in a relatively small group. The success of target grouping depended on the flexible use of staff, including in some cases, non-teaching staff, and on careful monitoring of pupil outcomes.

The schools involved in the project believed that in addition to improving outcomes, it had improved the quality of teaching, raised teacher morale and ensured much more intellectually challenging teaching and learning. The schools had decided collectively that the next step was to look at pedagogy within the target grouping sessions. They were keen in particular to draw on the 'School Matters' evidence that showed that directive teaching of whole classes and specific groups within classes is an important and effective strategy in certain circumstances. They believed they were advancing from the traditional Plowden-esque primary philosophy to a new and powerful mix of informal and more directive approaches.

Indeed, the Head Teachers we spoke to in the project schools believed that target grouping was affecting their educational philosophy as a whole. They recognised that they were challenging the prevailed primary orthodoxy in Nottinghamshire and believed they were setting a new agenda for high

achievement in urban areas. The evidence we saw suggests that they have a powerful case.

Underpinning the whole approach to teaching and learning was a much greater emphasis on the monitoring of pupil outcomes than is the case in many inner city primary schools. Standard tests were used regularly in English and Maths and discussed among the staff. This information affected decisions about teaching, the curriculum, grouping of pupils and the development of staff. The hidden message conveyed to all staff was that pupil performance and understanding the progress of individual children and specific groups of children were of the highest priority. In Science, where the schools had not found a test which met their needs, the school's Science co-ordinators had set about designing their own test. In the schools we saw the use of information technology appeared also appeared to be effectively integrated into teaching and learning.

Overall, on the basis of the evidence we saw, it seemed that the schools involved in the Nottingham GEST scheme had made major advances in primary practice. Their emphasis on target-grouping, directive teaching and performance monitoring appeared not to be at the expense of the benefits of traditional primary practice. For example, in all the schools we visited classroom displays were outstanding and pupils were encouraged to take initiative and to manage their own learning either as individuals or in groups. One was tempted to conclude, "I have seen the future and it works.'

APPENDIX B

NFER Standardised Scores for 1997

and 1998, and 1998 SAT test

Results for the Top Year 6

mathematics group

APPENDIX TO CHAPTER 13

To show and compare NFER mathematics standardised scores [May 1997 and May 1998] with SAT level results for 1998 of the pupils within the top year 6 ability mathematics group.

a Pupil	b Sex	c NFER S score May 97 (a)	d NFER S score May 98 (b)	e (b-a)	f SAT level 1998
R	boy	134	127	-7	5
DB	boy	127	125	-2	5
P	boy	126	115	-11	4
V	girl	121	114	-7	4
B	boy	121	113	-8	4
P	girl	120	122	+2	5
F	boy	118	114	-4	5
C	boy	117	113	-4	4
S	boy	117	115	-2	4
T	girl	116	112	-4	5
W	girl	116	111	-5	4
F	boy	115	108	-7	4
S	boy	115	127	+12	4
C	girl	115	122	+7	5
CB	girl	113	129	+16	5
C	boy	111	107	-4	4
P	girl	109	121	+12	4
M	girl	108	105	-3	4
B	girl	106	106	0	4
P	girl	106	106	0	4
C	boy	106	118	+12	4
M	girl	105	97	-8	4
T	girl	105	115	+10	3
L	girl	104	113	9	4
M	girl	103	104	+1	3
R	girl	103	113	+10	4
H	boy	103	109	+6	4
B	girl	102	104	+2	4
O	boy	102	103	+1	4
D	girl	102	99	-3	4

Number of pupils with recorded scores = 30
Number of boys: girls in group = 13 : 17

Helen Rose

APPENDIX C

Questionnaire Given to Both Staff

and Pupils

QUESTIONNAIRE GIVEN TO BOTH PUPILS AND STAFF OF ROSEMARY SCHOOL

NAME_____GROUP_____

1. How do you feel about maths?

_____

_____

_____

2. How do you feel about being in a maths group?

_____

_____

_____

3. What will you try to do better in maths next year?

_____

_____

_____

APPENDIX D

Bennett's Bombshell

Grove junior school in Handsworth, Birmingham includes eight to 11-year-olds in its "fast track" set for maths, with some taking GCSE as young as 10

Set to make a comeback

Emma Burstall on an old concept that can help raise standards

Next summer four 10 and 11-year-olds from Grove Junior School in Handsworth, Birmingham, will take maths GCSE, some five years ahead of their peers.

Around 10 per cent of pupils won places this year at Birmingham's selective grammar schools. And according to headteacher Dr David Winkley, many arrive at secondary school having already completed much of the work normally done in the first two years.

Dr Winkley is extremely proud of his pupils' achievements, not least because on the face of it, they do not seem to have a lot going for them.

Handsworth has been described by local Labour MP Clare Short as one of the five most depressed areas of Northern Europe. Unemployment is rife, an above average number of pupils come from broken homes, and a high proportion need language support when they arrive.

The key to Grove's success, Dr Winkley claims, is "setting", or grouping children together for certain subjects according to ability rather than age, a concept which has failed to find favour in primary schools since the 1960s and the advent of mixed-ability teaching.

Dr Winkley introduced setting throughout the junior school for maths several years ago. There are also sets for children with special writing, dance, and musical ability, as well as those with reading and language difficulties. He is currently considering establishing sets for science and technology too.

In maths, 33 pupils aged eight to 11 are in the "fast track", doing work at least two years ahead of the national average.

"The standard is absolutely spectacular," Dr Winkley enthuses. [illegible]

and there is plenty of flexibility. Why shouldn't we encourage the very good ones as well as support the less able? I think we as a country grossly underestimate what children can do and have a responsibility to pick up on real ability."

Although there is little recent research on the subject, it seems that Dr Winkley is not alone in his enthusiasm for setting and that "target grouping", as he prefers to call it, may be back in vogue.

A spokesman for the Office for Standards in Education says: "There is no evidence that streaming [where pupils are placed in ability groups across all subjects] is coming back into fashion in primary schools, but there is some evidence of a move back towards setting, particularly in maths and English. HMI [Her Majesty's Inspectorate] cautiously favours setting because it obviously can be effective in raising standards."

At a Fabian Society conference in Oxford earlier this month, Labour's education spokesman David Blunkett revealed his unhappiness with standards in primary schools and praised a setting experiment in Nottinghamshire, giving rise to speculation that ability grouping may become part of Labour's education policy.

The experiment was put in motion by Labour-controlled Nottinghamshire County Council after tests revealed that many inner-city primary pupils were under-achieving. Up to a third were two or more years behind in their reading and hardly any were in the top-ability band.

After introducing setting, the results showed more than an eight-fold increase in the number of high achievers and a halving in non-

were perhaps five or six different ability groups which the teacher had to get around. It was pretty inefficient. Now, there's much more direct teaching rather than worksheet supervision."

He has also experimented with gender setting, separate science lessons for girls to see if they perform better on their own.

"Education has been like a pendulum in the past few years. We don't want to go back to the rigid streaming of the 1950s, but clearly mixed ability isn't working either. We've tried to stop the pendulum by taking the best of all available strategies and putting them together," he adds.

According to Neville Bennett, professor of primary education at the University of Exeter, increasing interest in setting, particularly at the top end of primary school, is a direct consequence of the national curriculum, public accountability and the publication of results.

"Headteachers are looking around to see what kinds of classroom organisation give the best results and are experimenting with setting. Whether or not it's successful is another matter. There's virtually no research on this," he maintains.

One of the main obstacles is teacher knowledge. A bright 11-year-old can be capable of operating at level six in maths, doing work normally undertaken by a 14-year-old, but few primary teachers are qualified enough to teach that far.

"One of the ways headteachers could think about utilising scarce resources would be to have a science or maths specialist who could teach higher sets. This is something that's being talked about now," Professor Bennett adds.

Tim Brighouse, Birmingham's chief education officer, may be able to shed light on Labour thinking.

He has held discussions with David Blunkett about work that has been done on improving standards in schools, and though not in favour of streaming, believes some setting within a mixed ability framework is a good idea.

"Providing the kids are not losing confidence or self-esteem some setting can be beneficial. Teachers find mixed-ability teaching enormously challenging," he explains.

Already very few secondary schools are mixed ability from Year 7 through to 11. Most introduce setting in about Year 8. Primary school setting is more difficult to organise, unless the school is very large, but increasing numbers of headteachers are introducing ability grouping at key stage 2, particularly in maths and language work.

"I think that the further a child gets in a particular subject the more likely it is that teachers will want to set," Tim Brighouse maintains.

At the first OFSTED annual lecture at the Royal Society of Arts yesterday, Her Majesty's new chief inspector of schools, Chris Woodhead, criticised [illegible] and ultimately irrational commitments" to orthodoxies that he says prevail in many primary schools. He urged [illegible] open to alter-

now needed to be more flexi[...]

Whether setting, or target [...]ing, becomes a big issue in [...] months remains to be seen, b[...] the increased emphasis on ac[...] ability through testing and [...] inspection — which has le[...] least 11 out of 778 primary s[...] being identified as failing [...] pupils last term — more s[...] are likely to be reviewing th[...] they teach.

PRIMARY INDEX