DOCTOR OF PHILOSOPHY

Learning to spell: development and evaluation of a spelling programme for Key Stage one

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Learning to Spell: Development and Evaluation of a Spelling Programme for Key Stage One.

Sharon Elizabeth Anne McMurray
Bachelor of Education
Bachelor of Science

A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy in the Faculty of Legal, Social and Educational Sciences (QUB).

15 September 2004
ABSTRACT

This research considers the development and evaluation of a spelling programme for children of primary-school age. The Programme is designed to ensure that all the processes involved in learning to spell are activated and that the interaction between them is facilitated. In addition, a number of innovative features within the Programme's design allow sources of spelling knowledge to be presented in a developmental sequence that allows all children to learn together, regardless of their ability.

The impact of the Programme on progress, not only in spelling tests, but also in spelling accuracy and quality in independent writing was assessed by means of a longitudinal study with a 2 x 2 quasi-experimental design. The two independent variables were (i) Experimental school (intervention) or Control school (no intervention) and (ii) high or low social disadvantage. A sample of 81 children aged 5-6 years across the four schools were followed for three years from Year Two to Year Four. A range of quantitative measures were used for baseline assessment and to establish the quantifiable outcomes for children in both the Experimental (N=43) and the Control schools (N=38). Qualitative measures were used to illuminate the processes involved in the Programme in the Experimental schools. At the end of the study pupils who had been taught using the Programme had made significant improvement in spelling and independent writing. On the basis of the findings it is argued that spelling needs to be seen as an integral tool in raising standards in literacy and that it should not be taught in isolation from other literacy skills.
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M2  January 2000  
M3  December 2000  
M4  May 2001

Harriet  
H1  June 1999  
H2  January 2000  
H3  December 2000  
H4  May 2001

Aaron  
A1  June 1999  
A2  January 2000  
A3  December 2000  
A4  May 2001

Susan  
S1  June 1999  
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S4  May 2001

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Pupils in Experimental and Control schools with Baseline Standardised Spelling Score <90
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The pages in this programme are not numbered. The starting page for each book is identifiable by a coloured page:

- Green (Stage 1)
- Blue (Stage 2)
- Yellow (Stage 3)

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Glossary

CVC - consonant- vowel-consonant

CCVC - consonant- consonant- vowel-consonant

CCCVC - consonant- consonant-consonant- vowel-consonant

CASS - Curriculum Advisory and Support Service

CCEA - Council for Curriculum, Examinations and Assessment

CSP- The Complete Spelling Programme

DENI- Department for Education Northern Ireland

ELB - Education and Library Board

TTA - Teacher Training Agency
Acknowledgements

I am indebted to my supervisor, Dr Rosemary Kilpatrick, for her invaluable guidance and advice at both an academic and personal level. She has been a great encouragement to me over the last seven years and I have no doubt that without her friendship and support the completion of this thesis would not have been possible.

I also wish to place on record my thanks to the adults and children who participated in this study. In particular I would like to mention the teachers who allowed me to influence their classroom practice and the principals for permitting the research to take place in their school.

Last, but not least, I acknowledge the help and support of my family. In particular my mother who has provided invaluable emotional and practical support for, not only myself, but my husband and three children. My children have been a source of inspiration and joy sustaining me throughout this period of intensive study. I am also eternally grateful to my husband for his encouragement and belief in me throughout this process.

Finally I would like to thank CCEA, in particular Mrs Carmel Gallagher, for their encouragement and financial support. This research study would not have been possible without this funding.
Introduction
INTRODUCTION

By way of introduction to my thesis I would like to set the personal and professional context in which my interest in the whole area of spelling developed. This introduction therefore describes experiences and observations, both professional and personal, which serve to explain how my interest in spelling, the teaching of literacy and further study combined to illuminate the spelling process within the context of the classroom. From this background, the thinking underpinning 'The Complete Spelling Programme' emerged, culminating in the development of the Programme and the subsequent decision to commence this research project for the degree of Doctor of Philosophy. This introduction also discusses the education reform that has taken place within Northern Ireland over the last fifteen years in order to set the wider context in which this study has taken place. Finally I will outline the precise purpose and aims of the study.

Creative thinking and problem solving can seldom be derived from textbooks alone. On the other hand, experience of real problems in their natural environment may shed little light on possible solutions to these problems. It is only in combining knowledge derived from a breadth of sources including the research of others working in the field with one's own critical analysis of the problem that solutions can evolve. In seeking a solution to problems encountered by teachers when teaching spelling and difficulties experienced by children in learning and applying spellings, it has been necessary to take a panoramic view; a multidisciplinary examination of all factors that might impinge on teaching and learning in this area. It is from this background of research and practice that the foundational thinking of 'The Complete Spelling Programme' evolved.

Teaching experience 1980-1991

I began my teaching career in the preparatory department of one of the leading grammar schools for boys. Initially I taught Year One (children aged four and five years) but changed year groups to teach a class of thirty Year Threes (six and seven year olds). This early teaching experience provided valuable insight into the acquisition of early
literacy skills and raised questions which have taken two decades to answer: For example:

- Why do some children experience difficulty learning to read and spell while others learn with ease?
- Why are some children able to engage successfully in problem solving activities demonstrating high levels of understanding yet they experience great difficulty with the acquisition of basic literacy skills?

The catchment for the school was from a professional and business community which could afford to pay to have children educated outside mainstream primary education. The school had a long tradition of generations from one family attending the school. Children entering the school in Year One were generally articulate, expressive and energetic and entered school with an eagerness and appetite for learning. All the children came from financially and linguistically advantaged backgrounds. Parents were keen for their children to learn and very supportive of their children and the school. There was always 100 per cent attendance at parent teacher interviews and, in the majority of cases, both parents attended. Clearly within this setting there were none of the confounding variables that have been mooted by teachers as possible reasons for failure in acquiring literacy skills, i.e. lack of parental support, low ability, disadvantaged social background and impoverished language background.

Despite these advantages, some children were experiencing difficulties in learning to spell. Many of the children experiencing these difficulties showed advanced thinking in problem solving activities. From my own growing experience in teaching and interest in literacy development, I realized there were shortcomings in the traditional teaching of spelling.

In search of possible answers to the problems I observed, I administered the series of Quest diagnostic tests to those children experiencing difficulties. These tests highlighted difficulties in visual (lexical) and/or auditory (phonological) processing. I also conducted an analysis of the errors children were making in their spelling tests and independent writing. Furthermore, I differentiated between their ability to spell patterns
and sequences and words that are regular in phoneme-to-grapheme mapping and their ability to spell high frequency words and words that are not regular in phoneme–to–grapheme mappings. The results from my testing revealed difficulties in spelling regular and irregular words and difficulties in auditory and visual processing. The results are presented in the quadrant below, showing four learning groups. This quadrant (Figure 1) shows the four groups within my class, based on their spelling errors, showing effects of differing processing strengths and weaknesses.

Figure 1 : Effects on Spelling of Processing Strengths and Weaknesses

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Group one displayed strong auditory and visual skills and achieved high scores in spelling tests.
Group two displayed strong visual but poor auditory skills, achieving high scores with high frequency words that are visually different. However they achieved low scores with patterns and sequences that were visually similar and required good phonological discrimination.
Group three displayed strong auditory but poor visual skills, achieving higher scores with words where there was phoneme-to-grapheme transparency and lower scores with words where there was no phoneme/grapheme transparency i.e. high frequency words. Group four displayed difficulty with auditory and visual skills and achieved low scores in spelling tests.

As well as the processing difficulties identified by the Quest tests I made the following observations about spelling behaviours within Key Stage One classrooms.

- The reason for learning to spell was not understood by children. They related the words they learned to daily tests and not to independent writing. Often words retained long enough for the class test were forgotten in independent writing activities.
- The use of alphabet wordbooks appeared to inhibit creativity and interrupted the thought processes necessary to construct written language (text) independently. Children who were able to retrieve spellings automatically were at a considerable advantage. The performance of some very competent children orally was limited in written text. These children seemed to limit their writing to words they could spell because they were resistant to using alphabet wordbooks which they found tedious.
- Children did not feel confident enough to attempt to spell words themselves and needed a sufficient degree of success to enable their confidence to grow. The teaching of spelling was needed to ensure that what was learned could be retained and applied in independent writing.
- Words targeted for spelling needed to be those required in independent writing. High frequency words were also required as an essential component of any spelling programme which would be put in place.
- Teaching had to ensure that children could reason by analogy (i.e. if I can spell *can* I can spell *ran, man, fan*) to reduce the burden on memory.
- Able spellers needed to be challenged, so additional, more challenging words of specific interest were required for this group.
- The demands on teaching time were considerable in a class of 30 children. It was not possible to teach four different spelling groups about the meaning,
usage, visual features and phonology of the words that they were learning to spell.

- Movement between spelling groups was constrained because, with time, children in the below average and bottom groups fell further and further behind the rest of the class. This had a serious effect on motivation and self esteem.
- Use of the strategy ‘Look, Cover, Write and Check’ (Peters 1985, p66) did not ensure successful retention. It appeared necessary to find a way of helping children to retain a visual image of the word and improve visual sequential memory.

I also recognised that the problem was not confined to these factors which affected children's learning. Teachers' knowledge, understanding and degree of expertise in the purpose of spelling and methods used to teach it was variable.

In the school year 1987 -1988 possible solutions were emerging and in the school year 1988-1989 the methodology and approach to differentiation as used in 'The Complete Spelling Programme' were developed and the first spelling lists emerged.

1991-1996 A new direction

In September 1989 the first of my three children was born. This propelled me into a new and totally unfamiliar world of severe learning difficulties, (i.e. IQ lower than 50); my son was born with Down's Syndrome and congenital heart disease. His learning difficulties are at the severe end of the ability range, unlike many children with Down's Syndrome who are mildly affected by the condition. The first of his two sisters was born ten months and three weeks later and much was to be learned from the rich experience of observing normal and handicapped development side by side.

Growing knowledge about learning in relation to children with severe learning difficulties confirmed my beliefs that the problems of literacy skills acquisition experienced by children within the normal range of ability were at the level of automaticity in phonological and lexical processing and not related to higher level
abilities to think and problem-solve. Many children with severe learning difficulties can read fluently but cannot engage effectively in problem-solving or comprehension activities. Recall of spelling words can exist when automatic processes are working effectively at a subconscious or implicit level as is the case for some children who have very low levels of cognitive ability. This can occur without any higher order thinking abilities being involved.

In cases (identified in children within the normal ability range) where these phonological and lexical processes are deficient, the recall of spelling words will be affected. It is therefore essential to make certain that these automatic processes develop to ensure success when recalling a spelling sequence and also equally important; the preservation of self esteem. Many children suffer considerable loss of self-esteem when they experience difficulties with tasks that other children find easy e.g. simple recall of a sequence of letters that together make up a word.

Learning to spell is about learning to write independently and confidently. If spelling is only considered to be a process of simple recall of letters in a word there is little chance of improvement in application in independent writing. Within the context of the mainstream classroom, teaching spelling must go beyond the simple recall of a sequence of letters that make up a word.

The Medical Dimension: How can medical science illuminate what may be happening in cognitive processing?

Another pivotal experience in the development of my understanding occurred in 1991 when I had to take my son, who was 22 months old to see a consultant eye specialist about his poor vision. The eye specialist recommended that his right eye be patched for one hour every day. He explained that if this were not done, the vision would fail to develop in the weaker left eye because the stronger right eye was doing all the seeing. The left eye would not learn to see, even though it had the capacity to do so, and he warned that if we did not activate the vision in the left eye, by the time my son would be eight years of age he would be blind in that eye. He stated that the years, from birth to
eight years of age, are critical for the development of vision. Beyond the age of eight years there is limited improvement; further stimulation is non-productive. This led me to ask the question: Are there critical periods for development in other areas of the brain?

It seems possible, based on the example of the development of vision, that there may be a critical period for activating other neural activity in the brain. For example if, because of weaknesses in phonological processing, visual processes do all the work, phonological processes may fail to develop or vice versa. Is it possible that potential for further development will be lost?

**Further Professional development**

I needed to find answers to the many questions that were emerging. It was necessary for me to look beyond my own beliefs and observations to find evidence to support my theories and in 1993 I embarked upon study for a Diploma in Advanced Studies in Education (Special) at Queens University, Belfast and, in 1994 a Bachelor of Science Degree with The Open University (psychology based). This period of intensive study affirmed my ideas and commitment to the further development of the method, and also to the sequence of spellings, which had been devised as a result of observations in classroom teaching and analyses of words children could spell and those they could not. These early lists were to form the basis of 'The Complete Spelling Programme'.

**Spelling and Writing**

'Normal successful literacy does not mean that reading and spelling is absolutely flawless, but it means that it is automatic. Reading and spelling are activities that, after practice, normally can be carried out without conscious effort. They are automatic activities in a sense that we can do other things at the same time.'

(Frith, 1990, p1)
If children can process words automatically, without conscious effort, then it leaves other cognitive processes free to deal with higher order thinking skills such as comprehension and composition. What ‘practice’ is needed?

It appeared to me that a shift in the thinking of practising teachers in the classroom was needed. Spelling is currently seen as a low level secretarial or transcription skill (Graves 1983) however, if independent writing is a goal in learning to spell, spelling must be viewed as a high level text generation component within an independent writing system. If spelling is to be used as a tool to enhance independent writing it must be acknowledged that syntactic and semantic knowledge have an important part to play in the appropriate choice of words to express ideas. The accurate recall of the sequence of letters making up a word will then depend on phonological, graphemic, semantic and syntactic knowledge working together to assist in accurate recall.

Learning to spell is a complex process involving the:

- development of effective learning strategies to process a sequence of letters into memory;
- organization of storage of this sequence in long term memory ensuring development of connections which enable effective retrieval;
- development of understanding of the meaning and usage of this sequence so that it may be used appropriately in independent writing.

As already indicated children experiencing difficulty fail to make the progress necessary to ensure freedom in the writing domain. Writing becomes restricted by a limited ability to maintain and retrieve spellings from memory and disaffection with the process of writing develops as the child becomes dependent on sourcing words externally. The flow in writing may be broken by the process of having to use a personal word book, and/or queue up to ask the teacher to spell a word having first had to find the initial letter in an alphabetical word book. Some children learn to spell easily and perform well in spelling tests but fail to apply these spellings in independent writing; the semantic link that facilitates transfer to independent writing has not been developed.
How can all children be helped to achieve success in learning to spell? How can spelling in independent writing be improved? As Frith (1990) rightly points out, spelling is an activity that after ‘practice’ can be carried out automatically. What ‘practice’ is needed to bring about this spelling automaticity?

The Intensive Development Stage 1994-1998

‘The Complete Spelling Programme’ (McMurray & Fleming, 1998) developed as a result of a complex and exhaustive curriculum development process that began in my own classroom in 1987. The methodology, which was developed in those early days, remains virtually unchanged. The Programme is designed to improve spelling through enhanced auditory and visual processing by presenting two different types of words daily and introducing two new strategies for learning, retaining and retrieving these. The first of these strategies is the ‘single group with extensions’ approach to differentiation (McMurray, 1988) which enables all children to learn together throughout primary education. This ‘single group with extensions’ has three clearly defined levels, the lowest level being the core Programme that all children follow. The two extension levels further increase spelling knowledge for more able spellers. The focus is on different learning outcomes for the various ability groups to ensure that every child is challenged in their learning.

The second innovative teaching strategy, ‘Listen, Search, Select and Write’ (McMurray, 1996) allows children with severe phonological difficulties to move through the Programme’s rhyme element at the same pace as the rest of the class. This strategy facilitates the development of sound /symbol relationship which has been shown to be causally related to reading acquisition (Bradley & Bryant, 1983; Goswami & Bryant, 1990; Adams, 1990).

The introduction of visualisation as part of the Look, Cover, Write and Check strategy enables children to make effective use of this strategy ensuring that they can ‘visualise’ the word at the ‘Look’ stage.
In the school year 1994/1995, Christine Fleming joined me as co-author and together we developed the approach into a programme for Key Stage One in primary schools with support materials to reinforce learning and further enhance retrieval from memory. During this developmental phase, the content of the Programme went through many revisions and culminated in the piloting of the Programme in 1997/1998. Following this pilot minor amendments were made to the spelling programme and there was substantial development of the support materials. The Teachers' Manuals for Stages One, Two and Three of the Programme were finalised in 1998 and the support materials in 1999. 'The Complete Spelling Programme' is presently (2004) in use in just over 15 percent of schools in Northern Ireland.

In highlighting the merits of a teaching approach that takes account of multiple intelligence theory Jenson (1995) explains the difference between a great and average teacher. He argues that an average teacher, teaches so that at any given time, 60 percent to 80 percent of the class experience success. A great teacher teaches, so that at any given time 60 percent to 80 percent of the class experience success. So, what is the difference between the average and the great teacher? With the average teacher, it’s the same 60 percent to 80 percent who are learning all of the time. With a great teacher, a different 60 percent to 80 percent are learning every day.

The underlying message here is also applicable to the design of a spelling curriculum or any other curriculum for that matter. If the curriculum fails to allow all children to progress then the curriculum is merely average!

The Wider Education Context

Since the late 80s to the present day education in the United Kingdom has gone through a period of reform (Education Reform Order, 1988, [England & Wales]; Education Reform Order, 1989, [Northern Ireland]). The National Curriculum (England and Wales) and the Common Curriculum (Northern Ireland) introduced a core curricula for all primary and post primary pupils. This core curricula in primary schools includes the
three main subject areas of Literacy, Numeracy and Science and Technology with other compulsory subjects such as Religious Education, History, Geography, Art & Design, Physical Education and Music also being included. These curricular areas are set out in The Programmes of Study (DENI, 1990) and each Programme of Study outlines the types of educational experience and activities that children should be given throughout their schooling. In addition to these subjects, there are the cross curricular themes of Education for Mutual Understanding, Cultural Heritage, Health Education and Information Technology. The Programmes of Study leave the methods for implementation of this content to the discretion of the teacher.

The Education Reform Order (NI) 1989 divided compulsory schooling into four Key Stages. The primary school was divided into Key Stages One and Two (KS1 & KS2) and the post-primary being divided into Key Stages Three and Four (KS3 & KS4). In Northern Ireland KS1 refers to the school Years One -Four for pupils aged four-eight years of age and KS2 refers to the school Years Five-Seven for pupils eight-eleven years of age.

Within the Programmes of Study, the expected outcomes for each curricular area are divided into attainment targets with accompanying level descriptors. It is generally accepted that a child will take approximately 18 months to achieve an individual level.

Statutory assessment arrangements in Literacy and Numeracy were introduced in 1998. These statutory assessments are carried out at the end of each Key Stage. The assessments are based on the teacher's professional judgement of the level at which a child is working and involve the compulsory use of Assessment Units to confirm the teacher's judgement. This process is externally moderated every three years to ensure consistency within and between schools. Schools are required to return the results of these assessments to The Council for Curriculum, Examinations and Assessment (CCEA) and also to report to parents on their child's overall level of achievement in each subject. By the end of Key Stage One it is expected that the majority of pupils will be working at Level 2. By the end of Key Stage Two, it is expected that the majority of children will be working at Level 3 or 4.
Reform was ongoing and in 1996 the Education (NI) Order (DENI 1996) introduced the Code of Practice for the Assessment and Identification of Special Educational Needs into Northern Ireland. The 1996 Education (N I) Order followed the 1993 Education Act (England and Wales) which introduced the Code of Practice in England and Wales. With it came a movement towards more inclusive practice, although inclusion of children with special educational needs within mainstream schools is not compulsory.

In 1996 the National Literacy Project (NLP), a two year pilot study aimed at raising standards in a large number of struggling schools in England, was introduced in England and Wales and was followed by the National Literacy Strategy (NLS) (1998). The NLS introduced a prescriptive framework for use in schools in England and Wales (DFEE, 2000).

In Northern Ireland the Raising Schools' Standards Initiative (RSSI) (DENI, 1997) began and was replaced by a revised initiative, the School Improvement Programme in February 1998. This initiative was aimed at raising standards in Northern Ireland schools and included six documents covering recommendations for school improvement. (This initiative required schools to draw up a whole school improvement plan outlining goals to achieve set targets.) One of the documents contained within the 'School Improvement Programme' was 'A Strategy for the Promotion of Literacy and Numeracy in Primary and Secondary Schools in Northern Ireland' (DENI 1998). It introduced the Northern Ireland Literacy Strategy which was to be led by the Curriculum Advisory Service for English within each of the Education and Library Boards (ELBs). Additional ELB Curriculum and Advisory Support Officers were appointed to provide the necessary support for schools wanting to enter the Literacy Strategy. Schools themselves were to appoint co-ordinators to develop Literacy and Numeracy within their schools, with an emphasis on target setting and self evaluation. Reading Recovery was recommended within this strategy as an early reading intervention for children struggling to learn to read after one year of formal schooling (i.e., Year Two). The Northern Ireland Curriculum is currently under review (CCEA, 2002). The review period runs from 1999-2004.
Rationale and aims of this Study

This research project focuses on the development and evaluation of a classroom-based intervention designed to resolve problems identified in teaching and learning. It is intended to evaluate the effectiveness of 'The Complete Spelling Programme' and to consider its theoretical base. It is hoped that the theoretical basis for this intervention, together with the identified outcomes (in terms of changes in classroom practice, increased understanding of the learning process in this area and measurable outcomes in terms of pupil attainment), will clarify for teachers how greater success for all children may be achieved.

A small scale, longitudinal research study was conducted in four schools to test the effectiveness and impact of the programme on children's spelling accuracy, not only in spelling tests but also in independent writing.

In Chapter One I will seek to clarify the cognitive processes that are involved in learning to spell and that have influenced the development of this Programme. Following on from this, Chapter Two discusses the sources of knowledge in learning to spell and current influences on the teaching of spelling in Northern Ireland schools. Chapter Three considers other factors that have been found to affect learning and discusses the need to create a positive learning environment and success for all children. Chapter four describes the programme itself and how it should be implemented. Chapter Five outlines the methodological considerations in carrying out this research and the chosen methodologies. Chapters Six and Seven report the quantitative and qualitative findings and discuss each in turn. Chapter Eight considers the progress of four case study children in an effort to evaluate the Programme for the range of abilities within the mainstream classroom. Finally, Chapter Nine discusses these findings and makes recommendations arising from them.
Chapter 1

Processes in Learning to Spell
CHAPTER 1

PROCESSES IN LEARNING TO SPELL

Spelling has not had the attention in research or in the development of classroom practice that reading has been afforded. Many teachers would admit to knowing very little about the processes involved in learning to spell. Why do some pupils need little or no teaching while others experience difficulties that may be minor and temporary or major and life-long? Traditionally, learning to spell in English was considered a matter of rote visual memorization. According to Treiman (1994, 1998), proponents of this traditional view believed that children memorize the sequence of letters in each word with no reference to sounds in words, or patterns that apply to more than one word at a time. Indeed Peters (1970, 1985, 1992, 1993), whose influence on spelling within classrooms in the UK has been considerable, also believed that the most important attribute in spelling was good visual perception. Learning to spell according to Peters (1993, p180):

'depends on looking carefully at words containing the same letter sequences without regard to sound'

Furthermore, Schonell (1957), another influential writer within the UK, emphasised visual in preference to auditory learning; he discouraged the division of words into syllables as he believed this distorted the pattern or schema of the word being learned. His ‘Essentials in Teaching and Testing Spelling’ (1932, reprint 1957 revised by P. Wise 1985) was still in common use in schools in Northern Ireland at the outset of this research study.

The 1980s saw the beginning of a new focus on research into spelling largely due to the collection of papers edited by Uta Frith (1980) entitled ‘Cognitive Processes in Spelling’. This volume drew attention to issues in spelling that had not previously been addressed such as the importance of phonology in learning to spell and the accessibility of different routes for spelling.
Brown and Ellis (1994) building on the work of Frith (1980) introduced new research findings. As they identified, a recurrent theme emerging from the research reported in this volume was the interactive nature of spelling development. Researchers were proposing that several different knowledge sources interact continuously when spelling.

The stage models of spelling development that have influenced thinking and practice amongst professionals in education will be considered first of all. Then the implications of more recent research studies will be used to which challenge the stage model, the argument being that there is not a distinct movement from one stage to the next, but that stages develop side by side as part of an interactive process.

Next there will be discussion on how spellings are processed, from input to output, with particular reference to the well-established 'dual-route model' and its identified strengths and weaknesses. Spelling in prelingual deafness, brain damage and hyperlexia will be examined next, and arising from this, implicit and explicit learning and memory theory will be considered in relation to spelling.

The recent emergence of new models of spelling development in the form of connectionist models will be considered as they present a model of unitary processing. These new connectionist models may go some way towards offering an explanation of how phonological and orthographic processes, which can function independently, integrate and interact in effective spelling. The case for a possible critical period for the development of auditory and visual processing will be considered next with reference to neurological development in other areas. Finally relevant findings from research into spelling in languages other than English, will also be reviewed.

1.1 Developmental stage models

A number of developmental models of spelling where stages in spelling development emerge sequentially have been proposed. One such model is that advocated by Marsh, Freidman, Welsh, Desberg, and Welsh (1980). On the basis of their finding that both
very able spellers and less able spellers make considerable use of visual information, they put forward the following series of developmental stages in spelling:

- a sequential phonemic encoding strategy, in which a word is processed in left to right serial order when unknown words are being spelled. A visual representation of this word is stored in memory;
- a later hierarchical encoding strategy, based upon conditional rules, which develops more slowly than the previous strategy and over a longer period of time.
- the use of analogy (the spelling of unknown words by comparing their sound with wholes and parts of already known words and selecting the most likely combination from visual memory).

Concurrent with this model Gentry (1982) proposed another sequential stage model. Gentry’s levels of spelling development were based on the analysis of writing samples of children whose attainments were within the normal range of ability. The stages proposed by Gentry are as follows:

1. Precommunicative stage: writing is predominantly scribble writing.
2. Semiphonetic stage: spelling is identified by partial sound symbol relationship; one or two letters in a word may represent the word.
3. Phonetic stage: words are spelt as they sound with no visual reference eg 'nite' for 'night' or 'becos' for 'because'.
4. Transitional stage: spellings look more like standard spellings. There is awareness of patterns and sequences.
5. Correct stage: most spellings are close to accepted orthography.

Uta Frith (1985) proposed a 3-phase model of stages in reading and writing acquisition, incorporating six steps in total. She proposed that in normal development, reading and spelling may develop in advance of each other, with reading preceding spelling or vice versa depending on the developmental stage. Frith (1985, p313) regards progress in literacy as:
'an alternating shift of balance between reading and spelling. Reading is the pacemaker for the logographic strategy, writing for the alphabetic strategy, and reading again for the orthographic one.'

These three basic phases are subdivided into 6 stages:

1. Logographic phase: (Look and Say) Children recognise words as visual patterns. They look at salient features. They have no way of deciphering new words except guessing if a word is in context. In the first part of this phase (stage 1a) reading is logographic and spelling symbolic. In the second part of this phase (stage 1b) both reading and spelling are logographic.

2. Alphabetic phase: (phonological consideration) Children begin to learn letter to sound correspondence. In the first part of this phase (stage 2a) reading continues to be logographic, however, writing has begun to be alphabetic at a simple level. At the second part of this phase (stage 2b) both reading and spelling are alphabetic.

3. Orthographic phase: The final phase is characterised by the instant recognition of words as orthographic units without phonological conversion based on strategies such as morphemic units or letter strings. At stage 3a, reading is orthographic whilst spelling remains alphabetic. At stage 3b both reading and spelling are orthographic. Through experiencing regularly occurring letter clusters, children begin to see that some sequences of letters share the same sound. The child can, at this stage, use reasoning by analogy in order to generate rules, both for more efficient decoding of text during the reading process, and for encoding of text when spelling.

It is the sequential model of spelling development, proposed by Gentry (1981, 1982, 1993) that is generally accepted, within Northern Ireland, as the model that best explains spelling development in primary age children. More recent research evidence, however, challenges this sequential view of spelling development. Research conducted by Lennox and Siegel (1994) points out that as well as being sequential these models all propose a shift in emphasis. This shift in emphasis is in favour of visual memory, in the later stages of spelling development. Lennox and Siegel (1994, p96) refer to an earlier investigation they carried out which suggests that phonological and visual skills develop in parallel from the early years through to adolescence:
‘...although changes in the relative use of phonological strategies or strategies based on the use of visual memory skills can be seen in normal spellers ....... At any given time, children will use all of the strategies available to them to spell.’ (Lennox and Siegel, 1994, P96)

They go on to argue that as children get older they have more knowledge on which to base their spelling decisions and therefore there is greater evidence of the use of visual memory skills and the use of analogy. They believe that as children decode words, they store this information in visual memory and are able to draw on this knowledge to spell unknown words using analogy. A vital point that they make is that the use of analogy to a word in visual memory is reliant upon earlier successful application of phonological knowledge. They draw on further evidence from Gough, Juel and Griffiths (1992) that suggests that reading and spelling are based on the translation of print to spoken words but that specific lexical knowledge is also needed, neither being sufficient on their own. Based on their research of spelling development in good and poor readers, Lennox and Siegel (1994, p100) propose that the reason phonological and visual skills appear to characterise particular stages in spelling development is ‘in reality, a preponderance of use of one or other strategy, rather than use of one strategy in an absolute sense.’

In analysing the errors made by beginning spellers, Treiman (1993) notes that children use a variety of sources of information drawing on their pre-existing and developing knowledge. This developing knowledge includes information about phonological forms of spoken words, the names of letters and the sequences of letters that make up printed words. From this evidence Treiman (1994) argues that it is unlikely that spelling development progresses through a series of qualitatively distinct stages in which different sources of knowledge are used. According to Treiman (1994), it is more likely that development is continuous, reflecting gradual improvements in children’s phonological and orthographic knowledge.

Goswami and Bryant (1990, p146) put forward their own developmental theory for reading and spelling, claiming that it is not a stage model because they ‘do not think that children take a series of discrete and identifiable steps when they learn to read and spell’. Indeed they question the claim by Frith (1985) and Marsh (1980) that children
spell logographically before they spell alphabetically. Furthermore they question the 'narrow' focus on phoneme awareness and the 'apparent reluctance' to acknowledge that children recognise sequences of letters and relate them to sounds at a relatively early stage. They believe the phonological skill that children bring to writing (and reading) is the ability to segment words into their onset and rime. Consequently they advance a theory which 'concentrates on causal connections' (p146). They consider three main causal factors in the development of reading and spelling:

1. sensitivity to sound and the ability to recognise common rimes and onsets;
2. alphabetic knowledge - 'there is no doubt that for children of five and six years of age, the experience of being taught to read and spell is an extremely effective way to learn about phonemes' (p148)
3. the link between reading and spelling. The experiences children have when reading influences the way they spell, and this knowledge of spelling affects their reading. After two years of reading experience, children begin to make connections between reading and spelling. Up until this time they are carrying them out in different ways. They begin to use visual reference, noting the visual differences in words as well as the auditory similarities.

Although they admit that this model is purely speculative, it nevertheless recognises that there may be problems in oversimplifying spelling development into sequential stages.

1.2 Cognitive Processes - What happens from input of a spoken word to output of the written spelling?

1.2.1 The 'dual-route model' of spelling production

According to Barry (1992), the dual-route model of spelling production is widely accepted as an explanatory framework for spelling in adults. The model suggests that there are two separable processing 'routes' (See Figure 2). These routes are a sequence of cognitive processing systems that can, to some extent, be isolated from other systems. The 'lexical route' retrieves spellings of known words from the orthographic (graphemic) output lexicon (a permanent memory structure) and the 'assembled'
(phonic) route constructs spellings by applying sound to spelling correspondences. These correspondences are often referred to as phoneme-to-grapheme correspondences.

Figure 2. The Dual Route Model of Spelling Production

Source: Barry (1994, p32)
The lexical route, according to Barry (1992, 1994), does not work for spelling any unknown words or non-words. He suggests (1994) that in dictated spelling, a target word, processed via the lexical route, would be recognised and its corresponding representation activated in the orthographic output lexicon. This would be achieved by either the word’s meaning or by its output phonology. The ‘assembled’ route, on the other hand, operates by using existing knowledge of how the constituent sounds in the words are produced in spelling.

‘In the dictation task, the phonological form of a spoken item would be held in a phonological temporary buffer which may be akin to the ‘articulatory’ loop of short term memory) and segmented in some way in order to apply a process of sound-to –spelling conversion’ (p32)

This assembled route would produce reliable spellings of ‘regular’ words and produce phonologically plausible misspellings for irregular words. However, as Barry points out, words entirely dependent on lexical knowledge e.g. ‘yacht’ could not be produced accurately.

Once a spelling has been retrieved via the ‘lexicon’ or ‘assembled’ route in the phonological temporary buffer, it is placed in the graphemic output buffer (GOB), to be produced in written or spoken form once the output processes are completed.

Barry (1992, 1994) argues that it is reasonable to assume that the lexical route is more dependable than the assembled route, with the assembled route being used only as a ‘back up’ when attempting unknown spellings or where there is uncertainty about a word’s correct spelling. It may also be possible that not all words are stored in the lexicon and that the assembled route is used to generate the spelling of less frequently used regular words.

If spelling requires interaction between phonological and visual skills as suggested by Lennox and Siegel (1994) and Treiman (1994), it may be deduced that both routes need to be operating fully to have normal correct spelling consequently if either route is not functioning fully then it would not be possible to spell correctly. As Brown and Ellis (1994) point out, this allows for the possibility that developmental disorders of reading
and spelling may be characterised in terms of an over reliance on one of the two routes. They deduce from this that the dual route approach has important conceptual links with the theory that children pass through developmental stages when learning to spell, and that impaired development can be characterised in terms of an inability to pass beyond a particular stage. However, given the evidence from Goswami and Bryant (1990), Lennox and Siegel (1994) and Treiman (1994) which provides strong evidence of an interactive rather than sequential process, a more likely explanation may be that there are problems in the development of one of these routes which makes compatible interaction extremely difficult, if not impossible. This impaired development may appear to be a failure to move from one stage to the next but in reality may be the result of a failure to 'thrive' on the part of one of these processing routes preventing cognitive interaction therefore inhibiting further development.

1.2.2 Neuropsychological Evidence

Since 1980, cognitive neuropsychology, and in particular the study of spelling impairments in neurological patients, has been used to inform theories of normal processing. As Barry (1994) indicates the study of dysfunctional spelling performance has been used in preference to studying normal spelling performance because of the methodological difficulties in studying spelling directly. He argues that if a patient can no longer, as a result of brain damage, perform a particular task whilst being able to perform another task of similar difficulty quite normally, then this dissociation between these equivalent tasks supports theories of the existence of two separate processing systems or modules responsible for these tasks.

Barry (1994) considers evidence from phonological, surface and deep dysgraphia as sources of support for the dual route model. He interprets phonological dysgraphia as a condition where the assembled spelling route has been damaged resulting in an inability to spell non-words. However, because the lexical route is fully functional, spelling is accurate showing no phonetically implausible errors. Therefore, any errors that do occur cannot be pronounced by applying straightforward phoneme-to-grapheme mappings. Frequently produced errors would be in letter order, for example, 'knife-
kinfe'. Barry (1994) argues that it is unclear how phonological dygraphics retrieve lexical spellings but it seems probable that the semantic route may be involved. Furthermore, he suggests that their spelling accuracy, in the presence of limited ability to use phonological processes to spell non-words, indicates that an entirely intact assembled route is not essential for word spelling. Another interpretation is, however, possible. It could be construed that an intact lexical system comes with prior learning which will have been embedded as a result of previous phonological processing (Lennox and Siegel, 1994) and visual processing.

Barry (1994) argues that there may be three different lexical routes to the orthographic output lexicon, the first being a semantically mediated spelling route (L-sem, Figure 3).

In support of this theory, he contends (with particular reference to dictation tasks, and drawing on evidence from deep dysgraphia) that it is reasonable to assume that there is a connection from the auditory input lexicon to the semantic system to enable the comprehension of spoken words. Patients suffering from deep dysgraphia are unable to spell non-words, have greater success spelling concrete as opposed to abstract words and make semantic errors in dictation e.g. time – clock. The interpretation of this, Barry maintains is that patients are not spelling via the assembled route as they cannot spell non-words and show no sound to spelling regularity effect. The semantic errors and inability to spell abstract words suggests that they are spelling via the semantic route.

The second route proposed by Barry is spelling through the auditory output lexicon. (L-phon Figure 3) When a word is identified in the auditory output lexicon, its output phonology is activated, either directly or via the semantic system. Evidence from patients exhibiting homophone substitution errors indicates that the route from the semantic system to the orthographic output lexicon is disconnected. Patients spelling from the phonological output lexicon to the orthographic output lexicon without mediation from the semantic system exhibit difficulties in spelling homophones.
Figure 3. Routes to the orthographic output lexicon

Source: Barry (1994, p45)
Barry (1994) puts forward the possible existence of a third lexical route to the orthographic output lexicon. He refers to this direct connection with the auditory input lexicon as L-dir (Figure 3). Although he acknowledges that this theory is not widely accepted among researchers.

The evidence for phonological processes working entirely independently is less clear. Barry (1994) found that in the case of surface dysgraphia, not all irregular words cause difficulty indicating that not all lexical orthographic representations are inaccessible. (Patients with surface dysgraphia experience difficulty spelling ambiguous and irregular words producing phonologically plausible spellings). Nonetheless, the extent of the production of phonologically plausible errors shows that lexical processes are unable to interact with phonological processes in a way that makes spelling output accurate.

It is clear from the evidence presented so far that there are two modular systems, one responsible for processing lexical (visual) information and the other responsible for processing phonological information. Evidence from the study of errors of patients who have suffered brain damage suggests that these lexical and phonological modules can function independently of each other but in doing so they fail to be able to produce accurate spelling highlighting the importance of interaction between these processes. However, this evidence fails to shed light on how these processes function and work together for children who have not suffered any neurological damage but whose performance varies along a continuum from good spelling skills to poor spelling skills.

1.2.3 Good and poor spellers

Lennox and Siegel (1994) reviewed the research findings from studies on spelling which compared the performance of good and poor spellers. The methodology used in these studies was an analysis of misspellings. As Lennox and Siegel (1994) indicate, this type of analysis can reveal whether spelling errors approximate the sound of the word, (indicating use of a phonological strategy), or resemble the visual appearance of the word (thus indicating a visual strategy). Analysis of misspellings can also reveal whether both strategies have been used in combination. Lennox and Siegel (1994),
drawing on research such as that of Bradley (1988), contend that although there may be difficulties in interpreting findings (due to variations in sample size, tests used and composition of comparison groups), results from research support the view that phonological skills are of primary importance in the development of spelling.

Furthermore, as discussed earlier, it has been proposed that there is a shift in development from a phonological stage in spelling. This shift is recognised by a number of researchers who variously refer to it as a 'transitional stage' (Gentry, 1981; 1982) or 'an orthographic stage' (Frith, 1985) or a 'morphemic stage' (Ehri, 1986) where adults and older children rely on visual patterns and reasoning by analogy.

Lennox and Siegel (1994) investigated this proposed shift in development. It was found that children with normal spelling abilities (that is, good readers and good spellers) develop visual skills and the use of analogy from exposure to print 'in tandem' with phonological skills. They noted that, however, it is not until spelling development is more advanced that the use of analogy is common. On the other hand, the group of children who were poor readers and poor spellers were found to rely on visual memory skills and orthographic conventions because they had difficulty using phonological skills. However, those children who were poor spellers but good readers were able to use phonological skills in their spelling but had more difficulty than good readers and spellers in choosing the correct orthographic representation of a word from the phonologically accurate alternatives because they had deficits in visual memory and lack awareness of orthographic patterns.

As a result of their research Lennox and Siegel (1994) believe that phonological skills are of primary importance in spelling development. It can be seen from their research that children with poor phonological skills have the greatest problems with spelling. However, some children who are deaf from birth can learn to spell successfully, although they have no experience of the spoken word and therefore no access to the sound system. Or have they? Is phonological structure only accessible through the spoken word?
1.2.4 Prelingual deafness

The spelling skills of deaf children are of interest because they may reveal the extent to which effective spelling is dependent upon normally acquired spoken phonological structures (Campbell, 1994). If this group of children have no access to phonological skills, it could be expected that these spelling errors would be similar to those of patients who have suffered brain damage to the area of the brain responsible for phonological processing. How do deaf children learn to spell without access to the spoken word?

Based on the evidence from Gibson, Shurcliff and Yonas's (1970, p71) research carried out with deaf college students, it could be perceived that phonological skills are not required in reading and spelling.

'An intelligent deaf child does master and use the regular spelling patterns of the language in processing graphic material and is facilitated by the presence. The redundancy contributed by invariant mapping to speech sounds may well make it easier for the hearing child to pick up the common spelling patterns and regularities as he learns to read, but clearly it can be done without this.'

However, the more recent research of Campbell (1994), Campbell, Burden and Wright (1992), Sterne and Goswami (2000) and Leybaert and Lechat (2001) suggests that deaf children can draw on phonological skills in certain conditions. Campbell (1994, p256) argues that because there is significant evidence of a relationship between phonemic awareness and reading and spelling in normally hearing children this indicates that orthographic regularities are not solely achieved from exposure to written forms. She argues that deaf learners can make use of phonological structures in spelling and suggests that one possibility of how they can achieve this, with a very under specified phonological base, is that orthographic skills enhance and inform phonological ones in an interactive way. As a result of exposure to written words, regularities may emerge which educate the phonological level of representation into more detailed ones:

'the deaf reader-speller could through exposure to written forms, refine and extend the necessary knowledge of letters in words through more abstract, amodal and phonological processes. These may, phenomenologically, be unlike the 'speech in the head' p256
Sterne and Goswami (2000) investigated whether deaf children have phonological awareness at the three linguistic levels of syllable, rhymes, and phoneme, and the extent to which the development of these levels of phonological awareness is dependent on reading. Their results showed that deaf children with an average reading age of 7 years 6 months showed some phonological awareness at all three levels. They found that deaf children performed less well than children in the control group who were able to hear but who were younger. Deaf children developed phonological representations that were under specified because they had limited access to auditory speech information which impacted the development of a phonologically structured lexicon. Nonetheless deaf children demonstrated good segmental organisation at the level of the syllable. They showed some segmental organisation at the level of onset and rhyme, although this is less well developed than in younger children. Segmental organisation at the level of the phoneme was found to be dependent on a reading task. These results led to the conclusion that the most important factor for the development of phonological awareness in deaf children may be linguistic experience. Although orthographic information aids the development of phonological awareness in deaf children, it does not provide a complete explanation of the development of segmental awareness.

Leybaert and Lechat (2001) found that the linguistic experience of deaf children who exclusively used lip reading was inferior to that of children who had the additional support of cued speech (CS). In cued speech, the speaker complements speech (lip reading) with manual clues. A cue consists of two parameters: hand shape and hand placement around the mouth. Children who have been exposed to cued speech early and intensively at home 'develop a spelling production system strongly guided by phonology. Their misspellings are most of the time phonologically accurate.' p555

Leybaert and Lechat (2001, p561) argue that it is reasonable to conclude that the spelling of deaf children is phonologically guided depending on their language experience.

'A critical condition ensuring adequate spelling development seems to be early and intensive exposure to a system that makes phonological distinctions of spoken language visually accessible. A late and less
intensive exposure to systems like CS does not have the same effect on the use of phoneme-to-grapheme correspondences.'

These findings of Leybaert and Lechat (2001) are important not only because they suggest that deaf children have access to phonology but because they indicate that there is a critical period for this development.

A study by Aaron, Wilcynoki and Keetay (1998) that involved deaf and hearing subjects from Grade 5 through to Grade 12 found that word specific memory, which is thought to be rote visual memory for whole words, may be memory for intraword letter patterns conditioned by the frequency of their occurrence in print. Stochastic memory (Peters (1992), operates at an abstract level in that the probabilities of letters occurring in certain sequences are remembered as the subject becomes sensitised to these patterns. Knowledge of this form of computational probabilities can form the basis of rules for generating acceptable spellings. Aaron et al's (1998) observation that deaf subjects were better at spelling pronounceable non-words (orthographically legal non-words) than non-pronounceable non-words (orthographically illegal words), suggests that word specific memory may not be entirely rule free since these deaf subjects were highly sensitive to the extent the non words adhered to English spelling patterns. Furthermore it is difficult to separate orthography and phonology because: Aaron et al (1998, p408)

'orthography (spelling patterns from which stochastic rules are derived) and phonology are closely interrelated and developmentally become amalgamated.'

These studies in finding that, if deaf children of normal ability can or may be able to abstract phonological information through their experience of language and through exposure to written forms may offer an explanation as to how spelling can develop normally for this group.

Barry (1994) argued that the lexical route is mediated by the semantic system and that understanding about the meaning of words is important in processing spelling. What are the implications of this for hearing children who are cognitively delayed, have very low levels of intellectual ability, limited understanding of word meanings, and limited
syntactic awareness? How can some children in this very low ability group spell accurately?

1.2.5 Hyperlexia

Hyperlexia is the ability to read at a level well above that of other children of the same age despite overall low levels of intellectual ability. Siegel (1994, p230) reports that, in a number of rare cases, children with severe language and cognitive difficulties can exhibit advanced reading skills. She defines hyperlexia as:

'single-word reading precocity in children with general cognitive and language deficiencies. Operationally, this definition limits hyperlexia to individuals with moderate to severe deficits in cognitive functioning on a standardised intellectual test and, most importantly, advanced word recognition skills.

Other research has borne this out and challenges the widely held view of the relationship between IQ and reading.

'An intelligence quotient is not a stable predictor of reading ability, for groups of subjects with IQs as low as 40 have been taught to read fluently. They fail, however, to comprehend what they read.....' (Montgomery 1997, p20)

Siegel's (1994) definition of hyperlexia and Montgomery's (1997) example of fluent reading by some children with exceptionally low IQs confirm my own experiences whilst working with children in a special school. Children who attend the school are statemented as having moderate learning difficulties or moderate to severe learning difficulties. A group of children can be identified who can read and spell at the level of reading fluency without the accompanying understanding and are able to recall spellings but do not have the ability to create a meaningful piece of writing. This may well explain the advanced reading skills of some children with Down's Syndrome who may have very limited cognitive and language abilities in other areas.

According to Siegel (1994), reported cases of children with hyperlexia, who have both advanced reading skills and exceptional spelling performance, suggest that similarly
high levels of cognitive and linguistic abilities may not be necessary in spelling. On the surface, this challenges the assumption that spelling is a cognitive process involving the use of higher level semantic, syntactic, phonemic and graphemic information along side visual memory (lexical) and phonological (assembled) processing. However, Siegel (1994) argues that this provides evidence that reading and spelling are modular processes that can function independently of other cognitive and language skills. She advocates that children with hyperlexia have phonological skills that are well in advance of their syntactic, semantic and orthographic capabilities. However, whilst it may be true that reading and spelling skills can develop without higher level cognitive capabilities this performance may be limited to recognition of sight words in reading and simple recall of spelling words. Siegel (1994, p246) concludes by stating:

‘phonological processing and rote memory are sufficient for gaining some information from text, but in the absence of severe deficits in semantic and syntactic skills, reading and spelling can be adequate but higher-level language and cognitive skills are required for true comprehension and the ability to make inferences from text.’

These children of very low cognitive ability appear be able to learn, retain and retrieve spelling words at a level of automaticity without understanding how they know what they know or what may be done with this knowledge. This poses the question 'How can learning takes place at this level of automaticity without conscious thought?'

1.2.6 Implicit Learning and Implicit memory

An understanding of implicit learning and memory may serve to explain why some very low ability children can read fluently and spell accurately without accompanying understanding.

According to Steffler (2001) implicit memory and implicit learning differ, in that implicit learning refers to the acquisition of complex information without awareness while implicit memory refers to the storage and retrieval of information without being able to recollect learning it. According to Steffler (2001) implicit learning is thought to have occurred when there is differentiation between level of performance and the lack
of ability to verbalise the reason for this performance. It may also be characterised by evidence of having learned the underlying structure of complex stimuli. Steffler (2001, p175) argues that:

‘Implicit learning may be involved in spelling with regard to acquisition of spelling ability. Learning to spell involves abstracting structure and regularities from print and using this knowledge to produce accurate spellings at a later time.’

The ability to abstract rules and structure from complex environments is considered by Steffler (2001) in her review of the literature on implicit learning. She refers to the debate amongst spelling researchers as to whether orthographic knowledge involves abstract rules based on linguistic patterns and regularities (memory for rules) or alternately whole word knowledge (lexical memory), or information about statistical properties in terms of frequencies and probabilities of how letters go together to form acceptable letter combinations (stochastic memory). She draws attention to the similarities in the issues in spelling research and those in implicit learning literature. For example the differences in explicit and implicit memory as defined in the literature refer to properties of retrieval that involve conscious and subconscious recall of previous learning. Implicit memory is characterised by no conscious recollection of a past episode. Explicit memory refers to the conscious or intentional recollection of a previous experience and is therefore thought to be required to perform tasks such as recall or recognition. Her observations led her to conclude that as spelling involves the recall of information learned previously, it involves explicit rather than implicit memory, although implicit memory may also be involved where previous learning unintentionally affect choices of spellings. She cites research by Dixon and Kaminska (1997) suggesting that previous experience of a misspelled word can cause the word to be misspelled in the future. This research corroborates findings from work undertaken previously. Goswami (1988) showed that young children can use priming words to spell analogous new words, and Nation and Hulme (1996) found that beginning spellers are able to use analogies to familiar words when spelling real words and non words. More importantly, this implies that the use of analogies may be a result of statistical relationships between the sound patterns encoded in the system. Steffler (2001) argues
that when analogies are used it is not necessarily a deliberate process, which supports
the role of implicit cognition in spelling.

Implicit learning in adults is described as a process of unintentionally abstracting rules
from complex stimuli thus resulting in implicit knowledge that cannot be verbalised.

‘Implicit learning is the acquisition of knowledge that takes place largely
independently of conscious attempts to learn and largely in the absence of
explicit knowledge about what was acquired’. (Reber, 1993, P5)

The distinction therefore between implicit and explicit knowledge is based on the
intention to learn and the ability to verbalise this explicit knowledge. Karmiloff-
Smith’s (1994) distinction between implicit and explicit knowledge is very different
from that of Reber (1993). She conducted much of her research with children and her
theory of:

‘Representational redescription illustrates the dynamic interaction of
information already in the mind and the environment’ (Steffler, 2001, P185)

In Karmiloff–Smith’s (1994) model of representational redescription, knowledge can
be represented at multiple levels. She argues that there are four levels at which
knowledge is represented and redescribed: Implicit-(1), Explicit-1 (E1), Explicit-2 (E2),
and Explicit-3 (E3). Steffler (2001) summarises these levels.

Level 1
The representations in Level 1 are procedural and encoded sequentially. This
procedure, as a whole, is available to the cognitive system and the representations are
for analysing and responding to the external environment. Any new representations are
stored independently of previously stored representations. Therefore information at this
level is implicit, and can be accessed quickly and effectively. Behaviour giving rise
from level 1 representations is relatively inflexible. The direct retrieval of a known
spelling at a level of speed and automaticity is an example of a Level 1 representation.
Level E1
Level E1 representations are abstractions of conceptual information taken from level-1 representations and are more flexible within the cognitive system. Some of the detail of the Level-1 representation may be lost. At Level E1, representations are no longer stored as independent whole units. Information is now explicitly defined and available as data to the cognitive system. Another distinctive feature is that new connections can be formed and relations between other representations can be made. At this level, information is explicit, but it is still not available to conscious access and verbal report. An example cited by Steffler (2001) of a Level E1 representation is the use of analogy which allows generalisations to new situations.

Levels E2 And E3
Steffler (2001) further points out that Karmiloff – Smith (1994) did not make a clear distinction between Level E2 and Level E3 representations due to lack of empirical evidence for Level E2. However, it is implied that Level E2 representations are available to conscious access without the ability to verbalise them and Level E3 representations are available to conscious access and verbal report. Level E3 representations would be required when an explanation of a spelling rule has to be conveyed to another person.

According to this model, knowledge can be represented at multiple levels and when representations are redescribed at another level, the original representation remains intact and can be used at any time. Knowledge can come into the system at any level and can be redescribed to another level in any order, therefore the system is not hierarchal.

‘For example, we may learn the spellings of new words by mere exposure; hence the word would be coded as level-1 representation. On the other hand, we may be taught explicitly the spelling of a word, or a spelling rule to aid us in spelling a word; hence the verbal instruction may result in new information being coded at the E-3 level. In the latter case, only when procedural automaticity is reached would it be coded at level 1. Redescription can occur on-line, that is, in response to incoming data, or as a product of the internal dynamics of the cognitive system.’ (Steffler, 2001, p184-185)
Karmiloff-Smith’s (1994) model of representational redescription is important in understanding how knowledge changes over time. It explains how existing knowledge can be redescribed into new information that becomes increasingly flexible and accessible. It further supports the view that different forms of knowledge required in spelling may be interacting in dynamic ways within a flexible framework and not passing through sequential developmental stages as previously thought. Steffler (2001), however, points out that this model neither explains why some children do not experience this process as easily as others nor does it explain how representational redescription occurs.

Karmiloff Smith (1994) believed that there were three ways in which knowledge can be acquired. First, it may be innately specified. Secondly, it may be acquired through interaction with the environment and thirdly it is a process whereby the mind uses the knowledge it already has by redescribing its own internal representations, thereby creating new representations. These in themselves may explain why some children do not experience this process as easily as others- they may have less experience from the environment and in addition to this they may have further limitations in terms of processing ability due to inherited biological sensitivity or insensitivity to particular types of input. Furthermore if they have low intellectual ability, then limited reasoning abilities may inhibit the use of existing knowledge bases required for redescription. Implicit cognition has not been found to be affected by age or intelligence whereas there is a deterioration in explicit cognition with age and its performance is related to intelligence.

1.2.7 Connectionist models

The continuing debate around learning to spell has led to the development in recent years of alternative models of spelling development in the form of ‘connectionist’ or ‘neural network’ models. As Brown and Ellis (1994) demonstrate these provide a radical alternative to 'dual route' and 'stage models' of spelling development. These connectionist models claim that one mechanism (integrating phonological and
orthographic skills) can be used to spell regular and irregular words and one process can account for the developmental stages in spelling.

Connectionist models are computational models in the form of computer programs and are in contrast to verbal descriptions of psychological constructs such as modular or information processing models. These types of computational models are used to investigate the difficulty in learning different types of words by a process of statistical redundancy. Proponents of this approach claim that because psychological constructs are internal they cannot be observed directly therefore verbal models fall short of explaining exactly what constructs such as strategies, rules, representations are. Brown and Loosemore (1994) claim that computer programs can help explain the poorly defined aspects of verbally specified models. Their model of spelling development shows that developmental change and apparent stages in development emerge as natural properties of the network. According to Nation and Hulme (1998) the causes of a developmental change in these models is simply a change in the knowledge base of the model.

Nation and Hulme (1998) describe how the use of analogies to generate spellings of unknown words may be possible in a single route connectionist model. In the early stages of training, they argue that a network will not generalise to any great extent, because it will not have encoded the statistical relationship between inputs (phonology) and outputs (orthography). With greater exposure to more words the network begins to extract statistical regularities relating to input and output. This knowledge can then be used to generalise to unknown stimuli or words. Their evidence suggests that analogies are made from the earliest stages in spelling as long as children are familiar with the relevant sound symbol patterns. This supports findings of Lennox and Siegel (1994), that there are not discrete sequential stages in spelling development. Nation and Hulme (1998) also found that there was an equal analogy effect regardless of whether the transfer is based on shared rime units, shared consonant- vowels (CVs), or shared vowels. In a connectionist system, information is represented in a distributed fashion and no single unit codes uniquely for a word, rime, or phoneme. Young children are able to make analogies when spelling between words sharing rime units and
also words that share a single phoneme/grapheme correspondence. Their ability to do this is related to their phoneme-level awareness, even at the earliest stages of spelling development. This finding is also consistent with the findings of Antony, Lonigan, Burgess, Driscoll, Phillips and Brenlee, (2002) who present evidence that phonological awareness is a single, overlapping ability.

NETspell is an example of a network model developed by Olson and Caramazza (1994). This connectionist model does not have lexical or supra-segmental representations instead it converts sound symbols to letters.

NETspell consists of three layers of units. One layer codes input to the network, one layer codes output and an intermediate layer aids in the mapping from input to output. Input units are connected to units in the intermediate layer by weighted connections that decide how strongly a unit in the input layer will activate a unit in the next layer up. Another set of weighted connections connect units in the middle layer to units in the outer layer and determine which output units are activated. The output unit that is activated to the greatest extent is considered the unit's guess and if the guess is wrong the weights on the connections are changed in proportion to the amount each weight contributes to the incorrect guess. Items that are presented over and over eventually lead to connection weights that result in more accurate responses. Olson and Caramazza (1994) deduce that NETspell could be considered a successful model of the spelling system as this network learns to spell regular and irregular words without a lexicon. Furthermore the network produces phonologically plausible errors similar to those produced by people.

The authors do, however, recognise that there are problems in the interpretation of the responses. First the close connection between the representations chosen for the network and its performance cannot be ignored. Also the network was unable to produce a response above the set threshold in a significant number of instances.

Another shortcoming was that the network had no graphemic context to limit the choice of spelling for the phonemes requiring representation. As a result, errors occurred in the
system that could be attributed to inadequate graphemic representations thus preventing the system from making certain choices (e.g. the choice of vowels once the letter c has been selected). In addition the network was unable to learn spellings that are rare in occurrence e.g. aisle. This is because the other items make it impossible to produce a rare spelling because of the weighting of the connections due to frequency sensitivity. Because the network is dependent on frequency sensitivity to learn spellings it does not have the contextual tools to enable it to produce the spelling of words that occur infrequently.

Although NETspell and other connectionists model are unable to model English orthography completely (e.g. less frequent words) this does not render what they can do invalid. Olson and Caramazza (1994, p361) argue that network modellers can benefit from the insights developed by symbol processing theorists and the capacities of models can be matched to the characteristics required by cognitive tasks:

'clearly, there is much to be done, and no question that casting symbolic theories in computational form will be revealing for modelers, theorists and experimentalists alike'

They claim that since other modellers have had similar success using different representations (e.g. Brown and Loosemore, 1994) spelling may be mainly a statistical problem of matching input to output. Because the learning rule capitalizes on statistical redundancies that exist in the environment it is these statistical redundancies and not the form of representation that may be the most important factor in determining behaviour.

Kemp and Bryant (2003, p63), drawing on evidence from artificial systems that can model the acquisition of the English past tense without recourse to rules, argue that it 'still remains to be seen how closely this matches what children actually do'. It seems possible, or even probable, that 'what children actually do' could differ from one child to the next. It may be, given both the complexity of the human brain, capabilities or disabilities that have been inherited and the effects of experience on the development, that there are a number of potential ways input can be processed. The brain itself may choose the most economical route in terms of neural activity and effort required.
Certainly many teachers will be able to identify children within their class who learn implicitly without the need for formal instruction. This is at a subconscious, automatic level where the child may not be able to describe how he knows what he knows. Kemp and Bryant (2003) point out that sensitivity to the distributional and statistical features of input has been shown to occur in humans of all ages for many types of information. Our largely rapid, accurate and untaught ability to categorize things in our world they give as an example. They argue, however, that whilst there is now strong evidence that humans have statistical learning abilities that operate through experience and exposure, rather than through conscious study or instruction, there are some aspects of human learning that require or are more easily learned by the use of rules. One such example is the ability to learn to spell in English and other alphabetic languages that also include morphologically determined spelling patterns (Kemp and Bryant, 2003).

Indeed examples of learning as modelled in a connectionist framework may shed light on ways in which children can learn given the necessary biological basis. This may be at an implicit level where children can extract knowledge at a subconscious level as a result of frequency sensitivity. This may happen, for some children, simply as a result of exposure and normal experience of a phenomena, e.g. reading experience, or mathematical concepts. This would require the biological structure necessary to allow learning at an implicit level to occur. However, some children may have the necessary biological structure but require more stimulation to activate the neural connections and this learning may therefore be at an explicit level.

Consideration should be given to the possibility that implicit learning and explicit learning can work in tandem. The learning environment may provide increased experience enabling learning to take place as a result of frequency sensitivity (implicit learning as seen within connectionist models at this level the child may be unable to convey what he knows) and learning may be supported by teaching at an explicit level drawing attention to rules, regularities and meaning and usage within English orthography. As Steffler (2001, p182) states:
'Learning to spell involves complementary processes of implicit cognition when spelling regularities are acquired through exposure to print and explicit cognition when new spellings are explicitly taught.'

Rather than saying that spelling is either rule based learning or sensitivity to frequency and distribution, it may well be the case that it is both.

1.3 The Case for a Critical Period for the Development of Phonological and Visual Processing.

1.3.1 Neurological Development

The human brain consists of approximately 100 billion nerve cells, or neurons. Each is capable of making connections with any of the others although not all possible connections are appropriate for normal development. The neuron is a 'self contained communication centre with an information sending facility and an information receiving facility' (Smith 1996, p14). Each neuron has one axon and as many as 100,000 dendrites (Ratey, 2002). Dendrites are the main way by which neurons get information (learn); and axons are the main way by which neurons pass information to (teach) other neurons. Neurons send out roots and branches (the axons and the dendrites) in all directions. Repeated stimulation causes axons and dendrites to route closer and closer together until they connect in an electrical jump or synapse. The more frequent the stimulation the more permanent the connection becomes as Ratey (2002, p26) explains:

'The exact web of connections among neurons at a particular moment is determined by a combination of genetic makeup, environment, the sum of experiences we’ve imposed on our brains, and the activity we are bombarding it with now and each second into the future. What we do moment to moment greatly influences how the web continually reweaves itself.'

This interconnected ‘web’ of nerve cells is constantly changing, with connections that receive a lot of sensory input becoming stronger, while those that do not, die off in a process resembling Darwin’s natural selection. ‘Neural Darwinism’ (Ratey 2002, p31) is the theory that explains why the brain needs to be plastic. It explains how we can learn in the first instance, and also why people with brain injuries can recover lost functions.
Understanding how neurons acquire a particular role or function in the early stages of brain development is important in helping us understand the advantages and disadvantages of later rerouting due to lost neural function either as a result of brain damage or lack of stimulation.

In the developing foetus, neurons differentiate to perform distinct functions: first, by travelling to a specific area of the brain and then by communicating with neighbouring neurons. This migration itself affects how neurons gain their identity and organise the brain’s architecture and is critical for normal brain development and function. Visual neurons become visual neurons partly because they had a predetermined function and partly because they migrate to a part of the brain where visual information is processed. However, there are limits to neural plasticity (Ratey, 2002).

Age makes it harder to reroute and establish new connections. Furthermore, there are critical periods for brain development when connections for a function are extremely receptive to input. Critical periods for development beyond which new connections cannot be made have been identified. The neurons allocated to these particular functions die and cannot be revived if they do not receive sufficient stimulation within the allotted timescale for development.

One example of this comes from well established medical evidence about the development of vision. Information about the presence of complex light patterns falling on the retina is passed on to the cortex of the brain in the form of electrical activity (electrical synapses connecting a chain of neurons). If there is poor vision in a left or right eye, the stronger eye does all the transmitting of information from the sensory receptors. The dominant eye does all the "seeing"; the eye with the poorer vision does not learn to process visual information- it has no need to. If the weak eye is not exercised the dominant eye will continue to do all the work and although the weaker eye is capable of seeing it can lose the ability to do so and by the age of 7 or 8 the child can become blind in that eye. This condition is known as amblyopia. In these cases the lost sight cannot be retrieved.
Children, as young as two, who have a dominant and weak eye are encouraged to wear a patch on the dominant eye to ensure that the weaker eye is stimulated and exercised. The dominant eye must be prevented from seeing for this period of stimulation so that the neurons responsible for the development of the weaker eye are forced to activate and branch out to make the necessary connections. For connections to become permanent there must be repeated stimulation over sustained periods of time and so some children are required to patch the dominant eye for at least one hour each day, over a period of time ranging from 3 months up to a possible 5 years. Patching is discontinued when the child reaches 8 years of age because beyond this age the brain ceases to be able to establish connections in that area of the brain so no further progress can be made. Whatever level of vision is achieved by this age is the optimum level of vision that the eye will have for life.

A second example can be found by examining studies of language development in cases of extreme deprivation. These studies indicate that children's language will develop normally if the deprived child is exposed to normal stimulation by the ages of 7 or 8 but where the deprivation continues until later then normal language never develops.

Koluchova's (1972) case study of twins born in Czechoslovakia in 1960 indicates how removal from an environment of extreme deprivation can reverse the effects of the deprivation. The twins' mother died when they were born. Their father remarried and from the age of 18 months until 7 years, the twins spent their time in an unheated room away from the rest of the family. Their stepmother would not let her own children talk to them and she punished the twins by locking them in the cellar. No one outside the family knew of their existence and the neighbours sometimes heard strange animal like sounds coming from the cellar.

When the authorities found the twins at the age of 7 they had the appearance of 3 year olds. They could hardly walk because of rickets. They could not play and they relied mainly on gestures to communicate. They were removed from the family and placed in a home for pre-school children. The prognosis was poor. Kolochova estimated their intelligence to be around an IQ of 40. Once placed in a supportive environment their
progress was remarkable. After a year they were placed in a school for mentally retarded children. The next year they progressed to the second class of a normal infant school and were placed in the care of two sisters. A review at the age of 14 found the twins completely normal in their language development and functioning at an average academic level in a class of children only 18 months younger than them.

Skuse (1984) describes a number of studies that support the case for critical periods in development. Curtiss (1977), a graduate of linguistics, studied a girl ('Genie') who from the age of 20 months until she was 13 years, lived in a darkened room tied to a potty chair so that only her hands and feet could move. She was bound in a sleeping bag at night and was beaten if she made a sound. When her partially blind mother escaped with her, Genie was emaciated and weighed only 59 pounds. She salivated and spat and only made the occasional whimper. Genie learned to walk and her level of intellectual functioning increased. However, Genie only ever developed telegraphic speech, she never asked questions and never used pronouns. Curtiss speculated that Genie was using the right hemisphere of the brain for language use, rather than the left which is usual. Curtiss' explanation of Genie's unusual language development is that, if language is not acquired at the right time, the cortical tissue, normally committed for language and related abilities, may functionally atrophy.

The account of Genie's language development detailed by Curtiss (1977) provides support for the idea that there is indeed a critical period for the development of spoken language.

There are two possible conclusions that may be drawn from these examples admittedly they are merely speculative on my part and proving any of these theories is beyond the scope of this research. Nonetheless they are relevant here because they have been a driving force behind the development of 'The Complete Spelling Programme'. The spelling programme seeks to ensure that all children learn effectively within what I believe may be a critical timeframe. It seems reasonable to suggest that:

- In cases where a particular processing pathway is severely restricted (either the assembled or the lexical) due to genetic pre-determinants and lack of
environmental stimulation, ability to process in the area of the brain, whose primary function it is to process that particular type of information, may be lost altogether. That is the neural network responsible for that function dies (as in the case of amblyopia) or

- Ability to process in the area of the brain whose primary function it is to process that particular type of information is lost permanently but new neural connections develop which are less efficient because it is not the primary function of the newly allotted area of the brain to process that particular type of information. For this reason performance will always be somewhat cumbersome or below the expected proficiency level (Consider both brain damage patients who have to learn to process in the right hemisphere because the left hemisphere is permanently damaged and those who are unable to develop language to complex sentence stage because of lack of stimulation caused by extreme deprivation).

Educational programmes that focus heavily on one processing route to the exclusion of others, may be detrimental for children who need to learn in balance ensuring activation of all processes. A child who is weak in phonological processing may require an intensive phonological intervention and this will be beneficial, however a child who is weak in phonological processing will gain little from an exclusively visual approach. A psycholinguistic approach to reading, for example, places demands on working memory that render this approach ineffective for children with language difficulties and those with specific learning difficulties (dyslexia). On the other hand where visual processing is weak and phonological processing is working well, an intensive phonological intervention may bring few benefits.

Learning is considered to be a lifelong process, which of course it is. However, if the cells that are essential for the development of the visual system are culled due to deprivation of necessary stimulation (and in the extreme cases vision is lost entirely) and language development can functionally atrophy due to lack of stimulation because of extreme deprivation (with processing having to find a new area of the brain to process language) it seems reasonable to assume that we may be able to draw similar conclusions in relation to auditory and visual processing. Potential for optimum
development of some of these processes may be permanently restricted because the brain has to rewire elsewhere. I would argue that it is essential that we help children to develop phonological and visual processing in parallel so that children can make the connections linking phonological and visual information. For many children this does not happen without sufficient linguistic experience at both an implicit level through frequency sensitivity and at an explicit level through intentional teaching and reinforcement.

This teaching needs to develop more than an appreciation of phonemes and graphemes as isolated units but discrimination of both phonological and orthographic units within words and an ability to match these with the appropriate graphemes. This needs to take place within an integrated approach which allows the brain to make connections which integrate all the processes within the entire neurological system at an implicit and explicit level.

The evidence suggests that the primary school years may be one such critical period for ensuring that neurons learn to process information in the area of the brain whose primary purpose it is to carry out that function. According to Ratey (2002) the young child's brain (3-10 years of age) consumes twice as much of the blood nutrient glucose as that of an adult because during this stage the brain must form a vast number of connections. The input in a child's early years can have very positive or negative effects on the brain's wiring and therefore on future learning. The principal of 'use it or lose' (p31) it begins with inactive cells dying off and those that are exercised developing stronger connections.

Were it to be the case that there are critical periods for optimising performance this has serious implications for primary education. Learning may take place at a later date, but if a secondary area has to be identified by the brain, learning may be less efficient. This may not be the case for all learning but may be the case for some specific processes therefore future collaborative research between medical and psychological researchers is needed to answer these questions.
1.4 Learning to spell in orthographies other than English

Harris and Hatano (1999) contend that learning to spell in orthographies other than English can highlight difficulties children encounter as a result of the particular orthography they are learning. English has an irregular or deep orthography in that the relationship between graphemes and phonemes is highly inconsistent therefore learning to spell in orthographies which have highly consistent letter sound correspondences is of interest.

Findings from research from regular and irregular orthographies have shown that:

- even in a regular orthography (e.g. Italian) there are discrepancies between reading and spelling because initially children cannot spell every word they can read (Cossu, 1999);
- the multiple correspondences between graphemes and phonemes in deep orthographies are more problematic for spelling than for reading. Bryant, Nunes and Aidinis, 1999, based on their study of English, French and Greek argue that morphological based knowledge plays a more significant role in writing, and therefore learning to spell, than in reading because the spelling system represents distinctions that are not apparent in the spoken form. Rego (1999) found that learning phoneme-to-grapheme correspondences in Portuguese is relatively easy as in the case of Italian, German and Greek but acquiring morphological spelling rules is much slower and more complex;
- spelling patterns offer a greater degree of spelling-sound consistency across words than a c-v-c phonemic analysis (Goswami, 1999). She also found that the strong connection between rhyming and reading is not observed in regular orthographies. Only children in non-transparent orthographies develop larger phonological units;
- children have greater success in applying phoneme-to-grapheme correspondences in a transparent orthography such as German than an irregular orthography such as English (Wimmer, Landerl and Frith, 1999). This is because the demands on working memory are much less in a regular orthography. The children in this particular study had an average age of 12 and the researchers concluded that their findings are consistent with a biological 'hardware problem'.
If there is a critical period for development of processes is it possible that this biological hardware problem resulted from earlier under-stimulation? This may therefore have resulted in a new and less efficient area of the brain being identified for processing. Further research is required to answer this question.

Summary

From the research described so far in this chapter it is apparent that there are not clearly defined sequential stages through which spelling development passes rather the processes that each of these stages identifies as specific to that stage of development develop in parallel and there is continuous interaction between them. The fact that as spelling develops it appears that, for example, children are using only phonetic knowledge in a so-called phonetic stage, is because more phonetic knowledge than orthographic knowledge is available at that point due to constraints of experience. Likewise as orthographic knowledge increases and spelling becomes more automatic phonological knowledge continues to mediate output.

There is little doubt that these processes are interactive in normal development and coexist from the early stages of development through to the final stages, one having greater emphasis than the other depending on experience and knowledge at any given point in time. Evidence from neuropsychology has shown that these processes are modular processes that can exist in isolation, producing particular types of spelling errors that can be used to identify the process affected. This dissociation between processes makes effective spelling impossible highlighting the importance of ensuring that the processes develop side by side from the early years. The evidence presented suggests that spellings can be generated by a process of phoneme/grapheme conversion (the assembled route), or by a process of direct connection between speech production and a store of orthographic word forms (lexical route). For effective spelling these dual processes must interact with each other and with other skills such as meaning (semantics), grammar (syntactics), the use of analogy with known words in the lexicon and other orthographic or morphemic rules acting together as a unitary process.
Learning and memory retrieval within these modular/unitary interactive processes can occur at an implicit level or explicit level and learning and memory that has been implicit can become explicit or vice versa.

With regards to the development of a spelling curriculum I would like to draw on Clay's (1987) argument that educators must provide educational programmes for both learning disabilities and low achieving groups together. She argues that children in a programme adjust to the demands of the programme and that different programmes bias children's response patterns in different ways. Different programmes therefore shape up different behaviours. According to Clay it is reasonable to assume that high progress learners can overcome the conceptual, quality and random error aspects of programmes if they are actively working on building their own response systems independently, just as most children build their oral language system. Low progress learners fall victim to the conceptual bias of the programme and the quality of delivery.

Clay's argument, which is centred around the complex activity of reading, can likewise be applied to spelling. She argues that reading is a complex activity requiring the interaction of all possible responses that together make up effective reading behaviour. It is suggested that no processing component in reading can be omitted. She also argues that teachers run the risk of teaching children to be learning disabled if they try to teach from a diagnosis of what is wrong, for example, teaching children primarily through auditory processing avoiding visual weaknesses or vice versa. Consequently she argues that in these types of programme:

'The child is likely to learn many items and responses relevant to reading but be unable to orchestrate the act of reading.' (P166)

The problem that Clay has identified lies in the acquisition of skills learned in isolation of other skills that are essential for effective application of a complex activity such as reading. This argument may also be applied to spelling. For example, phonological knowledge on its own will not lead to the effective spelling of all words therefore phonological processing must interact with visual processing to ensure the correct spelling.
When a spelling is required in response to the spoken word, in a test situation, for example, some words can be spelled by simple rote memorisation of visual features or by assembling words through analysis of the sounds that make up these words. In a test situation this may be sufficient, but this will be wholly inefficient if application is required in independent writing. For a word to be used appropriately in independent writing the meaning or meanings of the word must be understood therefore semantic processing must also interact in retrieval. Furthermore spelling words which are abstract in meaning and cannot therefore be mediated by semantic processing, may be supported by syntactic processing which helps identify the correct target word through its association in a grammatical context i.e how it is used.

When learning to spell, words should not be learned in isolation of other knowledge that is essential for usage of the skill in the intended outcome. A child may be able to remember a sequence of letters in response to the spoken word by engaging assembled or lexical processing in the manner in which they have been taught i.e. either phonic or visual strategies or both but may be unable to orchestrate the act of spelling in independent writing if the meanings and usage of these words are not understood.

The design of any spelling curriculum must take all these factors into account.
Chapter 2

Sources of Knowledge in Spelling
and
Influences on Spelling in NI
CHAPTER 2

SOURCES OF KNOWLEDGE IN SPELLING AND INFLUENCES ON SPELLING IN NI

This chapter examines the linguistic knowledge required by young children in learning to spell. Three forms of linguistic knowledge are discussed; phonological, morphemic and orthographic. Research evidence is then considered which outlines the specific knowledge that is utilized by children in their early attempts at spelling. Finally the most recent influences on spelling in Northern Ireland will be considered.

2.1 The English Writing System

Ellis (1993) points out that linguists refer to the sound structure of any language as its phonology and the writing system as its orthography. Phonological awareness according to Goswami (1999, p134) is ‘a child's awareness that spoken words can be broken down into smaller units of sound’. According to Treiman (1991) phonological awareness refers to any of the smaller units of sound:- syllables, intrasyllabic units and phonemes. Orthography, on the other hand, refers to the rules and principles underlying the writing system (Sterling and Robson 1992). It includes the symbols used and the rules for combining them to write words. English orthography represents not only sounds but also morphemes that include rules for punctuation, the use of apostrophes, verb inflections and conventions such as capitalization. According to Ehri (1986), orthographic knowledge is considered to be the child’s current understanding of how the writing system functions. On the basis of this Goulandris (1994) argues that children make generalizations about the spelling system using their existing knowledge of written language and with increased experience these generalizations become more sensitive and more accurate.

In order to spell correctly a child must have, and be able to use, a number of forms of linguistic knowledge. These linguistic forms include phonological, morphological (which includes syntactic and semantic knowledge) and lexical (orthographic)
knowledge. As each of these is considered in turn it will become clear that for effective spelling they must operate in tandem as part of an integrated and interdependent system.

2.1.1 Phonological knowledge

While there has been some controversy surrounding the development of phonological awareness or knowledge, it has been identified as having a number of levels:

Phoneme level

Phonemes are the smallest units of sound that together make up spoken and written words. Single phonemes do not carry any meaning. The meaning of words however can be changed by substituting one phoneme for another e.g. /c/a/t/ and /m/a/t/, or h/o/t, h/i/t. Phonemes can be represented by one or more letters of the alphabet and are combined to form words. There are approximately 40 phonemes in English but only 26 letters and as Ehri (1986) points out, there are approximately 70 letters and letter combinations representing these sounds. Ehri (1986) argues that phonemic choices are more variable in spelling than in reading and the task of analyzing pronunciations of words to spell them is more difficult than the task of analyzing printed words in order to read them.

For example, there are sound-letter mappings such as the /b/ sound, that do not vary. The /b/ sound is always represented by the letter 'b' or 'bb'. There are however less straightforward conditional regularities such as the sound represented by the letter c in the words 'cylinder', 'circle' and 'centigrade' where the sound is 'soft' before vowels 'e', 'i' and 'y'. This contrasts with the 'hard' sound represented by the letter 'c' in 'cut', 'cloud', 'cross', 'scooter' or indeed the sound made by 'c' in the digraph /ch/ as in 'cheap'. Another example of the complexity of the sound system is the /f/ phoneme which can be spelled as 'f', 'ff', 'ph' or 'gh' as in 'field', 'traffic', 'graphic' and 'cough'. It is evident from these examples that the correspondences are not consistently one to one and as Adams (1990) points out, can be one to several in both directions. Consider the letter string -'ise' and its pronunciation in the following words - 'precise', 'promise', 'expertise', 'advise'. Consider also the word 'minute' referring to time and the word 'minute' referring to size (homograph). Also consider the case of homophones (where two words with
different spelling are pronounced in the same way) such as ‘allowed’ and ‘aloud’, ‘maid’ and ‘made’, ‘there’ and ‘their’. It is clear from this that the task of spelling a word from its pronunciation and breaking it down into its constituent phonemes is a daunting one.

Adams (1990) refers to a study, focusing on one and two syllable words in the reading material for six to nine year olds which identifies 211 spelling to sound correspondences. She emphasises that the task of remembering each individual phoneme, whether for reading or spelling, is a formidable one given that individual phonemes do not carry any meaning and are therefore easily forgotten and confusable. (It might, however, be argued that not all the correspondences are required with equal frequency.) Furthermore Adams (1990, p254) claims that without prior visual knowledge of letters, phoneme-to-grapheme mappings cannot be established.

‘The correspondences between sounds and letters are not one to one. Instead they are several in both directions. Acquisition of letter sound relations depends, first, on solid visual familiarity with the individual letters. Unless the relevant letters are already firmly represented in memory, such instruction will not be anchored’.

Syllable level
At this level of phonological awareness words can be divided into sub lexical units according to syllable division. For example, the word ‘interesting’ has four syllables (in ter est ing) while the word ‘can’ has one syllable. Breaking spoken multisyllabic words into individual phonemes in order to spell them is a tedious business, so the ability to divide words into larger units of sound at the syllable level can assist with spelling longer words.

Onset and rime level
Phonological awareness at this level refers to single syllables which can be broken down into intrasyllabic units comprising the onset – which corresponds to any phoneme before the vowel; and the rime – which corresponds to the vowel sound and any phonemes following it e.g. c-ap, cl-ap, scr-ap. Onsets may consist of one or more
phonemes as can be seen in these examples. Rimes may also consist of one phoneme as in the word ‘play’ but more often consist of more than one phoneme.

Disagreement centres around which of these levels of phonological awareness develops first. Goswami (1999) argues that syllable awareness develops first and that phoneme awareness develops via the onset and rime level. Thus, awareness of syllables followed by awareness of onset and rimes usually develops before children go to school with the process of learning to read aiding the development of phonemic awareness. However, Goswami draws attention to the fact that the development of onset and rime awareness also involves the development of knowledge at the level of the phoneme, as many words have single phoneme onsets. Goswami (1999, p137) contends:

‘Although a number of studies have shown that onset-rime awareness precedes phonemic awareness in most English speaking children........this general conclusion refers to the awareness of every constituent phoneme in words, rather than to the awareness of particular phonemes, such as the initial phoneme.’

This view is not supported by all and has been challenged by, Coltheart and Leahy (1992), and more recently Hulme, Hatcher, Brown, Adams and Stuart (2002) and Carroll, Snowling, Hulme and Stevenson (2003). They argued that children initially read using spelling to sound correspondences at the level of graphemes and phonemes and only later do they become aware of sub lexical units larger then the phoneme.

Brown and Ellis (1994) however suggest that the correspondences between the domains of orthography and phonology make use of whatever representations are available to them at a given time whether they be at the ‘phonemic’ or ‘rime’ level. They argue that the debate about which level develops first may be misplaced as it seems likely that they both develop in parallel and therefore

‘evidence that is found in favour of the earlier development of high- or low level correspondences may depend on the nature of the task used to investigate the issue.’ (p12)

This view is also supported by the research of Antony et al (2002), Antony, Lonigan, Driscoll, Phillips and Burgess et al (2003), Antony and Lonigan (2004). Anthony et al (2003) maintain that phonological sensitivity is a single ability developing from
sensitivity to words to sensitivity to phonemes in a quasi-parallel progression rather than a discrete sequential progression. Younger children were found to be sensitive to larger linguistic units but less sensitive to smaller linguistic units, and older children were found to be sensitive to both large and small linguistic units. They found that children generally master word level skills first, then syllable level skills followed by onset and rime and finally phoneme skills. They also found that children could detect phonological information before they could manipulate it and that children were able to blend phonological information before they could delete phonological information at the same level of complexity. Antony and Lonigan (2004, p53)

'It appears that the debate over whether sensitivity to rhyme or sensitivity to phonemes is most important for reading and spelling has led researchers and theorists astray in their conceptualisation of phonological sensitivity because of the implicit and explicit assumption of different types of phonological sensitivity. Instead we found that different phonological skills represent either the same ability or highly correlated abilities and that it is, therefore, children's sensitivity to the sound structure of the language that is important in learning to read and spell in an alphabetic system.'

It seems likely that phonological awareness at all levels is required for learning to spell. However why do some children experience difficulty in the development of spelling knowledge?

Brown and Ellis (1994) draw attention to an important possibility that must be taken into consideration if we are to understand why some children may experience difficulties in learning to spell. They suggest that problems may arise because representations in the different modalities may be at conflicting levels, making effective interaction difficult. They claim that there is now considerable evidence that the first sub lexical representations to develop in terms of phonological awareness of spoken words are onset and rimes and that representations at the whole word level should be treated as 'given'. They go on to say that in the case of written words, the input provides whole word units and, depending on the particular task, letters. When children endeavour to make connections between sound patterns and print they may have to map incompatible representations. This incompatibility arises because although they have representations of phonological rime units or indeed phonemes from spoken input, they
have no visual representations of rime letter cluster units or phoneme letter units stored in the lexicon that correspond to the spoken input. This is due to lack of experience of written forms at that level. Brown and Ellis (1994) advise that when learning to spell, the child must realize that there is a connection between orthographic (lexical) and phonological forms and more importantly develop representations that allow correspondences between these forms to develop at compatible levels. They posit three causal influences leading to the formation of different levels of representations in both the orthographic and phonological domains. These are:

- 'The levels of representation that are effectively 'given' by the input (or by explicit teaching)
- The levels of the representation that are developed in response to the need to store representations of a large number of orthographic or phonological word forms as economically as possible.
- The levels of representation that are developed in one domain because the existence of representations at that level in the other domain focuses the search for, construction of and attention to equivalent -level representations in the first domain.' (p9-10)

The need for intentional or explicit teaching to assist in the development of phonological knowledge at the level of the phoneme or onset and rime is confirmed by evidence from both Goswami (1999), and Adams (1990). As Adams (1990) submits, phonemic awareness is not spontaneously acquired but it can be successfully taught. She further asserts that explicit teaching is a more significant factor than age or maturation. She also suggests that the activities that lead most strongly to the development of phonemic awareness (short of explicit training) are those involved in learning to read and spell.

2.1.2 Morphological knowledge

Morphological information refers to morphemes (words or word parts) that represent the smallest units of meaning in speech (Ehri, 1986). As Bryant, Nunes and Aidinis (1999) point out they also represent syntactic function. For example, morphemes are represented in written language either by a precise letter string such as ‘graph’ (meaning to write) or by the grammatical function of a word, e.g. ‘ing’ in the word ‘walking’, (for the continuous), or ‘ed’ in ‘walked’ (for past tense of regular verbs) or ‘s’ (for plurals).
They are commonly classified into free morphemes and bound morphemes (Sterling and Robson 1992). Free morphemes can occur on their own as words e.g. hat, like, walk, whereas bound morphemes only occur in combinations e.g. free morpheme + -s, -ed, -ness, un-. There are three possible combinations of morphemes. The first are single, free morphemes such as ‘hat’, ‘like’, ‘walk’ that are significant units of meaning. They are also referred to as the ‘stem’ (Bryant et al 1999) or ‘root’ (Nagy 2003) and words with the same stem or root are usually related in meaning. These single free morphemes or roots do not have any syntactic function. The second are combinations of free morphemes e.g. bedroom, homework, football. The third are combinations of free and bound morphemes e.g. walk +ed, like +ly, un+ event+ ful. As Bryant et al (1999) highlights the inflectional morpheme ‘ed’ representing the past tense and the morpheme ‘s’ representing plurals are used with particular types of words e.g. ‘ed’ with verbs and ‘s’ with nouns but they do not in themselves determine syntactic category. The bound morpheme ‘ly’ however, does generate words of a particular category, in this case, adverbs.

According to Nagy et al (2003) morphology may contribute to writing (and reading) by providing insight into the writing system and that this insight develops later than phonological knowledge. Indeed it is generally agreed that morphology does not play a prominent role in spelling until the later years of primary education. Awareness of morphemes allows spellers to produce longer words more accurately without having to sound out each phoneme in turn. Nagy et al (2003) point out that the speller who can recognise the internal structure of a word, perceiving morphologically defined word parts rather than unanalysed wholes or individual phonemes, will spell with increased speed and accuracy. They believe the more detailed the links among orthographic, phonological and semantic forms of a word in memory, the more easily words are accessed and retrieved. Morphology also contributes to syntactic ‘packaging’ (p730), for example, morphological word structure (roots and optional affixes), punctuation, and word order provide vital information about the syntactic structure of a written sentence. Furthermore, morphology contributes to vocabulary learning and this relationship is reciprocal; the more insight the learner has into the word-formation process of English, the greater the likelihood of acquiring new morphologically

1. Deciding between two or more acceptable spelling sequences e.g. 'x' or 'cks' for /ks/. Singular nouns or adjectives end with 'x' whereas plural nouns or verbs have the ending 'cks' (cracks, licks);
2. Spelling silent morphemes e.g. apostrophe used to represent possession;
3. Conventional spellings for morphemes which flout letter-sound correspondence rules e.g. 'ed' in regular past tense verbs e.g. 'helpt', and 'jumpt' 'ed' spelled 't' as it sounds.

Goulandris (1994) argues that morphemes also provide a source of orthographic predictability as they retain their spelling in written language. This orthographic predictability can be at the level of lexical consistency e.g. the morpheme 'graph' means to write and derivatives of that word share the same meaning and spelling of the morpheme:- autograph, paragraph, graphic, photograph. Positional constraints are also a source of morphemic information; knowledge that certain letter combinations can only occur in certain parts of words- e.g. 'ck' is never found at the beginning of a word or that certain sequences of letters are consistent with English orthography and occur regularly while other letter patterns violate its conventions and never occur.

Orthographic predictability also occurs in the grammatical information contained in morphemes, though as Goulandris (1994) and Nagy et al (2003) identify confusion can arise for beginning spellers when these morphemes are not regular in the sound produced e.g. verb inflection 'ed' as in slipped, landed ,danced.

Knowledge at the level of the morpheme is vitally important for effective retrieval of spellings, not only in terms of knowledge of visual letter strings that adhere to positional constraints, but also in terms of associated meaning and grammatical function.
Furthermore, as Barry (1994) has indicated, the storage and retrieval of spellings in the orthographic output lexicon are semantically mediated. It is necessary at this point to consider this lexicon and the lexical information contained within it.

2.1.3 Lexical (orthographic) knowledge

Lexical information is word-specific information that is contained in a 'mental dictionary' of the written form of words stored in the orthographic output lexicon (and not the spoken form of words stored in the phonological output lexicon). If a known word has to be spelled, this mental representation is retrieved from memory as a single unit and written down. Funnel (1992) asserts that 'knowing' the spelling refers to the lexical spelling, and not a correct spelling assembled on the basis of sound-to-letter correspondences. Word-specific memory cannot be used to spell novel or pseudo words. It therefore follows that the accuracy of the spelling will depend on how well the word is known so the identity and order of the letters has to be stored in memory. Indeed Ehri (1986) argues that the most essential information is the alphabetic representation consisting of visual memory for letters as they symbolize phonemes and morphemes. Word specific memory however, if functioning in isolation, would require a huge amount of memory capacity and must be considered uneconomical in terms of storage. Although lexical information plays a crucial role in spelling, it is clear that its limitations are considerable given that each visual representation is stored as a single isolated unit. Aaron et al (1998) indicate that the nature and composition of word specific memory are unclear. They state that the conventional view is that word-specific memory is relied on in instances when spellings cannot be generated via the assembled route. Therefore not being rule based, it is considered to be rote visual memory for entire words.

Thus, a central question with regard to lexical information is how this rote or automatic memory for visual representation of words is acquired, and whether it is in fact rote visual memory for whole word or single units or whether it could be a rule based memory. Peters (1992, p221) argues that spelling is a stochastic process and that the laws of probability of occurrence apply to letter strings. She regards spelling as
'a kind of grammar for letter sequences that generates permissible combinations without regard to sound...(p221).

A study conducted by Aaron et al (1998) supports Peter's stochastic theory and, based on their findings, they propose that word-specific memory is likely to be memory for intraword segments within words. They suggest that this type of stochastic memory, although limited, is sufficient to override most of the potential spelling errors caused by inconsistencies between pronunciation and spelling.

'Word specific memory is memory for intraword letter patterns conditioned by the frequency of their occurrence in print'
(Aaron 1998, p417)

Whilst one might argue as to which type of information is most important in learning to spell, the argument may be somewhat academic for they are clearly all required to lesser or greater extents at varying points in time throughout development. It is crucial to understand how these various types of knowledge are acquired and how to apply acquisition of such knowledge into building a spelling curriculum which will ensure effective development of all processes and effective interaction between them. It is therefore necessary to consider the evidence from research which illuminates the various types of knowledge, explaining how they develop and when that development occurs.

2.2 Forms of knowledge in the early years of spelling development.

It is clear that dependence upon phonological knowledge is more predominant than dependence upon morphemic or lexical (orthographic) knowledge in the early stages of spelling development. Which precise aspects of phonological knowledge and morphological knowledge are utilized by beginning spellers and which of these aspects present difficulty?
2.2.1 Phonemes

Letter names
Carroll et al (2003) support the argument that children’s rime skills develop earlier than their phoneme skills, although they found little difference in levels of performance between syllable and rhyme awareness tasks. They argue that phoneme awareness and rime awareness tap fundamentally different processes. They found that rime awareness correlated with speech perception and short term memory measures whereas phoneme awareness correlated with reading and letter knowledge, suggesting that preschool phonological awareness can be divided into early implicit sensitivity to rimes and a later explicit awareness of phonemes. Carroll et al (2003, p922) also argue that there is an important reciprocal relationship between letter knowledge and phoneme awareness.

Indeed Treiman (1994) identified letter names as being one of the sources of phonological knowledge available to beginning spellers. First graders studied by Treiman (1993) showed many of the same influences from letter names on early spelling as those studied by Read (1975). Treiman’s findings indicate that children bring their knowledge of letter names to bear on spelling. They sometimes analyse a spoken word into phonemes and use the names of the letters in deciding how to spell one or more of the phonemes. This can happen with vowel phonemes that match the name of an English letter. However some sequences of phonemes are more susceptible to letter-name spellings than others. For example 'b', 't', and 'l' contain their sound in the letter name. 'G' and 'h', however, do not sound like their name.

Initial and final consonant sounds
Treiman (1994) also draws attention to the fact that children’s difficulties in learning to spell are often attributed to the irregularity of the English writing system. She states that although irregularity in spelling is a source of difficulty it is not the only one. Treiman (1993, 1994, 1995) found that regular words containing both onset clusters and
final consonant clusters presented difficulty for inexperienced spellers. Second consonants of initial clusters were found to be more susceptible to omission than the first consonants. Bruck and Treiman (1990) in their investigation of auditory recognition of initial consonant clusters and the spelling of these clusters, found a small but significant correlation between second letter omissions and errors in auditory recognition. Furthermore Adams (1990) argues that children experience difficulty in sounding final as compared to initial consonants sounds.

Vowels Phonemes
Another group of phonemes that are difficult for children to perceive are vowel sounds. Adams (1990) states that the decision about whether to teach long or short vowel sounds first is a difficult one. Short vowel sounds are very difficult to learn. However although long vowels sound like their name the long sound of the vowel is 'signaled by relatively complex but only semi-reliable clues' (p247). Considering the pros and cons of each, Adams (1990) concludes that the spelling patterns in which long vowels appear 'might best be saved for later.' (p248)

Despite the difficulty in perceiving and analysing vowel phonemes, it is important to include vowels in instruction because no word can be spelled without vowel sounds. Why are vowel phonemes so difficult to perceive?

Treiman (1985) suggests that vowels are not easily perceived as isolable phonemes because they are an integral part of the syllable's rime. Children therefore find it difficult to penetrate the syllable in order to separate the vowel and consonant phonemes. Adams (1990, p320) observes that vowel sounds are generally stable within rimes and memory depends on rimes for the phonological translation of the vowels. She claims that even the 'irregular' behaviour of vowels are relatively rime specific:

'...the vowel digraph 'ea' is quite consistently pronounced as long 'e', except in the rimes -ear, -ead, and -eaf.'
She presents further compelling evidence, drawing on research by Zinna, Liberman and Shankweiler (1986) and Wylie and Durrell (1970), that phonograms e.g. -ap, -at, -ake, -ack, -est provide economy and stability in vowel recognition, storage and retrieval. She implies that pronunciation of vowels is strongly influenced by final consonants. According to Adams (1990, p322) vowel sounds within phonograms are easy to learn whether 'long, short, regular, 'variant' or complex.'

2.2.2 Onset and rime

Another level of phonological knowledge accessible to beginning spellers are ‘rime’ based spelling to sound correspondences. Treiman (1983, 1985, 1986, 1988) was the first to identify the importance of this intrasyllabic division in words. She found that dividing syllables into their onsets (initial consonants) and rimes (remaining vowel and consonants) was easier and more natural than dividing at other points in the syllable.

Goswami (1992, 1994a, 1994b) argues that onset and rimes are among the first to be used by children because these are the most relevant phonological units available to children that can be used to link orthographic patterns. Goswami and Bryant (1990) suggest that a possible explanation of the link between rhyming and reading is that the ability to recognise rhyming words may form the basis for noticing that these words often share a common spelling pattern. A child who can hear that ‘bag’ and ‘wag’ rhyme will likely recognise that the spelling pattern at the end of these words is the same, and this insight guides him/her in recognising an unfamiliar word following the same pattern e.g. ‘lag’.

According to Funnel (1992), reading does not establish a full orthographic description of a word in the lexicon. Certainly this would appear to be the case as not all good readers are good spellers; being able to read a word does not mean that the reader has sufficient knowledge to spell the word. Therefore it cannot be assumed that observing the common spelling pattern between rhyming words will automatically occur as a consequence of learning to read. Indeed, not all rhyming words share the same spelling pattern e.g. ‘share’, ‘tear’, ‘pair’. Goswami (1992, 1994a, 1994b) has investigated the use of analogy as required for orthographic processes. Reasoning by analogy, suggests
Goswami (1992, 1994a, 1994b), is a result of experience and can be brought about by intentional teaching. She argues that children can reason by analogy from an early age and discounts the belief that reasoning by analogy is not available to younger children because of their level of cognitive maturity. She promotes a teaching strategy to beginning readers and spellers based on intrasyllabic units (onset and rime) incorporating analogous reasoning. Goswami (1986) found no development in the ability to use analogy once analogous reasoning is understood. Instead what develops is the number of words in a child's mental lexicon that can be used to generate new words by analogy. Adams (1990) has identified neglect in teaching analogy as a strategy for reading and spelling. It is an efficient strategy as from just 37 rimes over 500 words can be generated.

Considerable research evidence presented by Goswami and Bryant 1990, Adams (1990), Treiman (1992, 1993, 1994, 1998), Goulandris (1994) and Goswami (1994) have shown that children from the very early stages are able to use their existing spelling knowledge to produce the orthographic information necessary to assist in the spelling of unknown words. Goulandris' (1994) analysis of remarks made by children when spelling nonwords, showed that children preferred using rhyming words to help them spell a new word rather than sounding the word out phoneme by phoneme. She highlights that spelling new words by analogy has several important advantages over using sound-letter rules. It reduces the phonological processing requirements, since the only sound spelling correspondences required will be the exchange of the initial phoneme. As Goulandris suggests, use of analogy will therefore be easier for children who have acquired some lexical knowledge but cannot extensively apply correspondence rules or in cases where correspondence rules will not produce an accurate spelling. For example, the spelling of the word 'night' can be spelled by analogy with the word 'right' even though the speller does not know how to spell the /ight/ letter sequence. If this word were to be produced phonologically it could be spelled 'nite'. In addition to this sound spelling correspondence rules place considerable demands on working memory the more phonemes there are in words.
Goulandris (1994) also recognised that errors as a result of reasoning by analogy are often more orthographically plausible than alphabetical spelling errors. For example ‘brought’ written by analogy with ‘caught’ would result in ‘braught’ but spelled phonetically would result in ‘brot’. The analogous misspelling ‘braught’ is closer to the correct spelling than the alphabetic rendition. On the basis of this, Goulandris advocates that children should be encouraged to use analogy strategies to prevent over reliance on phoneme by phoneme encoding strategies. It therefore seems likely that the use of word families e.g. ‘cat, hat, mat’, may play a more important part in the acquisition of orthographic knowledge than has previously been acknowledged.

2.2.3 Verb inflections

Morphemic regularities require considerable orthographic knowledge and therefore it takes many years to learn them all. This is demonstrated by research in children’s spelling in Greek, French and Portuguese (e.g Bryant, Nunes and Aidinis 1999; Nunes Bryant and Bindman 1997).

The regular plural ‘s’ however seems to be the exception to this as Kemp and Bryant (2003) have shown. They found that young children can spell regular plurals correctly even when the plural is pronounced /z/ as in bees. Three studies conducted by Kemp and Bryant 2003 show that 5-9 year olds and adults do not usually base their spellings of plurals on the morphological rule that all regular plurals are spelled with an ‘s’. Kemp and Bryant (2003) found instead that participants were able to use their knowledge of complex and untaught spelling patterns, based on the frequency with which certain letters co-occur in written English and not through the learning of any rule.

Treiman (1993) and Nunes, Bryant, and Bindman (1997) point out that children spell the regular past tense of verbs phonetically at first e.g. ‘jumpt’ for jumped before using morphological information. As experience of written language increases, so does the ability to use morphological information to generate spellings.
Nunes et al (1997) carried out a longitudinal research study to discover more about the precise nature and timescale of the transition from reliance on phonetic spelling to greater use of morphological representations in spelling. They also carried out investigations to find out what brings about this change. They found that, between the ages of 6 and 10 years, there are very marked changes in children's ability to use the conventional spellings for morphemes. Of further interest was the finding that children generalize the conventional spelling for the 'ed' morpheme to irregular verbs and also words in other grammatical categories. They found that some children actually spelled incorrectly words they had spelled correctly earlier by generalizing the 'ed' pattern. Nunes et al (1997, p648) argue that this signifies progress in understanding. Children who spell slept as 'sleped' whilst realizing that the 'ed' ending is inappropriate for nonverbs 'have taken a major step toward using morphologically based spelling strategies'.

They maintain that children spell phonetically in the first instance but as they notice exceptions to their phonetic knowledge, they try to incorporate these exceptions without fully understanding their grammatical basis. After this they develop full understanding of the grammatical basis of spelling patterns that do not fit into sound-spelling rules, and finally, they learn about the exceptions to the grammatically based rules that they have mastered. It is interesting to note that Nunes et al (1997) found that while most children did progress along this developmental path, however this was not the case for all children: there were some children who went backwards rather than forwards.

Nunes et al (1997) further suggest that some of the factors determining the course and rate of development of spelling are internal to the experiences children have in reading and writing. They adopt the 'ed' spelling because they realize there are exceptions to the sound symbol correspondence rules, and later, through experience of morphological spelling patterns, they make the connection to the appropriate grammatical category. Nunes, Bryant, Bindman (1997) argue that their study shows that there is a developmental sequence in the acquisition of phonetic and morphological spelling strategies and this development is aided by the development of children's explicit grammatical awareness.
Because English is a deep orthography that requires morphological as well as phonological knowledge, lexical representations containing orthographic specifications are necessary in order to spell correctly. Treiman’s (1993) investigation into errors (classified as either honouring or violating the orthographic pattern for those letters), found that compliance with the orthographic constraints tended to be greater during the second half of first grade than during the first half. However even during the first half of first grade, children showed some knowledge of the patterns. This is an important finding because it suggests that children begin learning about the orthographic structure of their language from an early age. Thus it is argued children pick up patterns in English words that they see. It would seem that as far as lexical knowledge is concerned, the frequency of exposure and close attention to details in the visual image of the printed words will increase the likelihood of effective storage in the orthographic lexicon alongside developing phonological and morphological knowledge.

2.3 Spelling, reading and writing

When considering current trends in the teaching of spelling in Northern Ireland, it is essential to consider the influences affecting the teaching of reading over the last two decades, as reading has been, and continues to be, at the centre of research and debate in Northern Ireland and further afield. How reading is taught has had a bearing on how spelling is ‘caught’ by children in our schools. The word ‘caught’ is used rather than the word ‘taught’ because the teaching of spelling has been neglected, largely because teachers have neither understood the complexity of the spelling process nor understood the central relationship of spelling to literacy development in general. As Goulandris (1994 p422) states:

..‘it should be stressed that spelling is not an isolated skill but is a vital constituent of emerging literacy. By teaching children to spell we also teach them about written language and encourage the development of more accurate decoding and word recognition skills’

The whole language movement in the teaching of reading (Smith, 1971, Goodman, 1967) has resulted in a shift in the methods employed in both the teaching of reading and the teaching of spelling. Proponents of the whole language approach believe that
spelling proficiency can be acquired through spelling in meaningful contexts because it is a ‘natural’ process. This, being the case, it has not been considered necessary nor desirable to teach spelling skills systematically and sequentially to pupils (Graham, 2000). It is suggested that it is sufficient to ensure that children have plenty of opportunities to read and write for real purposes. Within this learning environment spelling knowledge is acquired through the act of reading and writing. Teachers model correct spelling when writing in class and provide plenty of opportunities for children to share and display their writing. As Graham (2000) noted formal teaching methods are only used when a need is identified and then techniques that provide more formal support to the learner are employed. These include identification of spelling errors in the child’s own writing in order to meet the child’s current spelling needs or taking advantage of opportune moments that occur throughout the school day to focus on issues in spelling as they arise. However, as Graham (2000, p242) argues:

‘If writing is a primary contributor to spelling development, then writing performance should predict spelling achievement. Although correlations between writing and spelling are typically in the 0.4 to 0.5 range (Graham et al., 1997), they are generally lower than correlations between reading and spelling (Ehri, 1987). Thus writing is not as predictive of spelling performance as reading.’

In recent years, there has been a move towards evidence based education and as Graham (2000) indicates carefully designed research of ‘instructional’ and ‘incidental’ approaches to spelling are necessary because ineffective programmes or methods result in some children failing to make progress and, in turn, development in other aspects of literacy may be affected. Adams (1990) has shown that the acquisition of spelling knowledge, enhances reading acquisition by extending and reinforcing children’s phonemic, orthographic, and morphemic knowledge. Similarly, according to Berninger, Abbott, Rogan, Reed, Brooks, Vaughan and Graham (1998), individual differences in spelling are predictive of individual differences in composition quality and improved spelling performance can have a positive impact on children’s writing.
2.3.1 Accountability

Considerable debate continues to wage as to the form that spelling instruction should take. One can draw on evidence finding support for a range of approaches that bear little resemblance to each other. So convincingly can the arguments be framed, that over the last thirty years we have seen the pendulum swing from one polarised viewpoint to the next. Convincing arguments, evaluation or opinion are untenable as reasons why a particular approach should be adopted. Were it a medical issue, a new drug or treatment, scientific research would detail the outcomes and any treatment having a negative effect on a significant proportion of patients would be considered unethical if there was a more effective drug or treatment available.

Is the ethics issue less relevant when considering which education interventions to adopt? Should we not ask why children are exposed to any curriculum that allows one in four children to experience failure? Sound research evidence must lead the way both at the level of curriculum development, (ensuring new programmes are developed taking into account research findings) and also at the level of evaluation of outcomes on children’s learning.

Not all children experiencing difficulty in learning to spell have difficulties resulting from the same underlying problem. Some children have difficulty perceiving basic sound letter regularities (Snowling, Stackhouse and Rack, 1986) whilst others produce phonetic spellings without regard for orthographic and morphemic regularities (Snowling, Hulmes, Wells and Goulandris 1991). For children to be able to overcome these difficulties or, better still, to prevent these difficulties occurring, instruction will be needed to help them process the different types of orthographic regularities effectively.
2.4 Recent Influences on Spelling in Northern Ireland

2.4.1 First Steps

First Steps (1997) language programme has been introduced to schools as part of the Northern Ireland Literacy Strategy. The approach to spelling within this programme has been influenced by the whole language movement. Children are encouraged to learn to spell by writing and trying out new words. In doing this they receive feedback on the correctness of their spelling from teachers or their ‘spelling buddy’ and from this a bank of spellings is built up for each individual child.

New spellings may also be learned as children ask others how to spell unknown words while writing, or by using a dictionary or spell checker, or by visually inspecting words for correctness.

First Steps describes the three main tools of effective communication as being oral language, writing and reading, spelling being described as a subset of writing to be considered within the context of writing; it has been given ‘special emphasis’ because judgements about literacy levels often make reference to spelling ability. Two of the eight manuals in the First Steps programme focus on the spelling developmental continuum and resources.

The First Steps programme acknowledges that time needs to be allocated to learning to spell and that there is the need for transfer of spelling into children’s writing. Importance is given to encouraging children to take risks and ‘have a go’ at spelling unknown words. It further suggests that children take responsibility for their own learning.

The strategies suggested for learning to spell words are mainly visual and whilst spelling is predominantly a visual process in the later stages, phonological knowledge is still required for encoding. Furthermore in the early stages of spelling development children rely heavily on sound symbol translation.
In the First Steps programme spellings are taken from individual children’s writing, although it is suggested that children should be grouped when choosing words for demonstration. The difficulty for the teacher lies in deciding which words to select for group instruction and the composition of the groups themselves. Should the words be selected from one child’s work, from a bank of commonly misspelled words, from topics? The pressure of dealing with individual children with different spelling errors must present considerable demands on teachers’ time in terms of day to day management and also the need for ongoing provision of suitable resources.

Additional difficulties may also arise because:

- It assumes that all teachers have competency in understanding the processes involved in learning to spell and the developmental sequence necessary to ensure progress. Unfortunately this may be an unrealistic assumption as this is not included in initial teacher training.
- There is no focus on the teaching of the usage of words in our language.
- It assumes that all children will be able to read their test partner’s words as children test each other using individual spelling journals. To use a journal effectively, children need to have as wide a knowledge base as the teacher – syllables, root derivations, prefixes, suffixes, homophones, structure of language.
- It does not give guidance as to how teachers can manage the system – to monitor, check and support individual children in large classes.
- Only minimal guidance, in an ad hoc way, is given to teachers as to particular features of words or rules.
- The high level of parental involvement in Year 1 means that children from homes where the parents are unable to provide high levels of support are disadvantaged.
- There is over emphasis on self-motivation. Not all children are intrinsically motivated. What happens if a child is not motivated or motivation is lost through lack of success?
- Teachers are required to analysis spelling errors and guide children in selection of appropriate spellings to be learned. In classes with numbers as high as 25-30 this type of analysis would be unmanageable on a regular basis.

The potential variation that there might be in interpretation of errors and choice of teaching focus must surely make continuity of provision difficult, if not impossible. Furthermore if spellings are always based on the child’s errors then spelling can only play ‘catch up’ with a child’s own writing level instead of being used as a means of language development which in turn enhances writing. The amount of time teachers would be required to spend analysing errors for all the class and the accuracy of the outcome must call the process into question given the wide-ranging curricular demands that are already placed on primary school teachers.

2.4.2 The Literacy Strategy Framework (England and Wales).

The National Literacy Framework claims to take a balanced approach to learning. As Dombey (1999) points out ‘The National Literacy Strategy’ claims that the detailed and prescriptive framework is ‘based on the evidence of inspection and research’ (Literacy Task Force, 1997, p17). However, she points out that exact references to this research are not included in this or the Framework for Teaching (Standards and Effectiveness Unit, 1998a) and there were no controls used in the research of the pilot which immediately preceded its introduction. A study by Johnson and Peer (2000, p9) criticises the framework for neglecting the need for developmental sequence as well as structure:

'It is clear from the research that the literacy hour has had a major positive impact on the literacy teaching in primary schools. It has generated feelings of success and enthusiasm on the part of both teachers ad pupils. Any difficulties seem to relate to the need for sequencing as well as structuring work for pupils with SEN (particularly dyslexia). 'Schools also need to feel more confident that they can diverge from the framework, particularly with regard to word level work if they can justify the alternative methods and present evidence of more effective learning by pupils.'

Weaknesses in the National Literacy Strategy Framework’s recommendations for spelling may be identified as:
• Lack of progression in the structure of the word level work. It is unclear what research evidence has provided evidence for the sequence of words contained in the lists.

• No clear rational or logical reason why words have been grouped together to be learned as spellings.

• No attempt to address usage of words to be learned.

• Lack of emphasis on the use of analogy in learning to spell. Although it is recognised that recognition of rhyming patterns is important in reception classes this may be insufficient experience for some children.

• There is no attempt to develop a coherent understanding of phonological knowledge and spelling development. This is seen as a body of knowledge to be introduced to children in a logical and interesting manner.

Dombey (1999, p19) comments on the logic behind The National Literacy Framework;

'As, to the logic, it really does seem perverse to fly in the face of what we now know about the patterning of children's learning in this area. Children are capable of learning whole words before they can manage the complex business of analyzing the visual components of written words and matching these to the sound components of spoken words. Rimes are simply easier to perceive than the individual phonemes of which they are composed. It is not surprising that, when asked to extend the word family 'fog',' dog', etc, children in a class on the demonstration video in the Literacy Training Pack (opcit) quietly insist on treating the rime 'og' as a single unit, rather than following their teacher's instruction to pick each letter in turn.'

The approach to phonological awareness within the National Literacy Strategy is essentially a traditional synthetic phonics approach with the inclusion of some onset and rhyme. The debate is not that phonological awareness is required for reading and spelling; it is rather on the extent to which intensive and explicit training is required.

2.4.3 Training in phonological awareness

Research conducted by Hatcher, Hulme and Snowling (2004) found that although normally achieving children made significant improvements in phonological skills as a result of explicit phoneme training, these improvements did not translate into literacy
skills. They conclude that, the majority of children do not need intensive training in phonological awareness in order to master the alphabetic principal. Their research would suggest, that intensive phonological training is unnecessary for normally developing children, because they already have sufficient levels of phonological skills for the task of learning to read. They claim that structured phonic work, included in a reading programme is sufficient for the majority of children. From the evidence, they assert that providing this training could not be justified on educational grounds. However, for children who are at risk of reading difficulties more intensive structured training in phoneme awareness was found to be beneficial.

These findings are congruent with my own experience as a teacher in a range of educational settings. My experience of teaching primary aged children is that normally achieving children only require phonological training at a level which clarifies and makes explicit their existing knowledge and assists the child in the application of skills he has acquired through implicit learning as a result of linguistic experience. This can, as Hatcher et al (2004) suggest, be achieved through structured phonic work included in the reading programme.

As Antony and Lonigan (2004, p53) argue:

'The most important question therefore, is not what type of phonological sensitivity is important in literacy? But which measures of phonological sensitivity are developmentally appropriate for this particular child.'

They suggest that the way forward may be a screening procedure to detect children at-risk so that phonological deficits can be remediated before these children experience failure in learning to read.

Research evidence, has established that phonological awareness is a powerful causal determinant of progress in reading and spelling (Bradley and Bryant, 1983; Stanovich, Cunningham and Cramer 1984; Goswami and Bryant 1990; Rack, Hulme and Snowling,1993). The issue is not whether children require phonological knowledge but the extent to which they require explicit and/or intensive training. There is evidence
from the research findings of Antony and Lonigan (2004) that normally developing children approach the task of reading and spelling having acquired sufficient phonological awareness to enable normal progress. As Adams (1990) identifies phonic programmes merely clarify existing knowledge for this group of children.

There are a large number of phonic programmes on the market ranging from analytic approaches that are implemented incidentally, e.g. Easylearn (Lettice, 1993) or Letterland (Wendon, 1992) and pre-reading and spelling packages that are implemented through intensive instruction, e.g. Jolly Phonics (Lloyd, 1992) Phono-Graphix (McGuinness and McGuinness, 1999). There remains little doubt that children experiencing difficulties have insufficient phonological knowledge and therefore benefit from such instruction but, the extent to which intensive instruction in phonological awareness is required by all children is called into question by the research cited above.

Whilst in the early stages of spelling development phonological processing is predominant, other processing modalities must be encouraged to develop thereby facilitating development of representations which will not only be compatible with present processing demands but which will facilitate future processing demands. If we wish to think of this in terms of strategies then arguably a phonological strategy is the most important strategy in the initial stages of learning to spell. However the development of visual processes must be also be enhanced from the beginning through the development of visual strategies to ensure that (present and) later processing demands requiring more visual knowledge will be available.
Chapter 3

Success for All Children
CHAPTER 3

SUCCESS FOR ALL CHILDREN

One of the main aims in developing 'The Complete Spelling Programme' (CSP) was to try to ensure success for all children. In pursuit of this aim it was necessary to consider factors that might impinge on the effectiveness of the spelling programme, and where possible, build into its design features that would take account of these factors. This chapter therefore considers factors in learning that are not necessarily specifically related to spelling but which may be important in the development of any curriculum as they have been found to impact on children's learning. First I shall consider the association between social disadvantage and achievement in school and from this I will move on to discuss the importance of creating a positive learning environment, with particular reference to children who are identified as failing. Following on from this the impact of teacher expectations will be discussed. Mixed ability grouping, curriculum planning, and classroom management are considered in turn and finally gender issues are considered.

3.1 Social Disadvantage

The evidence for an association between social disadvantage and achievement in school is well established (Rutter, 1976; Mortimore and Blackstone 1982). More recently Croll (2002) examined the relationship between social deprivation and special educational needs in the context of wider issues of social deprivation and achievement. Data were gathered from 46 primary schools in England and the results showed a very strong negative relationship between poverty and levels of special educational needs. Croll suggests that the results indicate that, to some degree, teachers judge special educational needs with reference to attainment levels in their school. He further suggests that the impact of poverty on special needs is largely mediated through the influence of poverty on achievement generally. Social deprivation was therefore found to be a very strong predictor of achievement in school, a moderately strong predictor of levels of special educational needs and a very strong indicator of special educational needs related to
discipline problems. Croll (2002) emphasises the fundamental position of social
deprivation in understanding the problems schools face and the circumstances in which
schools meet the needs of their pupils.

Mortimore and Whitty (1997) reviewed the evidence on the relationship between
educational achievement and social disadvantage and the extent to which teachers can
compensate for disadvantaging social circumstances. They considered the evidence on
the way poverty is associated with educational failure and concluded that, even with
attempts to improve the effectiveness of schools, the relative attainments of children
from poor and more affluent backgrounds are relatively fixed.

MacKay and Watson's (1999) study, aimed at enhancing reading achievement in
primary school children in an area marked by social disadvantage and reading failure,
highlighted the difficulties experienced by schools in areas of social disadvantage.
Children entering school in these areas lacked the prerequisites, identified by Adams
(1990), for progress in literacy.

On the basis of such evidence schools in disadvantaged areas are allocated additional
funding. The most commonly used and accepted measure of social disadvantage is the
number of children in receipt of free school meals (FSM). The expectation is that
schools with a higher proportion of children in receipt of free school meals will have a
higher proportion of children who will require additional support or who are registered
as having special educational needs. The Code of Practice (1996) recommends five
stages in the identification and assessment of pupils with special educational needs; all
children identified with such needs must be maintained on a Special Educational Needs
Register. Schools are required to meet the needs of pupils at Stages One and Two of this
assessment procedure from their own school budget. It is only at Stages Three - Five
that the resources of the ELB can be utilized.

Schools in NI are also allocated additional funding based on this criterion as this
remains the best means of identifying social disadvantage within schools.
3.2 Creating a positive learning environment

In order to create a positive learning environment, the premise that all children can succeed, irrespective of social background, must be accepted by teachers and conveyed to pupils from the outset. Smith (1996) emphasises the need for all learners to see themselves as successful in learning and this, he argues, must to be related to meaningful goals. Ideas such as belonging (doing the same work as everyone else), aspirations (I want to succeed and I can succeed), safety (I have enough knowledge and a strategy for tackling this) and success (I can see I have been successful) must be considered and how these may be created in curriculum design must be explored. Creating an environment where achievement is possible for all children is not easy. It involves challenging entrenched views on social disadvantage, ability, potential and success.

Westwood (1993) points out that a common response to children who are failing in school is to look for problems or deficits within the child. He suggests that all too often children are referred for assessment because parents or teachers are concerned that there is something wrong with the child and fail to examine external factors that may be contributing to the difficulties the child is experiencing. Clay's (1987) argument on learning to be learning disabled follows a similar line.

Westwood (1993) further suggests that assessment of factors within the child will provide only a partial explanation of the problem and therefore external factors such as quality and type of instruction, teacher expectations, relevance of tasks, classroom environment, interpersonal dynamics within the social group, and rapport with the teachers are all factors of consequence. He goes on to assert that if teachers do not consider these factors and realise the importance of effective teaching and differentiation they can precipitate a child's entry into the failure cycle. (See Figure 4)
Westwood's (1993, p7) message is clear: 'If at first you don't succeed, you don't succeed!' Westwood shows that children begin to regard themselves as failures from their earliest days at school if they cannot complete tasks that other children find easy. This leads to loss of confidence and avoidance of activities associated with failure. This cycle of constant failure results in low self-esteem and lack of motivation and can lead to avoidance of new or challenging tasks. He recommends that teachers reduce the possibility of early failure by being well prepared and by presenting new tasks clearly, ensuring that a child experiencing more difficulty than the rest can see that he or she is improving with practice. Westwood (1993, p3) identifies the following elements as being good practice within any effective class lesson:

- daily review of previous day's work;
- clear presentation of new skills and concepts; with much modelling by the teacher;
- guided student practice, with high success rates and with feedback to individual students;
• independent student practice, applying the new knowledge and skills appropriately;
• systematic cumulative revision of work previously covered.

Westwood (1993) cites negative feedback to pupils as a further contributory factor to pupil's loss of self-esteem. He draws on research by Thompson, White and Morgan (1982) to highlight this problem. Their observations of children in third grade classrooms found that all children received far more neutral comment and criticisms than praise and higher achievers received significantly more praise than less able or difficult pupils. Chapman and Tunmer (1997) argue that the extent to which children master academic skills and the ease or difficulty with which they acquire them, together with the way academic performance is conveyed to pupils by their teachers, contribute to positive and negative experiences in school. This gives rise to achievement related perceptions that form academic self-concept.

Guay, Marsh and Boivin (2003) point out that research in the area of self-concept has found that the self-concepts of very young children are initially very positive and not correlated with their achievements or skills. However with increasing age, children become aware of what they are good at and what they find difficult so self-concept becomes more highly correlated with external indicators. Butler (1999) concurs that children under the age of 7 years have not formed a normative concept of ability and therefore do not understand that outcomes are related to their current ability. With increasing awareness of competence or lack of competence, self-concepts of ability are less likely to be positive. Guay and Vallerand (1997) demonstrated that students who feel they are successful are more motivated to pursue school activities out of choice and because they are more highly motivated their academic performance increases. Guay et al (2003) found the relationship between self-concept and achievement to be reciprocal-if pupils believe they can do it, they are more likely to be successful. Consequently, self-belief and confidence grows alongside academic success. They argue that because these reciprocal effects were found for young children (Grade 2) this provides support for early interventions based on academic self-concept and achievement and not just achievement. Guay et al (2003, p134):
'However, the present results suggest that with young children, teachers should strive to improve simultaneously both academic self concept and achievement in order to produce positive changes in both constructs.'

Earlier research has also suggested that teaching is more effective when the teacher is able to focus on raising self-esteem as well as developing academic skills (Schweinhart et al. 1986). Rodgers (1967, p357) emphasises the need for 'psychological safety' in a classroom environment where the teacher has unconditional faith in the child no matter what he does. Indeed Lawrence (1981, 1987) found that primary school children were primarily concerned about the opinions of three groups of significant others- their peers, their parents and their teachers.

3.3 Teacher expectations

The link between teacher expectations and behaviour and pupils' performance and achievements has been found to be particularly strong.

'Teachers' evaluations of pupils are determined by many variables. Sometimes the teacher recognises disadvantages and perhaps, sometimes, she creates them. An evaluation of a child, lowered or raised by halo effects, may lead to specific expectation of performance which is communicated to the child who then may go on to fulfil the teacher's prophecy' (Rosenthal and Jacobson 1968, p55)

Rosenthal and Jacobson (1968, p180) found that 'teacher expectations can become translated into a pupil's intellectual growth'. The issues raised by Rosenthal (1968) remain today; that these judgements have the potential to become self fulfilling prophecies. Harris and Rosenthal (1986) describe the effect that expectancy has on teachers' behaviour and the relationship between the teacher's behaviour and outcome variables. According to Harris and Rosenthal's (1986) research into the effect teacher expectations have on teachers' behaviour tells us which behaviours are induced by a given expectancy. Research into the relationship between teachers' behaviours and outcome variables affirms that these behaviours affect the pupil so as to create a self-fulfilling prophecy. Harris and Rosenthal (1986) describe four major groupings of teacher behaviours considered to be involved in the mediation of teacher expectancy effects. This Four Factor Theory identifies:
1. Climate (i.e. the warmer socio-emotional climate). Teachers communicate both verbally and non-verbally to their pupils that they expect their pupils to achieve highly.

2. Feedback. This acknowledges the differentiation factor in feedback where the expectation on high achievers is greater than on low achievers.

3. Input. There is a tendency for teachers working with these more favoured pupils (i.e. the high achievers) to teach material which is both greater in quantity and complexity than the material with which other pupils are working.

4. Output. Refers to the likelihood that these expected higher achievers will be given more opportunity to respond. Harris and Rosenthal (1986, p102) found that these four factors were 'extremely significant' in mediating teacher expectancy effects with input being found to be the most important mediating factor in expectancy effects.

Whilst there have been some criticisms of these findings (Lawrence 1987) the effects of teacher expectations proposed by Rosenthal and Jacobson (1968) are supported by Alvaridrez and Weinstein (1999). They contend that teachers regularly make judgements about the ability of pupils, and these appraisals can have critical implications for children, both with regard to curricular and instructional opportunities, and also the children’s developing perception of their own ability. They demonstrate that there is substantial evidence, from both experimental and naturalistic studies, concerning the formation, transmission, and impact of teacher expectations on children’s performance. The researchers found that children with higher socio-economic status and those perceived by their teachers to be assertive and independent were judged more positively than their IQ score predicted. Children with low socio-economic status and perceived immaturity received more negative judgements by their teachers than their IQ score predicted. Conversely, preschool teachers’ over and underestimates of intelligence relative to IQ score significantly predicted achievement on tests taken 14 years later. The relationship between teacher ratings and future grades was strongest for children whose ability was underestimated.
Feiler and Webster's (1999), found that when children are perceived by their teachers to be potential failures, these judgements can be difficult to modify. Whilst teacher judgements were found to be based on a range of factors, teachers placed considerable weight on individual children's response to reading and writing tasks when making such judgements. Another factor that emerged strongly when predicting literacy outcomes was the teacher's assessment of parental support. Whilst it is desirable that children are supported by their parents or care givers this should not be a factor in deciding the opportunities children are given at school. An aim of the teaching and learning classroom must be to make children independent learners and independent of any disadvantage relating to home background.

Since teachers' expectations can be conveyed through assessment results and feedback communicated to the children, there are implications for the content of that verbal and/or written feedback to ensure that every child can develop a positive academic self-concept.

3.4 Assessment

Black and Wiliam’s (1998) review of the literature on classroom formative assessment, cites several studies which provide evidence that frequent formative feedback to pupils about their learning produces substantial learning gains. Drawing on evidence from a wide range of studies they found that a consistent feature of the research they reviewed was that formative feedback can lead to significant learning gains:

'Although there is no guarantee that it will do so irrespective of the context and the particular approach adopted, we have not come across any report of negative effects following on an enhancement of formative assessment.'

(Black and Wiliam 1998, p17)

A study conducted by Butler (1988) compared the progress of pupils who were offered feedback in the form of marks only, comments only or marks and comments. Groups receiving 'comments only' increased their scores by about one third whilst the 'marks and comments' group showed a significant decline in scores as did the 'marks only' group. This evidence led Butler (1988) to conclude that feedback, in the form of
comments to a child that are operationally helpful, can be undermined by the negative effect of normative feedback (i.e. marks).

Drawing on the research of Butler (1987) and Cameron and Pierce (1994), Black and Wiliam (1998, p17) provide further evidence of the negative effect of 'cueing pupils to focus on the self rather than the task'. They claim that while verbal praise and supportive feedback can increase children's interest in, and attitude towards a task, this feedback has limited effect on performance. They suggest formative feedback is of prime significance. Madeus and Kellaghan (1992, p143) propose that within assessment there are three factors that promote classroom learning. First, assessment directs teachers' and pupils' attention to identified skills and topics requiring improvement. Next, pupil responses to questions and tests require active participation in order to process material being tested. Finally, assessment can provide feedback that clarifies understanding and corrects misconceptions.

As Gipps (1996, p261) advances, 'Assessment does not stand outside teaching and learning but stands in a dynamic interaction with it.' Surely it must be important then, in the design of any curriculum, to consider how assessment will interact with learning in the particular subject area. Consequently, it seems advisable that guidance be given on how learning is best assessed.

3.5 Mixed Ability

Generally in primary schools, classes are of mixed ability composition, though within these classes, children may be grouped for various activities. A study by Kutrick, Blatchford and Baines (2002) considered issues relating to pupil groupings in primary school classrooms. The authors found that the most commonly used grouping was same ability level. They suggest that this grouping may work to the disadvantage of low ability pupils, especially boys. This is because the group interactions may be limited since lower ability pupils (mainly found to be boys) may not have the insight required to develop a given task. Kutrick et al (2002) conclude that ability grouping and misguided allocation of additional adult support results in disadvantage. (Lower ability pupils also
received less of the teacher's time than the other children and instead received more support from the learning assistant.)

Based on the evidence presented thus far, it seems reasonable to suggest that disadvantage may also be created if less able children are not given exposure to the full curriculum- at least at the level of oral participation. Furthermore, if there is no way out of a lower ability group because the gap created has become so wide, then the cycle of disadvantage in educational experience may create what Stanovich (1986) describes as Matthew effects. Stanovich (1986) highlights the effects of lack of reading experience on cognitive development generally. He refers to these effects as Matthew effects since the 'rich-get-richer' and the 'poor-get-poorer' Stanovich (1986, p381). Able readers read more and as a result their vocabulary usage, understanding and knowledge base increases. His contention is, that as reading develops, other cognitive processes linked to it follow the level of the reading skill. Relatively small differences in reading ability at the beginning of school often develop into very large generalised differences in academic skills and accordingly - achievement.

Many areas of the primary school curriculum are dependent upon progress in reading. This reciprocal relationship with reading therefore inhibits further development in other curriculum areas if reading skills are poor. Stanovich (1986) argues that as the gap widens, deficits become more generalised; affecting more and more areas of cognition and this leads to a reduction in IQ scores. Within our education system by the time many children are assessed for help they will have been underachieving for a number of years and the Matthew effects of lack of reading experience will already be operating. Stanovich (1986, p381) explains how mechanisms operate to create 'rich-get-richer and poor-get-poorer patterns of achievement'. Advantageous early educational experiences are able to utilise new educational experiences more effectively. Because instruction must mediate the initial stages of reading acquisition, for example, this instruction may well interact with the child's initial level of cognitive skill to cause Matthew effects. Stanovich (1986) argues that a major problem for research will be to determine whether instructional differences are a factor in generating Matthew effects.
One might conclude from this that if children are taught as a whole class using methods that take account of all learning needs and targeting different learning outcomes for different children or groups, this may reduce the likelihood of instructional differences generating Matthew effects or of the more traditional ability grouping creating disadvantage.

3.6 Curriculum Planning and Differentiation

In teaching mixed ability children, as a whole class or a single group, there are issues centred around curriculum planning. How can the teacher ensure that all children are challenged and experience success with appropriate differentiation of task demand for different levels of achievement? Bennett, Desforges, Cockburn and Wilkinson (1984) have highlighted weaknesses in the traditional approach to teaching groups of children rather than the whole class. Based on the authors' observations in primary classrooms, Bennett et al (1984, p220) conclude that:

'Unfortunately the use of classroom groups in practice has emerged as no more than a convenient seating arrangement rather than a specific site for teaching.'

The reality of teaching to different groups of children within the class places considerable demands on teacher time in an already packed day. A ‘single group with extensions approach’ to differentiation (which will be proposed and fully described in Chapter 4) challenges this more traditional approach of teaching different content to smaller groups.

Schumm, Vaughn and Leavell (1994) developed an approach to planning which has been found to be beneficial as a framework for curriculum planning when teaching classes with a broad range of ability. Their research on teacher planning in content area curriculum indicates that teachers seldom have the time to differentiate texts in ways which will be beneficial and necessary thus leading to a gap between what is recommended as best practice for teachers and what is happening in classrooms. Schumm et al (1994, p609) propose a Planning Pyramid framework:
The Planning Pyramid (see Figure 5) consists of two major components: degrees of learning and points of entry. The degrees of learning component is intended to help the teacher consider the importance of the concepts to be taught assuming that all children can learn, but accepting not all children should be expected to learn everything. The degrees of learning are divided into three parts. The base of the pyramid represents the most important concepts to be learned by all children. The medial part of the pyramid represents the information that should be prioritised next; for example, additional facts or extensions of base concepts, which are required by most but not all children. The top part of the pyramid represents information that is more complex and incidental and is only required by a few pupils. The authors emphasise that whether pupils master the base, medial or top levels of the pyramid is not determined by ability.

Figure 5: The Planning Pyramid Framework

Source: Schumm et al (1994, p610)
As pupils’ interests and prior knowledge may vary dependent upon the topic, pupils with learning difficulties, within this planning framework, are not locked into the base part of the pyramid which is concept learning only. All pupils can have access to information from all three areas of the pyramid. Schumm et al (1994) recognise that a great deal of repetition may be necessary at the base level to master concepts but that this should not be associated with drudgery. Enjoyment must be an integral part of work focused on base, medial and top concepts.

The second component of the pyramid is point of entry. Each axis of the pyramid represents different points of entry for content area planning. The points of entry include teacher, topic, context, student and instructional practices. Under each of these headings or points of entry, the teacher considers questions to guide her in the planning. An example of one of the questions from each of these points of entry is given below: (Schumm et al 1994, p613)

**Teacher:** What prior knowledge do I have of this topic?

**Topic:** What prior knowledge do students have of this topic?

**Context:** How will the class size affect my teaching of this concept?

**Student:** Will students with reading difficulties be able to function independently in learning the concepts from text?

**Instructional practices:** What methods will I use to motivate students and set a purpose for learning?

### 3.7 Classroom Management

How teachers teach is as important an issue as what they teach (Gammage 1986). Wosnitza and Nenniger (2001) highlight the importance of good classroom management in motivating children and arousing their interest in learning. Motivation is seen as part of the cognitive, content and social dimensions within the learning environment. The atmosphere within the classroom and the level of demand being placed on the child are important factors in motivating children. A general condition for arousing interest is also embedded in good class management. If learning in the
classroom is not well structured there is no way to develop interest. However interest also includes the subject, the content to be learned and also the procedures that enable learners to incorporate it. Learners have to be assured that the content has to be and can be learned, and that it is free from all emotional and social obstacles. Together with a sense of autonomy and class atmosphere, class management must allow for freedom and autonomy to be given to the learners. This enables them to step towards the learning objective without being hindered in their actions. Bennett (1984) also emphasises the importance of classroom management. According to Bennett (1984, p219), when seeking to bring about improvement it must be recognised that two problem areas exist. The first is classroom management. The second is the teachers' knowledge and understanding of the content and pupils' responses to it.

The teacher's concern for learning must not be overshadowed by management concerns as is the case in what Bennett calls 'crisis management'. Bennett (1984) observed that much of teachers' time was taken up by having to react to lower order requests. The authors use the example of language work lessons where teachers were observed being 'constantly harassed for spellings' (p219). This resulted in a large proportion of wasted time for both teacher and pupils and breaks in continuity of working. As Bennett argues it is unlikely that these 6 and 7 year old children would be able to produce errorless writing, and therefore they suggest that teachers must be clear about what they expect children to achieve. If it is a piece of imaginative writing then children must feel free to spell as best they can.

How teachers plan for and manage classroom learning is an important component of achievement in the particular area. A curriculum should therefore take account of the considerable demands on primary school teachers' time and have ease of management built into programme design.

3.8 Gender

The methods contained in 'The Complete Spelling Programme' and which are an integral part of it, were developed during my early career in response to the problems
and learning needs of a class of boys with a wide range of abilities. Disparity in the performance of boys and girls has been a particular concern within the education system and, over the past 20 years, has been a focus for improvement in UK and NI.

Mortimore, Sammons, Stoll, Lewis and Ecob (1988) considered the socio-economic status, ethnic group and sex differences in attainment at primary school and carried out a longitudinal study to assess progress over time. The progress, in reading and mathematics, of 2000 inner London pupils between the ages of 7 and 10 years were studied. Two significant findings were reported: boys made less progress than girls, and pupils entitled to free school meals (FSM) made less progress than those not entitled to FSM.

A more recent study reported by Strand (1999) followed the progress of 1600 pupils in one inner London LEA from Baseline at age 4, through to the end of KS1 at the age of 7. This study also found that girls made more progress in reading and writing than boys but less progress in mathematics. Another interesting result reported in this study was that pupils entitled to FSM fell further behind their peers. Noble and Bradford (2000) also highlighted the discrepancy between boys' and girls' performance which they suggest first becomes apparent at the age of 7 in the Key Stage 1 SATs and accelerates through the later Key Stages in favour of girls.

It is clear from the research that boys do not acquire literacy skills as quickly as girls; as a result the poorer performance of boys has been targeted for improvement. Within Northern Ireland CCEA (1999) produced the 'School Improvement Focus on Boys: Guidance on improving attainment particularly in literacy' which was distributed to all schools. According to the CCEA report (1999), boys in particular like to know why they are doing something and will perform better if they also know how they are meant to be doing it. The report points out that the gap between boys' and girls' attainments is greatest in writing. Boys tend to become competent at writing later than girls and are more likely to experience problems with writing.
Drawing on evidence from QCA (1998) and CCEA (1999), the differences in the approaches of boys and girls to writing would appear to be, as follows:

- Boys tend to write less than girls and in a narrower range of genres. Ideas, plots and characters are often less well developed and boys are more reluctant to redraft.
- Boys are less enthusiastic and committed to a piece of work, are less concerned about accuracy and presentation and therefore, are less likely to proof-read.
- On the other hand, boys are often more concise than girls in their writing so what may be perceived as lack of commitment, may, in fact, be a more efficient and focused selection of ideas.

In developing any curriculum there should not be bias to one or other sex. The curriculum should facilitate both sexes to reach their optimum potential. It should be equally beneficial for both but allow for differences in learning for these groups therefore incorporating features that are appropriate for both.
Chapter 4

The Complete Spelling Programme.
CHAPTER 4

THE COMPLETE SPELLING PROGRAMME

This chapter describes 'The Complete Spelling Programme' (CSP) and the materials required for implementation. It then discusses a number of features that make this programme unique. These are:

- how the programme aims to establish transfer of spellings into independent writing. Although spelling is the primary aim of the programme, spelling is also seen as key in the development of independent writing as they are inextricably linked;
- the single group with extensions approach to differentiation enabling the teaching of spelling in an inclusive classroom setting;
- the learning strategies promoted in the programme. A unique strategy for enhancing phonological awareness is introduced and adaptations of an existing strategy to enhance visual awareness is developed;
- the structure of the programme. It has been designed to enhance phonological and visual awareness and efficient memory storage;
- the developmental sequence. It includes high frequency words and rhyme patterns on a daily basis;
- the support activities. They have been designed to engage auditory, visual, semantic and syntactic processing as well as application of spellings learned in independent writing.

Finally this review of the innovative features of the programme is followed by an examination of the delivery of the programme, the layout of the spelling lists and the daily routine.

4.1 Description of the Programme

The Complete Spelling Programme is a graded spelling course designed for use in the primary school. It incorporates a whole class teaching approach. Spellings are planned for each school year and structured into daily word groups. Rhyme patterns and
frequency words are presented three days per week and curriculum word banks are included in the programme. There are also weekly dictation sentences and teaching notes. Learning is reinforced through support materials that are differentiated for differing abilities. These support materials include a range of activities designed to engage all processes involved in learning to spell and to provide opportunities for application of spellings learned in independent writing.

Key Stage One in schools in Northern Ireland consists of Years 1-4. Children entering Year 1 will have had their fourth birthday by the 1st July of that year. The youngest children entering Year 1 will therefore be 4 years and 2 months on school entry.

The programme for Key Stage One is set out in three stages, summarised in Table 1. Stage One is intended for use with Year Two (5-6 year olds). The Stage One programme is designed to start in the second term of Year 2 and runs for 20 weeks. Stage Two of the spelling programme is designed for use with children in Year Three (6-7 year olds) and has spellings planned for 34 of the 38 weeks in the school year. Stage Three of the spelling programme is designed for use with children in Year Four (7-8 year olds) and also has spellings planned for 34 of the 38 weeks in the school year.

<table>
<thead>
<tr>
<th>School Year</th>
<th>Stage</th>
<th>Age range</th>
<th>Number of weeks in the Programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 2</td>
<td>Stage 1</td>
<td>5-6 year olds</td>
<td>20 weeks starting at the beginning of the second term in this school year</td>
</tr>
<tr>
<td>Year 3</td>
<td>Stage 2</td>
<td>6-7 year olds</td>
<td>34 weeks</td>
</tr>
<tr>
<td>Year 4</td>
<td>Stage 3</td>
<td>7-8 year olds</td>
<td>34 weeks</td>
</tr>
</tbody>
</table>

The programme is supported by a series of manuals (see Table 2). When the research study was conducted there were seven manuals for use in Key Stage One. A summary is given of the contents of these manuals in Table 2.
<table>
<thead>
<tr>
<th>Stage</th>
<th>Teacher's Manual</th>
<th>Support Book 1</th>
<th>Support Book 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1 (used in Year 2)</td>
<td>1. Teaching notes explaining how to use the programme</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>2. Weekly spelling lists set out in daily groups</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>3. Support materials</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Stage 2 (used in Year 3)</td>
<td>1. Teaching notes explaining how to use the programme</td>
<td>7-8 pages of differentiated support activities for each spelling list for lists 1-13</td>
<td>9 pages of differentiated support activities for each spelling list for lists 14-24</td>
</tr>
<tr>
<td></td>
<td>2. Weekly spelling lists set out in daily groups</td>
<td>8-9 pages of differentiated support activities for each spelling list for lists 14-24</td>
<td>9 pages of differentiated support activities for each spelling list for lists 14-24</td>
</tr>
<tr>
<td></td>
<td>3. Support materials</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

(There was no Support Book 3 (support materials) for Stages 2 and 3 written prior to the research study although it has since been written in response to demand from schools.)
4.2. The innovative features of the programme

4.2.1 Spelling as part of a whole learning process within the classroom

It is necessary to consider not only the lexical and assembled processing demands of the task (in producing a sequence of letters that spell a word) but also the role of the environment in assisting with developing these processes and, in addition to this, the application of spellings in independent writing. In order to improve the likelihood of transfer of spellings to independent writing, it is necessary to consider what teachers expect of children in terms of spelling in independent writing. Unfortunately spelling is considered by many teachers to be merely a secretarial skill, with children asking the teacher to spell words they cannot spell themselves or being encouraged to look up wordbooks. Requiring children to spell correctly only encourages children to use automatic recall. This can restrict children's writing because some children quickly learn to write using only words they are sure they know how to spell. In adopting this approach, children are able to avoid the tedious task of looking up words in a wordbook. They also do not face reprimands for poor spelling in their writing. If children are to be able to write freely and express themselves clearly, spelling must assist with writing, not limit it. If spelling is to be an aid to writing, children must be able to use a range of thought processes that go beyond simple recall of known spellings (spelling automaticity is the desired end but an unreasonable expectation for young children). It is desirable that children be encouraged to spell at a number of levels when writing independently:
1. automatic recall;
2. spelling all of a word correctly using assembled and lexical processing;
3. spelling parts of a word correctly using assembled processing and lexical knowledge resulting in a spelling that is partly correct.

In this environment there is no need for wordbooks or dictionaries or any requirement to ask the teacher for assistance in spelling a word. However, the process of spelling within the classroom places further demands on the child. It seems likely that for children to be able to think of a word needed in independent writing, the meaning and
usage of that word must be understood or the word may not be selected for use even if it has been learned as a spelling. Within this programme therefore, it is intended that learning to spell is used as a vehicle for enhancing language understanding as well as a means of enhancing lexical and assembled processing. In this context of language usage and independent writing, spelling must surely be considered an essential text generation component. As a result, it seems reasonable to regard spelling as a high level skill within the writing process and not merely a low level transcription skill. If we do not consider spelling in this light, the benefit of teaching children to spell may never go beyond the simple recall of a sequence of letters in response to the spoken word in a test situation.

For this reason a focus of the teaching in Stage 2 and Stage 3 of the programme is the development of understanding about the meaning and usage of the patterns and high frequency words so that they may be used appropriately in independent writing.

When children want to write about something they may, in the first instance, think of ideas. They are likely then to construct sentences using words in the lexicon to express these ideas. It seems safe to assume that words that have been learned in spelling and not understood will not be used. They may be reproduced accurately in spelling tests in response to the spoken word but if there is no semantic link it seems unlikely that they will be transferred to independent writing. Surely therefore the first consideration for children, in this writing process, will be conveying meaning. Words that convey the meaning of what the child want to say will be used. As children construct ideas into sentences using language within their experience, they will then spell words that have been over learned through automatic recall, and the unknown spellings of words will be encoded using a combination of assembled and lexical processing.

If this is the case, the teaching of spelling must involve more than a knowledge of sounds in words or the memorisation of visual features. The process of learning to spell, and of conveying meaning through writing, must involve the development of language understanding. The process of learning to spell in the classroom therefore is a complex one. It starts with the development of strategies to enhance processing, the organisation
and storage of new knowledge and the retrieval of this knowledge for appropriate application.

4.2.2 Single group with extensions

The single group with extensions approach to differentiation allows all children to learn together regardless of their ability. All pupils cover the core programme with extension words and activities for more able spellers. This approach aims to prevent any negative impact associated with ability grouping on the performance of lower ability children and children with specific literacy difficulties.

It is intended therefore that all children participate in the whole class discussion about the meaning and usage of words to be learned and strategies to be employed for learning them. Drawing on my own teaching experience, I have found that children with specific literacy difficulties in particular can become very aware that they are being treated differently; learning different spellings from everyone else can be very stressful. This whole-class teaching approach allows children experiencing difficulty to participate in the same teaching focus as their peers but with appropriately differentiated follow up activities targeting different learning outcomes. Pupils are made aware from the outset that they can initiate a move to a different level when they feel they are ready. This allows pupils greater control (over the group in which they are placed and therefore greater control) over their own learning. The fact that the grouping is flexible is intended to have a motivating effect on children who might otherwise 'give up' because they feel that important 'others' such as the teacher, do not expect them to succeed. Some children may settle at a level that provides them with challenging activities and success and therefore may not need to move between levels. This allows children to experience success, feel challenged and enjoy learning. There must be no pressure or competition to work at 'another' level. A move to a different level must not be perceived as an end in itself but simply an appropriate level to be working at.

The underlying thinking behind the Planning Pyramid's 'degrees of learning', (Schumm (1994) which was discussed in Chapter 3) is similar to that of the 'single groups with
extensions approach' to differentiation. The similarities between this approach to differentiation and the Planning Pyramid are illustrated in Figure 6.

Figure 6: Parallels between the Planning Pyramid and The Complete Spelling Programme

Source: Schumm et al (1994, p610)

The base of this pyramid framework resembles the ‘core’ spelling programme which all children follow – i.e. spellings which all children should learn (rhyme words and one high frequency word per night for three nights).

The first extension level of the spelling programme is similar in thinking to the medial part of the pyramid, i.e. knowledge that most, but not all, children require at this point in time. In the spelling programme, this knowledge consists of high frequency words which most but not all children learn. The group of children who do not learn these extension words (the least able spellers) will learn them in the next stage of the spelling programme because they become the core words in the next stage. This structure
ensures that children who are following the core programme, but are not doing any extension work, do not miss anything in the developmental sequence.

The second extension level of the spelling programme (for the highest achievers) is similar to the top section of the pyramid. It represents knowledge that only some children will learn. At this second extension level of the spelling programme, the spellings are chosen by the teacher and are not part of the tightly structured, developmental sequence in the prescribed daily lists for the core and first extension level. Nevertheless, these words are important because they are curriculum words that the teacher has identified as necessary for independent writing (and to extend the abilities of the more able spellers.) At the back of the Teacher's Manual in Stage 2 and 3 there are curriculum word banks from which the teacher may select these topic related words. These are grouped under subject headings and include words required for English, Mathematics, Science, History and Geography.

In the CSP, the planning and differentiation is already done for the teacher; therefore, the skill required from the teacher is in placing the child on the appropriate level of the programme. Because movement between the levels of the programme is possible given the programme design, if a teacher places a child on a level that is too easy, then it may be quickly recognised that a move is necessary and this may be carried out with ease. It is always better to start a child on a level that may be too easy and then move the child onto more difficult work rather than start the child on a level that is too challenging and have to move the child onto easier work. Enhancing self-belief in young children is important for motivational reasons as ability to persist with difficult tasks is an essential component of success.

4.2.3 Strategies for learning to spell

Spellings are visual in the sense that a spelling is a sequence of letters that represents a word in written form. The process of encoding this sequence of letters is best achieved by multi-sensory / multi-processing strategies. An important feature of the programme therefore is the development of effective learning strategies to activate assembled and
lexical processing, so that this sequence can be processed into memory. The development of these strategies is the main focus of teaching in Stage 1 of the programme.

There are two main strategies promoted in the programme. The first of these strategies is a further development of the Look, Cover, Write and Check (LCWC) strategy advocated by Peters (1985) which is intended to enhance visual learning. In this LCWC method children look at the target word and study it for about 10-15 seconds. Then children cover the word so that it can not be seen and write the word down from memory. The word is then uncovered and the children check the spelling against their attempt. If it is incorrect the children repeat the process again.

This strategy would have been the main strategy used for learning spellings when I began teaching in 1980 and is still widely used today. My own teaching experience in these early days identified shortcomings in this strategy; despite using this method some children had limited success. I deemed that further investigation was necessary to discover why this was so and therefore allocated time each day in class for the children to use this method; my observations proved very revealing. Some children looked at, or rather, glanced at the target word to be learned but clearly did not 'see'. They appeared to take in very little, if any, visual detail. It appeared that it was necessary to help children notice the visual features of the word to be learned so that they could retain a visual image of it. To this end, more time was spent as a class focusing on the visual features of the word trying to capture a 'picture' of the word in the mind. I asked the children to visualise the word when their eyes were closed and if they could not, then more time was spent looking at the particular features of the letters; their size, shape, position and orientation. Development of the ability to visualise a word proved to bring about greater success in the use of the LCWC strategy.

Research by Weeks, Brooks and Everett (2002) and Brooks and Weeks (1999) has found (Neuro-linguistic Programming) NLP, when used in conjunction with LCWC, to be a very effective strategy for children with specific literacy difficulties. This NLP strategy also focuses on developing visualisation by using the 'camera' inside the child's
head and by observing the eye movements involved, thus finding the best visual field to facilitate learning for each child (which could be left, right or centre).

Within the Complete Spelling Programme the frequency words are learned using Look, Visualise, Say, Cover, Write and Check (LVSCWC). This procedure is described in Table 3.

Table 3: LVSCWC –Strategy for learning Frequency Words

<table>
<thead>
<tr>
<th>Look</th>
<th>Look at the word</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visualise</td>
<td>Look at the size, shape, position/orientation of each letter in the word</td>
</tr>
<tr>
<td>Say</td>
<td>Say the word</td>
</tr>
<tr>
<td>Cover</td>
<td>Cover the word</td>
</tr>
<tr>
<td>Write</td>
<td>Write the word from memory</td>
</tr>
<tr>
<td>Check</td>
<td>Check you have written the word correctly and try again</td>
</tr>
</tbody>
</table>

The ability to acquire visual knowledge is vitally important for spelling development especially in the later stages (when phonological knowledge cannot be relied upon to spell words accurately, due to the high proportion of words that are not phonemically regular). Many high frequency words, which do not conform to regular phoneme / grapheme correspondences, are required by children in their earliest attempts at independent writing. For this reason it is necessary to use visual knowledge in the early stages of spelling, even though the predominant strategy is phonetic. Evidence presented earlier showed that visual and phonological processes interact throughout development therefore, it is not desirable to promote dependence on one strategy to the exclusion of another at any stage in spelling development.

Another reason why it may prove vital to develop visual knowledge alongside phonological, is that visual perception and processing may possibly have parallels with the development of vision, in that, if either are under stimulated, they may fail to develop. Where under-stimulation is severe (due to other processes doing all the work - i.e. over dependence on assembled processing) then it may take months or even years to
allow sufficient stimulation for visual processes to be developed to a level which allows effective processing. In other words, if visual processing is going to work effectively in the later stages of spelling development then these processes must be stimulated at the early stages in such a way that they cannot be by-passed. To this end, in addition to the LVSCWC strategy, there are activities in the support materials designed specifically to enhance visual processing (See Appendix A).

The second strategy employed in the programme is LSSW (see Table 4.) This strategy was developed by the author to facilitate the development of phonological awareness both at the level of onset and rime, and also at the level of the phoneme. (Phoneme awareness is also a part of onset and rime awareness as many onsets and some rimes are individual phonemes). Recognising the importance of phonological awareness in learning to read and spell, and acknowledging the extensive difficulties that a small minority of children have in this area, this unique strategy is used as a teaching and learning strategy in the first stage of the programme and can be retained in Stages 2 and 3 if necessary, for any children with extensive difficulties. This allows these children to work within their zone of proximal development, yet have a 'scaffold' enabling them to experience success in smaller steps.

Vygotsky (1962) viewed developing children's cognitive ability not in terms of what they could achieve on their own, but rather what they were capable of achieving when given help. Children were perceived as having a zone of proximal development. This zone of proximal development refers to achievements currently beyond the grasp of the child but which are attainable given help and support. Bruner (1975) described how children could be given support in their learning until they have sufficient knowledge and skills to work independently, and he referred to this as 'scaffolding'. The LSSW strategy allows children to work within their zone of proximal development, providing a 'scaffold' for them, which can be removed once knowledge is secure.
When used in conjunction with the developmental sequence of visual patterns in the programme, this strategy allows phonological knowledge to be accessed implicitly and/or explicitly. This approach is not in competition with programmes that explicitly teach phoneme/grapheme correspondences such as more traditional synthetic phonics or analytic phonic programmes. Rather, it is an additional strategy that can enable children who fail to acquire phonic knowledge via more traditional approaches, to acquire phonological knowledge in the process of their day-to-day spelling activities. For this group of children, the approach is designed to establish sound/symbol relationship, not by teaching sounds in isolation (as has tended to be the approach used in the past) but by increasing listening skills and visual discrimination. Such a technique allows children, not only to identify where they have heard the sound within the word, but also how that sound links with the graphical representation on the page.

My teaching experience concurs with Adams' (1990, p239) conclusions that teaching individual letter–sound correspondences and blending them together can be ‘slow and tortuous’ for children who come to school with little prior experience of print. As Adams (1990) argues, sound-symbol lessons will proceed quite quickly for children who have the necessary knowledge about print already in place because the content will be a review and clarification of existing knowledge rather than the introduction of new information. Indeed some children do not require extensive and explicit instruction in phoneme/grapheme correspondences because they have already acquired the knowledge implicitly. In other words, some children already have acquired sufficient phonological knowledge implicitly and through the act of reading this knowledge becomes explicit. Other children find it difficult to remember sounds learned in
isolation for reasons cited by Adams (1990) – (phonological correspondences are meaningless and easily confused) whilst other children find it impossible to blend phonemes into words effectively. A primary reason for this difficulty is failure to recognise that sounds learned as isolated units are the same as those in whole words. Goulandris (1994, p410) explains why phonemes in speech are hard to identify.

'Speech is composed of a series of continuous speech sounds, often referred to as 'the speech stream'. A speech sound, or phoneme, is difficult to identify or extract from within a word because phonemes in running speech overlap.'

The importance of phonological awareness for literacy development is undisputed and as Anthony and Lonigan (2004), Anthony et al (2003), Anthony et al (2002) assert, phoneme awareness and onset and rime awareness are elements of one overall and overlapping ability.

The developmental sequence of words in the patterns and sequences in this programme together with the (LSSW) strategy is intended to facilitate the development of phonological knowledge at the onset and rime level for children who are, as yet, unable to spell because they have insufficient phonological knowledge. This group may include children who fail to be able to access phonological knowledge through explicit phoneme/phonological programmes. The learning outcome for these children, in this first instance, will be that they develop sound symbol relationship for initial consonant sounds and then rimes and final consonant sounds. This develops through exposure to the highly structured developmental sequence in the daily lists of rhyme words and through the use of the strategy. These lists, together with the progression through the programme, enable the brain to recognise patterns and sequences by providing enough experience of them. (A similar analogy would be a physiotherapist patterning a child’s motor responses to enable him to learn to crawl).

For many children, identifying and remembering spelling patterns and sequences is easy. The brain can organise and classify words on the basis of sound similarity and retrieve them with ease. However, for some children, their auditory and visual processes fail to do this effectively; the brain cannot make sense of the sounds they hear
and the visual patterns they see. It may be that it is not until the brain has experience of a significant number of patterns and sequences that it can begin to make sense of the common elements in the (specific formula) pattern that make up rhyme patterns and sequences in general. Each rhyme pattern is different e.g. man, can, / got, lot, hot, but visual rhyme patterns have common elements - i.e. same end pattern with changes only in the initial sound. What may be sufficient experience for one child may be insufficient experience for another. Repeated attempts to spell the same rhyme pattern for weeks on end can be unproductive for some children. This may be because repeating the same rhyme pattern over and over again does not supply the brain with sufficient information regarding common elements relating to rhyme patterns in general.

This is the rationale behind all children advancing through the programme together with a new rhyme pattern being studied every week. Using the LSSW strategy allows the child with the greatest difficulty to participate in the same programme as the rest of the class but with the focus being on different learning outcomes. For those children with insensitivity to sound it may be after 10, 20 or 30 different patterns that the brain recognises the common features that make up visual rhyme patterns and the sounds representing them and only at that point does memory begin to organise effectively. Children, as Adams (1990) points out, can generate 500 words from 37 'rimes'.

In summary, the LSSW technique facilitates the development of phonological awareness by enhancing the ability to perceive units of sound in words and match these to their corresponding graphemes. The first units of sound to be perceived are initial consonants and then, with further experience, rime units and final consonants.

As the majority of children already have this knowledge to draw on, their learning outcome will be that they can use their phonological knowledge effectively to process and manipulate sound segments of spoken language in order to spell target words. If children can spell the word 'man', then by changing the sound at the beginning of the word they can spell 'ran'. This considerably reduces the load on lexical memory because each word does not have to be stored as an individual unit but can be generated by analogous reasoning.
4.3 The Structure of the Programme

The strategies discussed in the last section are used to help process spellings into memory. This section discusses how the Programme facilitates the organisation and storage of these spellings in long term memory encouraging the development of connections which enable effective retrieval. The Programme's structure is designed to facilitate this by:

- grouping words into visual patterns based on sound similarity in the rime with consonant onsets being changed to generate a new word (thus linking visual and auditory memory). This reduces the amount of information required to be stored in the lexicon. The lexical store is only required to retain one element (i.e. the rime). From this, entire lists of words can be generated, as long as sufficient phoneme knowledge is in place in the phonological store to produce the initial sounds required to generate new words. The ability to reason by analogy is therefore dependent upon lexical and phonological processes interacting. Further links, ensuring that the meaning of words are known, allow semantic memory to interact with lexical and phonological processing when recall is required.

- grouping the high frequency words into semantic and syntactic groupings. This means that lexical, phonological and semantic memory can interact in recall. Because so many high frequency words are irregular in phoneme/grapheme mappings and abstract in meaning in a 'stand alone' situation, they can be difficult to recall. Demands on lexical (visual) memory would be considerable were it to be the only strategy available in recall where phoneme/grapheme rules cannot assist. It is therefore desirable to support visual memory (the lexicon) by interaction with other processes that can mediate recall such as semantic and syntactic processing.

The organisation of the lists in this way allows learning to take place at an implicit level by repeated exposure to the groupings. Explicit knowledge is facilitated by the intentional teaching of analogous reasoning and by drawing attention to how the frequency words can be applied.
4.4 The Developmental Sequence and Curriculum Planning

There are two separate components to the developmental sequence that make up the daily lists. The first are patterns and sequences. The second component to the developmental sequence is high frequency words. (An overview of this sequence can be seen in Table 6.)

4.4.1 Patterns and Sequences

Young children find it difficult to discriminate the second consonant in initial consonant clusters in words and consonants preceding the final consonant. Treiman (1991, 1993, 1995) has shown that second consonants and consonants preceding the final consonant in words are frequently omitted in young children's attempts at spelling.

For this reason, in Stage 1 of the Programme, the rhyme patterns consist of consonant-vowel-consonant (CVC) words only. The fact that there are no consonants following immediately after the initial consonant, and no consonants immediately preceding the final consonant, allows for greater success because there is phoneme/grapheme transparency. Children who are working at the LSSW level (the learning outcome is that they will establish sound-symbol relationship for the initial sound and rimes) can also experience greater success because the sounds map clearly on to the graphemes and there are no additional consonants that cannot be perceived at an auditory level.

In Stage 1, all the CVC words with the same short vowel sound are covered first and when all CVC words containing that short vowel sound have been exhausted, the lists containing the next short vowel sound are introduced. The order for the vowel sounds was decided on the basis of the number of high frequency words contained within the lists see Table 5). As well as containing a high percentage of high frequency words, the patterns with the short vowel sound 'a' in the words were an obvious starting point because traditionally children find this sound easier to remember. This is because the sound is the same as the word 'a' as in 'a man' or 'a bus'. The short vowel sounds are not mixed within the weekly lists. This is to provide children with the opportunity to
repeatedly hear the same vowel sound so that greater familiarity with the vowel sound can be built up.

Table 5: High Frequency Words containing the Short Vowel Sound

<table>
<thead>
<tr>
<th>Vowel</th>
<th>High frequency words contained in the rhyme patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Man, can, ran, van, than, plan, had, dad, sad, bad, bag, rap, map, sat, that, bat, cat, fat,</td>
</tr>
<tr>
<td>o</td>
<td>Lot, got, not, hot, top, stop, shop, drop, dog, rob, job,</td>
</tr>
<tr>
<td>i</td>
<td>Win, did, hid, bit, sit, big, dig, him, swim</td>
</tr>
<tr>
<td>e</td>
<td>Ten, men, then, red, let, met, get</td>
</tr>
<tr>
<td>u</td>
<td>Fun, run, up, but,</td>
</tr>
</tbody>
</table>

Table 6: Overview of Developmental Sequence of Daily Lists

<table>
<thead>
<tr>
<th>Patterns and sequences</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CVC words only</td>
<td>CVD, CCV, CCCV Words</td>
<td>CVCC, CCVC, CCCVC, CVVC, CCVVC, CCCCVC</td>
</tr>
<tr>
<td>Rhymes -an, -ad, -ag, -ap, -at, -ot, -op, -og, -ob, -id, -in, -it, -ip, -ig, -en, -et, -un, -ug, -ut, -ub</td>
<td>Rhymes -an, -ad -ag, -ap, -at, -am, -ab, -ot, -op, -og, -ob, -in, -id, -it, -ip, -ig, -im, -en, -ed, -et, -un, -up, -ud, -ug, -ut, -ub, um, Middle vowel t-n, s-t, p-n, l-d, p-t, b-g, d-g, r-b, p-p, h-t, j-g, b-t, f-n, r-g, h-m, r-m, t-g, b-d, g-t, n-t, l-g, l-t, t-p, c-t</td>
<td>Rhymes -ell, -ill, -ull, -ass, -ess, -iss, -oss, -iff, -uff, -and, -end, -ang, -ong, -ing, -ung, ent, -ant, -int, -unt, -ank, -ink, -unk, -ash, -ish, -ush, -osh, -ack, -ick, -ock, -eck, -uck, -ast, -est, -ist, -ist, -amp, -imp, -ump, -ask, -isk, -usk, -eed, -eep, -een, -eet, -eel, -eek, -eer, -ood, -ook, -oot, -oon, -oop, -ool, oo1, oom</td>
<td></td>
</tr>
</tbody>
</table>

High frequency words

<table>
<thead>
<tr>
<th>Core Programme (Row 1)</th>
<th>19, 2 letter words + yes</th>
<th>100 high frequency words including those in Stage 1 (1st Extension level)</th>
<th>2nd 100 high frequency words</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st extension level (Row 2)</td>
<td>20 words from 1st 100 high frequency words</td>
<td>2nd 100 high frequency words</td>
<td>3rd 100 high frequency words</td>
</tr>
<tr>
<td>2nd extension level (Row 3)</td>
<td>Colours and numbers</td>
<td>Words selected from curriculum wordbanks</td>
<td>Additional frequency word required for independent writing including polysyllabic words up to 5 syllables in length e.g. immediately</td>
</tr>
<tr>
<td>3rd extension level (Rows 4 and 5)</td>
<td></td>
<td></td>
<td>Words selected from curriculum wordbanks</td>
</tr>
</tbody>
</table>
According to Adams (1990), vowels are the last phonemes to be perceived. Observations from my own teaching experience indicate that, within CVC words, children perceive the initial consonant sounds first, followed by the rime and final consonant sound. It is only after these sounds have been grasped that they are able to discern the short vowel phoneme. According to Adams (1990, p119) 'the task of splitting vowels away from consonants is among the most difficult of phonemic segmentation skills.' Rhymes in CVC words allow children to perceive the short vowel when linked to the final consonant. However, because of the considerable difficulty that a lot of children have splitting vowel sounds away from consonants, the words in the lists which come in the third term of Stage 2 are organised to facilitate isolation of the vowel sound. The lists for the final 8 weeks of Stage 2 are not organised in rhyme patterns, but are CVC words, with the only difference in the spelling being the vowel sound e.g. bag, big, bug, beg, bog. This forces the children to focus entirely on the short vowel sound and this therefore enhances discrimination because the words can only be distinguished by identifying the vowel.

All the rhyme patterns covered in Stage 1 of the programme are repeated in Stage 2 but the lists now include initial consonant blends, digraphs (CCVC) and clusters (CCCVC) (See Table 6). The small group of children who are not fully secure in their knowledge of single initial consonant phonemes (children with extensive difficulties with phonological awareness) continue with CVC words until they are ready to discriminate the second and third consonant sounds in the CCVC and CCCVC words. Once single initial consonant-phoneme knowledge is secure, children are ready to have the CCVC and CCCVC words included in their list. Through experience gained in their daily spelling activities children learn to identify where they have heard the new sound in the word and learn to link the sound with the appropriate grapheme.

For the more able spellers, the aim is to apply these rhyme words in independent writing, but many of these rhyme words cannot be used in independent writing without adding the verb inflections 'ed' and 'ing', for this reason this must be taught. The programme aims to establish strong semantic links for the rhyme words so there is teacher-led, whole-class discussion to encourage pupils to explore the range of ways
some spellings can be used. There is little point in children knowing how to spell 'lap' if they don’t know how it can be used. For example:

I ran two laps of the race track.

The cat sat on my lap.

The cat is lapping up the milk.

The water lapped against the shore.

Spelling is reduced to the lowest cognitive level when it is considered to be no more than simple recall of a sequence of three letters as in the word 'lap'. This is only the beginning of a classroom process that must facilitate understanding of spellings so that the outcome of this learning process will be the ability to use words that have been learned in children’s own independent writing. This is incorporated into the Programme in the Support Materials for children who are working on the first and second extension levels of the programme. The extension activities provide opportunities for children to learn to double the last letter of these words before adding 'ed' or 'ing'.

In Stage 3, the Programme starts with CVCC, CCVCC, CCCVCC words, where the final two consonants are the same, e.g. hill, grill, shrill. This means that at the start of the Stage 3 Programme children are learning a longer sequence of letters but they do not as yet have to discriminate another consonant phoneme at the end of the word. Then the programme moves on to words ending in final consonants, e.g. nd, ng, nt, nk, ck and following this, double vowel sounds, e.g. ee, oo (one sound but the same two letters, e.g. cool, pool, stool, school (See Table 6)

4.4.2 High frequency words

The high frequency words in Stage 2 and Stage 3 are grouped semantically and/ or syntactically and not strictly in order of frequency of occurrence. This is so that words presented each week can immediately be used in context. For example, ‘going to the’, ‘my mum was’, ‘we went home’ are examples of some of the groupings in the core high
frequency words in Stage 2. This helps children to see the link between what they are being asked to learn to spell and their independent writing. Spelling schemes that present frequency words in groups with no semantic or syntactic link, fail to take account of the importance of immediate application and the need to develop connections between processes other than simple visual recognition and recall. This immediate application allows for over learning through practice in real contexts.

The comprehensive design and structure of this Programme, including the developmental sequence, ensures that any child working at the core level of the programme only, does not miss the opportunity to learn any frequency words or activities included in the extension levels. This is achieved by building in these extension frequency words and activities in the next stage of the programme, within the core lists and activities. This careful planning guarantees there are no gaps in learning for any child. The extensive curriculum planning that has gone into this sequence reduces the amount of curriculum planning required by the teacher.

4.4.3 Support Materials

The Support Materials are an important aspect of the programme because they allow children to engage in activities related to the spellings they have been learning. They provide opportunities for pupils to employ the strategies that they have been developing and apply spellings in the construction of sentences to convey meaning (See Appendix A).

In endeavouring to ensure the transfer of those spellings already learned (to the child’s independent writing) it is necessary to intentionally teach some of the rules of morphology. This is another important function of the Support Activities. Table 7 summarises the morphological knowledge explicitly taught through the Support Activities. As children do not have any difficulty adding the plural 's' to words, this is not intentionally addressed in the support activities but is taken as known. The morphological rule regarding plural 'es' is intentionally taught in Stage 3 because this is more difficult.
<table>
<thead>
<tr>
<th>Stage 2</th>
<th>Core Programme ('A' activity sheets)</th>
<th>1st and 2nd extension level ('B' activity sheets)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Adding 'ed' and 'ing'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Syntactic awareness (jumbled sentences)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Compound words (splitting)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Syllabification (dividing words into syllables)</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Adding 'ed' and 'ing'</td>
<td>Syntactic awareness (jumbled sentences)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Compound words (splitting)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Compound words (matching two words to make new word)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Syllabification (dividing words into syllables)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contractions (Book 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Homophones (Book 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Suffixes, e.g. ful, fully, less, er, est (Book 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spelling rule for plural 'es'</td>
</tr>
</tbody>
</table>
As discussed in chapter 2, it is generally agreed that morphology does not play a prominent role in spelling until the later years of primary education because morphological knowledge develops later than phonological and is more difficult to acquire (Nagy, Berninger, Abbott, Vaughan and Vermeulen, 2003). As Goulandris (1994) and Nagy et al (2003) point out, confusion can arise for beginning spellers when morphemes are not regular in the sound produced, e.g. verb inflection ‘ed’ as in slipped, landed, danced. However, these particular morphemes (‘ing’ and ‘ed’) are vital for independent writing, therefore they have been introduced in the Programme in Stage 2 for the extension levels. Furthermore, as Bryant, Nunes and Bindman (1999a) have highlighted, morphology can assist in deciding between two or more acceptable spelling sequences e.g. ‘x’ or ‘cks’ for /ks/. Singular nouns or adjectives end with ‘x’, whereas verbs have the ending ‘cks’ (cracks, licks). Although this is not explicitly taught in Stages 1-3, the Programme allows children to become familiar with these word endings through experience of the patterns and sequences. Therefore, they develop knowledge of these morphemes at an implicit level that can be made explicit at a later stage through intentional teaching of the rule. This intentional teaching may only have an impact if they have sufficient prior experience at an implicit level i.e. a level of knowledge on which to draw that ensures the rule makes sense and is therefore understood.

4.5 Delivery of the Programme

4.5.1 Layout of the weekly spellings

The emphasis of this Programme is on the teaching of spelling to the whole class. The single group with extensions approach to differentiation allows all children to learn together regardless of their ability. The teaching is to the whole class but the focus is on different learning outcomes. The Programme has cut off points for different levels of ability but ensures that all children cover the core programme together. Rhyme patterns are taught alongside frequency words focusing on two different methods for learning.
The spelling lists as presented in the programme are for the average group so teachers are required to amend each list for the below average group and the above average group. Each spelling list contains the words for one week.

Tables 8 and 9 show an example of the weekly layout of spellings. This example has been taken from Stage 2 but the structure is the same throughout the programme.

The words should be learned in the following order:

Monday - Rhyme words in Box 1 and Frequency word List A
Tuesday - Rhyme words in Box 2 and Frequency word List B
Wednesday - Rhyme words in Box 3 and Frequency word List C
Thursday - Revision of Rhyme words in Boxes 1-3 and Frequency word Lists A-C

There are follow up tasks for each list (see Volume 2, Appendix G1, G3, G4, G6, G7).

Table 8: Example of Weekly Rhyme Pattern Words

<table>
<thead>
<tr>
<th>Rhyme Patterns</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bag</td>
<td>ag</td>
<td>ag</td>
<td>ag</td>
</tr>
<tr>
<td>Sag</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lag</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wag</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tag</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rag</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8 continues...

Table 9: Example of Weekly Frequency Words

<table>
<thead>
<tr>
<th>Frequency Words</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>my</td>
<td>mum</td>
<td>was</td>
</tr>
<tr>
<td>B</td>
<td>happy</td>
<td></td>
<td>when</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 9 continues...
The teacher selects words from the curriculum word banks at the back of the Teacher's Manual and adds them into Row 3 for the above average group (second extension level). The extension words are removed for the below average group so that they only have one row of frequency words to learn (Row 1 – the core programme). All children proceed through the Programme together. The children who have insensitivity to sound and no awareness of rhyme are not expected to commit the rhyme words to memory until they are able. However they have three frequency words to memorise each week.

4.5.2 Daily routine

The importance of creating a positive learning environment, in which success can be achieved and academic self concept can grow, was discussed in Chapter 3. The design of the spelling programme, its structure, the ‘single group with extensions’ approach to differentiation, the learning strategies, and the developmental sequence in the lists of words have all been discussed and it has been shown that together, these aim to enable success. This design means that all children can progress within their zone of proximal development (Vygotsky (1962).

The Programme enables the teacher to teach spelling to the whole group instead of just giving out lists of words to be learned at home. A key element of the spelling programme is this strong emphasis on explicit teaching of spelling, ensuring that children develop strategies for effective storage and retrieval of target words and also understanding of these words so that they may be used in independent writing.

Tables 10-12 show the daily routine for this teaching for each of the Stages 1-3 and the order this routine takes. The teaching emphasis in Stage 1 is on the effective use of learning strategies to ensure that children develop assembled and lexical processing in tandem so that these processes can be used in an integrated way and linked to semantic understanding. In Stages 2 and 3, greater emphasis is placed on developing this language understanding and there are weekly guidance notes for the teacher highlighting teaching points (see the Teacher's Manuals in Volume 2, Appendix G1, G2 and G5 for teaching notes).
Table 10  Daily routine for Stage 1

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing</td>
<td></td>
<td>Daily practice of words taught on Monday*</td>
<td>Daily practice of words taught on Monday and Tuesday*</td>
<td>Daily practice of words taught on Monday, Tuesday and Wednesday*</td>
<td>Test of all words learned</td>
</tr>
<tr>
<td>Primary</td>
<td>Teacher modelling how to use strategies effectively allowing class participation and then individual practice. LVSCWC high frequency words and LSSW for rhyme words (White boards and markers can be used for class participation and individual practice)</td>
<td>Teacher modelling how to use strategies effectively allowing class participation and then individual practice. LVSCWC high frequency words and LSSW for rhyme words (White boards and markers can be used for class participation and individual practice)</td>
<td>Teacher modelling how to use strategies effectively allowing class participation and then individual practice. LVSCWC high frequency words and LSSW for rhyme words (White boards and markers can be used for class participation and individual practice)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Focus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow up</td>
<td>Activity sheet 1</td>
<td>Activity sheet 2</td>
<td>Activity sheet 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homework</td>
<td>The spellings are not sent home to be learned. The programme is designed to be taught in class in this first stage. This allows the teacher to help children establish strategies for learning the spellings and also assess the effectiveness of this teaching. Lack of progress can not be attributed to lack of parental support, which when used as a reason for lack of progress can mask other underlying difficulties a child may have processing information. The teacher must teach the children how to use these strategies effectively and the result of effective use of the strategies will be success in achieving the targeted learning outcomes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

See Appendices for examples of activity sheets contained in the support materials

*Daily practice consists of an informal spelling test using white boards and markers and weaker children are allowed to use LSSW for the rhyme words
<table>
<thead>
<tr>
<th>Sequence</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing</td>
<td>Daily practice of words taught on Monday*</td>
<td>Daily practice of words taught on Monday and Tuesday*</td>
<td>Daily practice of words taught on Monday and Tuesday*</td>
<td>Test of all words learned and dictation sentences (dictation sentences include words from previous lists for reinforcement)</td>
<td></td>
</tr>
<tr>
<td>Primary Teaching Focus</td>
<td>Meaning and usage of words for both rhyme and frequency words</td>
<td>Meaning and usage of words for both rhyme and frequency words</td>
<td>Meaning and usage of words for both rhyme and frequency words</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow up activity</td>
<td>Activity sheet 1. Teacher must differentiate this activity sheet for 3 levels. See appendix</td>
<td>Activity sheet 2. Teacher must differentiate this activity sheet for 3 levels. See appendix</td>
<td>Activity sheet 3 Teacher must differentiate this activity sheet for 3 levels. See appendix</td>
<td>Activity sheets 4A and 5A for less able spellers. Activity sheets 4B and 5B for majority of class</td>
<td>Activity revision sheet once every two weeks 6A for less able and 6B for rest of class</td>
</tr>
<tr>
<td>Homework</td>
<td>Revision of words taught using LVSCWC for frequency words, and LSSW for rhyme (for less able spellers) and analogy for majority of class (If you can learn one of rhyme words you can spell all the rest by changing the initial consonant(s))</td>
<td>Revision of words taught using LVSCWC for frequency words, and LSSW for rhyme (for less able spellers) and analogy for majority of class</td>
<td>Revision of rhyme and frequency words using strategies.</td>
<td>Revision of rhyme and frequency words using strategies.</td>
<td></td>
</tr>
</tbody>
</table>

See Appendices for examples of activity sheets contained in the support materials

*Daily practice consists of an informal spelling test using spelling practice books. Weaker children are allowed to use LSSW for the rhyme words.
<table>
<thead>
<tr>
<th>Teaching sequence</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing</td>
<td>Daily practice of words taught on Monday</td>
<td>Daily practice of words taught on Monday and Tuesday</td>
<td>Daily practice of words taught on Monday, Tuesday and Wednesday</td>
<td>Test all words learned and dictation sentences (dictation sentences include words from previous lists for reinforcement and monitoring)</td>
<td></td>
</tr>
<tr>
<td>Primary Teaching Focus</td>
<td>Meaning and usage of words for both rhyme and frequency words</td>
<td>Meaning and usage of words for both rhyme and frequency words</td>
<td>Meaning and usage of words for both rhyme and frequency words</td>
<td>Activity sheets 4 and 6A for less able spellers. Activity sheet 6B and top half of activity sheet 4 for majority of class</td>
<td>Activity sheets 5A for less able spellers. Activity sheets 5B for majority of class</td>
</tr>
<tr>
<td>Follow up activity</td>
<td>Activity sheet 1. Teacher must differentiate this activity sheet for 3 levels.</td>
<td>Activity sheet 2 Teacher must differentiate this activity sheet for 3 levels.</td>
<td>Activity sheet 3- Teacher must differentiate this activity sheet for 3 levels. Activity sheets 5A for less able spellers. Activity sheets 5B for majority of class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homework</td>
<td>Revision of words taught using LVSCWC for frequency words, and LSSW for rhyme (for less able spellers) and analogy for majority of class (If you can learn one of the rhyme words you can spell all the rest by changing the initial consonant(s))</td>
<td>Revision of words taught using LVSCWC for frequency words, and LSSW for rhyme (for less able spellers) and analogy for majority of class</td>
<td>Revision of rhyme and frequency words using strategies.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

See Appendices for examples of activity sheets contained in the support materials

*Daily practice consists of an informal spelling test using spelling practice books. Weaker children are allowed to use LSSW for the rhyme words.
Chapter 5

Methodology
CHAPTER 5

METHODOLOGY.

The global context of educational inquiry has seen education, research and politics become inextricably bound together. Guthrie (1990, p110) states that the ‘new’ strategic raw material, upon which economic productivity is ever more dependent, is ‘human capital’.

Governments have sought to enhance their economic position through the development of this ‘human capital’ and therefore policymakers over the last two decades have continually raised their expectations of the performance of the education system. This in turn, had an impact on the nature of educational research, resulting in a growing trend towards more evaluative research. In this evaluative role, the researcher’s task is to evaluate the effectiveness of given policies or educational programmes.

5.1 Evaluative Research - Inherent dangers

Historically ‘purists’ have sought to distinguish between research and evaluation (Macdonald, 1976; Chelinsky and Mulhauser, 1993). Although recognising that both use methodologies and methods of social science, they argue that evaluation has an almost entirely political agenda because it focuses on given initiatives seeking to shed light on a problem of action. This type of research is often categorically funded by governments or fund-awarding bodies. Where this is the case, the research agenda is set for the researcher and not by the researcher. Stronach and Morris (1994) suggest that where evaluations are commissioned and have strongly political implications, they may become ‘conformative’ and can be identified as such because they exhibit several characteristics:

1. a tendency to over-report change by giving undue weight to the perceptions of those responsible for implementing the programme;
2. a tendency to under-report the views of classroom practitioners, and programme critics;
3. over-dependence on short term learning outcomes highlighted by taking project goals as given, and supporting their realisation;

4. failure to evaluate longer term learning outcomes, or the economic and social consequences of the programme;

5. over-reliance on a body of opinion as the determination of overall significance;

6. having too tight a contractual relationship with the funding body leading to self-censorship to protect future funding prospects;

7. offering criticism in general rather than in particular.

Furthermore as Cohen, Manion and Morrison (2000) point out, the extent to which findings are taken on board, utilised and acted upon can be dependent upon the extent to which they are consistent with the agenda of political decision makers.

Norris (1990, p97) claims that 'evaluation is the application of research methods to elucidate a problem of action' and therefore must lead to decisions. It may or may not produce an explanation of why an educational programme is effective or ineffective or how it operates to produce its effects. He further suggests that the criteria for judging evaluations are 'utility' and 'credibility' compared with the much more rigorous criteria of internal and external validity which is applied to research.

According to Smith and Glass (1987), educational research, as distinct from evaluation, is identified by its autonomy and a desire on the part of the researcher to advance knowledge in the area of investigation, to contribute to theory and to make generalisations. Researchers therefore set their agenda and timescales, seeking neutrality so that findings can be held up for public scrutiny and be judged methodologically and by the contribution that the research makes to the field. The dissemination rights belong to the researcher and not the funding body and findings are used to further knowledge rather than inform decisions.

Norris (1990) points outs the weaknesses in deriving an account of evaluation based solely on the natural sciences, in particular experimental psychology. This view of research, he states:
'ignores the social context of educational inquiry, the hierarchic nature of research communities, the reward structure of universities, the role of central governments in supporting certain projects and not others, and the long-established relationships between social research and reform. It is in short an asocial and a historical account.' Norris, (1990, p99)

Cohen et al (2000, p41) argue that these representations of research and evaluation are indeed ‘ideal types’ and that this oversimplifies issues for the researcher as there is more overlap or ‘blurring’ than these differences suggest.

There is little doubt that there has been a change in the boundaries of what is defined as educational research, largely due to the ‘funding ‘and ‘politics’ of both evaluation and research. Evaluative research has increased in response to the categorical funding of research projects. As a result, a large proportion of research is now policy related; although not exclusively so. In so far as educational research is aimed at improving practice, it is difficult to see how this aim does not imply some kind of evaluation.

5.1.1 Characteristics of evaluative research

As Cohen et al (2000) point out, the methodologies and methods of social science research can be seen in evaluative research although they are not always rigorously applied. It is essential however to ensure that these are in place. For example the particular programme or policy has to be conceived in ways that make it amenable to methodology. There is the need to clarify the purposes of the investigation and to operationalize purposes and areas to be investigated. There is also the need to address a number of principles of research design:

- formulating operational questions;
- deciding appropriate methodologies; deciding which instruments to be used for data collection;
- addressing reliability and validity in the investigation and instrumentation; addressing ethical issues in conducting the investigation;
- deciding on data analysis techniques ;
- deciding on reporting and interpreting results.
Questions about the effectiveness of programmes are seen in terms of causal hypothesis testing and the evaluation is judged on the validity of its conclusions.

Approaches to evaluation are often thought of in terms of a set of methodological or epistemological differences, positivist versus anti-positivist, qualitative versus quantitative, idiographic versus nomothetic, naturalistic versus scientific.

At the outset of any research study the predicament for the researcher is one of choosing an appropriate methodology for the purpose, given the nature of the social phenomena to be investigated. One might argue that the divergent ontologies (nature of knowledge) and epistemologies (forms of knowledge and how they are acquired) of the phenomena to be investigated will ‘demand’ different research methods and where a ‘best fit’ is not found the validity of any findings will be called into question.

Deciding on an appropriate methodology and instruments for the collection of data not only depend on the nature of the phenomena to be investigated but also on the researcher’s view of how the knowledge is acquired, understood and acted upon by individuals. Different conceptions of social reality and of individual and social behaviour have resulted in competing views within the social sciences. In recent years these have been clearly reflected in educational research. A mandatory feature of ‘traditional’ research has been the ‘objectivity’ of the researcher compared with the more recent move towards more ‘interpretive’ research methods.

Researchers adopting an objectivist (or positivist) approach view social reality, in ontological terms, as being externally imposed on individuals. This tangible, concrete knowledge is the cornerstone of objectivist research and consequently can be isolated and held up for scrutiny by a wider audience.

On the other hand, researchers adopting an interpretivist (or anti-positivist) approach consider social reality to be internally constructed by individuals who are part of the activity being investigated. Epistemologically, the anti-positivist view states that knowledge is abstract and stresses the importance of the personal and unique experience.
of individuals in constructing understanding and knowledge of their social world. It is not possible therefore from this viewpoint to reduce knowledge to only that which is tangible.

In seeking objectivity, the researcher engaging in positivist research methods should strive for measurability, controllability, the construction of laws and rules of behaviour and the endorsement of causality and therefore will choose ‘nomothetic’ quantitative measures. In striving to understand and interpret the subjective world of human experience, in terms of the autonomous actions of individuals, the anti-positivist researcher relies on meanings and interpretations using one of a number of ‘ideographic’ variants of qualitative, naturalistic methodologies.

Whilst polarised in their underlying assumptions, these two approaches need not necessarily be an either/or choice for the researcher. There are strengths and weaknesses in both theoretical approaches to research. As Cohen et al (2000) highlights, the positivist approach has been heavily criticised for its dependence on scientific methods which rely on a mechanistic and reductionist view of natural phenomena which essentially negates individuality and ignores intention, freedom and moral responsibility. In regarding human behaviour as passive, essentially determined and controlled, critics of positivism disapprove of its oversimplification of human experience and actions. Positivism fails to take account of each individual’s unique ability to interpret experiences, construct theories about the world and act on them.

Conversely, the anti-positivist approach has received criticism for abandoning scientific procedures of verification and for failing to recognise the importance of generalisations. Moreover, the process of interpreting and defining a situation cannot be viewed as separate from the circumstances in which the individual is placed. Indeed, according to Bernstein (1974), the situation is a product of these circumstances. The power of others within these circumstances to impose their own definitions of situations on participants is neglected in anti-positivist research.

'The ability of certain individuals, groups, classes and authorities to persuade others to accept their definitions of situations demonstrates that while.....
social structure is a consequence of the ways in which we perceive social relations it is clearly more than this.’ Cohen et al (2000, p27)

5.1.2 The Positivist Paradigm – Quantitative Research

It seems evident that an essential feature of experimental research is that researchers control and manipulate all conditions that might influence the events being studied. Cohen et al (2000), Drew and Hardman (1985), Breakwell, Hammond and Fife-Schaw (2000). This type of true experiment is characterised by:

- the random allocation of subjects to both experimental and control groups;
- the identification and control of key variables;
- the exclusion of any other variables;
- the implementation of the intervention to the experimental group whilst holding every other variable constant for both groups;
- the post test measuring growth;
- the comparison of one group with another;
- the stage of generalisation.

The key feature of a true experiment is randomisation. Randomisation of exposures ensures the greater likelihood of equivalence between groups. This involves the equal distribution, between the experimental and control groups, of any differences in the characteristics of the subjects that may affect the experimental variable in which the researcher is interested. If the groups are equivalent, then any clouding effects should be present in both groups. However, the random assignment of subjects to groups is often not possible in many social settings such as education. In a research study where the groups are already intact, and there has not been random allocation of subjects to groups, an alternative approach needs to be employed to overcome such difficulties. One such alternative approach is the quasi-experimental design (or non equivalent control group design). In this type of compromise design, the researcher should endeavour to use samples from the same population or samples that are as alike as possible. The notions of isolation and control of variables is much more difficult in this type of quasi-experimental research design and requires careful planning if internal and external validity are to be achieved. However this is a necessary ‘compromise’ if we
are to find out what works in practice. (According to Drew and Hardman (1985) internal validity refers to the technical soundness of the study. A study has high internal validity when all the potential factors that might influence the data are controlled except the one under study. External validity involves how well the results of a particular study apply to the world outside the research situation.)

5.1.3 The anti-positivist paradigm- Qualitative Research

Qualitative research can probe into situations in ways that are not always open to numerical analysis. It can help establish cause and effect, recognising that context is a powerful determinant of both causes and effects. Qualitative research strives to describe what it is like to be in a particular situation. It seeks to convey the views of participants involved and their thoughts about the situation or intervention. The situation is seen through the eyes of the participants and therefore qualitative research follows the interpretive tradition. Like other research methods, qualitative research has to demonstrate reliability and validity and this can be difficult given the uniqueness of situations. However alongside quantitative data, qualitative data can strengthen the reliability and validity of any findings and provide insight into the processes involved in the social phenomena being investigated. As Adams (1993, p206) states:

'Qualitative and quantitative research are productive only in complement. Where the former gives us values and direction, the latter protects us from letting the strengths of our beliefs blind us to their limitations.'

5.1.4 Longitudinal Research

As the preceding discussion has highlighted, decisions relating to the type of data collected are of paramount importance in the design of any research study. However other considerations must be taken into account in order to ensure the validity of the findings. One such consideration is that of timescale, particularly where the research study deals with aspects of human development. Cohen et al (2000, p176) identifies that
longitudinal studies that focus on an area of potential growth when conducted on a representative sample of the population are:

‘uniquely able to identify typical patterns of development and to reveal factors operating on those samples which elude other research designs’

A longitudinal design, drawing on a single sample and measuring responses on a number of occasions has a number of advantages over other designs. For example, an increase in score on a variable can be compared with the same individual’s score at an earlier time. This permits the study of age related development. The inclusion of a control group can prevent observed increases (that are in line with increased age of respondents) being misinterpreted as resulting from the effect of the intervention. Furthermore, since changes can be monitored within individuals, erroneous pre-test and post-test results, which lead to statistical regression towards the mean, can be identified.

Longitudinal research, involving the same respondents for the period of the research, presents challenges for the researcher, particularly where the study runs over a number of years as opposed to months. This is clearly more expensive to conduct than cross-sectional research. It also involves obtaining the co-operation of the same group of respondents for the duration of the research rather than for a single, one off, occasion. Obtaining a commitment to cooperate for longer periods of time can be difficult, as can the maintenance of that cooperation throughout the research. There may also be the problem of sample attrition resulting in a change in the representative nature of the sample. However, where causal relationships are to be established, changes in certain characteristics which result in changes in others must be identified. These kinds of observations can only be facilitated by this type of design. Also, it is only by following the same sample over a period of time that the researcher may distinguish real developmental changes and growth from chance occurrence (see Bailey, 1978). Thus, sustainable improvements over longer periods of time have greater validity.
5.2 Research Design

Two traditionally separate methodologies can clearly be identified. First, the experimental design which falls in the positivist paradigm and involves pre-test and post-test comparisons between groups or individuals using tests to measure outcomes of an intervention in nomothetic terms. Secondly, qualitative research which falls in the anti-positivist paradigm and involves focusing on individuals and local situations using interpretative assessment tools such as observation, interview, questionnaires to describe processes involved in interventions and/or the perceptions and views of participants. The choice of instrumentation tool will depend on the general research purposes and aims and the specific research questions that need to be answered. As the two types of approaches to issues in social science can be used to tackle different research questions, it is clear that they can be illuminative when synthesised into one coherent monograph.

The design of this research project has sought to take into account the criticisms levied at recent educational research (Hargreaves 1996, The TTA 1997). It also tries to address the difficulties inherent in research carried out within the natural environment. And whilst recognising that certainties may never be absolute, considerable efforts have been made to reduce the many variables within the educational setting. When formulating conclusions, cognisance has been taken of these limitations; the intention is not to make definitive statements about teaching and learning but rather to raise issues that may bring about a shift in thinking and changes in practice. It is also hoped that this research may initiate further research to test theories that go beyond the scope of this project, such as the possibility of a critical period for the development of visual and auditory perception and processing. This type of investigation would require collaboration between medical and educational researchers.

A coherent strategy was developed for integrating methodologies, designed to test 'The Complete Spelling Programme' comprehensively. I have sought to combine experience and reasoning alongside these systematic and controlled procedures in an effort to ensure that what may be seen as subjective beliefs can be objectively tested and the results scrutinised by others.
5.3 Aims of the research

As discussed in earlier chapters, this literacy intervention developed because of identified problems in the classroom management of spelling, pupil performance in spelling tests and limited transfer to independent writing. The aims of this study are three fold:

1. To evaluate the impact of 'The Complete Spelling Programme' in a small stratified sample of primary schools in Northern Ireland by monitoring the progress of pupils being taught spelling through 'The Complete Spelling Programme' and comparing their progress with that of pupils being taught by other methods;

2. To identify whether 'The Complete Spelling Programme' is sufficient for the full range of ability in mainstream schools to make progress. 'The Complete Spelling Programme' is designed to improve spelling through enhanced auditory and visual processing and allows children with learning difficulties to be taught alongside their peers through a unique approach to differentiation and innovative teaching strategy;

3. To establish what is involved in the spelling process in the classroom as developed through 'The Complete Spelling Programme', from learning to spell a word to its application in independent writing.

5.3.1 Research Questions

To address the stated aims of the research, answers to the following questions are sought:

1. Do pupils who are taught spelling using 'The Complete Spelling Programme' show greater progress in standardized spelling test scores than pupils who are taught by traditional methods;

2. Is there greater accuracy in spelling in independent writing as a result of using 'The Complete Spelling Programme';

3. Is there improvement in the quality of independent writing as a result of using 'The Complete Spelling Programme'?

4. What is the effect of school context (i.e. high social disadvantage and low social disadvantage) on final spelling scores and independent writing scores?
5. Is there any influence of gender on final spelling scores and independent writing?
6. Can all ability groups be maintained within the single group with extension approach to differentiation?
7. What do educators in the study consider to be the advantages and disadvantages of this intervention?
8. What is the relationship between spelling, reading and independent writing?

The focus of the research then, is the implementation of a prescribed curriculum that incorporates innovative teaching methods designed to enhance teaching and learning. Careful evaluation of the impact of these on classroom teaching and learning was undertaken, using two methodologies (quantitative and qualitative) to ensure that findings were as reliable and valid as possible (given the limitations of this type of research) and to prove that it was no artefact of any one method that resulted in the success of the spelling programme. Every methodology has its limitations and the nature of these limitations differs. The decision to use more than one methodology was to ensure that weaknesses of one methodology could be compensated by supplementing it with another methodology which is stronger in that area.

5.4 Longitudinal Research Design

A longitudinal design was chosen so that data could be collected from the same sample of pupils to monitor changes in individuals and the group over time. The most appropriate timescale was to follow the programme from its intended starting point in Year 2 through to the end of the Key Stage 1 in Year 4. Financial constraints dictated the size of the study. The age of children in the research group was determined by 'The Complete Spelling Programme'.

Two methodologies were identified as being appropriate for answering the research questions listed above.
5.5 Quantitative Element of the Research

5.5.1 Quasi-experimental research design for collection and analysis of quantitative data

One can conclude from the findings of Tooley and Darby (1998) and the TTA (1998), that the real issue for researchers in education is whether change can be brought about in real classrooms. Taking this into account and given the problems of external validity associated with true experiments, a quasi-experimental design was chosen. An investigation is externally valid to the degree that the arrangements, procedures, and subjects are representative of the outside setting, thus making results generalizable. Bracht and Glass (1968, p438) discuss generalisation issues concerning accessible populations and the target population. They advise that,

'generalising from the population of subjects that is available to the experimenter (the accessible population) to the total population of subjects about whom he is interested (the target population) requires a thorough knowledge of the characteristics of both populations'.

Consequently, in choosing real classrooms as the setting, it was not possible to have random selection of subjects or random assignment of schools. While attempting to control for key factors, it was important to control any factors or conditions that might blur the real effects of the independent variable (the spelling programme) on the dependent variable (spelling scores).

The issue of validity in this type of design demanded that, given the circumstances, the most rigorous study feasible must be conducted. It must be recognised that it is difficult, if not impossible to eliminate all problems and therefore those remaining have been identified and the subsequent interpretation has taken account of them. The threats to internal and external validity in this type of quasi experimental design have been identified by Campbell and Stanley (1963) and by Bracht and Glass (1968). The following controls discussed below were put in place to minimize invalidity and maximize validity, since, as Cohen et al (2000, p105) identifies, it is impossible for research to be 100 percent valid.
Given the evidence for an association between social disadvantage and achievement in school, it was essential to control for this. The most commonly used and accepted measure of social disadvantage in schools is the number of children in receipt of free school meals. Therefore it was decided to use this as an indicator. A figure equal to or greater than 50 per cent of the pupils in receipt of free school meals was considered to represent high social disadvantage. Low social disadvantage was where 20 per cent or less were in receipt of free school meals.

As illustrated in Table 13, there were two independent variables (spelling programme intervention and social disadvantage) with two levels in each (i.e. 2X2 design)

<table>
<thead>
<tr>
<th>Spelling Programme in Place</th>
<th>No Spelling Programme in Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20% Low Social Disadvantage</td>
<td>School A</td>
</tr>
<tr>
<td>&gt;49% High Social Disadvantage</td>
<td>School B</td>
</tr>
</tbody>
</table>

It was decided to control for school size factor because small schools generally have composite classes with between two and four year groups being taught together. This would prevent the CSP being delivered as intended by the authors. In order to ensure that the sample was as representative of the school population as possible, a small stratified sample was selected, drawing on schools in rural towns from both sections of the community - i.e. controlled and maintained.
5.5.2 Selection of Sample schools

The schools were selected from one ELB. Using the Budget Statement that indicated the number of children who were in receipt of free school meals, two categories were identified - i.e. high or low social disadvantage. These two categories were then subdivided into controlled (n=102) and maintained schools (n=143). Small schools with less than 200 pupils were eliminated from the list. Schools in the high social disadvantaged group were to be selected from the maintained sector (n=36) and schools from the low social disadvantage group were to be selected from the controlled sector (n=21).

Exploratory interviews with the remaining schools were conducted in order to:
1. ascertain interest in being either a research or control school;
2. identify schools which intended entering the Northern Ireland Literacy Strategy within the period of the research;
3. identify schools which would be entering the Northern Ireland Literacy Strategy for the same period of time as the research.

The interviews included briefing the Principal about what was involved in being an experimental school. Some schools were unwilling to give a commitment to participate for 3 years and they were eliminated from the list. Other schools were unwilling to agree not to enter the Northern Ireland Literacy Strategy and they were eliminated from the list of possible experimental schools. This reduced to 7 the number of schools willing to participate.

Following further exploratory interviews, four schools were selected. Permission from their Principals, (to carry out research over the period January 1999 - June 2001), was obtained and they were briefed on the extent of their involvement.

In order to achieve internal validity, it was necessary to control factors affecting progress in literacy and eliminate all systematic differences between groups excepting the treatment method. It was important to ensure therefore that the experimental schools were not intending to implement any other literacy initiative aimed at raising
standards during the period of the research. One school that was entering the Northern Ireland Literacy Strategy over the same period of time as the research, was assigned to the control group. The second school was identified as a control school because they were unwilling to be an experimental school but were agreeable to being a control school. The two schools identified as experimental schools agreed not to enter the Northern Ireland Literacy Strategy until the research was over and were prepared to implement the Programme over the three year period. One of these schools was a single sex boys' school in the high social disadvantage group. This was a considerable commitment on the part of these schools given the political climate and pressure to bring about improvement. (More details about the four schools are recorded on Table 14)

Hawthorne Effects
It might be said that the improvements in the results in the experimental schools were due to Hawthorne effects. Any intervention, it might be argued, will bring about the same results, therefore it was necessary to ensure that there was an intervention on a similar scale, aimed at raising literacy standards, in at least one of the control schools. The argument that progress be attributed to Hawthorne Effects would be weakened if the same progress did not occur in the control school. Control School C entered into the Northern Ireland Literacy Strategy in the same school year as the research study commenced and remained in the Literacy Strategy for the duration of the research. Control School D did not enter the Northern Ireland Literacy Strategy but intended to raise standards by attending ELB courses with ‘in-house’ dissemination to staff.

Reading Recovery
As Reading Recovery was an initiative promoted in the Raising Standards recommendations from DENI (1997) and was being implemented in schools during this period, it was important to ensure that its effect would not be an influencing factor on progress in literacy in these classes. However this was not an issue of concern as none of the experimental schools had reached the point of dissemination of Reading Recovery strategies and techniques within the research classes between 1999 and June 2001.
Table 14: Background Information on Schools

<table>
<thead>
<tr>
<th></th>
<th>School A (E)</th>
<th>School C (c)</th>
<th>School B (E)</th>
<th>School D (c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Enrolment</td>
<td>330</td>
<td>251</td>
<td>312</td>
<td>459</td>
</tr>
<tr>
<td>Co-educational</td>
<td>Co -Ed</td>
<td>Co -Ed</td>
<td>All boys</td>
<td>Co -Ed</td>
</tr>
<tr>
<td>Number in research class at outset</td>
<td>27</td>
<td>26</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td>Number in research class at end of study</td>
<td>24</td>
<td>23</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>Education sector</td>
<td>Controlled</td>
<td>Controlled</td>
<td>Maintained</td>
<td>Maintained</td>
</tr>
<tr>
<td>Social Disadvantage-Percentage of children in receipt of free school meals</td>
<td>&lt; 20%</td>
<td>&lt; 20%</td>
<td>&gt;49%</td>
<td>&gt;49%</td>
</tr>
<tr>
<td>Reading Recovery</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Number of children who received Reading Recovery in Year 2</td>
<td>3</td>
<td>-</td>
<td>1 (Unsuccessfully discontinued)</td>
<td>2</td>
</tr>
<tr>
<td>Dissemination of Reading Recovery strategies within the research class</td>
<td>NONE</td>
<td>-</td>
<td>NONE</td>
<td>NONE</td>
</tr>
<tr>
<td>Northern Ireland Literacy Strategy</td>
<td>-</td>
<td>Sept 99-May 01</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Use of Big Books</td>
<td>YES</td>
<td>YES</td>
<td>YES (YR 2 only)</td>
<td>YES</td>
</tr>
<tr>
<td>Guided Reading</td>
<td>NO</td>
<td>YES</td>
<td>YR 2 ONLY</td>
<td>YES</td>
</tr>
<tr>
<td>Letterland Phonics Programme</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

(E)=Experimental school  (c)= Control School

Attrition
There was some loss of subjects as a result of movement of children to other schools. As the loss was similar between the control and experimental schools, this presented no serious difficulty regarding internal validity.

Implications
Caution must be exercised in generalising the findings of this study to the wider population; this was a very small study with only two experimental and two control schools. To be able to detect effects at the level of the school, the study would have required a much larger number of schools. A 'school effect' is described by Hutchinson
(2003, p25-26.) as being 'a substantial effect of the overall school circumstances on the progress of individual pupils'. It remains unknown therefore whether any such effects exist. There was however an important difference between the experimental and control schools that should be noted.

Both control schools were co-educational schools, although one of the two experimental schools was an all boys school, which meant there was a larger proportion of boys and a smaller proportion of girls in the experimental group, (see Table 15 below).

Table 15: Gender of Children in Experimental and Control Schools

<table>
<thead>
<tr>
<th>Schools</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>N=30</td>
<td>N=13</td>
</tr>
<tr>
<td>Control</td>
<td>N=20</td>
<td>N=18</td>
</tr>
</tbody>
</table>

As illustrated in the literature review, (Chapter 3 paragraph 3.7), boys have been found to make slower progress in literacy skills than girls. It might be expected that this could have restrained the progress in the experimental schools, as there were more boys than girls.

At the outset of the study there was a significant difference in the performance of boys and girls on baseline spelling score and visual discrimination. Girls were performing significantly better than boys (P<0.05 for both).

There was another difference between the schools at the outset. Standardised tests were carried out pre-intervention (see Table 16). Based on the pre-intervention spelling score, the low social disadvantage Experimental school spelling scores were comparable to the high social disadvantage Control school. The high social disadvantage Experimental school spelling scores were comparable to the low social disadvantaged Control school. This was contrary to expectations. The class in the high social disadvantage Control school were considered to be a very able class and not typical of most of the classes within the school. The class in the low social disadvantage Control school was considered to be a weak class compared to other classes within the school.
As both developer of the CSP and researcher any potential bias was addressed through the use of research assistants and independent raters (see page 138, paragraph 5.5.4).

5.5.3 Data collection

Baseline assessment
A series of tests were administered to the Year 2 children (5-6 year olds) in the control and experimental schools during the week beginning 11th January 1999, immediately prior to the implementation of the CSP in the experimental schools. These tests were designed to test spelling and a range of other factors associated with spelling. (See Table 16).

Standardised Tests
The following standardised tests were administered to both the control and experimental schools:

- British Picture Vocabulary Scales (11) (BPVS) Norm referenced test of receptive vocabulary for Standard English;
- British Spelling Test Series (BSTS) Norm referenced test of spelling ability;
- Primary Reading Test (PRT) Norm referenced test of reading ability.

(See Appendix B:1)

Diagnostic tests
1. Quest: visual discrimination test (letter sequences);
2. visual sequential memory test (letter sequences):* This was designed to test memory for a sequence of letters with combinations not found in English orthography. This was to rule out previous learning and familiarity with letter sequences in English orthography;
3. Aston index : grapheme\phoneme correspondence – sounds of the alphabet (initial sound knowledge);
4. Phonological Assessment Battery-rhyme test ch 2 pg 25

(See Appendix B:2)
Purpose of each of these tests

Pre-test measures on which we can compare samples are necessary to ensure that groups are truly equivalent and to establish any differences at the outset. The results of assessment instruments used are recognised as representative of performance criteria that may apply in the wider educational context. The BPVS test was administered to establish any statistical difference in verbal ability (which is recognised to be highly correlated with IQ) between experimental and control groups. The British Spelling Test Series was administered to establish any statistical differences between groups in spelling scores. The Primary Reading Test was administered to establish any statistical difference in reading scores.

Reading tests, as well as spelling tests, were administered to the research schools for four reasons:
1. reading has been at the heart of the initiatives to raise standards in literacy in England, Wales and Northern Ireland. It was important to establish any differences in reading scores between the control and experimental schools at the outset and to measure gains in reading in experimental and control schools at the end of the study. Had this measure not been taken, it might have been argued that spelling had not improved as much in the control schools because the initiatives in these schools were focused on raising standards in reading and not spelling;
2. to find out whether reading and spelling scores were correlated with end of Key Stage levels in independent writing;
3. to find out whether reading scores or spelling scores predicted writing scores;
4. to examine more closely the relationship between reading, spelling and writing.

The four diagnostic tests were administered in order to establish any differences between the groups based on these measures; and also to find out which of these measures predicted spelling and reading scores.

On completion of the CSP the standardised spelling test was re-administered to evaluate (as far as is possible) the effectiveness of the programme. The reading test was also re-administered for the reasons discussed above.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BSTS</td>
<td>All schools</td>
<td></td>
<td>All schools</td>
<td></td>
<td>All schools</td>
<td></td>
</tr>
<tr>
<td>PRT</td>
<td>All schools</td>
<td></td>
<td></td>
<td></td>
<td>All schools</td>
<td></td>
</tr>
<tr>
<td>BPVS</td>
<td>All schools</td>
<td></td>
<td></td>
<td></td>
<td>All schools</td>
<td></td>
</tr>
<tr>
<td>Quest Visual Discrimination</td>
<td>All schools</td>
<td></td>
<td></td>
<td></td>
<td>All schools</td>
<td></td>
</tr>
<tr>
<td>Grapheme/phoneme correspondence for sounds of the alphabet</td>
<td>All schools</td>
<td></td>
<td></td>
<td></td>
<td>All schools</td>
<td></td>
</tr>
<tr>
<td>Phonological assessment battery rhyme test</td>
<td>All schools</td>
<td></td>
<td></td>
<td></td>
<td>All schools</td>
<td></td>
</tr>
<tr>
<td>Additional diagnostic tests</td>
<td>Experimental School A</td>
<td>Experimental School A only</td>
<td>Experimental School A only</td>
<td>Experimental School A only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent writing samples</td>
<td>Experimental School A only</td>
<td>Experimental School A only</td>
<td>Experimental School A only</td>
<td>Experimental School A only</td>
<td>All schools</td>
<td></td>
</tr>
<tr>
<td>Criterion referenced test</td>
<td>Experimental Schools only</td>
<td>Experimental Schools only</td>
<td>Experimental Schools only</td>
<td>Experimental Schools only</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5.5.4 Standardised procedures for gathering data and administering tests

Test administrators were identified from a list of newly qualified teachers who were not in permanent employment on the data collection dates. As training was required for the test administrators, they all gave a commitment not to accept any other work.

Test administrators, who administered the baseline tests, were given one full day’s training on Wednesday 6th January 1999 immediately prior to the commencement of testing. Strict procedures for carrying out the tests were established e.g. exactly the same wording was to be used by all testers when administering the tests and absolutely no help was to be given to children by testers. Test administrators were advised on how to put children at their ease before starting the testing. All tests were administered in the same order with the same intervals of time between the tests. Testing ran over four days in Schools B, C, D and five days in School A. Tests included group (BSTS and PRT) and individual tests (BPVS, Aston Index sounds test and Phonological assessment battery rhyme test) Two testers were assigned to each school.

Test administrators for the second year of the research (Year 3 classes) were given training immediately prior to the testing in May 2000, ensuring that the administrators understood how to conduct the test and that the same procedures were followed in all schools.

I administered the final tests in May 2001 and the criterion referenced tests in June 1999 with the help of one research assistant. I also collected all the writing samples throughout the research study again with the help of one research assistant. All test papers throughout the research, were marked (and the standardised scores calculated) by research assistants. Furthermore all independent writing samples were assessed by two independent raters.
5.5.5 Implementation of the Spelling Programme

The baseline testing of children commenced on Monday 10\textsuperscript{th} January 1999 and the implementation of the CSP commenced immediately after that, on Monday 17\textsuperscript{th} January 1999. The programme ran for the remainder of Key Stage One (See Table 17).

Table 17: Timescale for the implementation of the Spelling Programme

<table>
<thead>
<tr>
<th>School Year</th>
<th>Age range</th>
<th>Number of weeks in the Programme</th>
<th>Start Date</th>
<th>End date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 2</td>
<td>5-6 year olds</td>
<td>20 weeks</td>
<td>17\textsuperscript{th} January 1999</td>
<td>June 1999</td>
</tr>
<tr>
<td>Year 3</td>
<td>6-7 year olds</td>
<td>34 weeks</td>
<td>September 1999</td>
<td>June 2000</td>
</tr>
<tr>
<td>Year 4</td>
<td>7-8 year olds</td>
<td>34 weeks</td>
<td>September 2000</td>
<td>June 2001</td>
</tr>
</tbody>
</table>

In order to minimise variability in the delivery of the Programme it was necessary to provide training for the teachers who would be teaching the research classes.

The Year 2 teachers were given one hour's training after school immediately prior to implementation of the Programme. There was no funding available until the start of the second year of the research, therefore it was not possible to provide substitute cover for a more comprehensive training. As there is very little differentiation required for the activity sheets in Stage 1, the hour-long training focused on the teaching routine and strategies for learning the spellings which, as outlined in Chapter 4, are an integral part of the Stage 1.

The Year 3 and Year 4 teachers participated in a more intensive training programme in the second and third years of the research. They were given two days training initially, one in August and then a follow up at the end of October. The first day's training for the Year 3 teachers was held on Friday 27\textsuperscript{th} August 1999. The first follow up day was held on 22\textsuperscript{nd} October 1999. There were also two evaluation days for the Year 3 teachers in January and June. The training and evaluation days for the Year 4 teachers were held on similar dates the following year. The ability range becomes greater as children get older since they learn at different rates. Consequently, the differentiation becomes more
complex in Stage 2 and Stage 3 and more support was required for the teachers involved.

(Some teachers, who had to complete written questionnaires, had attended two full training days and two evaluation days so I was familiar with the extent of their knowledge about the Programme.)

Written Questionnaires
These questionnaires sought to obtain the views of the respondents about the intervention and also sought to identify any differences in teaching methods, or difficulties encountered by individual teachers arising from the Programme or difficulties arising from the context of the school (See Appendix C:1- C:4). It must also be recognised that individual teachers can have differential effects on children’s performance (Tizard, Blatchford, Burke, Farquar and Lewis 1988).

To prevent respondents discussing the answers to the questions with each other, the questionnaires were given to the teachers at the two evaluation days in January and June and completed independently of input from any third party. The June questionnaires were constructed taking into account the information that had been already obtained in the January questionnaires.

In order to lessen variations that might occur during the implementation of the programme that might influence its impact, evidence of implementation (as intended by the author) was monitored by:

- establishing procedures for the operation of the Programme that should be followed by all teachers.
- differentiated groupings at the beginning of Year 3, in the experimental schools. The results of the criterion test administered in June 1999 were used to place children in differentiated groupings. Children with the same test scores obtained in June 1999 in all experimental schools were placed on the same differentiated level of the Programme at the start of this year. This was to reduce teacher error in placing children in groups. It was also to ensure consistency across schools;
so that a child in school A with result ‘x’ would be placed in the same group as children in school B who also obtained result ‘x’.

- the Support Materials supplied to the schools were already prepared for three levels of ability. This was to prevent the materials being differentiated in different ways by different teachers in different schools.

5.6 Qualitative Aspect of the Study

The employment of quantitative methods alone would mean that vital information about the processes involved in the implementation of this programme would be lost.

Whilst being able to highlight differences between schools and individuals, quantitative methods can tell us nothing about why these differences occur. Formative evaluation on the other hand, as described in The Cabinet Office Magenta Book (2003-2004):

'typically seeks information on the contextual factors, mechanisms and processes underlying a policy’s success or failure.'

The importance of looking at processes in evaluating a given intervention is emphasised by Bassey (1999); The work of Parlett and Hamilton (1977) and Bassey (1999, p29) stresses the importance of illuminative evaluation:

'The aims of illuminative evaluation are to study the innovatory programme: how it operates; how it is influenced by the various school situations in which it is applied; what those directly concerned regard as advantages; and how students’ intellectual tasks and academic experiences are most affected.'

For this reason, qualitative data was also collected within the experimental schools. Given that this research study was conducted through part time study, practical considerations had to be taken into account. These practical issues included considerations of time and costs. Negotiating time out of my full time employment was difficult and also required financing. For these reasons time was restricted. These limitations of time and finance had an impact on the methods of data collection chosen. Working within these constraints, methods were selected that might best illuminate the
processes involved; it is hoped that these are sufficient in achieving this aim. Bassey (1999, p69) offers some reassurance by stating that:

‘Case study research has no specific methods of data collection or analysis which are unique to it as a method of enquiry. It is eclectic and in preparing a case study researchers use whatever methods seem to be appropriate and practical’

It was therefore intended to monitor what happens in the process of using the Programme, identify advantages and disadvantages of using the Programme and possible reasons for the outcomes, using the following methods of qualitative data collection:

- Interviews;
- questionnaires (open ended);
- case studies;

Table 18 shows the schedule for data collection in the research schools.

5.6.1 Interviews

Interviews were chosen as the method for collecting data from parents, case study pupils and education professionals with whom I had limited contact. The purpose of these interviews was to provide respondents with an opportunity to express their views. The questions were open and supplementary questions were asked, where it was necessary, to probe more deeply or where respondents raised issues of interest. This called for care and restraint in ensuring leading questions were not asked when probing for further clarification. The naturalism of this sort of interview means that many extraneous variables are uncontrolled. On the other hand, since I was endeavouring to ascertain the views of school principals, parents and children, this format allowed for greater freedom in the discourse. The degree of control the interviewer has over the interview situation determines the extent to which the interview can be described as highly structured, semi-structured or unstructured and open ended. Along this continuum, these interviews might best be considered semi-structured in that they followed set questions but allowed for digression to gain further insight into respondents’ opinions and attitudes towards the intervention.
The specific questions that were set for all respondents were planned in advance and piloted to ensure clarity and also to ensure there was no bias in how they were framed. However, with probing, unplanned questions, it can be very difficult to ensure the interviewer remains neutral, does not react personally or show bias (Wilson, 1996; Babbie, 1995). Personal reactivity is maximal in the less structured interview and minimal in the highly structured one. Interviews are social interactions. The context in which respondents are asked to answer questions, not only affects their willingness to respond, but can also alter their responses. This can also be the case with questionnaires because there is still social interaction between the researcher and the respondent through the written questions (Wilson 1996).

Breakwell et al (2000, p241) offers a number of guidelines in formulating questions. The advice given is that questions should not

- be double barrelled (containing two different concepts in one);
- introduce an assumption before going on to pose a question;
- include complex or jargon questions;
- act as catch – alls, for example, 'Tell me everything you know about spelling'.

Breakwell et al (2000) advises that when framing questions and organising the schedule, the interviewer should take into account the ordering of the questions so that the interview does not jump from one topic to another and that all respondents should be asked all the questions, giving them equal hearing. Question order is also important because the wording of preceding questions can affect the way in which respondents interpret the current question. Furthermore it is essential to ensure that further probing questions are not 'leading' questions but rather non-committal encouragements to extend answers.

Interview schedules that were appropriate for the different respondents were developed (See Appendix C:2.1-C:2.5). All interviews were taped, with the permission of the interviewees.

The following Table 18 details the respondents in the research schools over the period of the research.
Table 18  Schedule for the Collection of Qualitative Data

<table>
<thead>
<tr>
<th></th>
<th>School A</th>
<th>School B</th>
<th>School C</th>
<th>School D</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 1998</td>
<td>School Principal Briefing interview</td>
<td>School Principal Briefing interview</td>
<td>School Principal Briefing interview</td>
<td>School Principal Briefing interview</td>
</tr>
<tr>
<td>June 1999</td>
<td>Interview with Year 2 Teacher</td>
<td>Interview with Year 2 Teacher</td>
<td></td>
<td></td>
</tr>
<tr>
<td>January 2000</td>
<td>Interview with Principal</td>
<td>Interview with Principal and Literacy coordinator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>January 2000 and June 2000</td>
<td>Questionnaire completed by Year 3 Teacher</td>
<td>Questionnaire completed by Year 3 Teacher</td>
<td></td>
<td></td>
</tr>
<tr>
<td>January 2001</td>
<td>Profiles for case study children completed by Year 4 teacher</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>January 2001 and June 2001</td>
<td>Questionnaire completed by Year 4 Teacher</td>
<td>Questionnaire completed by Year 4 Teacher</td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 2001</td>
<td>Interview with Principal</td>
<td>Interview with Principal and Literacy Co-ordinator</td>
<td>Interview with Principal, literacy Coordinator, Year 3 teacher and Year 4 teacher</td>
<td>Interview with Principal and Literacy Co-ordinator</td>
</tr>
<tr>
<td>March 2001</td>
<td>Interview with 4 case study children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>March 2001</td>
<td>Interview with mothers of 4 case study children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 2004</td>
<td>Interview with Principal</td>
<td>Interview with Principal and literacy coordinator</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5.6.2 Case Study Pupils

At the outset of the study, School A was identified as the school from which case studies would be chosen. Two reasons contributed to this decision. First, this is a co-educational school, educating both boys and girls and is therefore more representative of the population as a whole since the majority of schools in Northern Ireland are co-educational. Secondly, given constraints of time and finance, it was possible to visit only one location.

The selection of pupils as case study subjects is fraught with difficulties; primarily because there are so many pitfalls in selecting a representative sample. However as Babbie (1995, p225) recommends, selection of a sample can be based on the researchers judgement and the purpose of the study:

'Oasionally it may be appropriate for you to select your sample on the basis of your knowledge of the population, its elements, and the nature of your research aims.'

As the aim of the research was to evaluate the Spelling Programme, it was desirable to select children from the range of ability within the class who might best illuminate the strengths and weaknesses of the approach for various ability groups.

Case studies were not selected until the final year of the research. Eight children were identified as possible case studies on the basis of their BPVS score (verbal ability) and baseline spelling scores. Two children from each of the following groups were selected:

1. above average (BPVS >105);
2. average (BPVS >95, <105);
3. below average (BPVS <95);
4. discrepancy between verbal ability and spelling score > 25 standard points.

*For 1-3 the spelling score must be close to the BPVS score (no more than 5 points greater than the BPVS score).
The Year 4 class teacher was asked to write a profile for the eight children identified as potential case studies and from these profiles and the first three writing samples, the four cases that appeared most interesting were selected.

Due to the more in-depth investigation conducted for the case studies, the following tests were administered to all the children at the beginning of the study in School A:

1. Aston Index: visual sequential memory (symbolic);
2. Quest: auditory sequential memory -2 parts, a) commonly known sequences, e.g. days of the week, b) repeating a list of objects;
3. Test of ability to generate rhyme to test if children could give more words that rhyme with a target word. * This test was administered to find out if the case study children could reason by analogy;
4. Spelling, reading and writing ten high frequency words. In the first instance children are asked to spell ten high frequency words in a group test situation. As part of the individual assessments they are asked to read the same ten words and finally they are asked to recognise them if they can not read them. This test is designed to find the level at which learning has taken place. The lowest level is the recognition of a word when given the target word. The next level is being able to recall the word when asked to read it. The third level is being able to recall the sequence of letters in order to spell the word. The latter places the greatest demands on auditory and visual processing. *

(*Indicates that the test was designed by author.)

4.6.3 Independent writing samples

Independent writing samples were collected four times throughout the research in school A (See Table 19). All independent writing samples were carried out without any support. There was class discussion about the topic before beginning to write but no assistance was given with spelling. Once the children began to write, no further assistance was given. There were no word charts available for children to refer to and anything with writing on it in the classroom was covered up. Children wrote their stories behind screens so that they could not see anyone else's work. There were no opportunities given for amending or redrafting the work in any way. The entire
writing session, for each of the three samples of work collected in Years 3 and 4, including discussion of the topic at the beginning, lasted one hour.

The children were asked to write about themselves in the first sample. In the last three samples of writing the children were asked to write imaginative narrative. It was decided that the sample of writing collected in Stage 2 (Year 3) of the programme and the two samples of writing collected in Stage 3 (Year 4) should be from the same genre so that progress in that form of writing could be monitored/assessed. Recount was ruled out because it was dependent on past experiences that would vary from school to school and child to child.

Table 19: Schedule of Independent Writing Tasks

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 1999</td>
<td>Children were asked to write about themselves</td>
</tr>
<tr>
<td>January 2000</td>
<td>Class discussion about outer space. (How you would get there, what it might be like, etc). Children were then asked to write about outer space.</td>
</tr>
<tr>
<td>December 2000</td>
<td>Discussion about characters in fiction who were very small. Tom Thumb, The Borrowers, Mrs Pepperot. Children were asked to imagine what it would be like to be tiny and write about it.</td>
</tr>
<tr>
<td>May 2001</td>
<td>Excerpt from the Iron Man by Ted Hughes read to the class followed by discussion. Children were asked to write about a robot or imaginary creature and describe it. They were then asked to write a story about their robot.</td>
</tr>
</tbody>
</table>

The fourth independent writing sample was collected, at the end of the study in May 2001, from all the children in the experimental and control schools. The writing samples were awarded a CCEA level by two experienced teachers (hereafter referred to as raters). The scripts were anonymous and randomly assigned numbers so that the raters did not know whether the script belonged to an experimental or control school or whether they were written by a boy or girl. The CCEA level descriptors were used as the assessment tool. It takes children, on average, eighteen months to pass through a level, therefore in order to differentiate more clearly between a child who had just achieved level 2 and a child who was almost level 3 the CCEA superscripts were
Table 22: ANOVA Compare means between Raters A and B

ANOVA Table

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levels Raters 1 and 2</td>
<td>.633</td>
<td>1</td>
<td>.633</td>
<td>.160</td>
<td>.690</td>
</tr>
<tr>
<td>(Combined)</td>
<td>616.304</td>
<td>156</td>
<td>3.951</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Groups</td>
<td>616.937</td>
<td>157</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>616.937</td>
<td>157</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The average of these data values was therefore taken to be the final CCEA writing level for each piece of writing and this final score was used for statistical analysis.
Chapter 6

Results
CHAPTER 6

RESULTS

In attempting to evaluate the effectiveness of ‘The Complete Spelling Programme’ it was decided to use both quantitative and qualitative evidence to provide as complete a picture as possible of, not only the measurable outcomes, but also the processes involved in achieving these outcomes. This chapter considers the quantitative evidence that may be used to answer the research questions as detailed in Chapter 5 paragraph 5.3.1. Chapter 7 reports the qualitative findings.

6.1 Answers to Research Questions

Question 1: Were there any differences between the groups at the outset?

It was important to ascertain any differences between the Experimental and Control schools at the outset of the study as it could be argued that if the groups were not truly equivalent at the outset then progress may be attributed to identified differences between the groups. An analysis of variance was therefore carried out to compare the baseline mean standardized spelling scores, reading scores, BPVS scores and the diagnostic test results for the Experimental and Control schools. There were no significant differences between Experimental and Control schools at the outset on baseline BPVS Score, (F[1,75] = .053 p< 0.819), Spelling Score, (F[1,79] = .065 p<0.799), Reading Score, (F[1,64] = 3.237 p<0.077), Visual discrimination (F[1,78] = .529 p<0.469), Visual Sequential Memory, (F[1,77] = .075 p<0.785) and Recognising Rhyme (F[1,77] = 1.832 p<0.180). There was however a significant difference between Experimental and Control schools on the sound knowledge test (F[1,78] = 4.403 p<0.039). Experimental schools performed significantly better than the Controls at the p<0.05 level of significance (see Appendix E3).
Question 2: Do pupils who are taught spelling using 'The Complete Spelling Programme' show greater progress in standardized spelling test scores than pupils who are taught by traditional methods?

A univariate analysis of variance was conducted to establish whether there was any difference in the progress of the pupils in the Experimental schools compared to those in the Control schools and also to establish when any main effects occurred. The standardised spelling score was entered as the dependent variable. This analysis was conducted on the following factors: Year (January 1999, May 2000 and May 2001) and Type (Type of school i.e. Experimental or Control).

There was a significant difference in the mean spelling scores by Year \( (F[\text{df2},236]=24.437, p<0.000) \). When differences between school Type were analysed there was a significant difference in the mean spelling scores between the Experimental and Control schools \( (F[\text{df1},80]=29.149, p<0.0001) \). Experimental schools performed significantly better than the Control schools in May 2000 and in May 2001 (see Figure 7). When School Type and Year were analysed together there was some interaction between these groups \( (F[\text{df2}]=8.59, p<0.0001) \).

This interaction can be seen in Figure 7. At the point of interaction in 1999 the baseline mean spelling score was slightly higher in the Control schools than in the Experimental school and from then on the Experimental schools recorded higher scores than the Controls. This accounts for the interaction (see Appendix E4).
The graph illustrates that overall, the Experimental schools performed significantly better than the Control schools. It can also be seen that the Control schools were unable to make up this significant gap even in the final year when both the Experimental and the Control schools experienced a ceiling effect.

Because of the large number of factors that could have an effect on spelling scores over the period of the research, multivariate analysis of the data was necessary. This type of analysis takes into account the relationship between the factors that could have an effect on the dependent variable. A MANOVA was run to establish any significant differences between the Experimental and Control groups based on final spelling scores (May 2001) and the CCEA writing level (May 2001).
It was also important to establish whether being in the high social disadvantage group or low social disadvantage group had an effect on these outcome scores and whether gender had any effect. The following were entered as independent variables: Experimental/Control, High Social Disadvantage/ Low Social Disadvantage and Gender. The final spelling score in 2001 and the CCEA writing levels were the dependent variables (see Appendix E5).

**Question 3: What is the effect of school context on spelling and writing scores?**

There were main effects for:

- Level of social disadvantage on spelling scores 2001 ($F_{(dfl,78)}=6.115 \ p<0.016$)
- Level of social disadvantage on CCEA writing levels ($F_{(dfl,78)}=7.640 \ p<0.007$)

Overall, pupils in the high social disadvantage group performed better than pupils in the low social disadvantage group on spelling scores and CCEA writing level ($p<0.016$; $p<0.007$ respectively). Figures 8 and 9 also show an interaction between high social disadvantage and low social disadvantage and Experimental and Control schools for both these dependent variables. The interaction for spelling score was found to be significant ($p<0.049$). This interaction occurred because the high disadvantage Control school's spelling score was higher than the low disadvantage Control school's score. The interaction for CCEA writing level was not significant ($p<0.299$).

Figure 8  
Figure 9
The similarity between the impact of level of social disadvantage on spelling and independent writing can also be seen when the MANOVA plots for both these dependent variables are compared. Figures 8 and 9 also highlight the interactions between the independent variables. The interaction in Figure 9 occurred because of differences between the schools at the outset of the study; the high social disadvantage Control school matched the low social disadvantage Experimental school on pre-intervention spelling scores and the High social disadvantage Experimental school matched the low social disadvantage Control school. This is contrary to expectations. These differences remained since both Control schools increased their standardised spelling score by approximately 5 standard points over the period of the research and the high social disadvantage Control school retained its lead over the low disadvantage Control. It is interesting to note that the Experimental high social disadvantage school was 15 standard points behind the Control high social disadvantage school in 1999 and 3 standard points ahead of the Control high social disadvantage school at the end of the study. It is again interesting to note the similarity in the disadvantaged schools score. This is due to the high disadvantage Experimental school catching up with the disadvantaged Control school.

**Question 4: What is the effect of gender on these results?**

There was no significant effect of gender on outcome spelling scores (p=<0.111). There were, however, main effects for gender on CCEA writing level (F[df1]=5.654 p<0.020). Figure 10 shows that there was a significant effect of gender on CCEA writing levels (P=<0.020). Girls performed significantly better than boys on this measure.
Question 5: Is there greater accuracy in spelling within independent writing as a result of using 'The Complete Spelling Programme'?

In seeking to evaluate the impact of 'The Complete Spelling Programme' the evaluation of spelling must be considered, not only within the spelling test situation, but also within the context of independent writing as the purpose of improved spelling is greater freedom and accuracy in writing.

Spelling is only one component of a number of assessment criteria that must be considered before a CCEA writing level for independent writing can be awarded (see Appendix D for performance indicators for CCEA writing levels). Therefore the CCEA writing level cannot be used to judge whether spelling was actually better in the writing samples. In order to be able to assess whether better scores in standardised spelling tests actually translates into greater accuracy in independent writing it was necessary to look at the writing samples in more detail in relation to spelling accuracy. Hopefully this would go some way towards answering this question.
It was decided to assess the spelling within these writing samples in a more exact, quantitative way, rather than depending on subjective judgements that may be less reliable. First, the total number of words in each sample of independent writing was counted. The number of words spelled correctly was also counted (each word being counted only once). Then the number of words misspelled was counted (each misspelling being counted only once).

An analysis of variance was therefore carried out to compare the mean scores for the total number of words written, the number of words spelled correctly and the number of words misspelled within these independent writing samples. There were no significant differences between Experimental and Control schools based on the total number of words (p<0.309). There was however a significant difference between Experimental and Control schools based on the number of words spelled correctly. Children in the Experimental schools had significantly greater accuracy in spelling within their writing samples (p<0.017). Further more children within the Control schools had significantly more misspellings within their writing samples (p<0.001).

Question 6: Can all ability groups be maintained within the single group with extension approach to differentiation?

In the Control schools, the standardised spelling score for 24% of the children decreased over the period of the research and the trend was the same in both Control schools. Notably in the Experimental schools, however, the standardised spelling score for all of the children increased over the same period. The average standard score increase in the Experimental schools was 19 standard points (School A = 14.96, School B = 22.74) and in the Control schools it was 5 standard points (School C = 4.65, School D = 5.14). It can be concluded from this that all ability groups in the Experimental schools were successfully maintained within this single group with extensions. A closer look at the raw data provides further support for this conclusion. Table 23 summarizes the average spelling increase for five standardized spelling score bands. The average spelling score increase between baseline
January 1999 and outcome May 2001 for all the children in the Experimental schools is summarized in Table 23.

Table 23 Standard Score increases based on baseline spelling score

<table>
<thead>
<tr>
<th>Standardised spelling score range</th>
<th>Number of children whose score was in this range</th>
<th>Average standard score score increase for this group</th>
</tr>
</thead>
<tbody>
<tr>
<td>70-80</td>
<td>N=3</td>
<td>20</td>
</tr>
<tr>
<td>81-90</td>
<td>N=14</td>
<td>23</td>
</tr>
<tr>
<td>91-100</td>
<td>N=12</td>
<td>19</td>
</tr>
<tr>
<td>101-110</td>
<td>N=9</td>
<td>16</td>
</tr>
<tr>
<td>111-121</td>
<td>N=5</td>
<td>10</td>
</tr>
</tbody>
</table>

It can be seen from this table that all groups benefited from the intervention. Children who had the highest baseline spelling score at the outset made the lowest gains.

Traditionally within Northern Ireland the identification of children with specific learning difficulties (Dyslexia) has been by identifying a discrepancy between IQ score and performance scores in reading and spelling. In both Experimental and Control schools there was a group of children who had, at the outset, a discrepancy between their baseline spelling scores and their baseline BPVS score. At the end of the research, it was found that in the Experimental schools (n=5) three children had no discrepancy remaining and two children had no significant discrepancy remaining. Within the Control schools (n=8) five children had a significant discrepancy remaining and three had no significant discrepancy remaining. (A significant discrepancy was taken to be a difference greater than one standard deviation from the mean). However, Siegel and Himel (1998) have stressed the dangers in using this discrepancy criterion in the identification of reading disability (Dyslexia). They provide evidence that the measured IQ of a dyslexic child decreases with age leading to a reclassification from dyslexic to poor reader. They found a significant positive correlation (0.351) between IQ score of children and the socio-economic status.
(SES) of parents. Furthermore the dyslexic children had significantly higher SES scores than the poor readers.

'Two readers with equivalent reading difficulties might therefore be diagnosed differently by IQ-attainment discrepancy criterion with a child with lower SES or who is older being more likely to be classified as a poor reader.' (Siegel and Himel, 1998 p90)

For this reason the progress of all children in the Experimental and Control schools, with standardised spelling scores of less than 90, was considered. Appendix H shows the baseline spelling score (1999) and the outcome spelling score (2001) for these children. Using this criterion 17 children were identified (within the Experimental schools) having baseline spelling scores < 90. Only two out of these 17 children had spelling scores < 90 at the end of the research. Within the Control Schools 13 children were identified with scores <90 at baseline. At the end of the research six of these children had spelling scores < 90 (see Appendix H).

**Question 7: Is there improvement in the quality of independent writing as a result of using 'The Complete Spelling Programme'?'**

There was a significant difference in the CCEA writing level awarded for the independent writing samples in 2001 (F[1, 77]=19.701 p<0.0001). Experimental schools were performing significantly better than Controls (p=0.0001). A closer look at the breakdown of these scores shows that the percentage of children achieving Level 3 in CCEA writing levels was much higher in the Experimental schools and the number of children achieving Level 1 was much greater in the Controls. Of the ten children in the Control schools who received Level 1, five of them almost received Level 2 having been awarded minus two by the raters. Both children in the Experimental schools who were awarded Level 1 were close to achieving Level 2, also having been awarded minus two by the raters (see Table 24). As it was spelling rather than reading that was found to predict these independent writing scores, it could be suggested that the quality of writing may have been improved by increased performance in spelling.
Table 24 Percentage of children awarded CCEA Levels 1, 2 and 3 for independent writing

<table>
<thead>
<tr>
<th>School</th>
<th>CCEA Level 3</th>
<th>CCEA level 2</th>
<th>CCEA level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>42% n=18</td>
<td>53% n=23</td>
<td>5% n=2</td>
</tr>
<tr>
<td>Control</td>
<td>22% n=8</td>
<td>50% n=18</td>
<td>28% n=10</td>
</tr>
</tbody>
</table>

Question 8: What is the relationship between spelling, reading and independent writing?

To establish the relationship between final reading scores, spelling scores and independent writing, a correlation analysis was carried out (See Table 25). Spelling and reading correlated positively with writing ($r=0.794$), ($r=0.678$) respectively. In addition spelling was more closely correlated with writing than reading. Spelling also correlated positively with reading ($r=0.780$).

Table 25 Correlation analysis for reading, spelling and CCEA writing level

<table>
<thead>
<tr>
<th>Writing level</th>
<th>Spelling score 2001 Pearson Correlation</th>
<th>Spelling 2001</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.794**</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>Reading score 2001 Pearson Correlation</td>
<td>.678**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.780**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>77</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed). See Appendix E

Question 9: Do reading and spelling predict independent writing?

To find out whether spelling or reading scores (2001) predict independent writing scores as measured by CCEA writing level, a stepwise regression analysis was carried out. CCEA writing level was the dependent variable and spelling and reading scores were entered as the independent variables (see Table 26).
Table 26: Predictors of CCEA Writing Level

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Adjusted R Square</th>
<th>% Variance</th>
<th>DF</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spelling Score 2001</td>
<td>0.793</td>
<td>0.623</td>
<td>62%</td>
<td>1</td>
<td>123.430</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

Excluded variable: Reading score 2001

This regression analysis (see Table 26) clarifies that it is spelling rather than reading that predicts writing scores; with spelling accounting for 62% of the variance in writing scores. Spelling and not reading had a significant impact on CCEA writing levels (see Appendix E8).

**Question 10: What factors predict final spelling scores?**

A stepwise regression analysis was conducted to answer this question. The final spelling score taken in May 2001 was entered as the dependent variable. Independent variables entered were: Initial Sound Knowledge, Visual Discrimination, Rhyme Test, Visual Sequential Memory, BPVS 1999, Reading Score 2001 (see Appendix E 9).

This regression analysis clarifies that it is reading, initial sound knowledge and visual sequential memory that significantly predict spelling scores with reading (P<0.0001), and with initial sound knowledge (P<0.008) and visual sequential memory (P<0.048) together accounting for 63% of the variance.

When the predictor variables are considered separately within a regression again reading score 2001 is the most powerful predictor of spelling score 2001 (p<0.000) accounting for 60% of the variance in spelling scores (see Appendix 9.1). Initial sound knowledge accounted for 33% of the variance (see Appendix 9.2) and finally visual sequential memory accounted for 11% of the variance (see Appendix 9.3). Table 27 show the results for each of these regression analyses.
Table 27: Predictors of Spelling Score 2001

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Adjusted R Square</th>
<th>% Variance</th>
<th>DF</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading Score 2001</td>
<td>0.780</td>
<td>.603</td>
<td>60%</td>
<td>1</td>
<td>116.240</td>
<td>0.0001</td>
</tr>
<tr>
<td>Initial Sound Knowledge</td>
<td>.582</td>
<td>.330</td>
<td>33%</td>
<td>1</td>
<td>39.881</td>
<td>0.0001</td>
</tr>
<tr>
<td>Visual Sequential Memory</td>
<td>.351</td>
<td>.112</td>
<td>11%</td>
<td>1</td>
<td>10.832</td>
<td>0.002</td>
</tr>
</tbody>
</table>

**Question 11: What factors predict final reading scores?**

The final reading score taken in May 2001 was entered as the dependent variable. Independent variables entered were: Initial Sound Knowledge, Visual Discrimination, Rhyme Test, Visual Sequential Memory, BPVS 1999, Spelling Score 2001. This regression analysis clarifies that it is spelling that predicts final reading scores with spelling accounting for 57% of the variance in reading scores (see Appendix E10).

Table 28: Predictors of Reading Score 2001

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Adjusted R Square</th>
<th>% Variance</th>
<th>DF</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spelling Score 2001</td>
<td>0.758</td>
<td>0.569</td>
<td>57%</td>
<td>1</td>
<td>89.373</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

Excluded variables: Initial Sound Knowledge, Visual Discrimination, Rhyme Test, Visual Sequential Memory, BPVS 1999

The only variable found to predict final reading scores was the final spelling score taken in May 2001.
6.2 Discussion

6.2.1 What are the implications of the significant difference in the baseline test on sound knowledge between Experimental and Control schools?

The importance of phonological awareness in learning to read and spell is substantiated in the research literature. It might be argued that since the Experimental schools were significantly better in sound knowledge at the outset (p=<0.039) this might account for the progress in spelling (see Appendix E3). That being the case, it could be expected that children who performed poorly on this test at baseline would not make as much progress in spelling as the children who performed well. The total score for this test was 26 and the results for all of the children in the Experimental schools who scored less than 18 on this test are given in the table below, together with their standardized spelling score increase from baseline testing in 1999 to final testing in 2001.

Table 29 Standardised spelling score increase for children who performed poorly on the baseline sound knowledge test

<table>
<thead>
<tr>
<th>Sound knowledge test score out of a possible 26 points</th>
<th>Increase in spelling score from baseline 1999 to outcome 2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child 1 2</td>
<td>10</td>
</tr>
<tr>
<td>Child 2 5</td>
<td>27</td>
</tr>
<tr>
<td>Child 3 7</td>
<td>41</td>
</tr>
<tr>
<td>Child 4 16</td>
<td>20</td>
</tr>
<tr>
<td>Child 5 17</td>
<td>23</td>
</tr>
<tr>
<td>Child 6 17</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 29 shows that four of the six children exceeded the average standard spelling score increase for the Experimental schools (average score increase =19). This suggests that low baseline sound knowledge scores did not diminish the impact of the Spelling Programme in the Experimental schools. It may be proposed that as the Spelling Programme is designed
to enhance phonological awareness, as well as other processes, that these children were able to increase their phonological knowledge through participation in the Programme which in turn enhanced their progress in spelling.

6.2.2 Period of optimum growth and the ceiling effect

The greatest change in the pupils' scores occurred in the first 18 months of the study. This was followed by a "ceiling effect" - all four schools showed little or no further growth in terms of average standardised spelling score. Closer examination of the results revealed that a similar proportion of children in each school within both the Experimental and Control groups decreased in their standardised score from May 2000 to May 2001 while the rest of the class either increased or maintained the same score.

Within the Experimental schools, all the children increased their standardised scores from January 1999 to May 2000 and from Jan 1999 to May 2001. 17 of the 43 children experienced a decrease between May 2000 and May 2001; the earlier increase for these children had been between 17 and 36 standard points. The decrease for 13 of the children was small but two children had a decrease of 5 and 7 points respectively and two more had 13 and 18 standard point decreases. These two children with the higher standard score decrease (13 and 18 standard points) had recorded standardised scores of 136 in May 2001.

In the Control schools, 18 of the 38 children decreased in their standardised score from May 2000 to May 2001. From January 1999 to May 2000 25% of the children decreased in their standardised score and the decreases for this group between May 2000 to May 2001 were small although 24% children still recorded a decrease over the entire research period.

As this trend was detectable in all four schools in similar proportions, the following explanation is offered. For the children in the Experimental and Control schools who experienced a small decrease (i.e. n= 13 Experimental, n= 14 Control) this may simply
have been a result of the ceiling effect. The slight variation as seen in the decrease in scores may be accounted for by the fact that in May 2001 the next level of the test was used. This test had a different layout and the starting point was notably harder than both forms of the first level of the test that had been administered in January 1999 and May 2000. Some of the children may have been less confident in tackling the test.

As the Experimental schools made very highly significant gains in the first 18 months, (with all children increasing their standardised scores - the average gain being 18.38 standard points) a "levelling off" or "ceiling effect" could be expected as it would be difficult to sustain such rapid growth. It is more difficult to explain why the children in the Control schools also experienced this ceiling effect when there was clearly room for more growth. Both Control schools were using commercial spelling programmes and in one school a commercial programme had been introduced at the start of Year 4. Would the introduction of this Spelling Programme not be expected to bring about greater gains? This leads me to propose that there may indeed be a critical period for development and that this may explain why progress plateaued across all the schools. The gains may become minimal if time for maximal growth in terms of neural development has been exceeded. It may simply have been too late for rapid growth. Further investigation into the possibility of critical periods is required.

The two children in the Experimental schools who had very high standardised scores of 136 in May 2000 and who decreased their standardised scores by 13 and 18 points were high achievers and in their case it seems unlikely that it was simply a ceiling effect. In the Year 4 Spelling Programme, the teacher is required to add in additional curriculum words to stretch these high achievers. It may be that another prescribed row of extension words is needed to ensure that challenging polysyllabic words are included for these very able children. The samples of writing from the case study children, Susan and Harriet, showed that the words that these children spelled incorrectly were longer polysyllabic words and at present the Year 4 programme depends on the teacher adding this type of word in as extension words. It seems reasonable to suggest that another row should be added to the
prescribed lists and that this row would include these more challenging words. Further analysis of the spelling errors for these more able children is needed in order to ensure that appropriate words to enhance development are included.

It might be contended that the Control schools may have been less effective schools to begin with and this explains why the Experimental schools made such significant gains in comparison to the Controls. However the Control schools increased their standardized scores in reading and spelling significantly over the period of the research (Spelling: School C (p=.047), School D (p=.043); Reading: School C (p=.0001) , School D (p=.011). See Tables 30 and 31. This would indicate that the Control schools were improving standards in reading and spelling significantly and could not therefore be considered to be underachieving or failing schools.

Table 30  Spelling results for individual schools

<table>
<thead>
<tr>
<th>School</th>
<th>Number n=</th>
<th>Degrees of freedom</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Experimental</td>
<td>24</td>
<td>1,23</td>
<td>.0001</td>
</tr>
<tr>
<td>B Experimental</td>
<td>19</td>
<td>1,18</td>
<td>.0001</td>
</tr>
<tr>
<td>C Control</td>
<td>23</td>
<td>1,22</td>
<td>.047</td>
</tr>
<tr>
<td>D Control</td>
<td>15</td>
<td>1,14</td>
<td>.043</td>
</tr>
</tbody>
</table>

Table 31 Reading results for individual schools

<table>
<thead>
<tr>
<th>School</th>
<th>Number n=</th>
<th>Degrees of freedom</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Experimental</td>
<td>20</td>
<td>1,19</td>
<td>.0001</td>
</tr>
<tr>
<td>B Experimental</td>
<td>19</td>
<td>1,18</td>
<td>.0001</td>
</tr>
<tr>
<td>C Control</td>
<td>14</td>
<td>1,13</td>
<td>.0001</td>
</tr>
<tr>
<td>D Control</td>
<td>9</td>
<td>1,8</td>
<td>.011</td>
</tr>
</tbody>
</table>
It is interesting to note that in studies examining the spelling of good and poor spellers (Lennox and Siegel, 1994, 1996) the following groups were identified for consideration; good readers and good spellers, good readers and poor spellers, poor readers and poor spellers. There is no inclusion of a group of good spellers and poor readers. It seems safe to suggest, drawing on my own classroom experience and the omission of such a group from research studies, that there may be no such group or insufficient numbers of children within such a group as to make generalisation of findings unreliable. However, further research is needed to examine whether this is the case. Were it to be the case that there are no children who are good spellers and poor readers it would seem reasonable to propose that if children are good spellers they will not be poor readers and that if spelling performance can be improved then reading may track the spelling improvement. If reading is enhanced then it, in turn, will contribute to further spelling knowledge and therefore spelling and reading enter into what may be a reciprocal relationship rather than an alternating shift in the balance between reading and spelling as described in Frith's 1985 stage model of reading and spelling development. Drawing on the findings from a research study by McMurray (2000-2002) with 22 children who have moderate learning difficulties and who had failed to learn to read despite intensive intervention, this reciprocal relationship was found to be the case. Reading, spelling and sound knowledge developed side by side from the very beginning. More research, however, is needed to establish whether this is the case for children in the normal range of ability, as all of the children in this particular study were outside the normal ability range and may be an atypical group. I contend, drawing on my own teaching experience, that improved spelling can improve reading ability, most notably for poor readers.

The findings of Graham, Harris and Chorzempa (2002) indicate that there is a link between learning to spell and writing development for poor spellers. This present study supports that link, not only for poor spellers, but for learners over the full range of ability (as seen within the research schools). It is interesting to note that the Control school in the high social
disadvantage group had a higher baseline spelling score than the low social disadvantage Control school. Since both Control schools increased their standardised spelling score by similar amounts (5 standard points) over the period of the research, the high disadvantage school maintained its lead over the low disadvantage school and also achieved a higher average score for independent writing. It is a possibility that this Control school D achieved higher independent writing scores because their spelling scores were better than the other Control school. As the CCEA writing levels were significantly better in the Experimental schools, this adds support to the postulation that there may indeed be improvement in the quality of independent writing as a result of using 'The Complete Spelling Programme'? This improved quality may be a result of the increased language understanding and awareness of usage of words that are integral to the programme.

The process by which the progress in Experimental schools has been achieved is not answerable by quantitative statistics. The next chapter therefore deals with the qualitative research findings that seek to illuminate this process.
Chapter 7

Qualitative Findings
CHAPTER 7

QUALITATIVE FINDINGS

This chapter draws together the findings from the teacher questionnaires, interviews with school principals, interviews with parents of case study children, and also the case study children themselves. In doing so, this chapter aims to illuminate the processes involved in the Programme in an attempt to provide further evidence to support the findings highlighted in Chapter Six. The perceptions of those directly involved with the programme will be discussed and the perceived benefits and weaknesses of the spelling programme will be identified. Following on from this the whole school management issues are considered from the perspective of the school principals whose responsibility it is to ensure all children receive their entitlement as set out in the Northern Ireland Curriculum Programmes of Study.

7.1 Using the programme: General impressions

There are a number of themes which have emerged from the responses in the teacher questionnaires and interviews with principals. The first is the importance of whole class teaching facilitated by the 'single group with extensions approach' to differentiation. This was considered by everyone to be a significant benefit of the Programme. The second theme centres around the structure of the Programme – the extensive planning contained within the spelling lists and their clear layout. The third theme is concerned with improvements in spelling scores and spelling accuracy in independent writing. The improvements, found in the quantitative analysis of writing samples and CCEA levels (reported in Chapter 6), are borne out by the reports of teachers in relation to improvements in writing standards within their class generally. The fourth theme concerns the link between spelling and independent writing; teachers from all year groups reported greater application of spellings learned in independent writing as a result of this intervention. The children's ability to use a range of strategies when spelling was a further theme identified by professionals and parents. The support
materials facilitated the development and application of these strategies and the importance of these follow-up activities is examined as a further theme. Indeed, the absence of support materials in the third term of Stages 2 and 3 was seen as a weakness of the Programme. Finally, the enjoyment experienced by those working with the Programme (both teachers and pupils) is considered.

7.1.1 Importance of the single group with extension approach to differentiation

All teachers highlighted the single group with extensions approach to differentiation as particularly beneficial using such words as ‘excellent’ (Year 3 Teacher School B). Generally there was agreement that this was better than other approaches to differentiation because it allows more time to be spent actually teaching spelling and the attention of the class is not divided.

‘The attention of the class is not divided which means that the weaker children can pick up words that they may otherwise not have done.’
(Teacher Year 3 School A)

Others remarked that the more able spellers were able to be extended by the addition of curriculum extension words into their spelling lists.

‘You can challenge these children as far as you wish to challenge them’.
(Principal School A)

It was recognised that there are particular benefits for less able spellers. These children had increased their self confidence because they enjoyed doing similar spellings to the rest of the class. They had also increased their understanding of language through discussion of the meanings of words. Less able children benefited from listening to the more able children and showed great pleasure at being able to contribute.

The principal in School A said he had seen evidence of greater time being spent on discussion about the spellings and he felt this was beneficial to children’s learning. He felt the programme provided a great opportunity to talk about the spellings in a systematic way that the 'children find interesting and not boring'. They were therefore more engaged with spelling than they had been previously.
7.1.2 Curriculum planning: The structure of the programme

All teachers liked the structure of the programme describing it as:

- 'excellent' (School B Year 3),
- 'unbelievable' (School B Literacy Coordinator)
- 'I know exactly what I am doing and can monitor the children's progress'. (School A Year 4)

The principal in school B also expressed the view that 'spelling has now been given a structure which is transparent, and which, in my view, and also the view of the teachers, delivers what is needed.' (Principal School B)

The benefits of the structure were identified as:

- the layout – this was described as easy to follow with spellings clearly set out for teachers and pupils;
- the follow up support activities to reinforce spellings. These were seen as contributing to this success particularly for the less able children as they provided opportunities to reinforce learning and also to apply the spellings in a way that was meaningful for the children;
- the success experienced by all children; the structure enabled children to work at their own level ensuring a measure of success (even the child identified by the Year Four teacher in school B as struggling with the Programme, experienced success by increasing his standardised score by 10 standard points and also by showing a willingness to write freely and at reasonable length (105 words in final writing sample)
- Enjoyment- all participants who were interviewed or who completed questionnaires commented on the enjoyment not only for pupils but for teachers as well.
7.1.3 Gains made

All of the teachers reported that there were gains in:

- weekly criterion spelling test scores. Most of the children were now spelling all of the target words correctly. Prior to this intervention, all of the teachers said they would have expected the weakest group in the class to experience a much higher level of failure;

- increased accuracy in spelling within independent writing, with transfer of spellings learned and improved vocabulary usage within their written work and composition;

- increased independence when writing. The children no longer used wordbooks and dictionaries during independent writing sessions for the purpose of spelling words correctly. The teachers felt that a direct result of their improved spelling ability was that children were writing at greater length and with improved flow.

Generally it was agreed that the Programme had helped all children.

'What could you spend the time doing that would be more effective? I think this is very effective, and the teachers like it for many reasons.............' (Principal School A)

7.1.4 The link to independent writing

All teachers reported that much more work was being done using the spellings learned and generally there was agreement that this was because the words were meaningful to the children due to the focus on word meanings. In Year Four, both teachers identified pupils as writing longer, more interesting sentences and showing greater knowledge of nouns, verbs and adjectives. All children were reported as enjoying independent writing- something that had not been the case in the past.

The following improvements were identified for all ability groups:

- raising of spelling scores in class tests;

- greater accuracy in spelling within independent writing;
greater confidence in attempting to spell words. Children seldom asked teachers to spell a word for them;

the quality of independent writing had improved as the flow of writing was not interrupted. Children no longer asked for help with spelling;

more able children were observed extending their sentences, with better use of language and using a greater range of words to express their ideas e.g. using different words to start sentences such as 'suddenly', 'while' and also greater use of adjectives;

less able children could write freely and attempt to spell unknown words themselves;

children were able to use words in their writing in different ways and they demonstrated understanding that some words can have several meanings;

teachers observed that as the confidence of their pupils improved, so did their ability to express themselves through writing; all children being much less hesitant to express themselves

', there had to be something better than children who were coming and doing their 3 words or their 5 or 10 words and reproducing these and going home with good written on it or what ever, and parents thinking they are wonderful spellers, and yet they could not transfer that to their written work at all. Then you are reporting to the parents - your child is a poor speller. That whole business has changed and that will continue to change, there is no going back, we now know too much about it now.' (Principal School A)

7.1.5. Spelling Strategies

Generally it was agreed that children were able to use a range of strategies and this was identified as a strength of the Programme. The LSSW strategy was a learning strategy used by all children in Stage 1 and was agreed to be very beneficial by both Year Two teachers. This strategy was not used beyond Stage 1 except with children who had more extensive difficulties in the acquisition of phonological knowledge. By the end of Stage 2 and in Stage 3 the teachers reported that many children found syllabification a useful
strategy for learning to spell words. This was also confirmed by the verbal reports of the children selected as case studies. The LVSCWC was perceived to be a beneficial learning strategy with the whole class in Stage 1 as it enhanced lexical processing, the visualisation element of this strategy was regarded as particularly helpful for children who found it difficult to remember the visual representation of a word. Children also continued in their use of LVSCWC into Stage 3, as well as using reasoning by analogy, to generate an unknown word.

'Children have been using more strategies in learning spellings and are more able to use these in independent writing i.e. visual patterns, sounds, meanings, syllables.' (Year 4 Teacher School A)

7.1.6 The Support Materials

All the teachers found the Support Materials beneficial because:
- they provided opportunities for reinforcement;
- the children loved doing them and were therefore motivated to learn;
- children were not bored because they had interesting activities that consolidate learning;
- restless children really settle down when involved in the activities within the Programme;
- the support materials provide an opportunity to integrate what is being learned in spelling with what children need to know within English, e.g. punctuation, grammar.

7.1.7 Enjoyment

All teachers reported that:
- the children knew how well they were doing and were enjoying their success;
- children really enjoyed the Programme showing enthusiasm and high levels of motivation;
- the children enjoyed the spelling practice tests. Even the weakest children actually wanted to attempt the words they had not learnt that night for
homework (i.e. the extension words for the middle and top group). There was often great excitement when they could spell them correctly;

• all children enjoyed the support activities.

The teacher in Year Two, School B said she had really enjoyed teaching the programme and that the children loved it too. This was clearly seen on sports day. When she announced to the class that they would not be doing any work that day the children insisted that they do their spelling work and she had to proceed with it as usual. She said the children were highly motivated because of the success they were having. The Year Two teacher in School A also expressed enthusiasm for the programme. She said that she had really enjoyed teaching the programme and it had rekindled her enthusiasm for teaching.

7.1.8 Training

The teachers all really valued the training. This view was expressed unanimously- they would not have been able to implement the programme properly if they had not received training. This was because the programme involved quite a significant change in classroom practice.

7.1.9 Weaknesses identified by teachers

The major difficulty teachers had in implementing the Programme was identified as time. Teachers reported that it took between 35 and 45 minutes to implement each teaching day (Monday, Tuesday, Wednesday), as a result other subjects were given less attention: ‘but I believe it is worth it.’ School A Year 3

All of the teachers identified the following as being further weaknesses:

• marking – All teachers found that there was a lot of marking required;

• cost- The books had been provided for the research classes but in future years they would have to cover the duplicating costs themselves;
• There were no Support Materials for the third term and the teachers felt the children needed the extra practice in class (particularly those children who have no home support). The Year Three Teacher in School A felt the spelling from the weakest group was not as good in the third term as it had been previously and she felt this was a direct result of having no Support Materials.

• The dictation sentences only cater for the core programme and the first extension level, although the class teacher who raised this acknowledged that she needed to make up her own dictation sentences for the second extension level. The second extension level is made up of curriculum words selected by the teacher and therefore dictation sentences cannot be set within the Programme.

• The teacher in Year 4, School B said that he would like to reduce the time spent in class on practice tests and he thought that it might be a good idea if this practice was done at home as part of the homework pattern.

The Year Four Teacher in School B identified two children in his class who were very weak and who struggled with the Programme. One of these two children was the child who received Reading Recovery in Year Two and was unsuccessfully discontinued. The other child was not in the research class at the outset so there is no baseline information for him and he had not used the programme from the outset. The literacy coordinator said he was recommended for placement in special school but his parents had wanted him to attend a mainstream primary. It was the class teacher's view that whilst these children struggled with the programme 'I do not believe the programme is at fault, I believe they will struggle in any event.'

7.2 Whole school management issues

It is important to report the strengths and weaknesses identified by principals because teachers consider the impact of any curriculum change in relation to their own particular class. Principals, however, are required to look at the bigger picture. They are responsible to ensure that every child receives his/her entitlement in terms of the Northern Ireland Curriculum. As this spelling programme requires teaching time this
takes time away from other subject areas. (Traditionally in Northern Ireland spellings are given to children to learn at home and are not taught in class.)

7.2.1 A vehicle for change

Both principals expressed dissatisfaction with the traditional approach to teaching spelling and at the outset of the study both were looking for a vehicle to bring about change. They felt that, prior to the introduction of 'The Complete Spelling Programme' there was insufficient guidance on what to teach and when to teach it and therefore teaching was random and generally unsatisfactory. Both expressed the view that the programme had brought about considerable change within their schools, not only in spelling scores but also independent writing. The Principal from School A believed spelling to be 'one of the most difficult things to teach' and that his experience over the years had brought him to conclude that at least a third of children flounder very quickly. He went on to say that he believed, from the evidence within his school, that this programme was 'a way of ensuring that you don't get children floundering'. Both principals also expressed the view that the programme was 'a vehicle to change things without meeting things head on and without the confrontation that has to go with it.' (Principal School B)

7.2.2 Continuity and Progression

There was agreement that the structure of the programme allows for continuity and progression. The systematic approach within the spelling programme was considered to be is a huge plus for teachers because the overall planning was an integral part of the programme. As a result both principals expressed the view that teachers were more confident and relaxed about teaching spelling.

The fact that it is structured-- teachers know where they are going, they can plan ahead. It's not just a question of testing children,- you know the business of doing spellings, they learn them at home, they come in, you test them, they get 10 out of 10, three days later they can't spell 2 out of 10. This (the spelling programme) is a better approach, they have a certain pressure on them to learn them of course, but they haven't the same testing pressure on them as they would have in a
normal every day set-up, which can be largely non-productive. (Principal School A)

There was also agreement that there was now consistency in the approach to teaching spelling because all the children are being taught using the same instrument. When children move to another teacher, the same structure is in place and the strategies within the programme are the same, therefore, children do not have to adjust to a new teaching approach. 'We had been unable to achieve consistency in the past and the Programme has filled that gap.' (Principal School B)

7.2.3 Achievement and ownership for children

The principal from School A felt the children had a greater sense of ownership; this was something that belonged to them rather than being teacher driven all the time. The children therefore showed involvement in their learning and recognised that they were making progress.

Both principals expressed concern that they were entering the Northern Ireland Literacy Strategy in the next academic year and that the spelling programme was not part of the strategy. Both said that they were fully committed to the spelling programme and would not digress from it.

7.2.4 Difficulties in management

There were a number of difficulties identified by both school principals, again time was the most notable.

The principal in School A said that from his perspective this was the only drawback. However this is something he had discussed with teachers and they had all agreed it was 'time well spent'. Together they had considered 'what children need to know' and concluded that they placed primary importance on learning how to read, write and count because, in their view, difficulties in these areas restrict children in so many other things.
Another perceived difficulty was cost.

- Photocopying costs were also seen as a difficulty. The Principal in School A said the quantity of materials needed when the research ended would be expensive in terms of photocopying the resources. This was not an issue raised by the Principal in School B.

- Training costs in terms of substitute cover was another difficulty identified by principals. They considered the training essential however, this had a knock-on effect in terms of providing this substitute cover. At the end of the first year of the research both principals asked if the Year Four classes in their school (who were one year older than the research class) could use the Stage 2 programme alongside the research class in Year Three. They had seen such an improvement in the research class that they wanted more children to have the opportunity to benefit. Substitute cover was provided by CCEA for the teachers who were involved in teaching the research classes but not for any additional teachers. The principal from School B provided substitute cover for four extra teachers to attend the trainings held in the second and third years of the research study. The principal in School A could not afford to do this out of his budget. (Schools are allocated additional funding on the basis of the number of children in receipt of free school meals. School B would therefore have additional funding because the school had a high proportion of children entitled to free school meals. School A would have a much smaller allocation of additional funding because the school has a much smaller proportion of children entitled to free school meals.) This was a bone of contention with School A because they would have liked additional teachers to attend the training but could not afford to provide the substitute cover.
7.2.5 Follow up interviews with both Principals in Experimental research schools 24th May 2004.

- Both principals reported that the Programme was still being widely used throughout the school and the benefits seen in the research classes had been found in subsequent year groups.
- Both agreed that the Programme had a positive impact on their school and had led to more independent writing.
- Both principals had expressed concerns in 2000 /2001 about the time taken to deliver the programme and their school's entry into the Literacy Strategy in September 2001. These concerns had proved to be unfounded. The Programme worked well within the strategy.
- Developing independent writing was an important part of the Literacy Strategy and the spelling programme was found to work well in combination with the ideas promoted by the literacy team for developing and structuring writing. The teachers in the both schools remained convinced about the value of the spelling programme.
- The children’s writing had become more expressive and more productive.
- Both Principals remained convinced that in addition to improvements in spelling, the improvement in independent writing was a major benefit of the spelling programme.
- The approach to differentiation, where everyone learns the same words and the more able spellers are extended, was considered to be of 'tremendous benefit' for children and teachers. The ‘single group with extensions’ had been adopted as an approach to differentiation in other areas of the curriculum in School A.

7.2.6 Views of case study parents

All four parents were interviewed at the end of the study. They were unanimous in saying that the Programme was ‘just right’ for their child. It catered well for the ability of children, being neither too difficult nor too easy. They all said that their children had
benefited from the programme and made progress. They all liked knowing where they were, where they were going and what was expected of them.

7.2.7 Views of case study children

All four children, when interviewed, said that they liked spelling and were good at it. They were all unanimous in saying that they liked writing. This is important for two reasons. It goes some way in confirming the views of the teachers that all the children now liked independent writing. Secondly it should be noted that the child with the discrepancy of 33 points (his standardised spelling score was 33 points below his BPVS score) was a boy who had struggled considerably with early literacy. The child in the below average group was also a boy. Both perceived themselves as being successful.

7.3 Conclusions

7.3.1 The impact of a structured, developmental curriculum on children's learning

'Working in a school of all boys, in an area as deprived as this area it is great to see the progress. It just goes to show you, it just makes me shudder to think how many classes full of boys went through this school and they were just labelled and they never went on to achieve anything.' (Literacy Coordinator School B)

The teachers in the study were unanimous in agreeing that as the children progressed through the programme they became increasingly more confident. This resulted in every child being able to at least make an attempt at spelling the words they needed in independent writing. In addition to this they reported that spelling accuracy was high for the majority of children.

This supports the quantitative findings reported in Chapter 6. There were also improvements in the quality of independent writing. These were enthusiastically reported by all teachers and the CCEA writing levels reported in Chapter 6 provide quantitative evidence confirming these perceptions. The teachers and principals were
in agreement that all children could be maintained within the single group with extensions approach. The Year Four teacher from school B, who identified two children who struggled with the Programme, still identified progress for both children but acknowledged they required much greater support in their learning than the rest of the class. The child who entered the research class after the study had begun, and the child who had been in the study throughout, were low ability.

Caution should be exercised in concluding that all low ability pupils can be maintained within the single group approach as there were no children who were statemented as having moderate learning difficulties in the research classes. My experience in teaching children statemented as having moderate learning difficulties is that such children would struggle considerably to keep up with even the core element of the programme if they were introduced to it as early as Year Two. Within the moderate learning difficulties school where I teach, Stage 1 of the spelling programme is introduced at Year Five, Stage 2 at Year Six and Stage 3 at Year Seven. With this later implementation, children with moderate learning difficulties cope very well with the programme. Any mainstream schools which have low ability children within their school who are generally delayed in all areas and fall into the moderate learning difficulties range should bear this in mind.

7.3.4 Training

The teacher training sessions were considered to be essential by both teachers and principals because:

- the Programme requires significant change in classroom practice;
- demonstration of how to teach the strategies for learning – LSSW and LVSCWC was found to be beneficial;
- guidance on positive marking in both tests and independent writing was needed;
- further clarification was provided when teachers were unsure about a particular aspect of the programme.

It must therefore be emphasised that training may be an important factor in ensuring success for all children when implementing this programme.
Summary

All those involved in implementing the Programme were enthusiastic about the benefits not only for children of all abilities but also for teachers. However the issue of time required to implement the programme remains an issue in an already tightly packed day. The curriculum in Northern Ireland is currently under review (CCEA, 2002). The review aims to reduce the very heavy content emphasis within the Northern Ireland curriculum at present. This should allow greater flexibility in allocation of time, however, spelling itself remains either undervalued or misunderstood. Before schools can feel confident and comfortable about spending time teaching children how to spell there needs to be recognition of the central role in literacy that spelling can play. This recognition needs to be acknowledged not only by teachers but also by ELB curriculum advisory officers providing literacy support.
Chapter 8

Case Studies
CHAPTER 8

CASE STUDIES

The purpose of the case studies was to examine whether the Programme was perceived to be meeting the needs of all ability groups within one research class. At the outset of the study, School A was identified as the school from which case studies would be chosen. Two reasons contributed to this decision. First, this is a mixed sex school, educating both boys and girls. Secondly, given constraints of time and finance, it was possible to visit only one location. Case studies were not selected until the final year of the research.

Eight children were identified as possible case studies on the basis of BPVS score (verbal ability) and baseline spelling scores. The Year Four class teacher was asked to write a profile for each of the eight children and from these profiles the four cases that appeared most interesting were selected.

The first child, Mark, had a discrepancy between his BPVS score and his baseline spelling score and was described by his teachers in Year Two and Year Three as having considerable literacy difficulties. The second child, Harriet, had a BPVS in the above average range and also had the highest standardised baseline spelling score in the entire study. However, she was not typical of most girls in the study as she did not write at length in the samples of writing collected prior to the final writing sample. The third child, Aaron, was chosen to be a case study because he had a BPVS score below 95. His Year Four teacher and his previous teachers described him as being very difficult to motivate. The fourth child, Susan, was a child with an average BPVS score but more typical of girls in the study as she wrote at length and was described by all her teachers as very conscientious.

Material for the case studies was taken from a variety of sources.
1. Baseline diagnostic tests. Immediately prior to the research additional individual and group diagnostic tests were administered to the research class in School A (and not to the other schools) so that baseline information would be available for children who might be selected later as case studies.

2. Baseline BPVS


6. Teacher profiles

7. Parent interviews

8. Pupil interviews

8.1 Case Study One – Mark

8.1.1 Background

Mark is the eldest of two children. He has a younger sister and lives with his mother and father. At the beginning of the study Mark was in the lowest group for reading and spelling and remained in this group until the first term in Year Four.

Teacher’s profile

Mark was described by his Year Four teacher as a talkative, articulate boy who was a keen participant in class discussions. He was imaginative and sometimes got carried away when recalling events in his life. In discussions he displayed good general knowledge and a keen interest in the world around him. He had limited concentration and attention span especially when engaged in written tasks. Mark enjoyed working with his hands e.g. cutting, sticking and making things from junk. He liked experiments in school. He also liked learning the recorder and loved to tell his friends monster stories. He had a couple of close friends in the class and was friendly with an older boy in Year Seven. He could be quite boisterous and loud when playing. His teacher reported that she had moved Mark up from the bottom reading group in November
2000, because his reading 'suddenly took off' and he had begun to take a keen interest in reading. He was below average in his class in maths.

Interview with Mark's mother

Mark's mother was interviewed in the second term of the final year of the study (March 2001). She expressed disappointment that he had struggled to learn to read and write when he started school. His family had expected him to do much better.

'He can talk! He's always been a talker right from an early age, and gives you big words, we thought he would have done better at school because of how he was.'

She said he had always struggled with reading and spelling, from school entry in Year One, but in the first term of the final year of the study (October, Year Four) she noticed that his spelling and reading 'had improved really well' although his writing was, in her opinion, still poor. He leans very heavily on the page and he tends to write over his letters, which means they are thick and black. His mother felt he could do more at school but 'he is lazy.'

Mark's mother said he enjoyed spelling and considered himself to be good at it. She said she used to have to get him to write his spellings down in the evening when he was doing his homework, but now she just needed to ask him the spellings and he responded orally. He did not need to write them down any more. In her opinion he had progressed really well.

8.1.2 Pre-intervention profile

Phonological knowledge

Mark could name 16 of the 26 letters of the alphabet. For six of the ten letters he did not know, he named the Letterland character e.g. Golden Girl for the letter 'g'. He was able to give the correct sound for 19 of the 26 initial sounds presented. Mark performed poorly on the Phonological Assessment Battery Rhyme Test; scoring three out of a
possible six and he was unable to generate any words that rhyme with a given target word.

Auditory Sequential memory
Mark was unable to sequence the days of the week beyond Tuesday, (starting on Monday), mixing the order up and omitting Wednesday and Sunday entirely. On the Quest test requiring him to repeat a list of objects in the correct sequence, Mark scored five out of eight. He was also unable to sequence the months of the year. (Most of the class performed poorly on this test indicating that they may not have been taught the months of the year. However given Mark's difficulty sequencing the days of the week, it seems unlikely that he would have been able to sequence the months of the year even if he had been taught them.)

Visual discrimination and memory
Mark scored three out of five on the Quest visual discrimination test. He scored nine out of ten on the Aston Index visual sequential memory test (symbolic) but did not score as well on the visual sequential memory test for letter sequences; getting one out of Four correct.

Recognising, reading and spelling key words
Mark was able to spell three out of ten high frequency words, he was able to read five out of ten of the same words and recognise three of the five words he could not read. Mark's baseline standardised scores are summarised in Table 32.

Table 32: Mark's Standardised Test Scores

<table>
<thead>
<tr>
<th>Standardised Test</th>
<th>Standardised Score</th>
<th>Percentage of children who would have a lower score in the population as a whole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average score for each test =100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>British Picture Vocabulary Scales</td>
<td>113</td>
<td>80%</td>
</tr>
<tr>
<td>British Spelling Test Series</td>
<td>80</td>
<td>9%</td>
</tr>
<tr>
<td>Primary Reading Test</td>
<td>78</td>
<td>7%</td>
</tr>
</tbody>
</table>
There were considerable discrepancies between Mark's baseline verbal ability score as measured by the BPVS (113) and his standardised baseline reading (78) and spelling score (80), (see Table 32 above).

His diagnostic test results indicated that he had incomplete knowledge of letter names, being very dependent on the Letterland characters (Wendon 1992) in helping him to remember them. He also used Letterland to help him remember sounds and this proved successful for 19 out of a possible 21 consonant sounds. He was unsuccessful with the five vowel sounds. His difficulties with the rhyme test and his inability to generate rhyme words would be consistent with established research on importance of phonological awareness in learning to read and spell (see Chapter 2, paragraph 2.2.1). He also experienced difficulty with the auditory sequential memory tasks and visual discrimination and one of the two visual sequencing tasks. These difficulties in the area of auditory and visual processing would be consistent with difficulties in assembled and lexical processing and account for his underperformance in reading and spelling rather than attributing these difficulties to generally low ability.

8.1.3 Post Intervention

Standardised score results-
- British Spelling Test Series: 93 (May 2000), 109 (May 2001)
- Primary Reading Test: 93 (May 2001)

Mark made significant gains on each test for spelling. Significant gains were also found in reading by the end of the study.

Independent writing

Four independent writing samples were collected over the period of the research. Table 33 summarises how much Mark wrote in each sample and how many of these words he spelled correctly or misspelled.
The third and fourth columns of this table (i.e. those which indicate the number of correct and incorrect spellings) show that Mark made significant improvements in his spelling accuracy within independent writing.

The sample of independent writing in Figure M1 (see Appendix F) was completed in June 1999 when Mark had been on the Programme for 20 weeks. All the words that he was able to spell had been taught through the spelling programme, as had 'dad' which he misspelled. When he wrote words he had not been taught, his spelling errors indicated that he was relying heavily on assembled processing (sounds) e.g. 'vre' for very, 'tol' for tall, 'ped' for played and 'futbl' for football. Six months later in January 2000, Mark wrote a greater number of words but still had a high proportion of spelling errors (see Figure M1). He wrote a total of 55 words in this sample of writing, using a total of 32 different words. Of these 32 words 16 were spelled correctly, 'as, I, of, saw, a, from, and, were, on, it, hit, the, one, alive, that, had'. All of these words, except 'alive', had been taught through the Programme. There were 16 errors. Table 34 indicates the type of errors present in his writing.
Table 34  Spelling errors in Mark's second writing sample  (see Figure M1)

<table>
<thead>
<tr>
<th>Correct spelling</th>
<th>Mark's attempt</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>still</td>
<td>sil</td>
<td>Second initial consonant sound has been omitted</td>
</tr>
<tr>
<td>shot</td>
<td>sot</td>
<td>(and also double 'l' at end of still)</td>
</tr>
<tr>
<td>just</td>
<td>jesd</td>
<td>Incorrect vowel sound and final consonant</td>
</tr>
<tr>
<td>lazer</td>
<td>liesr</td>
<td>Incorrect vowel sound and vowel omission</td>
</tr>
<tr>
<td>was</td>
<td>weos, wes</td>
<td>Incorrect vowel sound</td>
</tr>
<tr>
<td>meteor</td>
<td>meter</td>
<td>Omission of vowel sound</td>
</tr>
<tr>
<td>called</td>
<td>calld</td>
<td>Verb inflection 'ed' spelled by sound rather than morphological rule</td>
</tr>
<tr>
<td>destroyed</td>
<td>desrod</td>
<td>for these three words</td>
</tr>
<tr>
<td>killed</td>
<td>cilt</td>
<td></td>
</tr>
<tr>
<td>earth</td>
<td>erath</td>
<td>Incorrect sequencing of letters might indicate visual awareness that</td>
</tr>
<tr>
<td>aliens</td>
<td>aleins</td>
<td>'a' should be in the word, however this error could also be phonetic-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>he may have spelt 'earth' the same way he pronounced it. Mark</td>
</tr>
<tr>
<td></td>
<td></td>
<td>spelt aleins as he pronounced it.</td>
</tr>
<tr>
<td>spaceship</td>
<td>sepiship</td>
<td>Addition of vowel sound in consonant blend in both words; also</td>
</tr>
<tr>
<td>strip</td>
<td>setrib</td>
<td>incorrect final consonant in strip</td>
</tr>
<tr>
<td>but</td>
<td>be</td>
<td>Incorrect vowel and omission of final consonant because he may</td>
</tr>
<tr>
<td>Mars</td>
<td>mros</td>
<td>omit the sound in speech. Spelling by sound for the word Mars</td>
</tr>
</tbody>
</table>

Mark was in the bottom spelling group and it can be seen from his writing sample that he could spell the high frequency words that he had been taught. He had not been working on the extension activities that focus on adding 'ed' and 'ing' and therefore, he depended on sounds rather than the morphological rule to add these endings.

By December 2000, when he completed the writing sample shown in Figure M3 (see Appendix F), Mark was, through the core Programme in Stage 3, covering the extension words and activities he missed in Stage 2. All of the class had an intensive focus on the short vowel sound in CVC words in the third term of Stage 2 of the Programme. He had
considerable practice in Stage 3 using the morphological rule for adding 'ed' & 'ing'. He had extensive experience of the second consonant sound, both in initial consonant blends in words and also at the end of words (through the visual patterns and sequences in the Programme). Mark now only had eight spelling errors in a total of 99 words written. Table 35 summarises the spelling knowledge that Mark demonstrated at the end of the first term of the Stage 3 Programme.

Table 35: Words spelled correctly in writing sample M3

<table>
<thead>
<tr>
<th>High frequency words</th>
<th>then, one, to, and, day, he, came, a, up, boy, his, it, with, gum, got, in, the, was, out, of, went, by, big, but, me, that, could, did, again, grass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verb inflections added correctly</td>
<td>wanted, pressed, called, landed, attacked, tricked, realised</td>
</tr>
<tr>
<td>Vowel knowledge and double letter</td>
<td>boot, ray, button</td>
</tr>
<tr>
<td>Consonant digraphs spelled correctly</td>
<td>machine, father, shrunk</td>
</tr>
<tr>
<td>Polysyllabic word</td>
<td>adventure</td>
</tr>
</tbody>
</table>

He showed greater mastery of vowel sounds in words and the morphological rule for adding 'ed'. Although these errors still appear in his writing, they are much less frequent (see Table 36).

Table 36 Spelling errors in writing sample M3

<table>
<thead>
<tr>
<th>Correct spelling</th>
<th>Mark's attempt</th>
<th>Correct spelling</th>
<th>Mark's attempt</th>
</tr>
</thead>
<tbody>
<tr>
<td>stuck</td>
<td>stock</td>
<td>chewing</td>
<td>chuthing</td>
</tr>
<tr>
<td>shoe</td>
<td>shuy</td>
<td>thrown</td>
<td>thorn</td>
</tr>
<tr>
<td>shovel</td>
<td>shevel</td>
<td>sting</td>
<td>stingk</td>
</tr>
<tr>
<td>lifted</td>
<td>levt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>press</td>
<td>prese</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The final writing sample was written at the end of May 2001 in the last term of using the programme at Stage 3 (Figure M4). Mark only had three mistakes in a total of 83 words, with 56 different words being written in the sample. The three words misspelled were lampposts- 'lampposts', rebuild- 'rebuild' and rude- 'rude'. Mark's writing sample was assessed as Level 2 by both raters.

8.1.4 Interview with Mark

An interview took place with Mark in March 2001 in the final year of the study. He found it very hard to sit still, continuously swinging his legs under the desk or moving backwards and forwards in his seat. He smiled a lot during the interview. I gained the impression that he was a very confident boy who expressed himself clearly. When asked whether or not he was good at spelling, he was very sure that he was and that he was good at writing too. When asked why he liked spelling he answered:

'Because if you couldn't spell, you wouldn't be able to write.'

The following is an extract from the interview with Mark.

Interviewer: How do you learn your spellings in school?

Mark: *I count how many syllables are in it, and try and work out if it is a word, and then put them together and say the word.*

Interviewer: You find syllables a good way of doing it, breaking the word down. What if the word has only one syllable, like the word *watch*, how would you learn that word?

Mark: *I would write it down, cover it, and then try and spell it.*

Interviewer: Do you use any other way?

Mark: *Not really.*
Interviewer: What about sounds, do you ever use the sounds?

Mark: *I usually use syllables.*

Interviewer: How do you learn your spellings at home?

Mark: *Just the same way. I just say them, hard ones I might write down.*

Interviewer: Is it easy or hard learning spellings.

Mark: *Sinch* (slang for easy)

Interviewer: Was it always easy, or did you find it hard in the beginning when you were Year 2 & Year 3? Has it got easier?

Mark: *It used to be a bit hard, but then when I got into Year Two it was 'pinch' (he meant he found spellings easy). I was getting brilliant at spellings.*

Interviewer: What do you like writing about best of all?

Mark: *I like writing about something I have done.*

Interviewer: Do you like making things up- writing about imaginary things?

Mark: *Yes.*

Interviewer: What are your favourite things to write stories about?

Mark: *Dragons and reptiles.*

Mark was then asked to indicate which activities he liked or disliked in the support activities. He said he liked them all because they were easy, except sometimes the
syllables activity could be quite hard. Further discussion about school in general revealed that he liked art best and that he did not like maths.

8.1.5 Summary

Mark made substantial progress with spelling, increasing his standardised score by 29 points, and his writing samples show that he was able to apply what he learned in independent writing. Initially he experienced greater difficulty with spelling than the other three case study children (and these difficulties remained for a sustained period of time), but the evidence shows that these difficulties were fully overcome. His teacher was convinced that the spelling programme had helped him, not only with his spelling, but also with his reading.

8.2 Case Study Two – Harriet

Harriet lives with her mother, father and older brother and sister. At the beginning of the study, Harriet was in the top group for reading and spelling and remained in this group throughout the study.

8.2.1 Background

Teacher’s Profile
Harriet was described by her Year Four teacher as a fully committed member of the class, always producing work of a high standard in all subjects. She could express her opinion clearly if required to do so but was not a keen participant in class discussion. She was a quiet, conscientious girl who was friendly and mature. She enjoyed working on her own but could also work well with others. Harriet enjoyed reading and all kinds of writing and her teacher said she is very unassuming, not drawing attention to her ability. Harriet was in the top group for all subjects. She was learning two extra rows of curriculum extension words each night and her teacher felt that she had always been a good speller but that by using the Programme she had greater understanding of the meaning of a lot of words. Harriet's sentences were interesting and her teacher had observed that she was using adjectives and adverbs to great effect.
Interview with Harriet's mother
Harriet's mother felt that she was doing very well at school. She would normally learn her spellings herself and then her mother would ask her her spellings. Her mother appeared relaxed about homework, finding that Harriet needed very little help.

'With her spellings, she has no routine with homework. If she wants to watch something, watch that first, then do your homework. She looks over her spellings then she would come to me with the book, and I would ask her the spellings.'

Her mother then went on to discuss Harriet's older brother who goes to the same school but is not a good speller. According to Harriet's mother, he would have had seven or eight spellings written in a notebook to learn each night and he would have had to learn these himself at home. His mother felt this wasn't sufficient, he needed more support than that. She said she thought there was more time taken with spellings now:

'.. the way they are laid out and that, I think that they go in better. She loves the crosswords, and she likes word searches and things like that, I think that it helps.'

When asked whether she was happy with the extra time that was being spent on spelling in school she replied:

'I'm happy with the time spent on it. Obviously it has been working.....I think that it is a good system for her.'

She went on to say that she thought her son would have benefited from this approach.

'A system like that at his stage may have been more beneficial and more interesting. Now he has to go over spellings and he is in First Year!' (First year of secondary education)

8.2.2 Pre-intervention Profile

Phonological knowledge
Harriet could name all 26 letters of the alphabet. She was able to give the correct sound for 25 of the 26 initial sounds requested. She scored six out of six on the Phonological
Assessment Battery Rhyme Test and was able to generate additional rhyme words for both target words.

Auditory Sequential memory
Harriet was able to sequence the days of the week. She was unable to sequence the months of the year but most of the class performed poorly on this test indicating that they may not have been taught the months of the year. On the Quest test requiring her to repeat a list of objects in the correct sequence, Harriet scored five out of eight.

Visual discrimination and memory
Harriet scored four out of five on the Quest visual discrimination test. She scored ten out of ten on the Aston Index visual sequential memory test (symbolic) and three out of four on the visual sequential memory for letter sequences.

Recognising, reading and spelling key words
Harriet was able to spell seven out of 10 high frequency words; she was able to read all of the same words.

Harriet’s standardised baseline test scores are summarised in Table 37.

Table 37: Harriet’s Standardised Test Scores

<table>
<thead>
<tr>
<th>Standardised Test</th>
<th>Average score for each test = 100</th>
<th>Standardised Score</th>
<th>Percentage of children who would have a lower score in the population as a whole</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Picture Vocabulary Scales</td>
<td></td>
<td>117</td>
<td>87%</td>
</tr>
<tr>
<td>British Spelling Test Series</td>
<td></td>
<td>121</td>
<td>92%</td>
</tr>
<tr>
<td>Primary Reading Test</td>
<td></td>
<td>98</td>
<td>45%</td>
</tr>
</tbody>
</table>

Harriet was a competent speller from the outset of the research. She had the highest baseline standardised spelling test score of all the children in the study, whether in a Control or an Experimental school. Her baseline diagnostic tests showed that she was
strong in auditory and visual processing and she had obviously learned to spell with ease as a result of these processing strengths.

8.2.3 Post Intervention

Standardised score results

- British Spelling Test Series: Absent (May 2000), 131 (May 2001)
- Primary Reading Test: 110 (May 2001)

Harriet improved her score on the spelling test by ten standardised points. She was absent for the test in May 2000. Her reading score improved by 12 standardised points over the period of the study.

Independent Writing

Table 38 summarises how much Harriet wrote in each of the four samples of writing collected over the period of the research. The table shows how many of these words she spelled correctly and incorrectly.

Table 38: Analysis of words written by Harriet

<table>
<thead>
<tr>
<th>Name</th>
<th>Total words</th>
<th>Correct</th>
<th>Incorrect</th>
<th>Total number of different words used (Correct +Incorrect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harriet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 99</td>
<td>58</td>
<td>32</td>
<td>5</td>
<td>38</td>
</tr>
<tr>
<td>Jan 00</td>
<td>40</td>
<td>28</td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>Dec 00</td>
<td>92</td>
<td>52</td>
<td>2</td>
<td>54</td>
</tr>
<tr>
<td>May01</td>
<td>101</td>
<td>53</td>
<td>1</td>
<td>54</td>
</tr>
</tbody>
</table>

Harriet was an interesting case study as she scored very highly in the standardised spelling test at the outset of the study. She was atypical of the girls in the study because she wrote with brevity. The writing samples collected over the period of the research showed that she did not write at length; according to her teacher she aimed for quality rather than quantity. Indeed, in the final writing sample, she wrote 101 words and the average length of writing samples for girls was just under 180 words. Harriet always produced work of a very high standard in class given the time to plan and complete a
writing task. These writing samples (from the research study) were collected in a time bound session, therefore a very small number of children did not have time to complete their story. Her class teacher did not doubt that she was Level 3 in writing however both raters assessed her final writing sample as Level 2 (the superscript level awarded was 3-)

It is clear from Harriet's writing samples that she is a good speller. In the first sample of writing completed in June 1999 (see Appendix F, Figure H1), she only had five errors—'rally' for really, 'walke' for walk, 'agian' for again, 'brghte' for brought, 'exitend' for excited. It seems likely from these errors that Harriet was using visual as well as sound awareness as she could spell words, or almost spell words, that could not be spelled by sound symbol awareness alone (see Table 39 below).

Table 39: Harriet's spelling errors in writing sample H1

<table>
<thead>
<tr>
<th>Error</th>
<th>Knowledge that could not have been determined by sound awareness alone</th>
</tr>
</thead>
<tbody>
<tr>
<td>rally</td>
<td>Double letter in word</td>
</tr>
<tr>
<td>walke</td>
<td>Silent l</td>
</tr>
<tr>
<td>agian</td>
<td>Awareness that spelling should be 'ain' although it is sequenced incorrectly. 'again' was pronounced 'agen' by Harriet, therefore it seems unlikely she would have spelled the word entirely by sound.</td>
</tr>
<tr>
<td>brghte</td>
<td>'ght' cannot be produced without some visual awareness</td>
</tr>
<tr>
<td>excitend</td>
<td>the inclusion of x and c in this word</td>
</tr>
</tbody>
</table>

Also, many of the words she could spell in this sample had not been taught through the Programme for example; 'nearly, sports, every, away, little'.

It seems likely from Harriet's errors and correct spellings that she was assimilating visual and phonological knowledge and that she may also have been building up additional visual knowledge from reading (which she used in spelling) as she was an avid reader.
The second writing sample (Figure H2), written in January 2000 contained two misspellings, 'Juipiter' for Jupiter and 'exiting' for exciting. Harriet had not been taught to spell 'Jupiter' and it would be unlikely that she had read the word 'Jupiter' with any degree of frequency, therefore her spelling attempt had most likely been constructed using assembled processing. With the second spelling error, she may also have used assembled spelling as she forgot the 'c', which would require the use of visual knowledge. Harriet had not written at length and it seems unlikely that she had been constrained in any way by her spelling. Harriet appeared not to have been motivated by the topic, as this was to have been an imaginative piece of work and she obviously preferred to write factually. Table 40 indicates that Harriet could spell words she had not been taught.

Table 40: Words Harriet has spelled correctly in writing sample H2

<table>
<thead>
<tr>
<th>High frequency words taught in the programme</th>
<th>in, there, are, some, and, on, the, you, can, see, when, my, was, little, it, because, first, man,</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verb inflections added correctly</td>
<td>called</td>
</tr>
<tr>
<td>Words learned through extension levels</td>
<td>many, other, granda,</td>
</tr>
<tr>
<td>Other words spelled correctly not learned through the programme</td>
<td>planets, earth, landed, moon</td>
</tr>
</tbody>
</table>

In the third sample of writing (Figure H3) completed in December 2000. Harriet used her imagination well and had only two spelling errors. It seems likely that she attempted to encode these words using assembled processing interacting with lexical knowledge. The underlined parts of the words indicate the parts of the words requiring lexical knowledge, even though some of this lexical knowledge is incorrectly used -- 'gigantickey' and 'tramenteously'.

Harriet ran out of time in the final sample of writing (Figure H4) written in May 2001, only having time to write a description of her robot and having insufficient time to develop her story beyond the opening comments. She only spelled one word incorrectly- 'absaloutly'. Again it seems likely that this word was constructed using
assembled processing and lexical knowledge. The underlined part of the word ‘lout’ indicates her attempts to apply lexical knowledge, even though this is incorrect lexical knowledge. Had this part of the word been spelled ‘loot’ it may have been considered to have been assembled. Harriet was awarded Level 2 for this sample of writing. The superscript Level was 3-. She was considered to have almost reached Level 3 but the level could not be awarded because she hadn't achieved it fully.

8.2.4 Interview with Harriet

When asked if she liked writing stories, Harriet said she did and that she especially liked writing stories about things that had happened to her. She said she enjoyed spelling and found it easy. When asked how she learned words that were difficult she said she used LVSCWC. She mentioned that she enjoyed the support activities and liked thinking about the different meanings of words. She said that she sometimes needed a dictionary to help her find all the meanings. Her favourite thing in school was maths.

8.2.5 Summary

Harriet increased her standardised spelling score by ten standard points over the period of the research. The benefit of the programme for Harriet, as her mother and teacher identified, was in the language development, in terms of language understanding and usage. Harriet herself identified this as a challenge because she recognised that she didn't always know the range of meanings for some words and used a dictionary to help with this so that she could write interesting sentences. Simply learning to remember and retrieve a sequence of letters is not a challenging activity for Harriet. The work on the meanings and usage of spellings was clearly considered to be important by both her mother and teacher. Harriet’s own enjoyment of the spelling activities and her eagerness to use a dictionary to explore the meanings of words, showed that Harriet herself gained satisfaction from work designed to increase and test her language understanding.
8.3 Case Study Three – Aaron

8.3.1 Background

Aaron lives with his mother, father and older brother. Aaron was in the lowest group for reading and spelling at the outset of the study.

Teacher's Profile

According to his teacher, Aaron worked more slowly than everyone else in the class and was difficult to motivate. He seldom managed to complete a task. He was ultra quiet but would occasionally convey information that he believed was vital. His teacher felt he lacked sparkle in class. He liked PE and art in school but he also struggled to finish art projects. He showed particular interest in science and experiments carried out in school. He was good at construction activities and, according to his teacher, likes Maths better than English (although Aaron contradicted this in his interview by saying he liked English best). Aaron was not placed in the lowest reading group in Year Four; he was in the next group up, but according to his teacher found unseen reading passages very difficult. His mother prepared his reading with him, in advance of what is being done in school. (This may have been masking greater difficulty with reading than his teacher realised, as Aaron did not perform well in the standardised reading test in 2001.) His teacher did say that she was unsure whether he was lazy (because he often appeared to be 'switched off') or whether there are more fundamental problems. Aaron's teacher said that he was doing very well with spelling and she had recently moved him into the middle group.

Interview with Aaron's mother

Aaron's mother expressed concern about the amount of effort he put into his work in class as sometimes work was sent home to be finished. According to his mother, anything sent home was completed really quickly so that he could get out to play. Aaron's mother admitted that it could be difficult to get him to sit down and do his homework because he loves playing- 'he can get great value out of a couple of cars, he can play for hours, he loves it, he is away in another world'.
She said he enjoyed spelling and it didn’t take long to do his spelling homework, she just asked him the spellings once. She felt he was progressing well with spelling. Aaron’s mother compared him to his older brother whom she said had more ability than Aaron, but would not be able to ‘break up words’ to spell them the way Aaron could. She thought Aaron had better strategies than his brother and that Aaron's brother would have benefited from a programme like this. Aaron's mother said she liked the structure of the programme. It was clear to her what he was doing and she found this helpful. She said she would like this kind of structured approach for other subjects.

8.3.2 Pre-intervention Profile

Phonological knowledge
Aaron could name 24 of the 26 letters of the alphabet. He was able to give the correct sound for 20 initial sounds. Aaron performed well on the Phonological Assessment Battery Rhyme Test scoring six out of a possible six and was able to generate additional rhyme words for one of the two target words.

Auditory Sequential memory
Aaron was unable to sequence the days of the week and the months of the year. On the Quest test requiring him to repeat a list of objects in the correct sequence Aaron scored eight out of eight.

Visual discrimination and memory
Aaron scored five out of five on the Quest visual discrimination test. He scored nine out of ten on the Aston Index visual sequential memory test (symbolic) but did not score as well on the visual sequential memory for letter sequences; getting two out of four correct.
Recognising, reading and spelling key words

Aaron was able to spell five out of ten high frequency words. He was also able read seven out of ten of the same words and recognise, but not read, the remaining three words.

Aaron’s baseline standardised test scores are summarised in Table 41

Table 41: Aaron’s Standardised Test Scores

<table>
<thead>
<tr>
<th>Standardised Test</th>
<th>Standardised Score</th>
<th>Percentage of children who would have a lower score in the population as a whole</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Picture Vocabulary Scales</td>
<td>91</td>
<td>28%</td>
</tr>
<tr>
<td>British Spelling Test Series</td>
<td>95</td>
<td>37%</td>
</tr>
<tr>
<td>Primary Reading Test</td>
<td>75</td>
<td>5%</td>
</tr>
</tbody>
</table>

8.3.3 Post Intervention

Standardised Test Scores

- British Spelling Test Series: 98 (May 2000), 101 (May 2001)
- Primary Reading Test: 80 (May 2001)

Aaron increased his spelling score by six standard points from the start of the study.

Independent writing

Table 42 summarises how much Aaron wrote in each of the four samples of writing collected over the period of the research. Table 42 shows how many of these words he spelled correctly or incorrectly.
Table 42: Analysis of words written by Aaron

<table>
<thead>
<tr>
<th>Name</th>
<th>Total words</th>
<th>Correct</th>
<th>Incorrect</th>
<th>Total number of different words used (Correct +Incorrect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 99</td>
<td>30</td>
<td>12</td>
<td>7</td>
<td>18</td>
</tr>
<tr>
<td>Jan 00</td>
<td>32</td>
<td>17</td>
<td>7</td>
<td>24</td>
</tr>
<tr>
<td>Dec 00</td>
<td>25</td>
<td>13</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>May 01</td>
<td>63</td>
<td>40</td>
<td>3</td>
<td>43</td>
</tr>
</tbody>
</table>

In Aaron's first sample of writing (see Appendix F, Figure A1) he was keen to write about what he was going to do that day with his mother. This was clearly a motivating topic for him. The spelling errors in his writing sample show that he was using visual and phonic knowledge when attempting to spell words. His misspelling of 'with' may indicate visual awareness because 't' does not represent the 'th' sound; he remembered what the word looked like visually but couldn't remember the last letter. His correct spelling of 'clock' showed visual awareness as he used 'ck' at the end of the word and not just 'c' or 'k'.

He spelled the following words correctly 'l, am, going, to, the, shop, mother, pool, o'clock, with'. All of these words had been learned through the spelling programme with the exception of 'pool' and 'o'clock'. Aaron may have had frequent exposure to the word 'pool' if he went swimming every week, as the word appears on signs within pool areas. He may also have had frequent exposure to the word 'o'clock' again through signs in the environment or in mathematics. There is no other evidence of reading influencing Aaron's spelling, and it seems unlikely that this would be the case as Aaron was not a good reader.

In this same sample he also spelt incorrectly 'mi'-my, 'theyn'-then, 'gowing'-going, parc'-park, 'tow'-two, 'siming'-swimming, 'qleing'- playing incorrectly. His attempts to spell these words indicate that he was using assembled processing.

When Aaron wrote this next piece of writing (see Appendix F, Figure A2) in January 2000, he was clearly not motivated by the topic. He had trouble thinking of anything to
write and ideas were not forthcoming. Aaron may have required someone to encourage him to write more or needed further assistance with ideas, but as the samples of writing composed entirely independently, Aaron could not be given any support. He was quite sure that he had written as much as he could when he handed in his writing.

His spelling errors showed that he was still predominantly using the assembled route for spelling unknown words. His misspellings were 'aeleeins'- for aliens, 'Erth'- for earth, 'rect'- for wrecked, 'whet'- for went, 'douing'- for down, 'whe'- for way.

He spelled the following words correctly- 'an, came, to, and, my, car, when, it, was, going, he, all, the, home, pet, in, is, garden'. All of these words with the exception of the word 'garden' had been taught in the spelling programme. It seems likely that Aaron may have spelled 'garden' correctly by using both the assembled route and reasoning by analogy as he could spell 'car' and 'when' and by changing the initial sounds could use analogy to spell 'gar' and 'den'.

The third sample of writing (see Appendix F, Figure A3) was written in December 2000. Again Aaron wrote with brevity and seemed happy with what he had written. It is difficult to analyse his overall spelling ability because he wrote so little. Four spelling errors 'srungk'- for shrunk, 'exctreemly'- for extremely, 'cokrowch'- for cockroach, 'scwosh'- squashed are all errors that indicated he is relying heavily on sounds to encode unknown spellings. The correct spellings remained restricted to largely one syllable high frequency words - 'the, day, I, saw, dog, and, cat, was, scary, next, my, mother, nearly'.

Aaron indicated in his interview in March 2001 that he preferred to write about things he had done. Without having collected samples of recounts it is difficult to say whether he would have written any more in another context. In the final writing sample in May 2001, he did write at greater length and may simply have been better motivated on this occasion. However, he did seem to find it difficult to write imaginatively; even on this final occasion he confined his ideas to a fish in the pond in his garden- something within his experience. Only three spelling errors were found in this sample, 'pound' for pond, and 'botom' for bottom, 'thout' for thought; 40 words were spelled correctly on
this occasion. 'pound' for pond could be a phonemic error as he pronounced the vowels in these two words in the same way. He was awarded Level 2 for this sample of writing.

Table 43 show the words that Aaron has spelled correctly in his final writing sample - A4.

Table 43: Words Aaron spelled correctly in Writing Sample A4

<table>
<thead>
<tr>
<th>High frequency words</th>
<th>the, said, is, make, him, he, a. but, that, we, swims, in, be, water, long, at, so, of, made, my, one, when, lot, sees, some, thing, goes, to, eat, my, dad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verb inflections added correctly</td>
<td>called</td>
</tr>
<tr>
<td>Words spelled correctly using</td>
<td>robot, fish, garden, self</td>
</tr>
<tr>
<td>assembled processing</td>
<td></td>
</tr>
<tr>
<td>Visual awareness</td>
<td>would</td>
</tr>
<tr>
<td>Polysyllabic word</td>
<td>different</td>
</tr>
</tbody>
</table>

8.3.4 Interview with Aaron

Aaron said he liked spelling and when he learned his spellings he thought of what the word looks like in his head and sometimes he thought of the syllables. He said that spelling was easy, it only took him 'a minute' to do them. Aaron said he liked writing and that he preferred to write stories about things he had really done. He said he liked spelling and writing. This would indicate that he was keen to work well but from his teacher's and mother's comments, he would often drift off into another world and before he knew it, time had passed. He could however get something done quickly if he wanted but maintaining focus was difficult.

8.3.5 Summary

Aaron's spelling improved over the period of the research – his standardised score increasing by six standard points. His improved performance in the final writing sample
may indicate that he was now finding it easier to write freely. He said in the interview in March, that he liked writing and this may be because he was finding the task easier. It was evident in his independent writing that he was applying the spellings he had learned. A reason why his output may be limited was because he had difficulty thinking of ideas. Helping children to plan writing so that they can structure ideas into an interesting sequence of events is not something that is addressed in the spelling programme. Aaron would require more support in this area and this can only come through such processes as modelled and guided writing.

8.4 Case Study Four – Susan

Susan lives with her mother, father and younger brother and sister. Susan was in the middle group for reading and spelling at the outset of the study. However by the time she reached Year Four she was in the top group for both.

8.4.1 Background

Teacher's profile
Susan was described by her teacher as a quiet, conscientious worker who was happy with her own company, but who could also work well within a group or in a whole class situation. She was of a sensitive nature and was easily upset. She always tried her best in everything. She worked confidently in all English related subjects but was less confident in mathematics, where extra help was sometimes required, especially when new topics were introduced. Susan liked reading and playing school with her brother and sister. She was friendly with a couple of girls in her class but was quite happy on her own as well. Susan had excellent home support.

Interview with Susan's mother
Susan's mother was pleased with her progress at school. Susan spent 10-15 minutes on her spelling homework at night. She was in the top spelling group so she had two extra curriculum words every night. Her mother thought she really liked spelling. She was being stretched, but not over stretched. If she couldn't do both of the extra words, she sometimes just did one of them.
Her mother said that she could see her spelling improving. She reported that Susan could sound out a word working her way through it to try and spell it correctly. Her mother used the example of her homework the previous night. Susan had a long word to learn and was able to break it down into syllables and work it out. Susan's mother said that when she was off sick, she asked for Susan's spelling workbook to be sent home. She said she could see that the activities really helped Susan understand the words.

4.2 Pre-intervention Profile

Phonological knowledge
Susan could name 25 of the 26 letters of the alphabet. She was able to give the correct sound for 20 of the 26 initial sounds requested. She scored five out of six on the Phonological Assessment Battery Rhyme Test and was able to generate additional rhyme words for both target words.

Auditory Sequential memory
Susan was able to sequence the days of the week but omitted Sunday. She was unable to sequence the months of the year but most of the class performed poorly on this test indicating that they may not have been taught the months of the year. On the Quest test requiring her to repeat a list of objects in the correct sequence, Susan scored three out of eight.

Visual discrimination and memory
Susan scored four out of five on the Quest visual discrimination test. She scored ten out of ten on the Aston Index visual sequential memory test (symbolic) and three out of four on the visual sequential memory for letter sequences.

Recognising, reading and spelling key words
Susan was able to spell seven out of ten high frequency words. She was able to read all of the same words i.e. ten out of ten. Her standardised test scores are recorded on Table 44 below.
Susan’s baseline standardised test scores are summarised in the Table 44.

Table 44: Susan’s Standardised Test Scores

<table>
<thead>
<tr>
<th>Standardised Test</th>
<th>Standardised Score</th>
<th>Percentage of children who would have a lower score in the population as a whole</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Picture Vocabulary Scales</td>
<td>98</td>
<td>45%</td>
</tr>
<tr>
<td>British Spelling Test Series</td>
<td>99</td>
<td>48%</td>
</tr>
<tr>
<td>Primary Reading Test</td>
<td>93</td>
<td>32%</td>
</tr>
</tbody>
</table>

8.4.3 Post Intervention

Standardised Test Scores
- British Spelling Test Series: 123 (May 2000), 117 (May 2001)
- Primary Reading Test: 110 (May 2001)

Susan made significant progress in both reading and spelling over the period of the research.

Table 45 summarises how much Susan wrote in each of the four samples of writing collected over the period of the research. The table shows how many of these words she spelled correctly and incorrectly.

Table 45: Analysis of words written by Susan

<table>
<thead>
<tr>
<th>Name</th>
<th>Total words</th>
<th>Correct</th>
<th>Incorrect</th>
<th>Total number of different words used (Correct + Incorrect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June '99</td>
<td>49</td>
<td>19</td>
<td>4</td>
<td>23</td>
</tr>
<tr>
<td>Jan '00</td>
<td>93</td>
<td>45</td>
<td>6</td>
<td>51</td>
</tr>
<tr>
<td>Dec '00</td>
<td>204</td>
<td>77</td>
<td>10</td>
<td>87</td>
</tr>
<tr>
<td>May '01</td>
<td>246</td>
<td>81</td>
<td>9</td>
<td>90</td>
</tr>
</tbody>
</table>

Figure S1 (see Appendix F) shows the first sample of writing that Susan completed in June 1999. Susan had written this sample putting greater emphasis on words she had
learned to spell rather than on the sense of the passage. She had been taught to spell the colours and is relating the colours to herself in a meaningless way. It would appear that she was more conscious of the spelling aspect of this activity than the other children and therefore the quality of her writing may have been affected by her desire to spell correctly.

All the words she spelled correctly had been learned in the programme except 'banana, because, after, teeth, looking'. The words she had spelled incorrectly (that's-'let's', right -'wite', every-'evre', my-'mi') have been spelled using assembled processing. The correct spellings she had not been taught show that she was using lexical (visual) knowledge as well as phonological knowledge since these words could not have been spelled using straightforward phoneme/ grapheme translation e.g 'because' and 'after'. Thus it is clear that phonological and lexical processes were interacting to assist with spelling known and unknown words at this early stage.

The second sample of writing S2 (see Appendix F) was written in January 2000 and a summary of the words spelled correctly are contained in Table 46.

Table 46: Words that Susan has spelled correctly in Sample S2

<table>
<thead>
<tr>
<th>High frequency words</th>
<th>first, I, am, going, to, put, on, my, now, and, very, down, time, here, come, same, them, looks, so, cat, bar, there, glad, pup, went, home, just, nearly, had, me, run, out, yes,</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vowel knowledge beyond what has been taught but which could have been deduced by analogy</td>
<td>hunting, stars, mars, moon, space</td>
</tr>
<tr>
<td>Visual knowledge</td>
<td>brought, rocket, people, better</td>
</tr>
</tbody>
</table>

Susan had six spelling errors in this sample of writing. The spelling errors in her writing sample show that lexical and assembled processing were interacting in her attempts to spell these words. For example 'teaght' for 'tight' shows that she was using lexical
knowledge for the 'ght' part of the word and that she had attempted to use sounds to spell the vowel sound. 'Twickly' may be how Susan pronounced 'twinkly' and in her attempt to assemble this word she has also used lexical knowledge as she has spelled the 'k' sound 'ck'.

This third sample of writing (Figure S3) was completed in December 2000 and it can be seen from this that Susan is spelling a much wider range of words than before with a number of polysyllabic words being spelled correctly e.g. 'frightening' and 'television'. Polysyllabic words are also appearing in her spelling errors e.g 'teirefied' – for terrified, 'lawenmore' – for lawnmower. Many words in her writing demonstrate that visual knowledge was required to spell them.

In the final sample of writing (Figure S4) she was able to spell a number of polysyllabic words correctly e.g. bullying, bicycle. She spelt 'giant' correctly which she misspelled in the last sample, and she also spelt a number of words which can be easily misspelled (because they include silent letters, double letters or digraphs ) e.g. 'knobbly, skinny, shoulders, brought'.

Susan's spelling errors indicate that she was using both assembled and lexical processing as she is spelling some parts of the words using sounds and other parts with reference to lexical knowledge eg biscuit- 'biscut', telephone-teleaphone, balloons-ballons, dinosaur- dinosaur. Susan was awarded Level 3 for this sample of writing.

8.4.4 Interview with Susan

Susan said that she liked spelling and that she was good at it. She said that she learned her spellings at night by 'taking the words to bits' (breaking the words into syllables) or by using the LVSCWC strategy. She said her mother usually covered the spellings up while she wrote them down. Susan said she liked writing, especially writing poems. She said she enjoyed doing the spelling activity workbooks especially the crosswords and wordsquares, though she acknowledged that she sometimes found the crosswords hard.
8.4.5 Summary

Susan's pre-intervention profile would suggest that she was a child of average ability who had no significant difficulties processing auditory and visual information. Her difficulties with auditory sequential memory may be more indicative of her difficulty with maths than any difficulty associated with learning to spell. Her teacher's and mother's comments indicate that she was very hard working and conscientious. Her conscientious nature and the excellent home support enabled Susan to make very good progress.

Susan increased her standardised spelling score by 17 standard points over the period of the research. Her standardised score decreased from May 2000–May 2001 but this may have been because the final test was different in layout and much harder than the previous two tests. (This was a trend seen across the Experimental and Control schools and is discussed in more detail in the discussion chapter.) However, this is one reason why it is important to have both qualitative and quantitative analysis. Without the additional qualitative information, it would be difficult to ascertain whether the test score is representative. As Susan's vocabulary understanding improved, so too did the standard of her writing.

Susan worked on the extension levels of the programme in Year Three (Stage 2) learning the morphological rule for adding 'ed' and 'ing' to one syllable words. She also completed activities identifying syllables in words. As already stated above, Susan's spelling score decreased between May 2000 and May 2001. It seems likely that her final score is the result of a 'ceiling effect' as her mother had said in the interview that Susan sometimes found two extension words difficult, therefore on some occasions she only completed one. It seems unlikely therefore that she needed more difficult polysyllabic words as extension words to improve her score.
8.5 Conclusions

Irrespective of the children's ability, all the mothers reported that their children enjoyed spelling, even Aaron, whose mother acknowledged that generally he was not motivated to work in school. The mother of Harriet (who was a good speller) mentioned how much Harriet enjoyed the spelling activities and got considerable benefit from the emphasis on word meanings. Susan's mother also thought that the activities improved her daughter's understanding of words. Three of the mothers specifically mentioned that their child had improved in spelling. One of these children was Mark who had been described as having considerable literacy difficulties and had a discrepancy of 33 points between his baseline spelling and BPVS scores.

The children's scores on the standardised spelling tests can be seen in Table 47. These scores indicate the gains made for all case study children. Over the period of the study, Mark improved his spelling score by 29 standardised points, Harriet improved by 10 standardised points, Aaron improved by six standardised points and Susan improved by 17 standardised points. Aaron's standardised spelling score increase was the lowest out of all the children in the Experimental schools (except for one child, in the above average group, who increased by only four standardised points). From the evidence in independent writing samples and these case studies, it may be concluded that, in addition to improvements in spelling accuracy as measured by spelling tests, there were also improvements in spelling in independent writing.

Table 47: Spelling test scores from 1999-2001

<table>
<thead>
<tr>
<th>Name</th>
<th>SPELL '99</th>
<th>SPELL '00</th>
<th>SPELL '01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark</td>
<td>80</td>
<td>93</td>
<td>109</td>
</tr>
<tr>
<td>Harriet</td>
<td>121</td>
<td>Abs</td>
<td>131</td>
</tr>
<tr>
<td>Aaron</td>
<td>95</td>
<td>98</td>
<td>101</td>
</tr>
<tr>
<td>Susan</td>
<td>100</td>
<td>123</td>
<td>117</td>
</tr>
</tbody>
</table>
CHAPTER NINE

GENERAL DISCUSSION

The purpose of this chapter is to consider the reasons for the success of 'The Complete Spelling Programme' given the high level of success in the Experimental schools in spelling accuracy in tests, spelling accuracy in independent writing and also in CCEA writing levels. Consideration will then be given to what may be learned from this study and recommendations made regarding the way forward. This chapter also considers the limitations of the study and makes suggestions as to the direction of future research.

9.1 Why has the programme succeeded?

9.1.1 Working memory

As reported in Chapter 6, children within the Experimental schools who had a significant discrepancy between their baseline spelling score and their baseline BPVS score made up this discrepancy or as seen in the case study Mark (see Chapter 8), almost made up the discrepancy (no longer having a significant discrepancy remaining). One factor that contributed to this success is the design of the Programme which allows for the demands on working memory to be reduced. Siegel (2004, p683) defines working memory as:

'...the retention of information in short term storage while processing incoming information and retrieving information from long term storage.'

Why do difficulties in working memory affect spelling performance?

Phoneme segmentation is difficult for young children (Goswami and Bryant 1990; Treiman 1992, 1993; Bryant 1993) because the application of phoneme-grapheme correspondence rules requires sufficient working memory capacity to hold the word and segment it into phonemes while selecting the appropriate graphemes. The early stages
of spelling development place considerable demands on working memory because of the predominant use of assembled processing. According to Chiappe, Hasher and Siegel (2000), Wimmer et al. (1999) and Siegel and Ryan (1988), children at risk of dyslexia have working memory difficulties which makes effective use of phoneme-grapheme conversion rules extremely difficult. Siegel (2004, p683) points out that in relation to reading:

'because the grapheme-phoneme conversion rules for each segment of the word must be held in memory while the remaining segments of the word are processed. Longer words, in terms of the number of syllables, place increasing demands on working memory.'

Following Siegel's line of argument, it might also be argued that retrieving grapheme-to-phoneme conversion rules when spelling is also a difficult task because of the number of possible spellings for the required phonemes in a word (Adams, 1990; Treiman, 1993). There are, however, additional demands on working memory. Spellings must be assembled whilst at the same time thinking of ideas to compose text.

The developmental sequence within 'The Complete Spelling Programme' ensures that the demands on working memory are minimised. This is achieved by presenting patterns and sequences that are regular in phoneme-to-grapheme mappings in Stages 1 and 2 of the Programme. It has been shown that the demands placed on working memory in applying phoneme-to-grapheme correspondence rules are much lower in a regular orthography (see Chapter 1, paragraph 1.4). Therefore it is important that children in the early stages of spelling development are provided with a high level of phoneme-grapheme transparency when learning to spell in English. The fact that children within the Experimental schools who had a significant discrepancy between their BPVS and their baseline spelling scores, made up this difference or almost made up the difference, suggests that this Programme may be effective in helping children overcome problems in working memory and therefore help prevent longer term difficulties in learning to spell.
9.2 The importance of developing phonological knowledge

The programme acknowledges in its design the importance of phonological knowledge in learning to spell (Lennox and Siegel, 1994; Siegel, 1994; Treiman, 1993; Adams, 1990). This relationship between phonological knowledge and spelling was also confirmed in the regression analysis which showed that sound knowledge was a predictor of spelling at the end of Key Stage One accounting for 33 per cent of the variance in spelling scores. Phonological knowledge has been identified as having three levels i.e. phoneme, intra-syllabic unit (onset and rime) and syllable. Children, through the experience of the patterns and sequences, can develop phonological knowledge at all three levels depending on their current knowledge and the knowledge required for the task. This learning may occur at an implicit level (through frequency sensitivity) and/or an explicit level (through intentional teaching). This explicit teaching helps children to develop their implicit knowledge into explicit knowledge. According to Karmiloff-Smith's (1994) model of implicit and explicit learning, knowledge can be represented at multiple levels and when representations are redescribed at another level, the original representation remains intact and can be used at any time. Knowledge can come into the system at any level and can be redescribed to another level in any order.

I would contend that children who struggle with the acquisition of phonological knowledge do so because they have insufficient learning at an implicit level therefore, they have no foundation on which to build their learning. Until they have this implicit knowledge, explicit teaching may have only minimal gains. This programme endeavours to ensure that the group of children who experience difficulty in the acquisition of phonological knowledge because of lack of linguistic experience obtain the necessary experience at an implicit level by moving through the patterns and sequences in the programme. This implicit knowledge, once it is in place, allows the child to make sense of what is being taught explicitly (the child must have this base knowledge on which to draw, allowing him/her to understand the concepts or relationships being explained). When sufficient experience is in place, then spelling will 'suddenly take off' (as with the case study Mark. See Chapter 8, paragraph, 8.1.2-8.1.3).
Progress will at this point proceed rapidly. The amount of experience required at an implicit level will depend on the extent of the individual child's difficulties.

9.3 The importance of developing visual sequential memory

The results of the regression analysis in Chapter 6 found that visual sequential memory was one of the predictors of spelling scores at the end of Key Stage One accounting for 11 percent of the variance in spelling scores. The Programme has been designed to make increasing demands on visual sequential memory. For this reason, children following the core of the programme in Stage 1 are only presented with frequency words that have two letters ('yes' is included in this core of twenty words because children are required to write 'yes' and 'no' in response to questions. The other 19 words are two letter words). This reduces the load on visual sequential memory to a minimum and likewise the number of phonemes in the words will also be minimised.

The patterns and sequences also increase incrementally in the demands made on visual sequential memory. Stage 1 contains CVC words only (three letters). Stage 2 contains CVC words; CCVC (four letter words) and CCCVC (five letter) words. Words including initial consonant blends and clusters are removed from the list for children who are not secure in sound knowledge and are introduced for these children when they are ready. In Stage 3 when words with two final consonants in the patterns are first introduced these two final consonants are the same letter eg 'ss', 'ff', 'll'. (four, five, and six letters). When two final consonants are introduced which are not double letters, the focus is on perceiving the consonant that precedes the final consonant.

Peters (1993 p180) argues that unlike phonics for reading, learning to spell depends on looking carefully at words containing the same letter sequences without regard to sound. For example, she suggests that in phonics for reading 'bone' would be taught with words like 'throne' and 'stone' but in spelling this would be extended to include 'one', 'done', 'none', 'gone'. She contends that it is by using word groupings of this nature that children are given the opportunity of associating an unknown word with one they
already know e.g. 'shoulder' which is a relatively easy word to write if you associate it with 'should'.

Whilst agreeing with Peters (1993) about the importance of visual letter sequences, I believe there are problems associated with this line of thought. Firstly, as spelling has been shown to involve interaction between visual and phonological processes, the grouping of words visually with words that differ in the sounds they make, renders interaction between these dual processes impossible and causes confusion for the learner. This type of grouping fails to take account of the continued importance of phonological processing throughout spelling development. For this reason, within the spelling programme, the groupings of visual spelling patterns are with same sound only. If the sound varies within a spelling pattern then this variation becomes a separate pattern. (This can be seen to an even greater extent in the Stages Four and Five of 'The Complete Spelling Programme'; these Stages are not included in this research study.)

9.3.1 The importance of exposure to a lasting visual representation of a word

The importance of writing down spellings in daily practice tests and within the follow up activities was supported by the responses of the teachers in the teacher questionnaires. Treiman and Bourassa (2000) argue the case for writing down spellings, as this presents a lasting visible form of a word's phonological structure. Treiman and Bourassa (2000), Hulme and Bradley (1984) suggest that writing a word on paper is a more effective way of learning its spelling than forming a word with letter tiles. This finding is supported by Cunningham and Stanovich (1990) who also found that hand writing was superior to arranging letter tiles or typing a word on the computer keyboard.

However Vaughn, Schumm and Gordon (1992) found no significant differences among writing, sorting letter tiles, typing on a computer as a means of learning a word's spelling. The study undertaken by Berninger, Abbot, Rogan, Reed, Abbot, Brooks, Vaughan and Graham (1998) had similar findings. Treiman and Bourassa (2000) point out that these techniques will also result in a visible record of the word's structure. They
argue that this visible record may be a primary factor accounting for the superiority of written spelling over oral spelling for children in early elementary classes and above.

It must be borne in mind however that difficulties in handwriting can exacerbate spelling difficulties (Berninger et al 1998) and that the superiority for written spelling was not found amongst very young children who write laboriously and slowly (Treiman and Bourassa 2000). This difficulty can be reduced to some extent by the use of white boards and markers. The use of the marker on a whiteboard is easier than a pencil on a page for children with motor control difficulties. It also provides a very clear visual representation of the word that cannot always be achieved with pencil marks which can be very faint. The teachers in the study confirmed the benefits of the use of white boards and markers for younger children and children with handwriting difficulties. In Stage 1, their use (i.e. the use of whiteboards and markers) in developing effective processing strategies (LVSCWC and LSSW), provide a visual representation of a word, enhancing both visual memory and phonological analysis.

9.4 The importance of teaching morphological rules for independent writing

Treiman's (1993) study showed that first graders consistently misspelled inflected words on the basis of their phonetic representation e.g. helpt, jumpt. As children often write in the past tense these verb inflections are important for independent writing and therefore must be intentionally taught. It could be seen from the samples of writing in the Experimental schools that when children are taught to apply the morphological rule they can do this successfully. Morphology can assist with the acquisition of spelling knowledge in a way that cannot be achieved by phonology because the spelling of a morpheme is always consistent (Goulandris 1994). Furthermore, morphology provides insight into word formation which in turn results in the acquisition of new morphologically complex vocabulary. Nagy et al (2003) points out that vocabulary knowledge also influences morphological awareness, and recognises that the influences go even further since they affect writing acquisition. Single syllable words are morphemes and therefore it is clearly important to learn the meaning of words for vocabulary development, because of the reciprocal relationship between vocabulary
learning and morphological knowledge. Compound words are combinations of free morphemes, therefore children must understand the meaning for each of the morphemes to understand the compound word e.g. bedroom, homework, football. This sort of morphological knowledge is important in the early stages of spelling development, as are combinations of bound and free morphemes e.g. adding the verb inflection 'ed'. In the later stages, morphological knowledge is necessary for more complex word building e.g. combinations of bound and free morphemes like 'uneventful'. These more complex combinations of bound and free morphemes are presented in the Key stage Two Programme.

9.5 The importance of teaching the meanings of words and their usage

The greater accuracy in spelling achieved by the children in independent writing and also the awards of CCEA writing levels provide evidence of the importance of language understanding in terms of the meanings of words and their usage. Despite comprehensive searching, I have been unable to find any other spelling programme that focuses so extensively on understanding spelling words and their use in different contexts. All professionals and parents in this study considered this to be very important indeed and identified benefits for all ability groups.

Understanding the meanings of words is not always an outcome of reading. Some children can read a page fluently and understand very little of what is read. A focus on comprehension within text must deal with the meaning of words within that context. It is important that children, when learning to spell, understand that if they can spell a sequence of letters making up a particular word there may be other usages for that word. It would be difficult to assist children with the full range of meanings of a particular word through reading alone. Spelling allows a focused exploration of words and their meaning or meanings linked to explicit efforts to relate spellings to their use in writing. This was considered to be a significant benefit by education professionals and parents alike when they were interviewed about their views on 'The Complete Spelling Programme'.
Berninger, Vaughn, Abbot, Begay, Coleman, Curtin, Hawkins and Graham (2002) point out that text generation draws on both idea generation and translation of those ideas into language representations. The more automatic spelling skills become, the more resources in working memory are available for high level composing skills. It could be hypothesised that, language understanding and usage must be developed alongside lexical and assembled processes when learning to spell, thus enabling automatic recall of spelling in independent writing to be achieved. If this is the case, then ideas will not be limited by spelling but will be enhanced by it. It seems reasonable to suggest that ideas cannot be expressed clearly if the generator of those ideas (i.e. the child) does not understand the words he/she is using. The results of this evaluation study provide sufficient evidence to suggest that language development (in terms of the meaning of words and their usage) should be linked to spelling thus facilitating greater transfer of these spellings into independent writing.

Berninger et al (2002) identified a second component in enhancing composition quality. They acknowledge the importance of supporting children with planning, reviewing and revising their written composition. This type of support for structuring composition is beyond the scope of 'The Complete Spelling Programme' but is a focus of the Northern Ireland Literacy Strategy which was reported by both principals in the Experimental schools to work well in conjunction with the spelling programme.

9.6 The importance of spelling strategies

As stated earlier in this discussion, children may be supported in their spelling development by the sequence and structure in the Programme. This sequence and structure allows spelling knowledge to develop through frequency sensitivity and through developmentally increasing demands on learning, building up to more complex knowledge of phonological, orthographic and morphemic skills. As spellers become more experienced they are automatically able to retrieve the correct spelling of words from long term memory with little conscious effort. When writing at speed, a word that is recognised as looking incorrect can be corrected by checking the sequence of letters. This may be done by rewriting the word to check if ‘it looks right’ (Peters 1993 p184) and cross checking the phoneme-grapheme correspondence. Unknown words may be
spelled by using analogy with the visual form of a word that sounds similar. They also may be encoded using orthographic knowledge in larger visual and phonological units such as syllables whilst also having the option of using smaller sound units (phonemes and intra syllabic units) when necessary. In addition to this, morphological knowledge may be applied to create new words by combining morphemes to make compound words or by adding verb inflections.

Steffler, Varnhagen, Friesen and Treiman (1998) contend that it is important for teachers to know how children spell words correctly so that children can be guided in choosing an appropriate spelling strategy for spelling unknown words. Children, however, can only choose to use a strategy that is functioning effectively for them. It is for this reason that the LSSW and LVSCWC strategies are taught. This is to ensure that processes, which may not develop due to lack of stimulation, are activated and become fully functional.

Reaching the stage of automatic recall, for many children, cannot be achieved without the intentional teaching of strategies designed to ensure that phonological and lexical processes are activated and working effectively. This is achieved in the programme by teaching 'learning' strategies from the outset and supporting children in using these strategies. All teachers using Stage 1-3 highlighted the benefits of the Programme in promoting a range of strategies for learning spellings. These strategies were considered to be used effectively by the children in activities that required them to write.

9.7 The importance of the 'single group with extensions' approach to differentiation

Read (1971, 1975) studied the spelling abilities of preschoolers and Treiman (1993) studied the spelling abilities of first graders (within a whole language classroom where spelling was not taught). Neither Read nor Treiman examined the writing samples of children whose written text was unreadable therefore there remains a group of children whose early spelling development is uncharted. This uncharted group would most likely include children who have not extracted rules or regularities from preschool experience
and those children who have difficulties in working memory. 'The Complete Spelling Programme' provided this group of children with a developmental sequence which gradually increases in difficulty and which included the spelling knowledge that other children acquire through their linguistic experience. This sequence enabled spelling development to proceed and measurable progress to be achieved by all children in the research group. Even the weakest children made quantifiable progress in spelling scores and displayed motivation to write freely as indicated in the reports given by their teachers. At the same time, 'the single group with extensions' approach to differentiation (through the extension levels within the word lists and the support activities) provided children who were beyond this stage with the spelling knowledge which they required e.g. additional frequency words and morphological knowledge which they could apply to make new words.

9.8 The importance of transfer of spellings learned to independent writing.

As Berninger et al (1998 p587) point out:

'..words are the building blocks for constructing meaning and precise representations of a word's spelling in memory can free up capacity limited resources, during reading and writing, to process and construct meaning. At some level, a functional writing system must be able to orchestrate the mechanics of written language as tools that contribute to the making of meaning'

Berninger et al (1998) contend that the earlier children are taught 'these tools to the construction of meaning' (p587) the greater the likelihood that they will enjoy reading and writing and that problems may be prevented. Berninger et al (1998) go on to argue that, based on the earlier research of Berninger (1994), difficulties with spelling interfere with the development of composition skill. Dreyer (1995), in a longitudinal study of spelling, found that poor spellers often learn words for weekly spelling tests but do not transfer this knowledge to their independent writing. Berninger et al (1998, p588) state that:
This failure to transfer may be related to children's treating words to learn for spelling tests as word-specific learning and failing to grasp the alphabetic principle that allows one to generalize sound-spelling relationships across word texts.

The transfer of spellings from this word-specific learning into independent writing involves more than a grasp of the alphabetic principle. This was confirmed by the responses from teachers and also by the percentage of children in the Experimental schools achieving Levels 2 and 3 in independent writing when assessed by the raters. The meaning and usage of words presented to children to be learned for spelling tests may not be understood and, if they are not understood, they will not be recalled for use in composition. One of the reasons for improved spelling accuracy in independent writing samples must therefore be attributed to increased language understanding resulting from the focus on meaning and usage within 'The Complete Spelling Programme'.

Berninger et al (1998), in their recommendations for formal instruction in spelling, emphasise that children need to see how the transcription component in writing is an important tool for communicating ideas, not just an exercise for the weekly test. They suggest that opportunities to apply 'new and old' spellings learned in meaningful composition should follow soon after the spelling lesson. 'The Complete Spelling Programme' affords opportunities for application of learning immediately after teaching, as children are encouraged to write independently as one of the activities outlined in the support materials (see Appendix A).

9.9 The importance of a structured approach to teaching spelling

Graham (2000) argues that there is very little support for replacing traditional spelling instruction with the natural learning approach. This natural approach advocates incidental and informal methods of learning to spell, assuming that spelling can be acquired without instruction and that reading and writing are the primary vehicles for learning to spell. His view is, that whilst reading and writing may contribute to spelling development this contribution is very modest. He concludes his review of the research in this area by stating that spelling instruction improves spelling performance for
children in general, as well as those who are experiencing difficulty with literacy and he suggests that natural learning methods in conjunction with systematic instruction can be used together to promote development in spelling.

According to Graham (1999), difficulties with spelling may lead to young children wanting to avoid writing. The reports from teachers emphasised how all the children enjoyed spelling and writing as a direct result of participating in the spelling programme. Whilst the spelling programme has been found to bring about improvements in independent writing as a result of increased spelling accuracy and language understanding, it should not be assumed that 'The Complete Spelling Programme' by itself provides sufficient support for enhancing all aspects of independent writing. It is clear that progress is enhanced even further when combined with assistance in other aspects such as planning writing.

9.10 The importance of a curriculum that supports the spelling process

The literacy co-ordinator and principal from the school in the high social disadvantage Experimental group considered that the lack of progress in spelling, prior to this intervention, resulted from not having a structured and developmental curriculum that 'delivers what is needed' (Principal school B). My experience of working in diverse educational settings leads me to suggest that if a structured language programme such as this is put in place at an early age, children can make up the deficit caused by disadvantage in terms of linguistic experience. (The Programme links spelling and word meanings and their usage so that children who have not had a rich linguistic background are not as disadvantaged as they may otherwise have been.)

The development of the Programme has taken account of the many dimensions in learning and the many ability groups within the range of children within mainstream school. Consideration has been given to the learning needs of children, the planning, management and monitoring needs of teachers and also the implications for parents in terms of homework. Because children are taught strategies in school and follow up work provides reinforcement of learning, homework does not place any demands on
parents that they are unable to meet (this was indicated in the responses from the parents of the case study children).

This spelling curriculum supports the process of learning to spell within the classroom context in two specific ways. Firstly it establishes learning strategies that enable children to engage in lexical and assembled processing effectively and secondly, it provides an appropriate developmental sequence in the lists of rhyme and frequency words. It also enhances understanding of spelling words facilitating their retrieval and transfer to independent writing. The extensive follow up activities (see Appendix G.1, G3, G4, G6, G7) provide:

- daily practice in spelling and writing;
- reinforcement of the lesson;
- review of spellings already learned;
- activities which children find enjoyable;
- homework for later in the week;
- contexts in which words can be used;
- activities to develop lexical and phonological processing;
- differentiated activities so that children can work on similar activities but at different levels.

9.11 Conclusions

The development of 'The Complete Spelling Programme' has sought to ensure that all the processes involved in learning to spell are activated and that interaction between them develops. In addition sources of spelling knowledge (identified in established research, most notably that of Adams 1990 and Treiman 1993) are presented in a developmental sequence that allowed all children within the Experimental schools to progress. In addition to this, other factors in learning have been considered in the development of the Programme and the design has taken account of them (see Chapter 3).
It could be argued that increases in the children's spelling scores might simply be a result of more time being spent on spelling in school. However, if this was the only reason, it is unlikely that progress would have been so substantial. Furthermore, a simple increase in the allotment of time given to spelling would not account for the benefits found across the full range of ability currently within mainstream schools. Additionally, within this Programme, many of the follow-up activities are concerned with the application of learned spellings within the English curriculum, therefore the support materials cover aspects of the development of independent writing, e.g. syntax, grammar, punctuation and vocabulary development. This places spelling in a central role in literacy.

This is an important finding because, traditionally, within schools in Northern Ireland spelling has a very low profile. Within the NI Literacy Strategy, the main thrust in attempting to raise standards was the implementation of literacy time with specific emphasis on reading and writing. It was pointed out by teachers in the Control school, which was in the NI Literacy Strategy, that spelling was 'just mentioned'; 'not looked at in depth' and:

'Yes we have a file with all that you should do, but there wasn't much guidance on spelling. They didn't actually refer much to spelling.' ('They' refers to the Education and Library Board CASS Literacy Team.)

The results of this study indicate that spelling is very closely related to literacy development generally, a key consideration for teachers.

The highly significant results from the study showed progress in the Experimental schools as to compared to the Control schools in three areas; first, in standardised spelling scores, secondly in accurate spelling in independent writing and finally, achievement in CCEA writing levels. It therefore seems reasonable to conclude that the developmental sequence and strategies within this spelling programme have successfully taken account of the knowledge children require to enable them to make sense of a deep orthography (irregular spelling system) such as English. This deep orthography includes phonological, lexical (orthographic) and morphological
knowledge that are developed in tandem within this Programme, taking account of the importance of interactive processing.

This research brings new knowledge highlighting the important role that spelling can play in literacy development, particularly in relation to independent writing. This has not, as yet, been identified within literacy teaching. The innovative features contained within the design of ‘The Complete Spelling Programme’ also shed new light on how children can learn to spell effectively. This research must surely be considered as contributing new knowledge to the field as the central role that spelling can play has not been understood and despite extensive review of the literature in this field, no other intervention has been found to be successful in bringing about sustained improvements in both spelling and independent writing for all ability groups.

9.12 Recommendations

Given the raised performance in both spelling tests and independent writing the following recommendations are made.

There should be:

- raised awareness regarding the relationship of spelling to literacy. The central position of spelling in relation to literacy development generally must be acknowledged, not only by teachers, but also the CASS service within each of the ELBs and in initial teacher training;

- consideration of the need for continuity of provision of a spelling curriculum, both within and between schools, not only in relation to pedagogy, but also in relation to the content of the curriculum itself, thereby ensuring that children are not advantaged or disadvantaged by movement between classes or between schools;

- greater clarity within the NI Curriculum Level Descriptors, through more precise statements relating to expectations of achievement at each level. At present,
there is lack of clarity in the level descriptors as to expected spelling standards at each level. Although not part of the research, this became apparent when the raters were conducting their inter-rater reliability. Expectations are conveyed in very general terms. If the level of progress observed in the Experimental schools were to be replicated in other settings, expectations in terms of spelling within the NI Curriculum would be required to be raised;

- greater accountability and more research to evaluate the effectiveness of any new literacy curriculum implemented in schools.

- consideration given to adequate resourcing for teaching spelling in terms of time and commitment. If a programme such as this were to be implemented in more schools in Northern Ireland the existing resources would not be adequate to ensure full implementation;

- provision for training in the correct implementation of the Programme as this programme requires significant change in classroom practice. (Training was considered to be essential by all the teachers in this research study);

- minor adjustment to the Stage 3 Programme. Given the accelerated progress experienced by all children in the Experimental schools, it may be necessary to add an additional row of extension words which include more difficult polysyllabic words such as 'generous' and 'absolutely'.

9.13 Limitations of the study

Caution must be exercised in generalising the findings of this study to the wider population. There are difficulties in choosing real classrooms as the setting for research because of the difficulties in selecting a representative sample. It was not possible in this research project to have random selection of subjects or random assignment of schools. The issue of validity in this type of quasi-experimental design demanded that,
the most rigorous study feasible be conducted (given the circumstances) however, it is impossible to eliminate all problems and therefore those remaining have been identified.

- This was a very small study with only two experimental and two control schools drawn from rural towns within one ELB. Because the study was small, it was not possible to detect school level effects. A 'school effect' is described by Hutchinson (2003, p25-26.) as being 'a substantial effect of the overall school circumstances on the progress of individual pupils'. It remains unknown, therefore whether any such effects exist. There were however, important differences between the Experimental and Control schools that should be noted;

- Both Control schools were co-educational schools, however, one of the two Experimental schools was an all boys school, which meant there was a larger proportion of boys and a smaller proportion of girls in the Experimental group;

- At the outset of the study the low social disadvantage Experimental school spelling scores were comparable to the high social disadvantage Control school. The high social disadvantage Experimental school spelling scores were comparable to the low social disadvantaged Control school. This was contrary to expectations.

For these reasons, it is not possible to generalise to the wider school population from this study, nevertheless, given the impact of this intervention as shown in quantitative and qualitative terms, further investigation on a larger scale may be warranted.

9.14 Further Research

- More extensive research is needed to establish whether the findings relating to this study can be generalised to the wider population.

- Multidisciplinary research is needed to investigate the possible existence of critical periods in the development of auditory and visual processing.
• Focused research with young children (aged 6-8 years) identified as having indicators of specific learning difficulties, should be undertaken to establish whether recognised problems in processing can be overcome by using 'The Complete Spelling Programme'.

• Any further longitudinal research should evaluate both the Key Stage One and the Key Stage Two elements of the Programme.
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Appendix A
Children using the LSSW strategy participate in the language development associated with these words and complete the cloze procedure copying the sentences underneath. The reading skills for this group may be very poor therefore they should complete the cloze procedure alongside the class discussion and use the target spelling words as a clue to the meaning of the sentence. Then the sentence is written beside the correct picture. Children who are learning the rhymes from memory but find it difficult to think of ideas of their own should attempt to write their own sentences for each picture using the picture as a stimulus for ideas.
The worksheet below is the same activity sheet differentiated for the children working on the first extension level.

Here they write sentences of their own for each of the rhyme words and do not have the picture as a stimulus. The pupils should attempt to spell all the words in these sentences themselves, thus providing a permanent record of their attempts at spelling the target spelling words, words they have learned previously and also words they have not yet learned to spell. If a pupil insists on help with any word, then this word should be written by the teacher at the bottom of the page. This allows the teacher to look back at previous work undertaken, knowing the extent of the help given. This in turn gives a more accurate assessment of the pupil's level of independence. Words that have not been taught are not corrected but the errors allow the teacher to monitor the knowledge the child is applying in his attempts to spell unknown words. Words that have been taught and are misspelled are drawn to the attention of the child and positive feedback given for the correct parts of the word and guidance given on what needs to be given more attention.
The worksheet below is differentiated for the most able in the class.

The cloze procedure has been removed and unlike the previous two activity sheets this group has no word bank on which to draw. The inclusion of the cloze procedure for the other sheets allows the pupil to use it as a word bank. The same assessment principles apply to this group.

This type of differentiated activity is carried out for the three rhyme patterns each week. There are additional activity sheets designed to try to ensure use of all processes. Activity sheets with an 'A' after the number are targeted at the least able. Activity sheets with a 'B' after them are for the rest of the class. In some of the activities one process will be used in isolation to ensure that it is activated and not bypassed by over dependence on another processing pathway.
The match and write activity at the top of activity sheet 4:4A is designed to stimulate visual discrimination drawing attention to the size, shape, position and orientation of each letter. This is designed to ensure children look closely at the letters in the word they are attempting to learn. It ensures that visual details are noticed and cannot be bypassed. The activity at the bottom of this sheet is designed to encourage children to identify the initial phoneme in each word and using this knowledge read the whole word. They then match it to the correct picture which shows whether they have read the word correctly.

In activity sheet 4:4B semantic memory is the primary target in the activity at the top of the page. Only semantic memory can be used to retrieve the correct word from the lexicon and then the word is encoded either by automatic lexical recall or with the assistance of assembled processing. This activity is the forerunner to crosswords. The activity below this 'clues' activity seen here focuses on the usage of some of the words in the rhyme lists. Many of these words function as nouns and verbs. Here children learn to add the verb inflections 'ed' and 'ing' because the ability to do this is important for independent writing. This brings in the doubling rule as many of these verbs double the last letter before adding 'ed' and 'ing'.
The activity in 4:5A is continued from Stage 1. This activity was designed because words in the speech stream flow continuously. Many children when they begin to write do not leave spaces between words, they write as they speak in one continuous flow. This can continue for some time with less able children. This activity is designed to draw attention to the need to leave spaces between words and to force children to look closely at the sequence of letters in the words they are searching for. Activity 4:5B is alphabetical order and is for the majority of children in the class but not for the less able children. This skill is important because children need to be able to look up dictionaries to find word meanings.
These activities are designed to ensure that children retrieve words, in the first instance using sound similarity and then they are required to link meaning to the words they have retrieved by writing a sentence or drawing a picture.

The activity below is introduced in the second term of the Stage 2 programme and introduces a new strategy - syllabification.
The Stage 3 programme starts with CVCC, CCVCC, CCCVCC words where the final two consonants are the same e.g. hill, grill, shrill. (ll, ss, ff) This means that at the start of the Stage 3 programme children are learning a longer sequence of letters but they do not as yet have to discriminate another consonant phoneme at the end of the word. Then the programme moves on to words ending in final consonants nd, ng, nt, nk, sh, ck, st, mp, sk and following this long vowel sounds ee, oo (letters eg cool, pool, stool, school).

There are now four rows of high frequency words and a fourth and fifth row can be added for more able spellers from the curriculum wordbanks at the back of the book.
LIST TWENTY

DICTATION SENTENCES
ROW 1
I cried because I was sorry that I did not get a present.
ROW 2
I got into trouble in school but it wasn't my fault. I was not to blame.

FURTHER TEACHING POINTS
lock--- noun -- They had lost the key for the lock.
   verb -- Don't forget to lock the door.
knock -- noun -- He heard a knock at his front door.
   verb -- Please knock before entering.

As with the Stage 2 Programme there are teaching notes highlighting teaching points and including weekly dictation sentences which are intended to be used on a weekly basis to monitor the retention of spellings covered previously and in that particular week. No words appear in the dictation sentences that have not been taught therefore, this is a reliable means of monitoring retention.
This activity is a further development of activity sheet 4:4A where the children are expected to identify the initial phoneme and match the words to the correct picture. This activity sheet is targeted at the least able spellers in the class. It includes a joined handwriting activity.
These word search activity sheets are an extension of the 4:5A activity sheet in Stage 2.

In the 20:5A sheet the words in the word search are written from left to right and up and down. The words do not cross over each other as this can be confusing for this target group. (i.e. weaker spellers). The target words are listed for this group and they have to search for the words and colour them in. The activities on the bottom half of the page include alphabetical order and jumbled sentences. Throughout the Key Stage One programme all words used in the jumbled sentences are words the children have previously been taught to spell.

In the B activity sheet the words in the word search are left to right, up and down and left to right diagonally. The children have to complete this activity entirely from memory. Other activities included in these pages are jumbled sentences, alphabetical order and homophones.
As in the Stage 2 programme the crosswords are used to retrieve words on the basis of meaning. The other activities included in these activity sheets are based on morphological rules. The A sheets include adding 'ed' and 'ing' which was not covered by this group in Stage 2 and the B sheets introduce new morphological rules and compound words.

The 7A activity is a based on compound words for the weaker spellers and the 7B activity is based on syllables for the rest of the class. Again all the words targeted are from that particular week or from previous weeks allowing reinforcement of previous learning.
Appendix B
B.1 Table of standardised tests administered to all schools

<table>
<thead>
<tr>
<th></th>
<th>JAN '99</th>
<th>May '00</th>
<th>May '01</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSTS</td>
<td>1X</td>
<td>1Y</td>
<td>2X</td>
</tr>
<tr>
<td>PRT</td>
<td>Level 1</td>
<td>Not tested</td>
<td>Alternate form</td>
</tr>
<tr>
<td>BPVS (11)</td>
<td>BPVS (11)</td>
<td>Not tested</td>
<td>Not tested</td>
</tr>
</tbody>
</table>

BSTS – British Spelling Test Series

PRT – Primary Reading Test

BPVS- British Picture Vocabulary Scales
Test 3  Visual discrimination (parts a and b)

Part a: Letters

Materials
The materials required are:

- Card 1 (see below)

<table>
<thead>
<tr>
<th>QUEST Diagnostic Test Card</th>
<th>pd</th>
<th>pb</th>
<th>pd</th>
<th>dp</th>
<th>db</th>
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</thead>
<tbody>
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<td>mhn</td>
<td>hmn</td>
<td>nmh</td>
<td>nhm</td>
</tr>
<tr>
<td></td>
<td>oae</td>
<td>oae</td>
<td>aoe</td>
<td>eao</td>
<td>eoa</td>
</tr>
<tr>
<td></td>
<td>zsck</td>
<td>skzc</td>
<td>zcsk</td>
<td>zsck</td>
<td>sczk</td>
</tr>
<tr>
<td></td>
<td>pqdb</td>
<td>pdbq</td>
<td>qpdb</td>
<td>dbqp</td>
<td>pqdb</td>
</tr>
</tbody>
</table>

Show the pupil Card 1. Then say:

Look at these letters. (point to the letters 'pd' in the left-hand column)

Now look along here..... look at all the groups of letters. (point to the letter groups on the right)

Show me the letters that are just the same as the first.

Repeat with the other letter combinations on the card: nhm, oae, zsck, pqdb.

Scoring
Score 1 point for each correct response.

Maximum score is 5.
Visual Sequential Memory Test

1. xb
2. tca
3. hlge
4. tsrwp
5. espyfw

Children are shown each of the letter sequences in turn. After card 1 is shown to the children for five seconds the card is removed and the children wait for five seconds and then write down the sequence of letters.
Visual Sequential Memory Test

Response Sheet

Name:

School:

1.

2.

3.

4.

5.
Aston Index Revised

Test 5
Grapheme/Phoneme correspondence

Level 1

Grapheme/Phoneme correspondence

w a j c e i x o z
l s h v k u t r f
n p m d y b g q

Task
The child is required to give the names and sounds of the alphabet for lower case letters.

Method
Present the alphabet and ask the child to give first the names of the letters and then the sounds for each.

Score as two separate tests on response sheet.

1. Letter names
2. Letter sound knowledge

B.2.4 Phonological Assessment Battery Rhyme Test pages 24-25
B3.1 Aston Index: visual Sequential Memory (Symbolic)
Test 15 Reference 81

B.3.2 Auditory sequential memory

Individual test

Auditory sequential memory

1. The child is asked to recite the:
   
   Days of the week
   Months of the year
   
   Language – Can you say the days of the week for me in the right order? Start with Monday (January)

Quest Auditory Sequential Memory test, Part C pages 31-32

2. Listen carefully
A friend of mine went shopping one day and bought some things. I am going to tell you the things she bought and I want you to remember them in the right order.

She bought: an umbrella, sugar, cakes and a hat
What did she buy?
Do not repeat the list but record the pupils answers

Now see if you can do the shopping list. My friend went shopping another day. This time she bought a chicken, paint, bread and a pan.

What did she buy?

Do not repeat the list but record the pupils answers

B3.3 Children are asked to think of words that rhyme with:
‘can’ and then ‘got’

Listen carefully. Listen to the word bun—run and fun and gun rhyme with bun.

I am going to ask you to listen to a word and I want you to think of other words that rhyme with it. Listen carefully ... the word is CAN can you think of words that rhyme with CAN

Record the child’s answers and repeat for GOT
Can you spell these words?

I am going to say a word and read a sentence with the word in it. Listen carefully when I have finished I want you to write the word down.

Remember do not write anything until I tell you to write. Just listen.

No 1    came    My friend came to my party
        Now write came in box 1

No 2    for     I have something for you
        Now write for in box 2

No 3    the     The cat is on the chair
        Now write cat in box 3

No 4    and     My friend and I
        Now write and in box 4

No 5    is      My dog is big.
        Now write is in box 5

No 6    went    I went to the swimming pool
        Now write went in box 6

No 7    not     Do not do that
        Now write not in box 7

No 8    with    I went to the park with my friend
        Now write with in box 8

No 9    was     I was late for school
        Now write was in box 9

No 10   have    I have a bicycle
        Now write have in box 10
Can you read?

B.3.4.

came for the
and is went
not with was
have

If the child has been unsuccessful at reading and spelling then check if he recognises the words

Ask him to point to went, etc
Appendix C
C.1.1 Teacher Questionnaire: Year 3, January 2000

1. What do the children think of 'The Complete Spelling Programme'. What behaviours, comments, or other evidence support this?

2. What is the total time required to complete all spelling activities (including teaching time)?

3. Has your principal given you permission to spend the time it takes?

4. What are you leaving out of your day to allow you to spend time teaching spelling?

5. What are your views about the length of time it takes?

6. Have you had any feedback from parents? If so what have their comments been?

7. The single groups with extensions approach – how do you feel it compares to traditional approaches in differentiation?

8. How do spelling scores in daily and weekly tests compare with before the programme was implemented?

9. How does independent writing compare with before the programme was implemented? Detail any improvement or deterioration in independent writing.

10. Has the programme helped or not helped children experiencing difficulty? Please give detail to substantiate your answer?

12. What are the strengths of the programme?

13. What weaknesses would you identify?

14. How was spelling taught prior to this approach?
15. Did you have a spelling programme throughout the whole school?

16. Were you happy with spelling in the past?

17. Had you considered a change?

18. Any other comments?

19. Will you use it in the future?
C.1.2 Teacher Questionnaire: Year 3, June 2000

1. List positive responses from children towards spelling?

2. List negative responses from children towards spelling?

3. List the names of any children who have had frequent absences?

4. How have the children coped with the focus on the short vowel this term?

5. What do you feel about having no support materials in the third term?

6. How have you taught spellings this term?

7. Having completed a full year how do you feel about teaching spelling this way?
C.1.3 Teacher questionnaire: Year 4, January 2001

1. How long do you spend each day teaching spelling and what do you do –i.e. TESTING, TEACHING, SUPPORT MATERIALS ETC?

2. Have you had any feedback from parents? If so what have their comments been.

3. How did you group children for spelling before you started the research study?

4. The single group with extensions approach to grouping – how do you feel it compares to what you were doing before? What are the benefits or drawbacks.

5. How do you feel the programme is meeting the needs of the various ability groups within your class?

6. How does independent writing compare with before the programme was implemented? Detail any improvement or deterioration in independent writing.

7. Has the programme helped or not helped any children experiencing difficulty? Please give detail to substantiate your answer?

8. What are the strengths of the programme?

9. What weaknesses would you identify?

10. Were you happy with spelling in the past?

11. Had you considered a change?
12. What do the children think of the programme? What behaviours, comments, or other evidence support this?

13. Any other comments?

14. Will you use it in the future?

15. Please write the names of the children in the various groups within your class.
C.1.4 Teacher Questionnaire: Year 4, June 2001

1. Over the last 3 years has the school implemented any other literacy initiatives, other than the spelling programme, to raise literacy standards within the school? Please specify.

2. What literacy intervention/initiatives, if any, were implemented in year 1 in the school year 1997/1998 – when the present year 4 class were in P1?

3. Has there been any support from the English/literacy team, or reading Recovery tutor prior to or during the period of research in the research class?

4. Has there been any other support to raise standards in the research class?

5. Have you attended any literacy courses during the period of the research? Please specify with dates.

A. What was the main focus of these courses?

B. What was the advice/guidance given on spelling?

6. Why do you think this programme is more successful in the transfer of spellings to independent writing. (*This question was asked because all teachers in their responses on the previous questionnaire had commented that there was transfer of spellings to independent writing and that this had not been the case in the past.*)

6. How has the independent writing improved within your class?

7. How often do the children write independently? (stories, recounts, reports)

9. Do they attempt to spell every word themselves or do they use a wordbook?

10. How do you mark their work?
13. Do the children enjoy the programme? Why give examples if possible.

14. Listed below are benefits you have outlined previously? Please rate their importance on a scale of 1-3 3 being most beneficial

- Whole class teaching and grouping approach
- Daily spelling patterns
- Daily high frequency words
- Daily spelling practice
- Weekly spelling test
- Dictation sentences
- Meanings of words and their range of usage.
- Pupil enjoyment
- Support materials
- Opportunities for reinforcement of learning
- Structure – what is to be done and when
- Developmental sequence in lists
- Differentiation

15. Will you continue to use this programme?

17. Any other comments
C.2.1 Principal Interview No. 1 January 2000

Question: I just wanted to ask you a few things about this programme. We are not quite at the half way stage yet, the interview is just to get an idea how you feel about it at this stage.

Question: What about the length of time required to deliver the programme as intended. What do you think about the length of time being spent teaching spelling?

Question: Do you find that the approach to differentiation, which is the single group with the extensions, better, the same or worse than the traditional approach?

Question: What are the benefits of the CSP that you would identify?

Question: What weaknesses would you identify then?

Question: Do the teachers feel the children are being challenged enough?

Question: What do you think of the standard of independent writing?

Question: How were spellings taught before this?

Question: Had you considered changing spelling in your school before you were approached about the research study?
C.2.2 Principal Interview No. 2 May 2001

Question: The last time we had a chat we were at the half way point, we are now nearing completion. When we last met you mentioned that the length of time taken to deliver the programme was an issue. Does the length of time required still remain an issue?

Question: Can you expand on the reasons for your answer?

Question: The teachers have said how children enjoy this approach have you any sense of why this appeals to them?

Question: How important do you think the teacher training is?

Question: Are there any other comments you would like to make?

C2.3 Principal interview No. 3 May 2004

Question: Are you still using the CSP?

Question: To what extent is it being used?

Question: At the end of the study you were concerned about how it would fit in with the Literacy Strategy- did you experience any difficulties with this?

Question: Are there any other comments you would like to make about the benefits or weaknesses?
C.2.4 Parent Interview Schedule

1. What age is (child's name)?

2. How long has she been at (school name)?

3. Has (child's name) any brothers and sisters?

3a Did (child's name) brothers and sisters go to this school?

3b What age are (child's name) brothers and sisters?

4. How is (child's name) doing in school generally?

5. Is he/she happy at school?

6. What does he/she get for homework?

7. What does he/she have to do for spelling homework?

8. How long does spelling homework take?

9. How does he/she feel about doing spelling homework?

10. Why do you think this?

11. Do you think the spellings are easy, hard or just right for your child?

12. Why do you think this?

13. Do you think the way he/she is learning to spell is the same or different to the way your other children learned to spell?
14. Do you know what he/she is doing in class – are you well informed?

15. What do you think helps your son/daughter learn to spell?

16. Is there anything you don't like about the way he/she is being taught spelling?

17. Are there any other comments you would like to make about spelling that we haven't discussed already?
C.2.5 Pupil Interview Schedule

1. What do you like doing in school?

2. What do you like doing in school?

3. Do you like learning to spell?

4. Why do you like/dislike learning to spell?

5. Are you good at spelling?

6. Why do you think this?

7. How do you learn your spellings in school?

8. Do you use any other way of learning them?

9. How do you learn your spellings at home?

10. Is it easy or hard learning spellings?

11. Was it always easy/hard?

12. What do you like writing about?

13. Do you find it easy or hard to think of ideas?

14. Do you like doing the spelling workbooks?

15. Which activities do you like doing?

16. Which activities do you not like doing?
Appendix D
Performance Indicators – AT3 Writing

It is suggested that these performance indicators are applied only to responses chosen for assessment purposes, for example, during internal standardisation, to assist teachers in reaching agreement on standards within a school. Teachers should apply only those performance indicators which are appropriate for the task, allowing for strengths in one aspect to compensate for weaknesses in another.

<table>
<thead>
<tr>
<th>Level 1:</th>
<th>Level 2:</th>
<th>Level 3:</th>
<th>Level 4:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• communicate meaning through pictures or symbols;</td>
<td>• attempt to express, with help, some ideas, thoughts and feelings within their experiences;</td>
<td>• relate experience expressing ideas, thoughts, feelings and imaginings, with some independence;</td>
<td>• relate experience and attempt to reflect on ideas, thoughts, feelings and imaginings, independently;</td>
</tr>
<tr>
<td>• write words, phrases or some simple sentences, under the guidance of the teacher;</td>
<td>• write, with help, so that separate ideas and sentences can be identified;</td>
<td>• present simply, a limited range of ideas and information;</td>
<td>• convey ideas and information clearly;</td>
</tr>
<tr>
<td>• show some control over the size, shape and orientation of letters;</td>
<td>• write, with help, simple brief narrative;</td>
<td>• begin to use appropriate form, showing a sense of structure and organisation;</td>
<td>• use appropriate form, style and structure, including paragraphs, showing some awareness of audience;</td>
</tr>
<tr>
<td>• begin to select letters from a keyboard to produce simple words and phrases.</td>
<td>• use limited structure and organisation;</td>
<td>• use some supporting detail to improve meaning;</td>
<td>• include appropriate detail using a widening, imaginative vocabulary;</td>
</tr>
<tr>
<td></td>
<td>• spell common and familiar words recognisably;</td>
<td>• spell familiar and important words correctly;</td>
<td>• express explicit meanings and attitudes;</td>
</tr>
<tr>
<td></td>
<td>• begin to use punctuation;</td>
<td>• plan writing, where appropriate, in collaboration with teacher/peer</td>
<td>• plan and begin to revise and redraft work with some help;</td>
</tr>
<tr>
<td></td>
<td>• produce legible upper and lower case letters;</td>
<td>• use basic punctuation with some accuracy;</td>
<td>• use generally accurate punctuation and spell most common words correctly;</td>
</tr>
<tr>
<td></td>
<td>• produce, with help, simple sentences on a computer screen.</td>
<td>• produce handwriting which is accurately formed and consistent in size and/or produce work on a computer screen, as appropriate.</td>
<td>• write legibly;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• compose work on a computer screen</td>
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Appendix E
Results Appendix E1

Correlation analysis for CCEA Writing Levels awarded by Raters A & B

<table>
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<tr>
<th>Writing Level Rater</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
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<th>Writing Level Rater</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
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<td></td>
<td></td>
<td>B</td>
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<td></td>
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<td></td>
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<tr>
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<td>79</td>
<td></td>
<td></td>
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** Correlation is significant at the 0.01 level (2-tailed).
Results Appendix E2

Anova to Compare Means between CCEA writing levels awarded by Raters A and B

Case Processing Summary

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<td></td>
<td>N</td>
<td>Percent</td>
<td>N</td>
<td>Percent</td>
<td>N</td>
<td>Percent</td>
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<td>Raters A &amp; B * levels awarded</td>
<td>158</td>
<td>97.5%</td>
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<td>162</td>
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Report

Levels awarded

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<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
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<tr>
<td>Rater A</td>
<td>6.2025</td>
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<tr>
<td>Rater B</td>
<td>6.0759</td>
<td>79</td>
<td>2.02404</td>
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<tr>
<td>Total</td>
<td>6.1392</td>
<td>158</td>
<td>1.98231</td>
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ANOVA Table

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<th>F</th>
<th>Sig</th>
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Measures of Association

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<td>Raters A &amp; B * levels awarded</td>
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288
Results Appendix E3

Comparison of Baseline Mean Test Scores for Experimental and Control Schools (pre-intervention January 1999)

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<td>Percent</td>
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<tr>
<td>BPVS 1999 *</td>
<td>77</td>
<td>31.4%</td>
<td>168</td>
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<tr>
<td>Experimental or Control</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Spelling Score 1999 *</td>
<td>81</td>
<td>33.1%</td>
<td>164</td>
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<tr>
<td>Experimental or Control</td>
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<td></td>
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<tr>
<td>Reading Score 1999 *</td>
<td>66</td>
<td>26.9%</td>
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<tr>
<td>Experimental or Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual Discrimination *</td>
<td>80</td>
<td>32.7%</td>
<td>165</td>
</tr>
<tr>
<td>Experimental or Control</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Visual Sequential Memory *</td>
<td>79</td>
<td>32.2%</td>
<td>166</td>
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<tr>
<td>Experimental or Control</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Initial Sound Knowledge *</td>
<td>80</td>
<td>32.7%</td>
<td>165</td>
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<tr>
<td>* Experimental or Control</td>
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<tr>
<td>Rhyme Test *</td>
<td>79</td>
<td>32.2%</td>
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<td>Experimental or Control</td>
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### Report

<table>
<thead>
<tr>
<th>Experimental or Control</th>
<th>BPVS 1999</th>
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<th>Reading Score 1999</th>
<th>Visual Discrimination</th>
<th>Visual Sequential Memory</th>
<th>Initial Sound Knowledge</th>
<th>Rhyme Test</th>
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<tbody>
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<td>Experimental</td>
<td>Mean</td>
<td>97.3846</td>
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<td>Std. Deviation Mean</td>
<td>14.06866</td>
<td>12.21843</td>
<td>9.60754</td>
<td>1.30082</td>
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<td>Control</td>
<td>Mean</td>
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<td>95.4211</td>
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## ANOVA Table

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<td>-------------</td>
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Results Appendix E4

Univariate Analysis of Variance comparing progress of Experimental and Control Schools based on Standardised Spelling Scores 2001

Between-Subjects Factors

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<tr>
<td>2=Control</td>
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<tr>
<td>1=January 1999</td>
<td>1.00</td>
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<tr>
<td>2=May 2000</td>
<td>2.00</td>
</tr>
<tr>
<td>3= May 2001</td>
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Tests of Between-Subjects Effects

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<th>Sig.</th>
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<td>2831.079</td>
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<td>Type Exp /Con</td>
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</table>

a R Squared = .296 (Adjusted R Squared = .281)
Profile Plots


1 = Experimental
2 = Control

Estimated Marginal Means

1 = January 1999 2 = May 2000 3 = May 2001
Results Appendix E5

Results of Multivariate Analysis of Variance for CCEA Writing Levels and Spelling scores 2001

General Linear Model

Between-Subjects Factors

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<tr>
<td>Control</td>
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<td>male</td>
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<tr>
<td>female</td>
<td>31</td>
</tr>
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<td>disadvantaged</td>
<td>34</td>
</tr>
<tr>
<td>not disadvantaged</td>
<td>45</td>
</tr>
<tr>
<td>Experimental or Control</td>
<td>1.00</td>
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<tr>
<td>Gender</td>
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<td>High Social Disadvantage or Low Social Disadvantage</td>
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<td>2.00</td>
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### Multivariate Tests

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a Exact statistic
b Design: Intercept+ExpCon+Gender+HighDisLowDis+ExpCon * Gender+ExpCon * HighDisLowDis+Gender
* HighDisLowDis+ExpCon * Gender * HighDisLowDis
### Tests of Between-Subjects Effects

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a R Squared = .364 (Adjusted R Squared = .311)
b R Squared = .302 (Adjusted R Squared = .244)
Profile Plots

Spelling Score 2001

Estimated Marginal Means of Spelling Score 2001
Estimated Marginal Means of Spelling Score 2001

High Social Disadvantage or Low Social Disadvantage

--- disadvantaged not disadvantaged

Experimental or Control

Estimated Marginal Means

- 115.00
- 110.00
- 105.00
- 100.00
- 95.00

experimental control
Estimated Marginal Means of CCEA Writing Level

Gender
- male
- female

Experimental or Control

Estimated Marginal Means

8.00
7.50
7.00
6.50
6.00
5.50
5.00

87x401
[87x401]
Estimated Marginal Means of CCEA Writing Level

High Social Disadvantage or Low Social Disadvantage

--- disadvantaged
--- not disadvantaged

Experimental or Control

Estimated Marginal Means
Results Appendix E6

Compare means for spelling accuracy, total words written and number of words misspelled in independent writing examples.

**Case Processing Summary**

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**Report**

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Correlation between final assessments, May 2001 (CCEA Writing Levels, Spelling, Reading)

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** Correlation is significant at the 0.01 level (2-tailed).
Results Appendix E8

Stepwise regression to establish whether reading or spelling (or both) predict CCEA writing levels

Variables Entered/Removed(a)

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a Dependent Variable: CCEA Writing Level

Model Summary

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a Predictors: (Constant), Spelling Score 2001

ANOVA(b)

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a Predictors: (Constant), Spelling Score 2001
b Dependent Variable: CCEA Writing Level

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a Dependent Variable: CCEA Writing Level
## Excluded Variables (b)

<table>
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<tr>
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<th>Collinearity Statistics</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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a Predictors in the Model: (Constant), Spelling Score 2001  
b Dependent Variable: CCEA Writing Level
Results Appendix E9

Stepwise regression to establish what predicts spelling score

Variables Entered/Removed(a)

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</tr>
<tr>
<td>2</td>
<td>Initial Sound Knowledge</td>
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<td>Stepwise (Criteria: Probability-of-F-to-enter &lt;= .050, Probability-of-F-to-remove &gt;= .100).</td>
</tr>
<tr>
<td>3</td>
<td>Visual Sequential Memory</td>
<td></td>
<td>Stepwise (Criteria: Probability-of-F-to-enter &lt;= .050, Probability-of-F-to-remove &gt;= .100).</td>
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a Dependent Variable: Spelling Score 2001

Model Summary

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<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
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<tr>
<td>1</td>
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a Predictors: (Constant), Reading Score 2001
b Predictors: (Constant), Reading Score 2001, Initial Sound Knowledge
c Predictors: (Constant), Reading Score 2001, Initial Sound Knowledge, Visual Sequential Memory
## ANOVA(d)

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<td>3</td>
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- a Predictors: (Constant), Reading Score 2001
- b Predictors: (Constant), Reading Score 2001, Initial Sound Knowledge
- c Predictors: (Constant), Reading Score 2001, Initial Sound Knowledge, Visual Sequential Memory
- d Dependent Variable: Spelling Score 2001

## Coefficients(a)

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
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<tbody>
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<td>B</td>
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<td>.232</td>
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- a Dependent Variable: Spelling Score 2001
### Excluded Variables (d)

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<th>Rhyme Test</th>
<th>Visual Sequential Memory</th>
<th>BPVS 1999</th>
<th>Beta</th>
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<td>BPVS 1999</td>
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a Predictors in the Model: (Constant), Reading Score 2001
b Predictors in the Model: (Constant), Reading Score 2001, Initial Sound Knowledge
c Predictors in the Model: (Constant), Reading Score 2001, Initial Sound Knowledge, Visual Sequential Memory
d Dependent Variable: Spelling Score 2001
Reading score

Variables Entered/Removed(b)

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<th>Method</th>
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a All requested variables entered.
b Dependent Variable: Spelling Score 2001

Model Summary

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a Predictors: (Constant), Reading Score 2001

ANOVA(b)

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a Predictors: (Constant), Reading Score 2001
b Dependent Variable: Spelling Score 2001

Coefficients(a)

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<th>Standardized Coefficients</th>
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<th>Sig.</th>
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<td>B</td>
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<td>Beta</td>
<td></td>
</tr>
<tr>
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a Dependent Variable: Spelling Score 2001
Results Appendix E9.2

spelling score

Variables Entered/Removed(b)

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a All requested variables entered.
b Dependent Variable: Spelling Score 2001

Model Summary

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a Predictors: (Constant), Initial Sound Knowledge

ANOVA(b)

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<th>Mean Square</th>
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a Predictors: (Constant), Initial Sound Knowledge
b Dependent Variable: Spelling Score 2001

Coefficients(a)

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a Dependent Variable: Spelling Score 2001
Results Appendix E9.3

visual sequential memory

Variables Entered/Removed(b)

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a All requested variables entered.
b Dependent Variable: Spelling Score 2001

Model Summary

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a Predictors: (Constant), Visual Sequential Memory

ANOVA(b)

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a Predictors: (Constant), Visual Sequential Memory
b Dependent Variable: Spelling Score 2001

Coefficients(a)

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<th>Sig.</th>
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a Dependent Variable: Spelling Score 2001
Results Appendix E10

Stepwise regression to establish what predicts reading scores

Variables Entered/Removed(a)

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<th>Variables Removed</th>
<th>Method</th>
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</thead>
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<td>Stepwise (Criteria: Probability-of-F-to-enter &lt;= .050, Probability-of-F-to-remove &gt;= .100).</td>
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a Dependent Variable: Reading Score 2001

Model Summary

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<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
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</thead>
<tbody>
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a Predictors: (Constant), Spelling Score 2001

ANOVA(b)

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<th>df</th>
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<th>Sig.</th>
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a Predictors: (Constant), Spelling Score 2001
b Dependent Variable: Reading Score 2001

Coefficients(a)

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<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
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<td>Beta</td>
<td></td>
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a Dependent Variable: Reading Score 2001
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</table>

**Excluded Variables(b)**

*a Predictors in the Model: (Constant), Spelling Score 2001

*b Dependent Variable: Reading Score 2001
Appendix F

Where xxxx appears within any of these writing samples it is to delete a child’s name or the name of the town. This is for reasons of anonymity.
Yes, as I fled of Earth I saw a spaceship from Nipos and aliens were on it and a meteor hit the aliens. The spaceship was destroyed by one alien. Sil weas a live and that alien was called Seth. He had a laser and it set my spaceship but I hit the alien.
M3

One day a boy called me to press a button on his father's machine, and he pressed it and then his father came up with chewing gum on his boot so got stuck in it. The story was brought out into the garden, he landed into the grass he got out of the chewing gum and went on a adventure he was attacked by a big ant but he tricked it and a shoveling came don and iver Ma he realised that I could reverse the shrink ray and I did and I was big again.

M4

One day I found a machine. It was as huge as a skyscraper. It eats computer to give it knowledge it drinks get from the ears but when it sleeps it always snores and when you sick it always burn but one day he bumped the loud be exploded it took you to rebuild and when he did rebuild he was back to bring food.
Appendix F

H1

I really like my new dog she is called Honey and every time I take her for a walk she turns me. Every time my cat goes near Honey she runs away again. I brighten my dog on sports day. On sports day I nearly came first in the bean bag and bat race, but but I was a little excited. H xxx xxx did.

H2

In space there are planets. Some are called Jupiter and Mars. On the moon you can see Earth and many other planets. When my grandpa was little it was exciting on Earth because the first man landed on the moon.
When I shrunk,

One day when I woke up I was

the size of a rubber. When I had

my breakfast (which was cereal) I

went outside. It took me ages to
get the door open. When I was outside

I fell into a puddle but luckily a ladybird

(who was gigantically huge) came and

rescued me. "Thank you so much," I said.

When we landed I saw a spider. "Help

me!" I said. "Calm down," he said. "But

your tremendously big, huge, large. When

I woke up the next morning everything

was back to normal."
My robot is absolutely massive. He has eyes as big as cupboards. His nose is as big as a tree. He has a back as straight as a ruler. His gigantic feet are like houses. He has ears twice the size of a window. He is made of rock solid silver. His fingers and toes are like baby giraffes. His fingernails are the size of an a4 page.

One day a robot came to xxxxx. Everyone stared at it and the robot stared at everyone. I went up to it and asked his name. He said "I am The Mighty."

It said.
Appendix F

A1

I am going to the shop at two o'clock with my mum theyn I am going to the parc and the swimming pool with my mum I am going football ten o'clock.

A2

An aclewin came to Erth and ret my car. When it was going bungeegumine and the whet doing doing doing all the whe home and the is my pet in the garden.
The day I swung, I saw a dog and a cat.

It was extremely scary. The next day I saw

a cat rowing my mum nearly swept.
Appendix F

S1

Bananas are yellow and apples are red but I am not yellow or red but I am good every day so I am yes lets wite so it is because I am looking after my teeth so I am every day.
First I am going to put on my space suit. Now I am going into space rocket and I am holding on very tight. Now count down time 10 9 8 7 6 5 4 3 2 1 blast off I can see aliens hurting other people here I come to save them. I am going to mars. So I better eat a Mars Bar. The moon looks very small. Oh look there is the stars twinkly stars. I am glad I brought stickel my pup. I went home just in time. The dogs nearly had me. And nearly run out of gas...
When I Shrunk

One day I was playing outside and I shrunk.

I was terrified I couldn't see anything,

but Massive things. I followed the toby cat.

but it didn't work the cat nearly stood like a shark

for help but nobody could hear me. Large

tan drops were falling it was so frightening.

Then SUDDENLY something followed me. Then

started chasing me it a bee it put pollen over

me. I was so frightened. Then I heard

a strange noise it was the lawnmore I was

afraid of it sucking me up. I jumped on a

rabbit it was so fast that I fell of and

landed on a car wheel it started moving oh no.
Then it started moving I jumped off

and landed somewhere that I thought

was a swimming pool but it was a puddle.

I was then in the house somebody threw

me into somebody's breakfast. Lucky they

were round. They were like rubber rings

to me. A giant ball fell on top of

me. It was very slow I then was in the

living room. The television was like in the

movies. Then I went to sleep in the

morning. I had grown It of been a

dream.
My Robot

I have a robot he has a

masarvic head, a long thin neck, big

boney shoulders, big fat stahmar,

thin smooth legs, long knobbly knees,

Giant banana feet, and lots of

skinny hair. He is generous

and helps you out. He has a big

furry hands which are covered

in lots of fluff. His hand is as

big as a classroom. His neck is

as long as an apple tree trunk.

His big boney shoulders are as

big as big balloons stuck to him.
His big fat stomach was as big and fat as to big balls. His smooth legs are as smooth as the touch of a petal. His knees are as knobbly as bony's of a dinosaur. His big banana feet are as big as a teleaphone wire. His long skinny hair is as long as a metre stick. One day My robot was walking down the street when he came across a real unusual thing it was an old bicycle but of course he didn't now that.
He brought the strange thing home with him. I told him it was a bicycle. Then he went for a ride on it. Then he came to big bad boys. There were 5 of them. They started bullying him. He fought them in 4 rounds he won 2 and they won two. He came running home wheeling the bicycle beside him. When he came home, I discussed it with him while drinking tea and eating a biscuit.
Appendix H
Appendix H

Standardised Spelling Scores at Baseline in January 1999 and Final Assessment in May 2001 (for children who had a baseline score <90)

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