

THE EFFECTIVENESS OF THE
“HIWAY” LITERACY PROGRAMME
FOR LEARNER SUPPORT
IN THE FOUNDATION AND
INTERMEDIATE PHASE

DR. MILSON DONALD HAILSTONES

The search for
excellence in schools
is the search for
excellence in people

Clark – Cited in Kreigler & Farman, 1996

THIS WORK IS DEDICATED TO
MARYLYN MARGARET ALICE HAILSTONES

**“HER CHILDREN ARISE AND CALL HER BLESSED;
GIVE HER THE REWARD SHE HAS EARNED,
AND LET HER WORKS BRING HER PRAISE
AT THE CITY GATE.”**

PROVERBS 31:28.31(NIV)

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THE LEARNER SUPPORT STUDENTS OF CEDAR COLLEGE OF EDUCATION
TOGETHER WITH WHOM I HAVE LEARNED

MAL HAILSTONES AND ALISON HAILSTONES
FOR ASSISTANCE WITH ASSESSMENT OF THE LEARNERS

MY WIFE AND FAMILY FOR THEIR SUPPORT AND ENCOURAGEMENT

MY HEAVENLY FATHER
IN WHOM ARE HIDDEN ALL THE TREASURES OF WISDOM AND UNDERSTANDING

THE HIWAY KIDS
OUR MOST ENTHUSIASTIC SUPPORTERS
Learner: Aren't we going to do any work today?

Educator: We did work today!

We did a comprehension, and then we worked with the phonic programme.

Learner: That wasn't work. That was fun.

OPSOMMING

Sleutelwoorde: Kognitiewe ontwikkeling / volledige leesprogram / bewysgebaseerde leesonderrig / Hiway Reading & Spelling Programme® / hoofstroming / leesbegrip / leesprobleme / sistematiese klankleer onderrig.

'n Literatuurstudie wys op die behoefte na volledige leesprogramme wat in die hoofstroom geïntegreer is om die unieke behoeftes van leerders wat sukkel om te lees in Suid Afrikaanse skole te bevredig. Onlangse navorsing stel voor dat die gebruik van 'bewysgebaseerde', volledige leesprogramme doeltreffende veeldoelige gereedskap vir leesingryping, kognitiewe verryking en die identifisering van leerders wat swak reageer op gewone leesonderrig is.

Die hoofgevolgtrekking van hierdie studie is dat die HIWAY READING & SPELLING PROGRAMME® 'n volledige leesprogram is wat uit veelvuldige komponente insluitende fonemiese bewustheidsonderrig, sistematiese klankleeronderrig, onderrig in vlotheid, uitbreiding van woordeskat en begripstrategieonderrig bestaan.

'n Voortoets-natoets kontrolegroepontwerp is gebruik. Die bevindinge van die studie wys daarop dat die HRSP statisties betekenisvolle verbetering in spelling en leesbegrip teweegbring. Die HRSP is suksesvol in die hoofstroom geïntegreer, en die effektegroottes bekom in die studie is groot.

Voorstelle rakende die gebruik van volledige leesprogramme soos die HRSP binne skoolkonteks is gemaak om die behoeftes van leerders wat swak op leesonderrig reageer te adresseer.

ABSTRACT

Key words: Cognitive development / complete reading programme / evidence-based reading instruction / Hiway Reading & Spelling Programme® / mainstreaming / reading comprehension / reading difficulty / systematic phonics instruction

A literature-survey indicated that there is a need for complete reading programmes that are integrated within the mainstream to meet the unique needs of learners who struggle to read in South African schools. Recent research suggests that the use of 'evidence-based', complete reading programmes are effective multi-purpose tools for reading intervention, cognitive enrichment, and identification of learners unresponsive to regular literacy instruction.

The main conclusion of this study was that the HIWAY READING & SPELLING PROGRAMME® is a complete reading programme, comprising of multiple components including phonemic awareness instruction, systematic phonics instruction, fluency training, vocabulary building and comprehension strategy training components. It is also a much-needed tool for in-service and pre-service teacher training and whole-school capacity building in the implementation of evidence-based reading instruction.

A pre-test-post-test control group design was used. The weight of evidence obtained in this investigation indicates that the HRSP caused a statistically significant improvement in spelling and reading comprehension measures. The HRSP was successfully integrated within the mainstream, and the effect sizes obtained in this study were large

Recommendations were offered with regard to the use of the complete reading programmes like the HRSP in school contexts to address the needs of learners unresponsive to literacy intervention.

Copyright Note: The HiWay Reading & Spelling Programme® in its entirety (and all the component parts, including the analogy of the road, the 'robots' and the colour code, 'potholes' and the colour code, e for electricity, "if its blue there must be two", the Post Box game, Read remember write) is the property of Probe Education CC. Mrs M.M.A Hailstones and Dr M.D.Hailstones exert their right to be identified as the authors of the programme.

CONTENTS

ACKNOWLEDGEMENTS	i
OPSOMMING	li
ABSTRACT	iii
CHAPTER 1. INTRODUCTION, PROBLEM STATEMENT, AIMS OF STUDY, METHODOLOGY, LIMITATIONS OF STUDY, EXPLANATION OF CONCEPTS AND PROGRAMME OF STUDY.....	1
1.1. INTRODUCTION	1
1.2. PROBLEM STATEMENT	17
1.3. AIM OF STUDY	19
1.4. RESEARCH METHODOLOGY	19
1.4.1. LITERATURE STUDY.....	19
1.4.2. EMPIRICAL RESEARCH.....	19
1.4.2.1. Qualitative Investigation.....	20
1.4.2.2. Quantitative Investigation.....	21
1.5. LIMITATIONS OF THE EMPIRICAL RESEARCH	24
1.6. EXPLANATION OF CONCEPTS.	25
1.7. PROGRAMME OF STUDY.....	26
CHAPTER 2. THE RELATION BETWEEN COGNITIVE DEVELOPMENT AND READING INSTRUCTION.....	27
2.1. INTRODUCTION.	27
2.2. THE VYGOTSKIAN PERSPECTIVE ON COGNITIVE DEVELOPMENT.....	27
2.3. 'SOCIAL COGNITION AND COGNITIVE DEVELOPMENT.....	29
2.3.1. THE CONTRIBUTION OF PIAGET.....	29
2.3.2. THE CONTRIBUTION OF VYGOTSKY.....	31

2.3.3. THE CONTRIBUTION OF BRUNER.....	33
2.3.4. THE LINK BETWEEN COGNITIVE DEVELOPMENT AND LANGUAGE.....	34
2.4. CONSTRUCTIVISM AND THE COGNITIVE STRUCTURE OF LEARNERS	36
2.4.1. CONSTRUCTIVISM	36
2.4.2. COGNITIVE STRUCTURE	37
2.5. INTERVENTION.....	40
2.5.1. THE RATIONALE FOR INTERVENTION.....	40
2.5.2. COGNITIVE DEVELOPMENT AND READING DIFFICULTY	43
2.6. METACOGNITION	46
2.7. THE PASS PROCESS MODEL OF COGNITION	48
2.7.1. 'BRAIN BASED' TEACHING AND LEARNING	48
2.7.2. THE PASS MODEL.....	49
2.7.3. BRAIN STRUCTURE IN RELATION TO COGNITIVE FUNCTION.....	49
2.7.3.1. The first functional unit.....	50
2.7.3.2. The second functional unit.....	51
2.7.3.3. The third functional unit.	52
2.7.4. THE APPLICATION OF THE PASS MODEL TO LEARNING AND READING DIFFICULTY.....	52
2.8. FROM THEORY TO INSTRUCTION METHODS.....	55
2.8.1. TEXT COMPREHENSION INSTRUCTION.....	57
2.8.2. TEACHER PREPARATION AND COMPREHENSION STRATEGIES INSTRUCTION.....	60
2.9. SUMMARY.....	62

CHAPTER 3. THE NATURE AND APPLICATION OF READING	
INSTRUCTION IN RELATION TO READING ACQUISITION.....	63
3.1. INTRODUCTION.....	63
3.2. TRENDS IN LITERACY EDUCATION AND LITERACY RESEARCH.....	63
3.3. THE COGNITIVE PROCESSES NECESSARY FOR READING ACQUISITION.....	67
3.3.1 THE MATURATIONAL STAGES OF READING ACQUISITION.....	68
3.3.2. THE UNDERLYING PROCESSES OF LEARNING TO READ.....	70
3.3.3 THE NEUROPSYCHOLOGY OF READING.....	71
3.3.4. READING AS A COGNITIVE PROCESS.....	72
3.3.4.1. Neuropsychological evidence for distinct cognitive process in reading	73
3.3.4.2. Specialisation of cognitive processes and lateralisation of distinct functions.....	74
3.4. TEACHING READING WITHIN AN OBE EDUCATIONAL PARADIGM.....	78
3.5. READING INSTRUCTION.....	81
3.5.1. METHODS OF READING INSTRUCTION.....	82
3.5.1.1. Whole language approaches	82
3.5.1.2. Systematic phonics approaches	86
3.6. READING INTERVENTION FOR LEARNERS UNRESPONSIVE TO REGULAR	
READING INSTRUCTION.....	90
3.6.1. READING DIFFICULTY.....	91
3.6.2. LEARNERS WHO ARE UNRESPONSIVE TO READING INSTRUCTION.....	93
3.6.2.1. Core deficits in phonological processing.....	94
3.6.2.2. Multi-component two-phase reading programmes.....	96
3.6.3. ADDITIVE BILINGUAL MODELS IN SOUTH AFRICA.	96
3.6.4. LEARNING STYLES AND READING.....	101
3.6.4.1. Successive and simultaneous processes in reading	102

3.6.4.2. Teaching reading through visual versus auditory modalities.....	105
3.6.4.3. Field dependent and field independent cognitive style and reading.....	106
3.6.4.4. Instructional strategies for field dependent learners.....	109
3.7. SUMMARY OF CHAPTER.....	109

**CHAPTER 4. THE RATIONALE AND STRUCTURE OF THE HIWAY
READING & SPELLING PROGRAMME AND THE RESULTS OF THE
QUALITATIVE EVALUATION OF THE HRSP.....**

4.1. INTRODUCTION.....	111
4.2. THE GOALS OF THE HRSP	111
4.2.1. READING PROFICIENCY	112
4.2.2. FLUENCY.....	114
4.2.3. AUTOMATICITY.....	115
4.2.3.1. The model of sequential engagement of cortical regions.....	118
4.2.3.2. Planning, attention, successive and simultaneous processing model.....	118
4.2.3.3. Dimension analysis.....	122
4.3. A VYGOTSKIAN PERSPECTIVE ON INSTRUCTION – LEARNING ACTIVITY... ..	124
4.4. THE STRUCTURE OF THE HRSP.....	127
4.5. A QUALITATIVE COMPARISON OF THE APPROACH OF THE HRSP IN RELATION TO THE FINDINGS OF THE NATIONAL READING PANEL REPORT.....	134
4.5.1. INTRODUCTION	134
4.5.2. WAS THE PROGRAMME OR ITS METHODOLOGY REVIEWED BY THE NATIONAL READING PANEL (2000)?.....	134
4.5.3. IN READING INSTRUCTION, ARE PHONEMIC AWARENESS AND PHONICS TAUGHT SYSTEMATICALLY AND EXPLICITLY?.....	137

4.5.3.1. Phonemic awareness instruction.....	137
4.5.3.2. Systematic Phonics instruction.....	139
4.5.4. HOW ARE LEARNERS TAUGHT TO APPROACH AN UNFAMILIAR WORD?.....	148
4.5.5. DOES THE PROGRAMME ALSO INCLUDE PLENTY OF OPPORTUNITY FOR LEARNERS TO PRACTICE READING?.....	149
4.5.5.1. Fluency.....	149
4.5.5.2. Vocabulary Instruction.....	150
4.5.5.3. Text Comprehension Instruction.....	152
4.6. A QUALITATIVE INVESTIGATION INTO THE FEASIBILITY OF INTEGRATING THE HRSP INTO THE MAINSTREAM AT DSS SCHOOL.....	153
4.6.1. SAMPLING.....	153
4.6.2. INSTRUMENT.....	154
4.6.3. DESCRIPTION OF PARTICIPANTS IN THIS QUALITATIVE STUDY.....	155
4.6.4. DESCRIPTION OF ITEMS.....	156
4.6.5. THEMES IDENTIFIED FROM THE DSS TEACHER QUESTIONNAIRE.....	160
4.6.6. THE RESULTS OF THE QUALITATIVE INVESTIGATION.....	160
4.6.7. DISCUSSION OF THE RESULTS OF THE QUALITATIVE INVESTIGATION.....	164
4.6.8. CREDIBILITY.....	169
4.7. SUMMARY.....	169
CHAPTER 5. THE RESULTS OF THE QUANTITATIVE INVESTIGATION.....	171
5.1. INTRODUCTION.....	171
5.2. THE PURPOSE OF THE QUANTITATIVE INVESTIGATION.....	171
5.2.1 PROBLEM STATEMENT.....	172
5.2.2. AIM OF THE QUANTITATIVE STUDY.....	173

5.3. THE RESEARCH DESIGN.....	173
5.3.1. METHOD.....	173
5.3.2. DEFINING RESPONSIVENESS TO INTERVENTIONS.	174
5.3.3. IDENTIFYING THE NON-EQUIVALENT GROUP.....	175
5.3.4. SAMPLING.....	177
5.3.5. INSTRUMENTS.....	178
5.3.5.1. Schonell Graded Word Spelling Test A	179
5.3.5.2. The Schonell Silent Reading Test A	179
5.3.5.3. The Daniels and Diack Test of Reading Experience.....	180
5.3.6. FIDELITY OF INTERVENTION.....	180
5.3.7. REPLICATION.....	181
5.3.8. THREATS TO VALIDITY.....	181
5.3.8.1. Maturation effects.....	181
5.3.8.2. Historicity effects.....	181
5.3.8.3. Regression to the mean.	181
5.3.8.4. Hawthorne effects.....	181
5.3.8.5. School effects.	182
5.3.8.6. Racial identity.....	182
5.3.8.7. Gender.....	182
5.4. DATA ANALYSIS.....	182
5.4.1. STATISTICAL METHODS.	182
5.4.1.1. Matching on dependent variable measures.....	183
5.4.1.2. Differences between schools.....	183
5.4.1.3. Differences between grades.....	183
5.4.1.4. School effects.....	184

5.4.1.5. Gender and racial differences.....	184
5.4.1.6. Pre-test-post-test designs.....	184
5.4.1.7. Replication.....	184
5.4.1.8. Fidelity of treatment.....	185
5.4.1.9. Effect sizes.....	185
5.4.1.10. Causal-comparative design testing for interactions.....	186
5.4.2. NON-PARAMETRIC ANALYSES.....	188
5.4.3. CORRELATION.....	189
5.4.3.1. Pearson Product-moment correlation	189
5.5. RESULTS OF THE EMPIRICAL INVESTIGATION.....	189
5.5.1. SAMPLE DEMOGRAPHIC INFORMATION.....	189
5.5.2. THREATS TO INTERNAL VALIDITY.....	190
5.5.2.1. Pre-test measures for spelling and reading comprehension.....	190
5.5.2.2. Gender effects.....	191
5.5.2.3. Race/language effects.....	193
5.5.2.4. School effects.....	195
5.5.2.5. The nature of literacy instruction in control group.....	196
5.5.2.6. Hawthorne effects.....	201
5.5.3. THE EFFECTS OF THE HRSP.....	202
5.5.3.1. Fidelity of treatment and Effect sizes.....	202
5.5.3.2. Pre-test post-test measures and main effects.....	205
5.5.3.3. Effects of the modulation of the independent variable.....	207
5.5.3.4. Modulation of Independent Variable: GradexHRSP interactions	208
5.5.3.5. Gender effects.....	209
5.5.3.5. Language/race effects.....	211

5.5.3.6. Interactions and causal-comparative inference.....	215
5.5.3.7. Partial replication.....	221
5.5.3.8. Effect sizes for the study.....	222
CHAPTER 6. INTERPRETATION AND DISCUSSION OF RESULTS.....	224
6.1. INTRODUCTION.....	224
6.2. THE LITERATURE REVIEW IN RELATION TO THE RATIONALE OF THE HRSP....	224
6.3. INTERPRETATION OF THE RESULTS OF THE QUALITATIVE RESEARCH.....	225
6.3.1. THE QUALITATIVE EVALUATION OF THE HRSP AGAINST THE RESULTS OF THE META-ANALYSIS OF READING RESEARCH AS PUBLISHED IN THE NATIONAL READING PANEL REPORT (2000).....	225
6.3.1.1. Phonemic awareness instruction.....	225
6.3.1.2. Phonics instruction.....	226
6.3.1.3. Fluency.....	228
6.3.1.4. Comprehension.....	228
6.3.1.5. A complete reading programme.....	230
6.3.1.6. Summary.....	232
6.3.2. THE QUALITATIVE INVESTIGATION INTO THE FEASIBILITY OF INTEGRATING THE HRSP WITHIN THE MAINSTREAM LITERACY CURRICULUM.....	232
6.3.2.1. Overall result.....	232
6.3.2.2. Credibility.....	233
6.3.2.3. A multi-component, two phase approach.....	233
6.3.2.4. OBE compatible.....	234
6.3.2.5. Teacher in-service training and school capacity building.....	235
6.3.2.6. Methodological considerations.....	237

6.4. INTERPRETATION AND DISCUSSION OF THE RESULTS OF THE QUANTITATIVE RESEARCH.....	238
6.4.1. THREATS TO INTERNAL VALIDITY.....	238
6.4.1.1. Demographic details.....	238
6.4.1.2. Pre-test measures for spelling and reading comprehension.....	238
6.4.1.3. Gender effects.....	238
6.4.1.4. Race/language effects.....	239
6.4.1.5. School effects.....	239
6.4.1.6. The nature of literacy instruction and effects.	240
6.4.1.7. Hawthorne effects.	242
6.4.1.8. Fidelity of treatment.....	243
6.4.1.9. Regression towards the mean.....	245
6.4.2. THE EFFECTS OF THE HRSP.....	246
6.4.2.1. Effects of the modulation of the independent variable.....	246
6.4.2.2. Main effects.....	247
6.4.2.3. Gender effects.....	247
6.4.2.4. Language/race effects.....	248
6.4.2.5. Interactions and causal-comparative inference.....	249
6.4.2.6. Partial replication.....	250
6.4.3.7. Effect sizes for the study.....	251
6.5. SUMMARY OF RESULTS.....	253

CHAPTER 7. SUMMARY AND RECOMMENDATIONS.....	254
7.1. INTRODUCTION.....	254
7.1.1. THE MAIN FINDINGS	254
7.1.2. NON-EQUIVALENT GROUPS DESIGN.....	255
7.1.3. CAUSAL RELATION BETWEEN THE HRSP AND ACHIEVEMENT MEASURES....	256
7.1.3.1. Spelling achievement.....	256
7.1.3.2. Mathematics achievement.....	257
7.1.3.3. Effect size and fidelity of treatment measures.....	257
7.1.4. RESULTS OF THE QUALITATIVE ANALYSES.....	258
7.2. CONCLUSIONS OF RESEARCH.....	258
7.3. RECOMMENDATIONS.....	260
7.4. SUMMARY.....	263
7.4.1. THE RESULTS OF THE QUALITATIVE INVESTIGATION	263
7.4.2. THE RESULTS OF THE QUANTITATIVE INVESTIGATION.....	263
7.4.3. CONTRIBUTIONS TO THE FIELD.....	264
BIBLIOGRAPHY.....	265
APPENDIX 1. FIDELITY OF TREATMENT QUESTIONNAIRE.....	298
APPENDIX 2. SYSTEMATIC PHONICS QUESTIONNAIRE	302

LIST OF TABLES

TABLE 4.1. THE HRSP COMPARED TO THE EVALUATIVE CRITERIA FOR METHODOLOGICAL STRENGTH OF A READING PROGRAMME.....	135
TABLE 4.2. TYPES OF PHONEMIC AWARENESS INSTRUCTION.....	138
TABLE 4.3. SOUND UNIT, RULES AND SEQUENCE TAUGHT IN RELATION TO GRADES IN THE HRSP.....	141
TABLE 5.1. DEMOGRAPHIC DATA FOR DOMINO SERVITE SCHOOL AND ST DAVID'S DIOCESAN PRIMARY SCHOOL. GRADES 1-5 OF THE DSS SCHOOL (SHADED) RECEIVED THE HRSP.	190
TABLE 5.2. THE PRE-TEST SPELLING AND READING SCORES FOR THE WHOLE GROUP	191
TABLE 5.3. SUMMARY OF COMPARISON OF PRE-TEST GROUP MEANS FOR GIRLS AND BOYS IN DSS AND SDD SCHOOLS.....	192
TABLE 5.4. THE MEANS AND STANDARD DEVIATIONS FOR READING COMPREHENSION IN THE DIFFERENT LANGUAGE GROUPS IN THIS ANALYSIS.....	194
TABLE 5.5. THE MEANS AND STANDARD DEVIATIONS FOR SPELLING ABILITY IN THE DIFFERENT LANGUAGE GROUPS IN THIS ANALYSIS.....	194
TABLE 5.6. THE MEANS AND STANDARD DEVIATION FOR READING COMPREHENSION IN DSS AND SDD GROUPS.....	195
TABLE 5.7. THE MEANS AND STANDARD DEVIATION FOR SPELLING ABILITY IN DSS AND SDD GROUPS.....	195
TABLE 5.8. THE RESULTS OF THE COMPARISON OF THE RESPONSE SCORES FROM THE TEACHER QUESTIONNAIRE ON LITERACY INSTRUCTION IN GRADE 1 TO 3 OF SDD SCHOOL AND COMPARED WITH THE HRSP.....	197
TABLE 5.9. THE RESULTS OF THE COMPARISON OF THE KAPPA SCORES FROM THE TEACHER QUESTIONNAIRE ON LITERACY INSTRUCTION IN GRADE 1 TO 3 OF SDD SCHOOL AND COMPARED WITH THE HRSP.....	198
TABLE 5.10. THE COMPARISON OF THE SCHEFFE COMPARISONS FROM THE TEACHER QUESTIONNAIRE SCORES ON LITERACY INSTRUCTION IN GRADE 1 TO 3 OF SDD SCHOOL AND COMPARED WITH THE HRSP.....	198
TABLE 5.11. THE MEANS AND STANDARD DEVIATIONS FOR MATHEMATICS SCORES FOR THE THREE GROUPS IN THIS ANALYSIS.....	201
TABLE 5.12. THE PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENTS FOR THE	

RESPONSES TO THE TEACHER QUESTIONNAIRE	202
TABLE 5.13. THE PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENTS FOR THE CORRELATION OF THE GRADE EFFECT SIZES AND THE RESPONSES TO THE TEACHER QUESTIONNAIRE	203
TABLE 5.14. THE MEANS AND STANDARD DEVIATIONS FOR THE TEST AND RETEST SCORES FOR GRADES 1 TO FIVE IN DSS.	204
TABLE 5.15 THE MEANS AND STANDARD DEVIATIONS FOR THIS ANALYSIS FOR PRE AND POST TEST SCORES IN SPELLING ABILITY.....	206
TABLE 5.16 THE MEANS AND STANDARD DEVIATIONS FOR THIS ANALYSIS FOR PRE AND POST TEST SCORES IN READING ABILITY.....	206
TABLE 5.17. EFFECT SIZES FOR GRADES ONE TO FIVE IN SPELLING AND READING ABILITY. THE ANALYSIS WAS REPLICATED FIVE MONTHS APART.....	207
TABLE 5.18. A COMPARISON OF THE MEANS AND STANDARD DEVIATIONS FOR READING SCORES OF BOYS AND GIRLS BETWEEN DSS AND STD.....	210
TABLE 5.19. A COMPARISON OF THE MEANS AND STANDARD DEVIATIONS FOR SPELLING SCORES OF BOYS AND GIRLS BETWEEN DSS AND SDD.....	211
TABLE 5.20. A COMPARISON OF THE MEANS AND STANDARD DEVIATIONS FOR READING SCORES OF LANGUAGE GROUPS BETWEEN DSS AND SDD.....	212
TABLE 5.21. A COMPARISON OF THE MEANS AND STANDARD DEVIATIONS FOR SPELLING SCORES OF LANGUAGE GROUPS BETWEEN DSS AND SDD.....	212
TABLE 5.22. A COMPARISON OF PRE AND POST-TEST SCORES FOR READING COMPREHENSION AND SPELLING ABILITY IN THE DIFFERENT LANGUAGE GROUPS.....	214
TABLE 5.23. THE MEANS AND STANDARD DEVIATIONS FOR READING AND SPELLING FOR THE POOLED GRADE SIX AND SEVEN SCORES IN THE DIFFERENT LANGUAGE GROUPS.....	214
TABLE 5.24. THE COMPARISON BETWEEN MEANS OF THE AFRICAN LANGUAGE GROUPS IN DSS AND SDD SCHOOL FOR GRADES SIX AND SEVEN.....	215
TABLE 5.25. A COMPARISON OF MEANS BETWEEN THE GRADE 2 LEARNERS EXPOSED TO THE HRSP AND THOSE NOT AND THE SCORES FOR DIFFERENT WORD CATEGORIES.	217
TABLE 5.26. A COMPARISON OF MEANS BETWEEN THE GRADE THREE LEARNERS EXPOSED TO THE HRSP AND THOSE NOT AND THE SCORES FOR DIFFERENT WORD CATEGORIES.	218
TABLE 5.27. A COMPARISON OF MEANS BETWEEN THE GRADE FOUR LEARNERS EXPOSED TO THE HRSP AND THOSE NOT AND THE SCORES FOR DIFFERENT WORD CATEGORIES.	219
TABLE 5.28. EFFECT SIZES AND POWER ESTIMATES FOR THIS STUDY.....	223

LIST OF FIGURES

FIGURE 2.1. SEMANTIC FIELD OF CHAPTER 2 AND 3.....	28
FIGURE 2.2. RATIONALE FOR INTERVENTION.....	41
FIGURE 2.3. THE DIFFERENT FUNCTIONAL UNITS AS DESCRIBED BY LURIA (1970)....	50
FIGURE 2.4. THE PASS STRUCTURE OF COGNITION	53
FIGURE 3.1. A SCHEMATIC REPRESENTATION OF THE BRAIN AREAS CONSIDERED TO BE ASSOCIATED WITH THE DEVELOPMENT OF READING.	74
FIGURE 3.2. MODEL OF PHONOLOGICAL ASSEMBLY.....	77
FIGURE 5.1. THE RELATIONSHIP BETWEEN THE DIFFERENT GRADES 1 TO 3 ON EACH OF THE COMPONENTS OF LITERACY INSTRUCTION.	200
FIGURE 5.2. THE DIFFERENCE BETWEEN THE TWO SCHOOLS IN SPELLING	209
FIGURE 5.3. THE DIFFERENCE BETWEEN THE TWO SCHOOLS IN READING	209
FIGURE 5.4 A COMPARISON BETWEEN GRADE TWO LEARNERS EXPOSED TO THE HRSP AND THOSE NOT FOR MEAN SCORES OF DIFFERENT WORD CATEGORIES. ...	218
FIGURE 5.5 A COMPARISON BETWEEN GRADE THREE LEARNERS EXPOSED TO THE HRSP AND THOSE NOT FOR MEAN SCORES OF DIFFERENT WORD CATEGORIES. ...	219
FIGURE 5.6 A COMPARISON BETWEEN GRADE FOUR LEARNERS EXPOSED TO THE HRSP AND THOSE NOT FOR MEAN SCORES OF DIFFERENT WORD CATEGORIES. ...	220
FIGURE 5.7. MATURATION EFFECTS FOR DSS GRADES 2, 3 AND 4, AND THE RESPONSE TO DIFFERENT LEVELS OR WORD DIFFICULTY.	221

LIST OF ABBREVIATIONS

- ANOVA – ANALYSIS OF VARIANCE
- ANCOVA – ANALYSIS OF COVARIANCE
- BICS – BASIC INTERPERSONAL COMMUNICATION SKILLS
- CALP – COGNITIVE ACADEMIC LANGUAGE PROFICIENCY
- CUP – COMMON UNDERLING PROFICIENCY
- DSS – DOMINO SERVITE SCHOOL
- fMRI – FUNCTIONAL MAGNETIC RESONANCE IMAGING
- FRNRP – FINDINGS AND RECOMMENDATIONS OF THE NATIONAL READING PANEL
- HRSP – HIWAY READING AND SPELLING PROGRAMME
- NRP – NATIONAL READING PANEL
- PASS – PLANNING, ATTENTION, SIMULTANEOUS, SUCCESSIVE
- RNCS – REVISED NATIONAL CURRICULUM STATEMENT
- SDD – STDAVID DIOCESAN PRIMARY SCHOOL

CHAPTER 1

INTRODUCTION, PROBLEM STATEMENT, AIMS OF STUDY, METHODOLOGY, LIMITATIONS OF STUDY, EXPLANATION OF CONCEPTS AND PROGRAMME OF STUDY

1.1. INTRODUCTION

This study is about describing and evaluating the HiWay Reading & Spelling Programme® (HRSP) as a complete reading programme (Shaywitz & Shaywitz, 2004b). Identifying an applicable theory for literacy instruction as well as for language and cognitive development was the necessary first step in this research, and the second step was to identify a suitable literacy instruction programme for the Foundation and Intermediate Phases in South Africa. The aim of the resultant empirical research was an evaluation of the HRSP as a possible tool for learner support in literacy instruction in the context of South Africa, through the process of operationalising a Vygotskian approach to education in general and literacy instruction in particular.

Vygotsky viewed language as a central “tool” and ontogenetic principle in cognitive development (Das, 1995; Estep, 2002). While the biological or genetic basis for thinking provides the necessary physiological substructure, in Vygotsky's view language instruction stimulates and guides the unfolding of the learner's cognitive development (Das, 1995, 2002; Donald, Lazarus & Lolwana, 2002:70; Estep, 2002; Woolfolk, 2001:46). Language development in general and literacy instruction in particular were considered salient in cognitive development and later cognitive abilities, attitudes and life skills of learners (Donald *et al.*, 2002:70; Wiechers, 1996:175; Woolfolk, 2001:46). However, that exact relation of **literacy** instruction to cognitive development has not been clearly articulated. There is little dispute that these are strongly and positively related (Donald *et al.*, 2002:70; Woolfolk, 2001:46), but a causal relation between the two is a subject of debate (Bloome & Green, 1984:395; Crano & Johnson, 1991; Rogoff & Chavajay, 1995; Spiro & Myers, 1984:471) i.e. does literacy acquisition ‘cause’ cognitive development, or does cognitive development ‘cause’ literacy acquisition. Piaget would have emphasised the latter relation, while Vygotsky would have emphasised the former relation (Estep, 2002).

The view of Piaget has prevailed for some time (Estep, 2002). More recent research, however, (Xu, Kemeny, Park, Frattali & Braun; 2005) has indicated that the view of Vygotsky needs more careful consideration (Estep, 2002; John-Steiner & Mahn, 1996; Palinscar & Perry, 1995). Some research (Xu *et al.*, 2005; Das, 2002; Das, Naglieri & Murphy, 1995; Bischoff-Grethe, Proper, Mao, Daniels & Berns, 2000; Crano & Johnson, 1991; Rouke & Strang, 1984:473) has suggested that the cortical areas associated with language development may represent a general cognitive substructure which also underlies aspects of numeracy and mathematical ability. Earlier research in the field of cognition and language (Calfee, Chapman & Venezsky, 1973:139; Davidoff, Cone, Scully, 1978; Muscovitch, 1977:193; Neimark, 1975; Sinclair-de Zwart, 1973:7; Witelson, 1977:213) indicated that while neurophysiology provides the basic biological grounds for cognitive development, language development in general, and the achievement of literacy in particular, were necessary for the full actualisation of the innate cognitive potential (Das, 1995; Jansen, 1996:144; John-Steiner & Mahn, 1996; Wiechers, 1996:175). The earlier work by Muscovitch (1977:193) suggested that the absence of a normally developed phonetic system may permanently affect the process of lateralisation of cognitive functions in general, and disrupt normal cognitive development. More recent research, however, indicates that evidence for 'abnormal' cerebral lateralisation is equivocal, and that the broad organisational structure of the brain may follow normal developmental trajectories even in learners with learning difficulty (Hynd, Connors & Nieves, 1988; Jansen, 1996:144). Normal cognitive functioning may however be impaired by neurodevelopmental deficits in any of the specific regions associated with learning in general and reading acquisition specifically (Jansen, 1996:144; Joseph, Nobel & Eden, 2001; Pugh, Mencl, Jenner, Katz, Frost, Lee, Shaywitz & Shaywitz, 2000; Pugh, Mencl, Jenner, Lee, Katz, Frost, Shaywitz & Shaywitz, 2001).

Both Wernicke's and Broca's areas of the left hemisphere are implicated not only in language development and reading acquisition but also in general cognitive development (Bischoff-Grethe *et al.*, 2000; Wise, Scott, Blank, Mummery, Murphy & Warburton, 2001). In this regard, Jacobs, Schall & Schiebel (1993) reported that the dendritic system of Wernicke's area, a brain region classically associated with language (Jansen, 1996:144), proliferates in response to novel and challenging environments in human subjects. Thus, the reported relation between literacy instruction and cognitive development may represent at least a two-way relation (Crano & Johnson, 1991). It is plausible, therefore, that the fostering of cognitive abilities **through literacy instruction**, particularly phonological ability and reading comprehension, may provide an effective tool for intervention in the trajectory of the learner's cognitive development to bring about changes in their

cognitive structure (Donaldson, 1978 - cited in Moll, Bradbury & Winkler, 2001:115; Wiechers, 1996:175). In fact this is simply the Vygotskian insight on cognitive development (Donald *et al.*, 2002:70; Estep, 2002). Chang-Wells and Wells (1993:61) stated that in the Vygotskian view, cognitive development is “dependent on literacy, when it is understood not simply as the encoding and decoding of written language or the use of written texts for functional purposes but as engaging with texts of all kinds in ways that exploit the symbolic representation of meaning as a means of empowering intrapersonal mental activity.” As early as 1969, Vernon (1969) proposed that literacy intervention would transfer to cognitive development. He stated that “the greatest promise for a quick advance lies in the field of language teaching, that is, the spread of **effective methods** of acquiring a language **which is suitable as a medium for advanced education, communication and thinking.**” (Vernon, 1969:231- my emphasis). By this Vernon (1969) was referring to what he termed the “formal” code of language usage. Despite being formulated over 40 years ago, Vernon’s (1969) distinction between the ‘public’ and the ‘formal’ language code, and the need to foster the formal language code in learners, pre-empted Cummins’ (1979, 1981) well attested distinction between **basic interpersonal communication skills** and **cognitive academic language proficiency** (Lemmer, 1996:325).

Recent brain imaging studies (Pugh *et al.*, 2000, 2001) have identified localised regions of the left frontal, temporal, occipital and parietal cortex associated with reading acquisition. Xu *et al.* (2005) point out that these regions are implicated in a variety of cognitive processes – attention, semantic association, problem solving and mental imagery. Xu *et al.* (2005) state further that these regions are important as a “cardinal element” in the activity of a range of cognitive functions that include the ability to attribute mental states to others, understand social concepts and making moral judgements, and on this basis has been argued to play a central role in social cognition. These regions have also been implicated in cognitive processes that lie outside the social domain such as inferring logical relationships between events or propositions to evaluating and verifying facts based on personal knowledge and experience. This is suggested (Xu *et al.*, 2005) to indicate that these regions may serve a more general role, operating at the interface of self and environment, yoking a variety of cognitive processes to knowledge about the world. Furthermore, language development and literacy are not only implicated in cognitive development but also in ‘conation’, i.e. attributions and beliefs that underlie the motivational and attitudinal aspects of behaviour, and which encourage thinking and creativity (Engelbrecht, 1996:199; Monteith, 1996:207; Naude & Van der Westhuizen, 1996:159; Scott, 1996:236; Xu *et al.*, 2005).

Vygotsky differed from Piaget in that he regarded **inner speech** as not dysfunctional but rather crucial to cognitive development, strategic thinking and executive control (Woolfolk, 2001:46). Scott (1996:237) stated: "... intrinsically motivated learners attribute their learning to causes they perceive to be under their personal control." Extrinsically motivated learners (especially those experiencing learning difficulties) do not have the metacognitive skills to effectively probe their abilities. Metacognition is not simply 'thinking about one's thinking', but lies essentially in the inner speech described by Vygotsky (Das, 1995; Baker & Brown, 1984:253; Donald *et al.*, 2002:70; Woolfolk, 2001:46). As an inner **speech** mechanism, the development of metacognition might plausibly be related to language and literacy development (Baker & Brown, 1984:253; Galambos & Goldin-Meadow, 1990). Simply stated, if in the Vygotskian view language is central to cognitive development (Donald *et al.*, 2002:70; Estep, 2002), then raising the level of language usage would raise the level of dialogue between the learner and their environment, thus furthering cognitive development. The primary cultural 'tool' for raising the level of language usage is literacy i.e. reading and writing. It follows from this that fostering a high level of proficiency in reading would provide the educational means of facilitating a higher level of language usage and therefore a higher level of cognitive development.

If certain dysfunctional behaviours such as inattention, impulsivity, inability to plan, learned helplessness, and inability to monitor behaviour, are present because learners lack the cognitive apparatus to evaluate and control their own behaviour (Scott, 1996:237), then merely telling learners to change their attitudes is likely to be ineffective (Donald *et al.*, 2002:70; Feuerstein, Rand & Hoffmann, 1979; Feuerstein, Rand, Hoffmann, & Miller, 1980; Feuerstein, Klein & Tannenebaum, 1991; Nel, Dreyer & Klopper, 2004; Wallace-Adams, 1996:312). The well documented observation of strong, positive correlation between language proficiency and literacy on the one hand, and achievement at school and life on the other hand (Chall, 1984; Chall, Jacobs & Baldwin, 1990; Nel, Dreyer & Klopper, 2004; Richek, List & Lerner, 1989:2; Lerner, 2003:77; Ziglert, Taussig & Black, 1992), makes it plausible that developing literacy in general, and reading comprehension proficiency in particular, could play a central part in the actualisation of learners' cognitive development (Ramarumo, 1996:344; Wallace-Adams, 1996:312; Wiechers, 1996:175). Reading and writing proficiency are not only crucial learning tools but also life skills (Wallace-Adams, 1996:312).

Scott (1996:237) stated that the primary focus of attributional retraining is on changing perceptions about the locus of control and responsibility. Learners should be equipped to differentiate between

evidence and conclusions about the self, and to take the risks necessary to transform or cognitively modify old self-views (Scott, *op cit.*). However, it would appear implausible to facilitate change without first making change possible (Feuerstein *et al.*, 1991). In the light of this, fostering **cognitive modifiability** is an educational goal (Feuerstein *et al.*, 1991). Fostering and optimizing learners' reading proficiency could enable learners to gain the cognitive modifiability, self-efficacy and intrinsic motivation that leads to achievement (Malan, 1996:249; Skuy, 1996:185). This is the central paradigm that informs this research. That is, fostering a **high level** of reading proficiency - as described by Chang-Wells and Wells (1993:61) - is crucial for the learners' cognitive development, the emergence of intrinsic motivation, and the higher cognitive functions such as metacognition, problem solving, critical thinking and life-long learning characteristic of an autonomous learner (Estep, 2002; Skuy, 1996:185)

Wallace-Adams (1996:312) has stated that "language development ... forms the basis from which cognitive growth is promoted..." It is increasingly acknowledged that the linguistic environment or socio-cultural context of the learner determines the learner's cognitive development and level of achievement (Estep, 2002; Jansen, 1996:144; Ramarumo, 1996:344; Rogoff & Chavajay, 1995; Wiechers, 1996:175). Skuy (1996:185) described the goals of Instrumental Enrichment as fostering **autonomous learning** and thinking ability through decreasing cognitive deficiencies. As early as 1969, Vernon observed that independence (autonomy) of perception is linked with independence of personality and cognitive style generally, and its origins could be traced to the learner's linguistic development. "The independent person is more active, resourceful, self-directing, less affected by social norms, more realistic in self-appraisal, and he displays greater clarity in his concepts e.g. about time, space, occupations etc" (Vernon, 1969:58).

Similarly, Ericksson (1984:79) described the "nature of the communication between parents and children" as important for the nurturing of independence (autonomy) in thinking and action. She stated further, "Studies have shown that the most effective form of leadership that will foster independence, self-discipline and responsibility is that of 'democratic' leadership" (p. 75). The relevance of such an observation for this study is that this style uses a **verbal** form of social control and conscience-formation, in contrast to a more physical, punitive approach (Berk & Spuhl, 1995; Hart & Risley, 1992; Hess & McDewitt, 1984; Van der Merwe, 1996:283; Wallace-Adams, 1996:312). In other words the 'democratic style' places relatively more emphasis on language as a central psychological 'tool' for cognitive interaction and behaviour control (conscience formation). Furthermore, this 'higher' use of language is associated with a higher incidence and level of literacy

(Chall, 1983; Chall *et al.*, 1990; Cummins, 1981; Lemmer, 1996:325). Woolfolk (2001:38) cites Neimark (1975) as reporting that the attainment of formal operational thinking is associated with **literate** cultures.

Language, and its correlate literacy, is therefore critical for cognitive development (Das, 1999; Donald *et al.*, 2002:70). It provides the means for interpreting experience, expressing ideas, asking questions, the categories and concepts of thinking, and the links between the past and the future (Das, 1995; Woolfolk, 2001:46). In order to operationalise a Vygotskian approach to reading instruction, it would first be necessary to evaluate the different methods of reading instruction to establish which have the most research support and which are most likely to make possible the achievement of the envisaged level of reading comprehension and facility.

In 1998, the U.S. Congress mandated the National Reading Panel to develop rigorous criteria for evaluating reading research, apply these criteria to existing reading research, identify the most effective teaching methods, and then make findings accessible for parents and teachers (Shaywitz & Shaywitz, 2004a). The major findings of the National Reading Panel Report (NRP; 2000) indicate that in order to read, all learners must be taught alphabets, (comprising phonemic awareness and systematic phonics); reading fluency; vocabulary; and strategies for reading comprehension. These must be taught systematically, comprehensively and explicitly; it is inadequate to present the foundational skills of phonemic awareness and phonics incidentally, casually and fragmentally (Shaywitz & Shaywitz, 2004a).

The Findings and Recommendations of the National Reading Panel Report (FRNRP; 2000:8) stated, "Comprehension is critically important to the development of learner's reading skills and therefore to the ability to obtain an education. Indeed, reading comprehension has come to be the 'essence of reading' (Durkin, 1993), *essential not only to academic learning in all subject areas but to lifelong learning as well.*" (my emphasis) The FRNRP (2000) noted three predominant themes in the research on the development of reading comprehension skills. First, reading is a **complex cognitive process** that cannot be understood without a clear description of the role that vocabulary development and vocabulary instruction play in the understanding of what has been read. Second, comprehension is an **active process** that requires an intentional and thoughtful interaction between the reader and the text. Third, the **preparation of educators** to better equip students to develop and apply reading comprehension strategies to enhance understanding is intimately linked to students' achievement in this area (Allington, 2002, 2005).

Research (Shaywitz & Shaywitz, 2004a) alerts us to the cognitive complexity of learning to read. The ease with which most learners cope with learning to speak seems to obscure the fact that reading (and writing) is a cognitively demanding, non-innate skill that has to be learned like any other non-innate skill, that is, through direct instruction and practice (NRP; 2000). In contrast to the maturational approach to reading instruction, which views the onset of reading as a correlate of biological development, research indicates that the skill of reading cannot be picked up informally (Shaywitz & Shaywitz, 2004a). Furthermore, there is evidence to suggest that learning to read and write is fundamentally different from learning to speak (Lerner, 2003:341; Shaywitz & Shaywitz, 2004a; Woolfolk, 2001:46). The first is innate and spontaneous. The brain responds immediately on exposure to language. Reading and writing by contrast require direct instruction and practice to achieve automaticity (Hook & Jones, 2002; Logan, 1997; Shaywitz & Shaywitz, 2004a).

Despite this clear difference in the cognitive **processes** of learning to speak and to read, however, evidence indicates that the brain 'uses' the same cognitive **apparatus** for learning to read (comprehension) as for learning to speak a language (communication). What distinguishes learning to read from learning to speak is the interposition of a phonological system which links sounds to a particular sign system (Shaywitz & Shaywitz, 2004a). If the development of the phonological system is neglected, learner's language skills, particularly reading and writing, fall further behind (Stanovich, 1982, 1986; Lerner, 2003:76). Though the blame for this should not be placed upon the learners, this is what inevitably happens (Van den Berg & Naicker, 1996:21).

Mason (1984:536) stated that the theoretical shift from the analysis of **products** of learning as in outcomes-based approaches to the **process** of learning has helped to differentiate overall **maturation** from particular **skill** and knowledge acquisition. Cognitive psychologists have found that the learning of skills e.g. driving car, using a keyboard, and playing a musical instrument, is overwhelmingly task and situation specific (NRP; 2000) i.e. using a computer keyboard will not transfer to playing a piano. With regard to reading, it is now apparent that "the preparation for reading is better addressed with specific learning experiences that are closely related to reading than general cognitive and motor tasks" (Mason, 1984:536). This is the significance of the Vygotskian perspective - by cutting reading loose from its association with deterministic maturational trajectories, we are able to view it as a complex skill like any other cultural tool or skill (Estep, 2002). Mason concluded, "While some educators still argue for a maturational approach for reading preparation, their position has been severely eroded by mounting evidence that early

reading instruction benefits young learners". Mason's position has been proven correct by more recent research on reading (NRP, 2000), which indicated solid support for direct instruction of specific reading skills. This result has particular importance for the debate around Outcomes Based Education (OBE) in South Africa, and would alert us to the need to carefully evaluate the underlying maturational premise of OBE behind the claims that all children can and will reach the outcomes *if given enough time* (Winkler, Modise & Dawber, 2001:2), and the implicit stimulus-response typology in the focus of assessment on the products of learning (Deacon & Parker, 1999:59; Jansen, 1999:145; Wolf, 1995).

The debate around the best practice regarding the teaching of reading has always revolved around two main approaches, namely the whole-language approach (sometimes also called the language-experience approach), and the code-emphasis (phonetic) approach (Smith, 1992; Stahl & Miller, 1989). Of the two, the first seems to enjoy the most support in South Africa because it is perceived to be a 'natural' or developmental learning approach, despite the evidence in support of the decoding approach (Smith, 1992). Lerner (2003:393) cites four basic tenets of the whole-language approach:

1. *The advocates of the whole-language approach emphasise active experience of authentic language tasks, and the early exposure of the learner to books and other forms of communication.*

There is good evidence in support of this view (Richek, List & Lerner, 1989:175; Richek, Caldwell, Jennings & Lerner, 1996). However, one needs to be cautious about the claims that whole language will benefit **all** learners (Barr, 1984:545; Stahl & Miller, 1989). Those who struggle to read are likely to be disadvantaged by the approach, as it does not foster phonemic, grammatical and syntactical awareness, which have been shown to be highly correlated with reading proficiency (Shaywitz & Shaywitz, 2004a) and general cognitive development (Das, 1995; Wiechers, 1996:175).

2. *Both spoken and written language are acquired naturally.*

'Naturally' here means "without direct instruction". Research however indicates that many learners benefit from direct instruction in reading and from the teaching of strategies that are rule-based

(Shaywitz, 1996, 1998). Evidence also points to the possibility that the phonological route is also the *only* route to achieve automaticity in reading (Shaywitz & Shaywitz, 2004a, 2004b).

3. *The use of authentic literature provides abundant opportunities for expressive literacy.*

Advocates of whole language approaches claim that learners from early on need to be engaged with and exposed to a wide variety of books and literature. There seems to be little argument here (Richek *et al.*, 1989, 1996). The large repertoire of nursery rhymes, poems, children's stories and children's songs is clearly an integral part of early childhood development.

4. *The teaching of language as units of sounds and sign combinations, and the use of phonetic grammatical rules, interfere with the natural development of language and reading behaviour.*

It is claimed that this is because teaching sounds as units fragments the whole process in the learner's mind, divorcing it from meaning-rich literary contexts, and making the assigning of meaning very difficult if not impossible (Lerner, 2003:393). There appears to be little empirical support for this view. In contrast to this, it has been argued that the logical structure of the sign-sound code system is intrinsic to the mastery of the ability to read, and that helping learners understand the code is a more parsimonious position (NRP, 2000). This is supported by recent findings of research on systematic phonics instruction (NRP, 2000) and functional Magnetic Resonance Imaging (fMRI) studies (a technology that allows us to monitor localised changes in blood flow in relation to glucose metabolism in the brain) in reading disabled and normal learners (Pugh *et al.*, 2000, 2001) which showed a link between the engagement of specific brain regions associated with reading and systematic phonics instruction.

Furthermore, the results of research on reading instruction methods strongly support the importance of fostering phonemic awareness and providing code-breaking strategies in helping beginner and reading disabled individuals to read (Torgesen, Wagner & Rashotte, 1994; Shaywitz & Shaywitz, 2004a). Lerner (2003:393) goes as far as to say that the question is no longer whether the use of phonics and other code breaking tools should be taught, but what is the best way of teaching them. The approach advocated by Lerner (2003:393) and by Richek *et al.*, (1996:166) is an integration of the two approaches in a way that capitalises on the strengths of both. The Revised National Curriculum Statement also advocates a 'balanced approach' (RNCS, 2002)

It is important to be cautious about claims for 'evidence-based' reading instruction (Allington, 2005, Allington & Johnston, 2001) and a 'one-size-fits-all' approach (NRP, 2000). Al Otaiba and Fuchs (2002; 2006) reported that not all learners benefit from early (kindergarten and first grade) literacy intervention, and apparently it is precisely those learners that need it most that seem to benefit the least (Donald *et al.*, 2002; NRP, 2000). The NRP (2000) review of research on phonemic awareness and systematic phonics training revealed two important areas in need of further research. Despite the evidence in support of the effectiveness of direct instruction of phonemic awareness and systematic phonics in improving measures of **reading** ability, phonemic awareness instruction did not improve **spelling** ability of **reading disabled** learners (identified by discrepancy between IQ and reading achievement levels). Furthermore, systematic phonics instruction did not improve reading comprehension and spelling ability in 'garden variety' poor readers **above first grade**. The NRP (2000) concluded that *further research is needed to find ways to improve the effectiveness of systematic phonics instruction for learners struggling to read above first grade*. This would indicate that not all systematic phonics approaches are equally effective, and that the unique strengths and weaknesses of different learners need to be considered when designing reading programmes. This would need to be borne in mind when developing and evaluating a complete reading programme.

In this regard, Al Otaiba and Fuchs (2006) point out that it might be difficult to characterise 'typical' non-responsive learners due to their complex profile of strengths and weaknesses. Furthermore, the use of IQ discrepancy to identify reading disabled learners and the 'two group' classification of reading difficulty (IQ discrepant and "garden variety" poor readers) has been called into question (O'Malley, Francis, Foorman, Fletcher & Swank, 2002). Rather, Al Otaiba and Fuchs (2002, 2006) proposed developing a complete reading programme that will provide something for every struggling reader. In their view, such a programme would be a two-phase intervention programme. In Phase 1 (primary preventative intervention) of the programme, the programme's basic components are implemented by regular educators in mainstream (regular) classrooms with the expectation that these components will enhance the literacy levels of most learners. Phase 2 (secondary-remedial intervention) involves only those learners unresponsive to the Phase 1 instruction. In Phase 2, additional components are brought into effect with greater frequency and longer duration. Because of its comparative complexity and intensity, phase 2 instruction would be conducted by someone other than the classroom educator and typically in small learner groups.

This programme as proposed by Al Otaiba and Fuchs (2006) reflects developments in the USA that led to the *Reading First Initiative*. The USA Department of Education is at present investigating just such a two-tier approach to identify learners with reading difficulty, as part of the *No Learner Left Behind* programme. The following protocol was proposed: Rather than rely on establishing a discrepancy between IQ and reading achievement to diagnose reading difficulties and the eligibility for special education, school personnel would employ this two-tier reading intervention process - learners must demonstrate unresponsiveness to **both** primary and secondary interventions before they are considered eligible for special education. This indicates that complete reading programmes might also provide a means of alternative assessment, and a way forward within the South African context (Archer & Green, 1996:123; Burden, 1996:97; Kriegler & Skuy, 1996:109).

Although only 10 % of the population of South Africa are native English speakers (Olivier, 1993), there is a clear preference for English as a medium of instruction, and its status in South Africa is predicted to increase (Donald *et al.*, 2002:218; Lemmer, 1996:325; Wallace-Adams, 1996:312). For this reason, English instruction at school is likely to also increase, with the overwhelming majority of parents favouring a 'straight-for-English' approach (Wallace-Adams, 1996:312). This however, confronts us with the problem of limited English proficiency in learners in South Africa.

According to Cummins (1981), the language deficit of Limited English proficiency (LEP) learners is a hidden one which is not always noticeable on the playground or in everyday situations where conversation requires only informal colloquial language, or Basic Interpersonal Communication Skills (BICS). The school uses formal academic language, and consequently LEP learners lack the more sophisticated mastery of the English language required for school success, namely Cognitive Academic Language Proficiency (CALP). Lemmer (1993) claims that the experience of teachers from a wide spectrum of South African schools introduced to the BICS/CALP dichotomy during in-service teacher training has endorsed Cummins' (1981) theory. Lemmer (1996:325) points out that written admission tests only assess surface elements of language such as basic vocabulary, comprehension, grammar and oral tests which allow learners to express themselves in undemanding context-embedded situations. However, subsequent school performance in content subjects shows that learners lack the subject-specific, academic vocabulary, reading and writing skills necessary for school success (Chall, 1983; Lemmer, 1996:325; Wallace-Adams, 1996:312). This may plausibly explain the observed fall in matriculation pass rate (Deacon & Parker, 1999:59) and the poor literacy achievement in schools in South Africa (Steyn, 2004; Rademeyer, 2004) which has led to renewed calls for more stringent transformation of education in South Africa, and

a strong advocacy for an “own language” approach to education i.e. mother tongue instruction *only*, up to grade 6.

When faced with a similar situation in the USA 20 years ago, Chall (1983:7), an influential researcher and writer on reading instruction in America (NRP, 2000), had argued that “it seems wasteful to cry for a different instructional programme whenever scores drop, when we have little evidence as to what brought it about.” Chall (1983) reported that after the implementation of the Head Start and similar early interventions in the USA (Caldwell, 1974), gains in literacy and comprehension scores were observed in grade four cohort in the USA, while the grade eight cohort showed mixed results, and grade 12 cohort showed declines, particularly in inferential comprehension. This was met with calls for educational reform and the transformation of educational policy, particularly for disadvantaged groups and the lower grades.

At that time, Chall (1983) however cautioned that this reaction was premature and even wrong-headed. She proposed a historical perspective based on a stage theory of reading development. In her view, the mixed results obtained for the grade eight cohort was due to the uncertainties and novelty of the implementation phase of the Head Start programme. The improved performance of the grade four cohort was due to the improved intervention programmes that developed out of the implementation phase. In contrast to these two groups, the grade 12 cohort had not received any literacy intervention at all (they were entering school before the implementation of the Head Start programme), and this is reflected in their performance scores.

Furthermore, she maintained that the reading process changes in characteristic ways from beginning to highly advanced and skilled reading (Chall, 1983). She noted that “a major break seems to be at about grade four” (Chall, 1983:6). Prior to grade four, reading is based on an oral tradition, and the text rarely goes beyond the language and knowledge the reader already has through listening, watching television etc. In contrast, reading beyond grade four is seen as comprising the literary tradition – “when reading matter goes beyond what is already known”. Grade four is seen as the beginning of a long process of development of increasing facility in the reading of texts that are ever more complex, abstract and technical. Reading such texts require more general knowledge and more advanced language and cognitive ability to make possible the interpretation and critical evaluation required. This parallels Cummins’ (1981) distinction between basic interpersonal communication skills (BICS) and cognitive academic language proficiency (CALP).

The frequently reported increase in the incidence of learners with reading difficulty after grade four (Diamond & Mandel, 1996; Fletcher & Fooman, 1994:185) may therefore be due to the possibility that they have only acquired basic interpersonal communication skills. Chall (1983) postulated that this might be due to the different demands made on the reader. Earlier reading requires skills in word recognition and analysis, while upper grades require linguistic and cognitive competencies. *She also points out that without the foundation skills, the higher skills are not likely to emerge.* Cummins (1981) estimated that an English-second-language learner requires five to seven years to acquire sufficient CALP to perform well on academic tasks, whereas the acquisition of BICS takes two years. This has important implications for the planning and implementation of reading intervention programmes i.e. early gains at the BICS level may not transfer to appreciable gains at the CALP level without careful longitudinal intervention design. The challenge of having to acquire BICS and CALP simultaneously within the school context of the Intermediate and Senior Phase is emotionally and cognitively demanding for the additional language learner. Because English is the main medium of instruction at Senior and FET (Further Education and Training) levels, the LEP learner at Senior and FET levels faces the formidable task of acquiring CALP while having to master the academic content at the same pace as that of native English speakers.

These findings (Lemmer, 1996) suggest that an early and gradual introduction to English in the early grades is preferable to later introduction in order to allow the learner sufficient time to acquire the CALP which will be needed to master the upper primary and secondary syllabi (Donald *et al.*, 2002:218). It needs to be stressed here that research (Cummins, 1981) indicates that the main reason for the negative effect of semi-lingualism is *the level of proficiency in the home language*, regardless of race, gender or age, and not the early introduction of an additional language (Donald, *et al.*, 2002:218). It is implausible that teaching learners in their home language will meaningfully address the problem of 'semi-lingualism' (Lemmer, 1996:325) if the level of language usage remains at the BICS level. To counter this, a model of **additive bilingualism** is strongly advocated in the South African context (Lemmer, 1996:325; Donald *et al.*, 2002:218; RNCS, 2002).

However, this argument for an early introduction to English must be placed within the context of the learner's home language (Donald, *et al.*, 2002:218; Ramirez, Yuen, Ramey & Pasta, 1991). Research indicates that the learner's **common underlying language proficiency** (CUP) is more central to the acquisition of higher language usage than simply early exposure or non-exposure to another language (Fitzgerald, 1995). The **level** of language usage is therefore of crucial importance here, rather than questions of home language as opposed to additional language

instruction (Cummins, 1981). Cummins (1979) suggested that the home language instruction would aid the LEP learners' academic progress **only** if the learner had developed appropriate levels of proficiency in their home language. Research on learners from bilingual contexts supports this contention (Ramirez *et al.*, 1991). Evidence does not indicate that such learners are academically disadvantaged (Hakuta & Garcia, 1986; Heugh, Siegrunn & Pludderman, 1995). In fact there is growing research support for the finding that learners from bilingual homes and schools achieve higher than those from single language homes and schools (Fitzgerald, 1995; Fletcher, Simos, Shaywitz, Shaywitz, Pugh & Pappanicolaou, 2000; Hakuta & Gould, 1987), and the results of the Ramirez *et al.* (1991) study clearly support a 'late exit', additive bilingual model. The weight of evidence would indicate *that failure to reach adequate levels of language proficiency in the home language* means that many learners suffer the negative effects of subtractive bilingualism (Donald *et al.*, 2002:218) or semi-lingualism, that is, the failure to reach adequate levels of language skills in the home language before the introduction of English (Lemmer, 1996:325).

To illustrate his hypothesis with regard to the different levels of language usage, Cummins (1981) suggested that the semi-lingual person's two languages represent a common underlying proficiency (CUP) instead of two separate and distinct proficiencies. In this model, the proficiency in the home language transfers to the additional language since there is a common underlying proficiency. Fitzgerald (1995) reported that a result of a review of research on bilingual learners supports the construct of a common underlying proficiency, and that it transfers to the additional language, not only negatively but also positively. *This finding alerts us to the possibility that underlying skills will also transfer from an additional language to a home language.* Learners who have broad, fluent language skills make better progress in school than learners who have not developed their home language at all, regardless of the medium of instruction (Lemmer, 1996:325). This has unforeseen implications for the South African situation, particularly in view of the debate around education in the mother tongue. Simply adapting the school environment or the curriculum to make it compatible with African culture e.g. use of mother tongue, is unlikely to help if the level of language usage at home *and especially at school* remains at the BICS level (Ramarumo, 1996:344).

In South Africa, recent press reports emphasize this (Blaine, 2006; Momberg, 2006). Western Cape Education Minister Andre Gaum said an analysis of grade three reading and numeracy levels in the Western Cape indicated that only 36% of grade three learners in the province are reading and calculating at the specified level. Fifteen percent cannot read and calculate at the most basic

levels (Steyn, 2004). The Vice Principal of a High School on the Cape Flats was quoted by Steyn as saying some grade eight learners “read so badly they could not read question papers, and they spelled so badly they couldn’t write their own names”. Me. Perolt, Department of Educational Psychology at the University of Stellenbosch, confirmed that the poor language, spelling and numeracy ability of some grade eight learners have forced many high schools to use the first two weeks of school to give reading and numeracy lessons to the newcomers (Steyn, 2004). Professor Maree of the University of Pretoria attributed this to the learners never having mastered basic principles, especially with spelling, reading and numeracy (Rademeyer, 2004). Dr Hatting, Educational Psychologist from Johannesburg, confirmed that learners’ verbal ability and their abilities to think logically, to argue and to express themselves have deteriorated over the past few years (Rademeyer, 2004).

The observation that basic abilities continue to decline in South Africa (Blaine, 2006; Momberg, 2006; Steyn, 2004; Rademeyer, 2004) should make us skeptical of attempts to blame past imbalances or social inequality. The Vygotskian perspective would lead us to look for the reason for the problems we encounter in the socio-cultural present, not in the political past (Jansen, 1999:145, Estep, 2002), and intervention is urgently required. Learners’ whose language proficiency is weak will need to develop their full ability or they will face handicaps in school (Cummins, 1981; Lemmer, 1996:325). Poor literacy, especially reading comprehension, is strongly correlated with diverse forms of learning difficulty (Booyesen, 1996:405; Lomofsky, Roberts & Mvambi, 2003:69; Engelbrecht, Kriegler & Booyesen, 1996:228; Morris, Stuebing, Fletcher, Shaywitz, Lyon, Schankwieler, Katz, Francis & Shaywitz, 1998). The USA Department of Education estimated that almost one third of the school population have significant learning difficulties (Wills, 1986) and most of these learning difficulties were reading related (Palinscar & Perry, 1995). Studies in the USA revealed that almost 80-90% percent of learners with learning difficulties had their primary need in the area of reading (Lyon, 1985; Palinscar & Perry, 1995). This trend is also seen in South Africa (Engelbrecht *et al.*, 1996). This seems to indicate that we observe a global phenomenon, not one tied to our unique situation in South Africa. Kriegler and Farman (1996:48) stated that “ we have to find ways of changing the root culture, including our schools organization, curricula, methods of teaching and procedures of assessment.”

Learning to read well constitutes a major challenge and significant accomplishment on the part of the learner (Moll, Bradbury & Winkler, 2001:145). In South Africa this is complicated by a high incidence of illiteracy that has barely been addressed within the new educational dispensation

since 1994 (Caelers, 2005; Machet, 2002). Machet (2002) reports that 34% of adults (7.4 million) are functionally illiterate in this country. Machet (op cit.) states that reading behaviour amongst the majority of South Africans is poorly developed. Furthermore, press reports (Blaine, 2006; Momberg, 2006; Caelers, 2005; Rademeyer, 2004; Steyn, 2004) indicate that literacy levels may be on the decline in South African schools. There is therefore a need in South Africa for an effective reading intervention tool integrated into the mainstream curriculum (Csapo, 1996:34).

Donald (1996:84) claimed that "it is only the provision of a specialized education service which is integrated and strengthened through holistic cooperation with other education support services, which is centrally articulated with the mainstream of education and the user community, and where the general curriculum is infused with its particular skills and resources, that can be seen as meeting the complex and extensive special learning needs of our country". Without such intervention, learners will continue to tackle their problems in ways that are ineffective (Scott, 1996:236). Their disabilities usually go unnoticed due to inadequate educator training, and they fall into self-defeating beliefs and strategies (Monteith, 1996:207; Scott, 1996:236). This leads to them experiencing learning as difficult, and to internalizing beliefs and attributions that entrench self-helplessness. Such learners do not acquire the intrinsic motivation to further cognitive development that comes from achievement.

Brandon-Muller and Elias (1991) stated that the introduction of primary prevention programmes into schools has great potential to *expand the roles of school personnel* to facilitate adoption of social skills and health promoting programmes. Primary prevention programmes are targeted at promoting competence or preventing psychological dysfunction in essentially well people (Donald *et al.*, 2002). Eisenberg and Harris (1984) reported that learner's social competence and adjustment are gauged by a) how well they display the attributes of perspective taking, b) a conception of friendship, c) interpersonal strategies for decision making, problem solving and moral judgement, and d) communication skills appropriate to their developmental level. The relation of these skills to higher literacy levels and reading proficiency is indicated from the results of socio-linguistic research (Ramarumo, 1996:344; Rogoff & Chavajay, 1995; Wallace-Adams, 1996:312).

It is important for this discussion to notice that poor reading ability is highly correlated with social and personal dysfunction, including school dropout rate and juvenile delinquency (Lerner, 2003:313; Nel *et al.*, 2004; Richek *et al.*, 1989:2, Ziglert, *et al.*, 1992). Scott (1996:244) claims, "... inefficient learners may be characterised, not by poor memory or lack of ability, but by inefficient

strategies for discriminating, organising, storing and retrieving information. Attributional training not only improves learners motivation to maintain ... strategies designed to improve reading comprehension and achievement, but also selectively facilitates generalisation to other related tasks in learners with learning problems." From the above discussion it is evident that research is also needed to investigate the possibility that the corollary is equally true. It is plausible that intervention aimed at fostering phonological skill (spelling) and reading comprehension will not only improve motivation, but will also selectively facilitate generalisation to attributional styles and other related tasks in learners with learning difficulties as implied by Xu *et al.* (2005), Chang-Wells and Wells (1993), Donaldson (1978) and Vernon (1969).

To summarise, by adopting a Vygotskian perspective on education in general and reading instruction specifically, it is evident that there is a need for the effective teaching of reading - and thus for effective reading intervention programmes - in the Foundation and Intermediate Phase in South Africa. The question remains, Can Vygotskian theory be translated into practice? More specifically, what is the feasibility of developing a reading intervention programme that can be integrated into the mainstream curriculum that will successfully foster reading comprehension as a means to ultimately developing autonomous learning and social competency? The first step in the process of answering these questions is to develop and evaluate a suitable complete reading programme.

The HiWay Reading & Spelling Programme® (HRSP) is a reading programme informally developed and piloted at the Domino Servite School (DSS), a private school in KwaZulu-Natal, South Africa. The "HiWay" programme combines decoding or sounding of letters (phonics) as code breaking strategies with vocabulary building, fluency training and comprehension strategies training. This programme is implemented within the daily classroom activity and integrated with the mainstream curriculum (Revised National Curriculum Statement - RNCS) at Domino Servite School (DSS).

1. 2. PROBLEM STATEMENT

From the above description of the implications of the Vygotskian perspective on education, the **centrality of reading instruction** in cognitive development and in the debate surrounding reading acquisition, reading difficulty and bilingualism was identified. Secondly, the need for developing a reading intervention programme for use in the regular classroom in the South African context

emerged. Thirdly, the existence of the HRSP, a reading programme informally developed for implementation in the regular classroom context in a school in South Africa, was noted. The main question for this study can be stated as follows:

What is the effectiveness of the HiWay Reading and Spelling Programme® (HRSP) for improving reading and spelling achievement in learners from grades one to five in Domino Servite School, KwaZulu-Natal, South Africa?

The following *sub-questions* can be formulated from this main statement:

- 1.2.1. Does the HRSP meet the criteria stipulated by the National Reading Panel Report (2000) for complete reading programmes?
- 1.2.2. What is the feasibility of integrating the HRSP into the mainstream curriculum in the Foundation and Intermediate Phases in Domino Servite School?
- 1.2.3. What is the effectiveness of the HRSP as a tool for improving reading and spelling achievement of grade one to five learners in Domino Servite School?

The rationale for using the National Reading Panel Report (2000) as a benchmark is as follows;

1. The NRP (2000) reviewed reading research internationally and not just in the USA.
2. The incidence and nature of reading difficulty indicate a global phenomenon, not one unique to the South African situation.
3. Reading and educational research in the USA has a very strong influence on educational theory and practice in South Africa. Two examples will suffice. In a recent textbook on Educational Psychology designed for use in the South African context (Donald *et al.*, 2002), the overarching paradigm and theme of the book can be subsumed under two researchers, Bronfenbrenner, who developed an 'ecological' or 'systems' approach to education in the USA, and Spady, who developed the Outcomes Based Education Approach, also in the USA.
4. The process of transformation in South Africa has moved into a 'pragmatic' or 'economic' phase as predicted by Skinner (1999:117), and the South African Qualifications Authority has embarked on a process of external auditing which is clearly aimed at aligning South African qualifications and criteria with those of the international community (Revised National Curriculum Statement, 2002).

A hypothesis for this study can be formulated as follows:

Ha: THE HIWAY READING AND SPELLING PROGRAMME® WILL RESULT IN AN IMPROVEMENT IN THE SPELLING AND READING ACHIEVEMENT OF GRADE ONE TO FIVE LEARNERS AT DSS SCHOOL.

The null hypothesis can be formulated as follows:

Ho: THE HIWAY READING AND SPELLING PROGRAMME® WILL NOT RESULT IN AN IMPROVEMENT IN THE SPELLING AND READING ACHIEVEMENT OF GRADE ONE TO FIVE LEARNERS AT DSS SCHOOL.

1.3. AIM OF STUDY

This study aims to investigate the effectiveness of the HRSP for reading instruction in grades one to five in DSS.

The sub-aims of the study can be formulated as follows:

1.3.1 To determine if the HRSP meets the criteria stipulated by the National Reading Panel Report (2000) for complete reading programmes.

1.3.2 To determine the feasibility of integrating the HRSP into the mainstream curriculum in the Foundation and Intermediate Phase at DSS Primary School.

1.3.3 To determine the effectiveness of the HRSP as a tool for reading instruction in the Foundation and Intermediate Phase in DSS.

1.4. RESEARCH METHODOLOGY

1.4.1 LITERATURE STUDY

A literature survey will be conducted on:

- i) The Vygotskian perspective on cognitive development, language, and literacy instruction (Chapter 2);
- ii) current approaches to reading instruction, specifically the whole-language and the code-emphasis (systematic phonics) approach and the implications for reading instruction (Chapter 3) and
- iii) the nature and application of the HRSP in relation to relevant literature and recent findings in the fields of reading instruction and reading intervention programmes (Chapter 4).

1.4.2. EMPIRICAL RESEARCH

The research and data analysis will be qualitative as well as quantitative in nature. The qualitative research in this study addresses the questions of 1) whether the HRSP meets the criteria for a complete reading programme and 2) the integration of the HRSP into the mainstream. The quantitative research in this study addresses the effectiveness of the HRSP in improving reading and spelling achievement in DSS learners from grade 1 to 5.

1.4.2.1. QUALITATIVE INVESTIGATION

Qualitative research seeks to interpret human actions, institutions, events and customs and in so doing construct a reading, or portrayal, of what is being studied. The ultimate goal of this kind of research is to portray the complex pattern of what is being studied in sufficient depth and detail so that someone who has not experienced it can understand it (McCutcheon, 1981). Ary, Jacobs and Razavieh (2002:354) list the major characteristics of qualitative research as follows:

- i) Qualitative inquiry assumes that human behaviour is context-bound. Human experience takes its meaning from, and therefore is inseparable from, social, historical, political and cultural influences within a particular **context**.
- ii) Because of this qualitative inquiry takes place within a **natural setting** e.g. in a classroom.
- iii) Furthermore qualitative inquiry aims at being **descriptive** rather than prescriptive, and relies on interviews, observations and documents for data collection.

Qualitative inquiry is therefore particularly suited to establishing the feasibility of integrating the HRSP into the mainstream classroom. The **phenomenon under study** in this case is then the integration of the HRSP into the mainstream classroom context. According to Ary *et al.* (2002:354) qualitative researchers cannot observe everything and all aspects of the phenomenon of interest, but they try to obtain a representative sample though **purposive sampling**. Purposive samples are assumed to provide maximum insight and understanding of the phenomenon by providing relevant information on the issue from as many perspectives as possible (Ary *et al.*, 2002:354). For the first part of the qualitative study, a **document analysis** will be undertaken. For the second part of the qualitative study, **comprehensive sampling** will be used.

Qualitative investigation to determine if the HRSP meets the criteria stipulated by the National Reading Panel Report (2000) for a complete reading programme

The method that will be used in this investigation will be *Content* or *Document Analysis* as described by Ary *et al.*, (2002:354). The main sources of data for this investigation will be the *HRSP Teachers Manual – Reading* and the *HRSP Teachers Manual – Spelling*. These documents will be examined for evidence for the use of phonemic awareness approaches, systematic phonics approaches, fluency training, vocabulary building, reading comprehension training and teacher training as described in the *National Reading Panel Report* (2000) for complete reading programmes.

Qualitative investigation to determine the feasibility of integrating the HRSP into the mainstream curriculum at DSS Primary School

For this component of the qualitative investigation, as recommended by Ary *et al.* (2002:354) **comprehensive sampling** will be used because of the small sample size (five class teachers) and the need to include all cases to ensure that all viewpoints were represented in the study to be able to declare a point of **data saturation**. The data collection method for this part of the qualitative study will be a 'structured interview' (Ary *et al.*, 2002) in the form of a self-constructed **questionnaire**. The questionnaire will consist of 21 closed-ended questions of scaled items and two unscaled questions (Appendix 1). According to Ary *et al.* (2002) open-ended questions permit a freer response rather than restricting the respondents to a choice from among stated alternatives. This format provides opportunity for richer response but is often difficult and time consuming to score. Close-ended questions ensure that all subjects have the same frame of reference in responding and also make it easier for respondents to respond on sensitive or private issues. Closed-ended questions are also easier to score and quantify (Ary *et al.*, 2002). The aim of the questionnaire will be to obtain information on the integration of the HRSP into the mainstream. The **credibility** of the data will be determined by the use of a procedure where the results of the questionnaire will be scored (quantified) and correlated with the findings of the **quantitative** investigation. The items of the questionnaire will be grouped by themes. The results of this procedure will be inter-correlated by means of the Pearson product-moment correlation, and also correlated with **effect size** scores for both spelling and reading for each class teacher.

1.4.2.2. QUANTITATIVE INVESTIGATION

Quantitative research is concerned with the use of calibrated instruments to categorise, measure and quantify phenomena. These data are then subject to statistical analyses to establish levels of

confidence about measured differences between scores. The findings are then used to establish the validity of hypotheses about the phenomena under investigation.

Research design

Two independent schools will participate in the study. Domino Servite School (DSS) has about 100 learners in the Foundation and Intermediate Phases, and seven teachers with mixed formal and in-service training. The school is situated in the Greytown area of KwaZulu-Natal, with a diverse learner profile, drawing from both urban and rural backgrounds, of whom most have limited English proficiency, and are from upper working to upper middle class homes. St David Diocesan (SDD) school is situated in Greytown, Kwazulu-Natal, and will serve as the control group. This school will be matched with DSS for learner profiles.

A non-randomised, pre-test post-test, non-equivalent control group design will be used. Both groups will be pre- and post-tested for literacy levels (reading and spelling). The grades one to five learners in DSS school will be subjected to the HRSP, as research group, while the grade one to five learners of St David Diocesan school with a matched learner profile, and which did not receive this programme, will serve as a control group. Grades six and seven of DSS school and St David Diocesan (SDD) will also be used for matching purposes.

Statistical methods

Inferential statistic is used firstly to establish the level of confidence we can attribute to a measured difference between two scores, usually group or sample means, and secondly to ensure representativeness of the groups or samples and thus to allow extrapolation of the findings of research to the target population. In this study however, whole intact groups will be used as the 'population' as recommended by Steyn (2000, 2002) and Ellis and Steyn (2003), and **effect sizes** will be used to evaluate the practical meaningfulness of differences between means (Steyn, 2005). To balance out the possible effects of extraneous variables, a random sample drawn from the pooled data of grades one to five will be analysed quantitatively using t-test and analysis of variance. **t-tests** were used for testing difference between group means. The **analysis of variance** will be used to partial out variance due to error thus providing a more sensitive test for the effects of the independent variable. It is also useful for estimating the contribution of different variables to the total variance. The **analysis of covariance** will be used in the pre-test-post-test design to 'correct' for pre-test variance between treatment and control groups, thus providing a more sensitive estimate of treatment effects. Pearson product-moment **correlation** will be used to

estimate whether a statistically significant relation existed between two variables. **Chi square** analyses will be used to evaluate categorical data. **Effect sizes** will also be calculated to compare differences between groups on different amounts of exposure to the HRSP and on fidelity of treatment measures. Effect sizes will also allow comparison with other similar research in the field. Effect sizes are useful as the measure is independent of sample size and allows for comparison across treatments and different studies (Howell, 1992:208; Shaughnessy & Zeckmeister, 1997:228).

The statistical package *OpenStat 3* will be used to carry out simple ANOVA, factorial ANOVA, ANCOVA, t-test, and product-moment correlation. ANOVA only indicates if a difference is present or not. *Post hoc* comparisons of means such as the Scheffe method allows pair-wise comparisons of individual group means, thus establishing where the differences are. *Post hoc* comparisons of means will be kept to a minimum, and the Scheffe method will be used. The Scheffe method allows for pair-wise comparison of means in an analysis of variance while controlling for family-wise error i.e. the chance of 'finding' a difference that is not there – a Type I error (Howell, 1992). Five texts, Leedy & Omrod, (2001), Howell (1992), Shaughnessy & Zeckmeister (1997), Monteith & Steyn (2001) and Ary *et al.* (2002) will be used to guide experimental design and statistical procedure.

Measuring instruments

The measuring instruments to be used to assess the learners' literacy level (and inherently their benefit from the HRSP), will be the formal *Schonell Graded Word Spelling Test* (Schonell & Schonell, 1956); the formal *Schonell Silent Reading Test A* (Schonell & Schonell, 1956); the formal *Daniels and Diack Test of Reading Experience* (Daniels & Diack, 1977), the formal *Young Group Mathematics Test* (Young, 1974). The mathematics test was included to test for Hawthorne effects (Shaughnessy & Zeckmeister, 1997).

The rationale for using the above mentioned first-language, norm referenced tests not standardised in South Africa was as follows:

- i) The criterion set in this study for evaluating the effectiveness of the HRSP was whether it would lead to the attainment of an advanced level (i.e. first language level) of spelling and reading proficiency.
- ii) The tests could be administered to whole groups in 15 to 20 minutes. Administering lengthy reading inventories individually to over 200 learners twice a year is logistically daunting and very disruptive to normal classroom activity.

- iii) The use of reading ages allowed for simple correction for maturation effects and yielded a single metric (a quotient score) which allowed comparison across grade levels. This would not be possible with most reading inventories which usually yield a grade level score, or simply an estimation of ability in a three point scale; basic, proficient or advanced.
- iv) The tests can be linked to underlying cognitive processes as described by Das, Kirby & Jarman (1979), Das, Naglieri & Kirby (1994) and Das, Karr & Parrilla (1996). They are therefore an index of underlying cognitive processes, which is a major emphasis in this study. This is difficult if not impossible with most reading inventories.
- v) Our experience indicates that despite their limitations these tests are very reliable i.e. they do not produce wide variability in individual scores over time.
- vi) These tests are not used for determining disability status or for placement, and reading ages are not as a rule reported. In the context of the HRSP, what is of greater interest is the change in score with intervention and not the raw score.

These tests will be administered by the class teachers of the respective groups. To avoid practise effects, repeated measures will be undertaken a minimum of six months apart. Other information obtained will be racial identity, gender, chronological ages and whether the learner used English as a first or second language.

Self-constructed questionnaires

Troia (1999) reported that a weakness of much reading intervention research is that **fidelity of treatment** i.e. how well the treatment was administered, is frequently not determined. For this reason, a questionnaire (Appendix 1) was given to the DSS teachers who used the HRSP to determine fidelity of treatment. The results of this questionnaire will be correlated with effect sizes per grade class. Secondly, Troia (1999) also commented that very often the type of reading instruction given to the **control group** is seldom reported. In order to obtain information on the type of reading instruction given to the control group, a questionnaire (Appendix 2) was given to the grade one to three teachers at SDD. The questionnaire was given to only first to third grade teachers because reading is not **explicitly** taught above third grade.

1.5. LIMITATIONS OF THE EMPIRICAL RESEARCH

The aim of this research was to establish if a **causal relation** existed between reading and spelling achievement in DSS and the HRSP. The emphasis in this study was therefore on **internal validity**.

The results of the empirical research will therefore be applicable to the two schools **only** and not to other learners and other primary schools.

1.6. EXPLANATION OF CONCEPTS

The overarching approach to this study is a sociocultural one in the Vygotskian sense. **Sociocultural theory** emphasises the role in cognitive development of co-operative dialogues between learners and more knowledgeable members of society. Learners learn the culture of their community (ways of thinking and behaving) through these (usually linguistic) interactions (Donald *et al.*, 2002:70; Estep, 2002; Woolfok, 2001:46).

In this dissertation, **literate** is used in the 'narrow' sense of being able to read and write, and **literacy instruction** is teaching children (usually) to read and write at a basic mechanical level. **Language development** occurs both informally and formally. **Language instruction** is formal and occurs usually in a school context, and includes all aspects of **communication**: reading, writing, speaking and listening. **Literary instruction** refers to the introduction of the child to story, narrative, genre and other aspects of the literary tradition.

In this dissertation **spelling** does not refer to 'correct usage' as defined by e.g. the Oxford Dictionary, but the awareness on the part of the child that words are made up of sound units, that these units map onto signs or graphemes, and that there are rules or generalisations governing the mapping of sounds to signs (Donald *et al.*, 2002:342). In this sense spelling is closely associated with **phonemic awareness** and **word analysis** (encoding and decoding skills). In this sense also spelling overlaps with reading at the basic mechanical level. **Reading** is used in the sense of understanding or interpreting texts (Chang-Wells & Wells, 1993:61), and as such must be distinguished from the more mechanical aspects of 'word calling'. For the purpose of this study, a child is not considered to be reading if they don't know the meaning and cannot interpret what is written. For this reason, the terms **reading proficiency** and **reading comprehension** are sometimes used in the discussion to draw attention to this distinction.

Spelling instruction would therefore be teaching children the sound-sign system and the rules and generalisations that govern it. **Reading instruction** would be making learners more efficient interpreters of texts. However, for the purposes of this study, reading instruction will include **both** aspects, as the former underlies and is a prerequisite for the latter. **Reading acquisition** is the

process of acquiring increasing facility in reading and is potentially a life-long process. Spelling and reading instruction occurs mostly in a formal context in a school environment, and usually to children in the early stages of development.

Learner Support in this dissertation includes the Vygotskian concepts of **mediation** and **the zone of proximal development**, and the Brunnerian concept of **scaffolding** (Donald, 2002:104; Estep, 2002). It includes all intentional and deliberate **interventions** in the becoming of the learners to enable them to reach their full potential cognitively, emotionally, physically and spiritually (Estep, 2002).

1.7. PROGRAMME OF STUDY

CHAPTER 1: Introduction, Problem Statement, Aims of Study, Methodology, Limitations of the Study, Explanations of Concepts and Programme of the Study.

CHAPTER 2: The Relation between Cognitive Development and Reading Instruction.

CHAPTER 3: The Nature and Application of Reading Instruction in Relation to Reading Acquisition

CHAPTER 4: The Rationale and Structure of the HiWay Reading & Spelling Programme® and the Results of Qualitative Evaluation of the HRSP.

CHAPTER 5: The Results of the Quantitative Investigation.

CHAPTER 6: Interpretation and Discussion of Results.

CHAPTER 7: Summary and Recommendations.

In the following chapter, the relation between cognitive development and reading instruction will be discussed.

CHAPTER 2

THE RELATION BETWEEN COGNITIVE DEVELOPMENT AND READING INSTRUCTION

2.1. INTRODUCTION

Nicolopoulou (1993:7) stated that "Vygotsky, unlike Piaget, thus does not offer a systematic and carefully documented program of research. Rather he offers a set of orienting concepts that, if accepted, foster a new way of viewing the psychological terrain." In this chapter the Vygotskian perspective on cognitive development and reading instruction will be discussed, and the relation between cognitive development and reading instruction explored. Figure 2.1 provides a summary of the semantic field addressed in this chapter. The major themes explored in this chapter are:

- The Vygotskian perspective on cognitive development
- Social cognition and cognitive development
- Constructivism
- Cognitive structure
- Intervention
- Metacognition
- Cognitive process models of cognition
- Practical implications for reading instruction

The major emphasis will not be an exhaustive discussion of the constructs but the evidence for a plausible relation between them.

2.2. THE VYGOTSKIAN PERSPECTIVE ON COGNITIVE DEVELOPMENT

Estep (2002) states that the foundational premise of Vygotsky's constructs of development is that the formation of the mind or cognition is dependent on the social context in which an individual lives. Blank (Estep, 2002) describes the assumptions upon which Vygotsky's

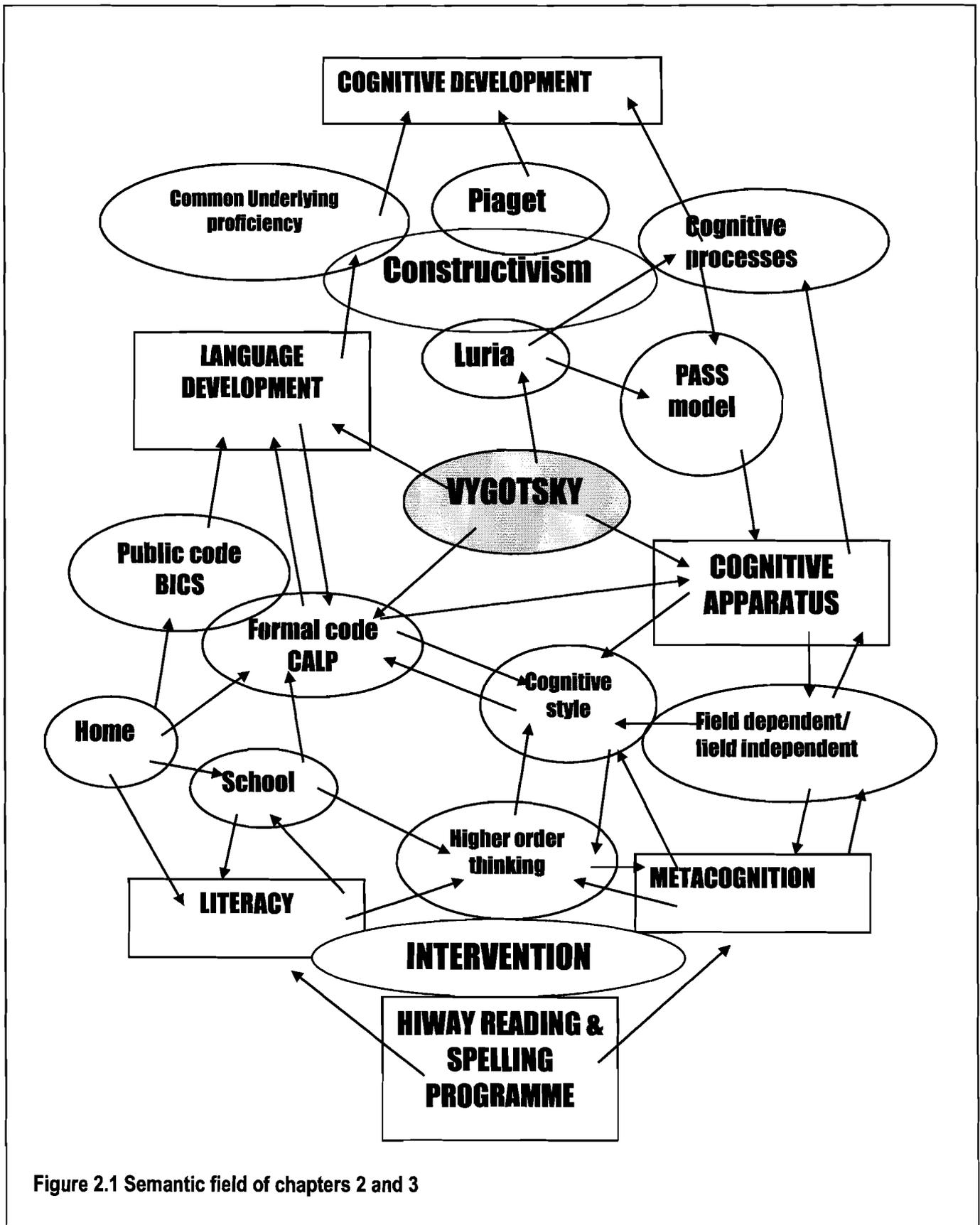


Figure 2.1 Semantic field of chapters 2 and 3

developmentalism rests. Mental activity is uniquely human. Culture is internalised in the form of neuropsychological systems that form part of the functional activity or 'cognitive apparatus' of the human brain. According to Vygotsky, the process of internalisation of these higher mental functions is 'historical' in nature i.e. society precedes the individual and provides the conditions that allow individual thinking to emerge. This development is not deterministic and maturational but is context dependent. As such, cognitive development will be different in each individual child arising from their unique social context (Estep, 2002, John-Steiner & Mahn, 1996). Culture is mediated to the individual through cognitive 'tools'. Cognitive tools are the sociocultural elements such a language and other symbol systems (e.g. the alphabet) which provide the necessary means of cognitive development (Donald, *et al*, 2002:70; Estep, 2002; Wertsch & Tulviste, 1992).

Moll (1992:239) used Vygotsky's perspective to gain insight into providing effective education for linguistically and culturally different students. He wrote (cited in John-Steiner & Mahn, 1996) that:

"One advantage [of a sociocultural perspective] is that in studying human beings dynamically, within their social circumstances, in their full complexity, we gain a much more complete andvalid understanding of them. We also gain, particularly in the case of minority children, a more positive view of their capabilities and how our pedagogy often constrains, and just as often distorts, what they do and what they are capable of doing." (Moll, 1992:239)

Such a view has particular relevance to the South African situation.

2.3. SOCIAL COGNITION AND COGNITIVE DEVELOPMENT

2.3.1. THE CONTRIBUTION OF PIAGET

An early attempt to describe the cognitive development of the learner was the work of Piaget (Donald *et al.*, 2002:70). His work remains very influential. He posited a developmental trajectory that was tied to maturation and was therefore deterministic. The stages a learner moved through were considered genetically innate. While some learners may develop faster than others, all learners would move through the same sequential stages of **sensory-motor**, **preoperational**, and **concrete operational** stages to achieve **formal operational** thinking. As a biologist by training, Piaget considered cognitive development to be a mechanism of **adaptation** to environmental conditions and demands. The basic impetus for cognitive development, however, came from within the biological constitution of learner i.e. it was innate. Piaget's model of cognitive

development has been criticised in terms of recent findings in the field of educational psychology (Woolfolk, 2001:27). While there is support for the **order** of the stages, his theory has been shown to be too rigidly tied to a maturational trajectory. Learners may reach these stages earlier than Piaget suggested. Furthermore, not all learners achieve formal operational thinking (Woolfolk, 2001:27). Piaget's theory also does not make room for a major socio-cultural input in cognitive development (Woolfolk, 2001:27). Nevertheless, the influence of Piaget's ideas remain strong, and Piaget's work is the major reason for the persistence of the maturational-lag perspective - (there is no intrinsic deficit - some children are just slower than others due mainly to 'contextual disadvantage' (Van den Berg & Naicker, 1996:21)) - in the literature on development and learning disability (Donald *et al.*, 2002:317), and the view that all children can learn and will all reach the outcomes if given conducive environmental conditions and enough time (Naicker, 2003:12; Winkler *et al.*, 2001:2). Moll *et al.* (2001:11) and Woolfolk (2001:14) have pointed out that the field of Education has many popular 'common sense', 'intuitive' and 'politically correct' perspectives and views. The goal of scientific enquiry to sift out fact from fancy, and to identify 'myths' or half-truths in our thinking that blind us to important issues, resulting in ineffective teaching practice (Moll *et al.*, 2001:11). Applying this to the above views on learning, the 'conducive environmental conditions' and 'enough time' would need more careful definition and rigorous testing in real-world conditions.

An important contribution of Piaget to learning theory is his view of the learner as a constructor of **schemas** (*schemata*), or mental frameworks of meaning. These schemas become more **differentiated** and **integrated** with time, and form the necessary foundation for formal learning (Moll *et al.*, 2001:4). The learner encounters new information and events constantly, and experiences as state of **disequilibrium** due to the need to fit new information or experience into their existing schemas. This **cognitive conflict** in Piaget's view provides the motivational energy to learn and to **assimilate** this information into existing schemas to achieve equilibrium (Donald *et al.*, 2002:70). Furthermore, if the new information and experience challenges or contradicts their existing schemas or constructs, the learner experiences 'cognitive conflict' (Donald *et al.*, 2002:64), and the learner must change their schemas to **accommodate** the information

The phenomenon of learning is rooted in the primordial fact that the learner is continually and intentionally directed at his or her world (DuPlooy, Griessel & Oberholzer, 1982:71) a phenomenon sometimes referred to as **intentionality** (Feuerstein *et al.*, 1991). In order to understand learners (and their learning), they must be understood as individuals in their **world**. The work of Piaget was crucial in alerting us to the world of the child (Woolfolk, 2001:46). Learning matter, facts and

information must be given meaning by being related to learners' prior interpretations of experience. Learning is essentially an intentional activity and a means of actualizing existence by interpreting experience and assigning meaning which in turn forms part of every learner's constructed 'world-of-meaning' (DuPlooy *et al.*, 1982:71). In Piaget's view, the initiative to learn must come from the learner - the adult (facilitator) only directs an appeal to the learner to organize and master the learning task.

2.3.2. THE CONTRIBUTION OF VYGOTSKY

The introduction of Vygotsky's work to the West has considerably weakened the strength of Piaget's arguments (Woolfolk, 2001:43). Vygotsky (Donald *et al.*, 2002:69) argued that cognitive development proceeds via a process of **mediation**. This is essentially the dialogue that takes place between members of a cultural group. In Vygotsky's view, cognitive processes are not innate but first appear within the context of socio-cultural dialogue and only then become internalized into the learners' cognitive apparatus as the internal semantic structure of the mind. The cognitive skills that obtain within a specific culture are the 'software' of the mind and as such need to be mediated to the learner (Rogoff & Chavajay, 1995). They will not appear spontaneously through direct experience (Estep, 2002; Feuerstein *et al.*, 1991). From the socio-cultural perspective, it is evident that learning must not be viewed as a purely mechanical, objective matter. Learners bring to the learning situation various beliefs, goals, attitudes, feelings and experience. They are existentially and inter-subjectively involved in the learning endeavour (DuPlooy *et al.*, 1982:71). Since cognitive development generally requires concept formation and concept acquisition, learning can only be achieved if the learner is actively involved or engaged at a deeper-than-cognitive (i.e. affective) level in the teaching-learning situation (Griessel, Louw & Swart, 1991) i.e. **connecting** must occur (Donald *et al.*, 2002:109).

Piaget regarded cognitive development as a relatively deterministic set of qualitative changes in thinking (Woolfolk, 2001:27). He considered these changes to be the natural adaptive response to the environmental stimuli. Piaget saw these changes as a result of **direct** exposure to his or her environment. Through these experiences the learner acquires more sophisticated schemas and matures sequentially through a series of developmental stages. Therefore, it was reasoned, improving the *environment* (i.e. material conditions) and providing stimulating *experiences* will facilitate this progress. His view in various forms is still found in the literature (Donald *et al.*, 2002:63). In contrast to this, Vygotsky postulated that the social transaction or *mediation* of

meanings is the fundamental means through which cognitive development progresses. Education 'leads' cognitive development (Estep, 2002). He stressed the vital role of language of the learner's development, whereby the learner gains mastery (Cole, 1985; Estep, 2002; John-Steiner & Mahn, 1996; Palinscar & Perry, 1995; Palinscar, 1998; Wertsch & Tulviste, 1992).

Vygotsky maintained that through primarily *verbal* dialogue the learner internalizes concepts and cognitive processes, and gradually gains greater cognitive control over his or her actions and thinking processes, which in turn become **tools** for further learning (Donald, *et al.*, 2002:70). For Vygotsky, psychological tools such as sign systems **mediate** cognitive development (Estep, 2002). For Bruner (see below), it is the teacher who acts as mediator, although this kind of mediation is implied in Vygotskian thinking in the concept of 'learning activity' (John-Steiner & Mahn, 1996; Kozulin & Presseisen, 1995; Wertsch & Tulviste, 1992). The mediator performs the function of providing mental "scaffolding" for the learning task until the learner becomes independent (Moll *et al.*, 2001:102). The elementary concepts are gradually extended into increasingly complex schemas or cognitive structures (Donald *et al.*, 2002:70) as the learner reflects on past experience in order to interpret the new (Wallace-Adams, 1996:312). These two processes, reflection and interpretation, are fundamental skills we need to foster and lie at the center of the reading process (Palinscar, 1998).

To emphasise the role of language in cognitive development, Wallace-Adams (1996:320) quotes Leontev and Luria, former students of Vygotsky, as saying: "The process of social intercourse and specifically its most systematized form, the teaching process, forms the development of the learner, creates new mental formations and develops higher processes of mental life. The assimilation of general human experience in the teaching process is the most important specifically human form of mental development in ontogenesis. *This deeply significant proposition defines an essentially new approach to the most important theoretical problem of psychology, the challenge of actively developing the mind*" (my emphasis)

Vygotsky stressed the importance of cultural transmission and intentional mediation of the learners' experience (John-Steiner & Mahn, 1996). Where these two processes are inadequate the learner fails to develop fully effective cognitive functions, resulting in his or her depressed functioning (Wallace-Adams, 1996:312; Feuerstein *et al.*, 1980; Skuy, 1996:185). If learners have constructed certain concept networks of experiences which have resulted in, for example, a sense of inferiority, experiences of failure, fragmentation of language, or alienation, they will need extensive 're-

mediation' through interaction, personal reflection and re-negotiation of meaning and significance in order for those concept networks to be re-defined. This redefinition must also take place at the level of attitudes, attributions, beliefs and goals (Scott, 1996:236). Wallace-Adams (1996:312) claims that most South African learners commonly encounter the following cognitive conflicts and fragmentation of experience.

- Firstly, cultural mores about parent-child relationships means that the type of dialogue envisaged by Vygotsky is frequently absent.
- Secondly, the mediated learning experience essential for the appropriate development of cognitive strategies and structures is weak or absent.
- Thirdly, the learners' language and concepts are based on a 'public' language code or basic interpersonal communication (Cummins, 1981, Lemmer, 1996:325). The school syllabus is based on a 'formal' code that bears little or no relationship to these learners' early experiences.

This last observation is of particular relevance to the crisis in South African education. The Revised National Curriculum Statement (2002:9) assumes that the learners arrive at school (Reception year) with a "high level of proficiency in their home language." As will be discussed later, this almost certainly is not the case, and this oversight might militate against the success of the RNCS in transforming education in South Africa.

2.3.3. THE CONTRIBUTION OF BRUNER

Bruner (Donald *et al.*, 2002:102; Duminy, Steyn, Dreyer, Vos & Dobie, 1996:234) following Vygotsky, claimed that cognitive skills are socio-culturally determined. Cognitive skills are transmitted by the culture into which a learner is born (Woolfolk, 2001:27). The manner in which a person reacts, perceives, and thinks depends upon skills and cognitive strategies which are acquired or inherited within a cultural context. Bruner defines cognitive growth as the development of internal representation systems to deal with information and the application of those internal systems of representation to the organization of newly acquired information (Donald *et al.*, 2002:102).

Whereas Piaget emphasised the *limitations* of the learners' capabilities at each stage, Bruner stressed those tasks that the learner *can* accomplish i.e. the cognitive skills in place and thus the learners' **learning potential** (Duminy *et al.*, 1996:234). This is similar to Vygotsky's zone of proximal development (Estep, 2002). In contrast to Piaget's fixed and unalterable stages of development, Bruner maintained that cognitive development can be accelerated (Duminy *et al.*,

1996:234). Furthermore, Bruner considered the learners' cognitive structures to be modifiable. Since he claimed that cognitive skills are transmitted by culture, cognitive development is dependent upon stimulation from the cultural environment, hence his concept of **scaffolding** i.e. providing educational support until the learner can function independently (Donald *et al.*, 2002:102). Bruner stressed the different **levels of cognitive functioning** rather than different **stages of development** (Duminy *et al.*, 1996:234).

2.3.4. THE LINK BETWEEN COGNITIVE DEVELOPMENT AND LANGUAGE

Wiechers (1996:175) stressed a strong link between cognitive development and language development. As mentioned in chapter 1, this might provide a rationale for intervention. As Wiechers (*op cit.*) pointed out, the rationale for choosing reading proficiency and reading comprehension instruction as a tool for fostering cognitive development lies in the fact that there is high correlation between verbal ability and measured intelligence. This is traditionally seen as indicating a direct relation between IQ and language development. The traditional view has been that IQ 'leads' cognitive development (Estep, 2002). Vygotsky criticised the idea of intelligence as a fixed genetic endowment, and claimed that language development and education in general 'leads' cognitive development. A consideration of the evidence (John-Steiner & Mahn, 1996, Wertsch & Tulviste, 1992, Xu *et al.*, 2005) indicates that this might be at least a bilateral relation. This implies that if language ability is highly developed, intelligence - as cognition and not genetic endowment - is also likely to be so. According to Wiechers (1996:175) cognitive development takes place by means of language, and more sophisticated thought patterns are also carried by means of inner speech as language.

According to Vygotsky's theory, to understand individual thinking, one needs to understand the social and cultural-historical contexts in which it is used (Kapp, 2004). Research cannot just look at individual differences in thinking without looking at the kinds of activities in which individuals engage and the kinds of institutions of which they are part (Rogoff & Chavajay, 1995). Olson (1976) (in Rogoff & Chavajay, 1995) suggested that cognition cannot be separated from the 'technologies' (reading, writing, speech and numerical systems) invented within a particular cultural context to extend cognitive processes. He argued that people who are literate become skilled in very task-specific cognitive processes. Earlier research by Scribner and Cole (1981) indicated that literacy relates to cognitive skills through *specific practices* involved in the use of literacy. Different forms of written text and genres promote specific cognitive skills related to their use. Rogoff (1981)

concluded that there was a local relationship between school literacy practices and *specific* cognitive activities. Schooled (literate) individuals showed a variety of cognitive skills that were related to the activities of schooling. Schooling seemed to foster perceptual skills in the use of graphic conventions to represent depth in two-dimensional stimuli and in analysis of two-dimensional patterns. Schooled individuals were skilled in deliberately remembering disconnected bits of information. Schooled individuals were more likely to spontaneously engage in strategies that organise unrelated items to be remembered. Schooled individuals also were more likely to organise objects on a taxonomic basis, putting categorically similar objects together. They also showed greater facility in shifting to alternative dimensions of classification and in explaining the basis of their organisation (Rogoff & Chavajay, 1995).

It is in the light of the above that cognitive development is discussed in terms of the instruction of reading. Ramarumo (1996:350) commented on the findings of a research project on underachievement in school beginners. He stated that one of the most significant findings was the “very strong relationship” between *literacy* at age five (sic) and all later assessment of school achievement. Ramarumo (1996:350) listed “the predictors of a child’s ability to benefit from formal education”, as “his or her levels of intellectual functioning, motivation, *language development* and especially, knowledge of (sic) *literacy* ...” (my emphasis).

Over thirty years ago, Vernon (1969:231) made a similar observation. He maintained that literacy instruction and the fostering of the ‘formal’ language code was one of the most promising avenues for intervention in the cognitive development of learners. He felt that it was the learner and those associated with the learners’ cognitive development, rather than the environment that needed to be the target of initiatives to bring about educational reform. As Wallace-Adams (1996) pointed out, merely changing environmental factors and addressing past imbalances, while important, would likely be ineffective if the proximal causes of cognitive dysfunction were not addressed. Kriegler and Farman (1996:48) stated that “we have to find ways of changing the root culture, including our schools organization, curricula, methods of teaching and procedures of assessment”. Vernon (1969:68) commented that “many educationists and public speakers, but also social scientists who ought to think more rationally, frequently state that the superior scholastic achievement ... of the upper and middle class is in some way unjust, or attributable to class privilege.” Vernon wrote further “ ... ‘unfair’ economic or educational conditions are not the sole or the most important explanation. It is the people and not only their material conditions that we must strive to change.”

The socio-linguistic perspective (Donald, *et al.*, 2002:70) alerts us to the fact that the construct 'literacy', like 'intelligence', is first and foremost not a universal biological, maturational or even psychological phenomenon, but a specific socio-linguistic (i.e. a cultural) construct and goal within a specific cultural structure of meaning (Das *et al.*, 1979; Rogoff & Chavajay, 1995). On the basis of the above discussion, "changing people" would mean providing people with the cognitive modifiability to be able to change the cultural narratives and discourses that keep us mired in our problems (Kapp, 2004), and the cognitive apparatus to accommodate our existing worlds of meaning to reality and truth (Gibbs, 1981). Piaget alerted us to the hidden danger of assimilation via selective attention, selective inattention, and the distortion of information and experience to fit our existing understanding (Woolfolk, 2001:27). It follows from this that "changing people" would mean firstly changing the cognitive structure of the individual to ensure openness to experience and reality and an active epistemological stance (Gibbs, 1981) which seeks to know and discover truth despite the disturbing consequences for our **constructed worlds of meaning**. In the following section **constructivism** and **cognitive structure** will be considered.

2.4. CONSTRUCTIVISM AND THE COGNITIVE STRUCTURE OF LEARNERS

2.4.1. CONSTRUCTIVISM

Constructivism is the view that learners must play an active role and participate in their own becoming (Moshman, 1982; Woolfolk, 2001:329, Donald *et al.*, 2002:96). In Piaget's view, learning is viewed as a dynamic activity emanating from people themselves; learners, through the learning intention, want to know and want to understand the learning material. The weakness of Piaget's view is that it assumes that the learning intention is always present and always strong (Woolfolk, 2001:27). However, if the learning intention is weak or absent, learning will hardly be possible. This need not be viewed simply as a lack of motivation. The reasons for this need not only be sought in the learners' goal structure, which in turn reflects their beliefs and interpretations of reality, but also their cognitive capacity to constructively engage their experience (Kruglanski, 1990, Feuerstein *et al.*, 1991).

The development of constructivist learning theory can be traced back to Kelly (1955) who referred to the products of a person's interpretations as *personal constructs*. The person utilizes these constructs for dealing with new information from the environment in his/her unique way. Constructs are therefore more than verbal labels of something, more than mere 'concepts'. They also contain

value judgments and valence - relevance and meaning (Phillips, 1995; Prawat & Floden, 1994). The learning and development of an individual thus revolves around attempts to understand the world through the continuous explication, evaluation and elaboration of the person's construct system or world of meaning (Du Plooy *et al.*, 1982:71; Kruglanski, 1990). With these personal constructs, the individual continually tries to make sense out of his/her experiences. Kelly rejected the mechanistic view that cognitive development was determined solely by the operation of environmental events. Individuals do not simply react to the environment; instead, they actively, uniquely, and systematically **construe** it, and then utilize these constructs to manipulate, anticipate and control events (Duminy *et al.*, 1996:241, Marshall, 1996; Spiro, Feltovich, Jacobson & Coulson, 1991).

2.4.2. COGNITIVE STRUCTURE

The educator has an important task to convert knowledge into forms that fit growing minds. A range of cognitive experiences should be provided to the learner to ensure adequate concept formation, and the accommodation of new knowledge into the learner's existing cognitive structure. Appropriate experiences need to be provided to stimulate and accelerate the onset of the next level of cognitive development (Griessel *et al.*, 1991).

Only adequate, functional cognitive structures facilitate successful learning. Educators should therefore actively seek to develop the most efficient methods of fostering long-term acquisition of meaningful and usable bodies of knowledge (Skuy, 1996:185), not only as content or outcomes, but as process skills. If the learners' cognitive apparatus is dysfunctional, intervention and re-mediation of the necessary cognitive processes are essential **before** meaningful learning can take place. However, the practical implications of this in a class of 40 to 50 learners are often daunting to poorly trained educators. Csapo (1996:34) states that equipping educators to apply appropriate learner support strategies within the mainstream is a priority in South African schools.

Skuy (1996:185) claimed that it is helpful to assess and to evaluate the quality of learner's existing cognitive structures. Failures in the learning situation i.e. learning difficulties, however, are often the result of an inadequate **integration** by the learner of new learning material in the existing body of knowledge. Educators should therefore determine the extent to which a functional cognitive apparatus is in place, and that important concepts are understood by the learners *prior* to teaching new concepts (Feuerstein *et al.*, 1980).

Feuerstein *et al.* (1980) stated that we cannot be sure that understanding is complete if only the learners' verbal explanations (outcomes) are considered. This is an important critique in view of the present emphasis on outcomes. Kriegler and Skuy (1996:109) also claim that educators should take cognisance of the *errors* made by learners. A poor output response will often reflect not a low cognitive ability but the absence or dysfunction of the underlying cognitive operations necessary to complete the learning task. Wrong answers should never be ignored on the basis of the view that the learner will reach the outcomes given enough time, but should always be followed up. In certain cases, a wrong answer can be of much more value to an educator (and a strategic learner) than a correct one. A preoccupation with 'right' outcomes (achieved or not achieved, competent or not yet competent) would pose the very real danger of missing important information about the needs of the learner.

Ericksson (1984:55) states that to develop competence in their learners, parents and educators need to create opportunities that are appropriate to the learners' stage of cognitive development so that they may **exercise skills** and integrate such skills into strategies for learning and thinking. Learners are not necessarily or deterministically competent but need to experience challenges that will give them a sense of mastery (Feuerstein *et al.*, 1980; Scott, 1996:236). To achieve excellence in any field requires self-discipline, practice in tasks and training in skills, plus persistence and self-evaluation (NRP, 2000). Parents and educators can provide stimulating experiences through which the learners are able to become aware of and understand the way in which they are thinking (metacognition), and thereby increase their learning and stimulate cognitive development (Skuy, 1996:185; Wallace-Adams, 1996:312).

Woolfolk (2001:200) wrote that learning takes place by initiating connections and associations between stimulation and the response, and such associations are ordered and sequenced through the development of language leading to the formation of concepts. Learners need to develop competence in learning, perceiving, communication and thinking skills to be encouraged to manifest or actualise their potential ability and achieve excellence (Eriksson, 1983:55). Furthermore, skills in listening and reading comprehension (input) and effective communication in both speaking and writing (output) are essential to cognitive growth (RNCS, 2002; Wallace-Adams, 1996:312; Wiechers, 1996:175). Vygotsky (cited in Donald *et al.*, 2002:70) argued that the skills of thinking, such as the formation and creation of ideas, the testing of hypothesis, the gathering of information, and the presentation of effective arguments (Skuy, 1996:185), are developed by means of the dialogue or 'intellectual exchange' between parents and learners (Wiechers,

1996:175). In Vygotsky's opinion, it is this interpsychological process which leads the learner towards independent reasoning and learning as an end in itself, i.e. life-long learning (Naude & Van der Westhuizen, 1996:159; Skuy, 1996:185).

Wallace-Adams (1996:312) states that the learners' cognitive structure for learning, both rural and urban, often arise from basic life experiences, which in Vygotsky's theory was inadequate for eliciting the emergence of higher cognitive functioning (Estep, 2002). Feuerstein (1980) argued that learners for whom culture (in the Vygotskian sense) is adequately mediated can assimilate another culture since the mediation and interaction within their own culture have enabled them to build cognitive frameworks, attitudes, beliefs and goals which allow them to function in any culture. Wallace-Adams (1996:312) wrote that when an entire culture is in a state of transition of such magnitude as that of moving from developing to the developed world (as in South Africa), there is often a rejection of the past cultural heritage that is perceived as a burden to be discarded. In the context of global culture and post-modernism, learners receive mediation that is disconnected, fragmentary, and conflicting. Values, attitudes, and behaviours are in dissonance. This tends to lead to the establishment of resistance cultures together with a victim mentality which reinforce existing cognitive styles of conformity, dependence and passivity, and which is very difficult to address (Scott, 1996:236; Van der Merwe, 1996:283). In such a changing and uncertain context as post-modernism (Veith, 1994), the mediating processes, which should structure the underlying functions upon which successful thinking depends, are fragmented and ineffective. As Wallace-Adams (1996:312) pointed out, a learner who cannot perform these cognitive operations because his or her perception of the world is uncertain or contradictory, cannot perform the overall task.

It is important at this point in the argument to preempt any objection to these ideas on the basis of perceived elitism in claiming that a certain individual or group is superior to another (Wertsch & Tulviste, 1992). If we accept the Vygotskian perspective that the cognitive apparatus acts a 'tool box' and serves particular functions within a specific socio-cultural context, then it is quite legitimate and even necessary to speak of the superiority of different cognitive tools to carry out certain tasks e.g. compare the Roman numeral system with the modern numeral system (Woolfolk, 2001:45). By analogy, a Pentium 4 is clearly 'superior' to a 386, and saying so says nothing about the innate worth or intelligence of the individual using the 'tool'. Should an individual or a group insist on using a 386 even when a Pentium 4 is available because it has been sanctioned by culture and tradition, we may want to ask questions about their goal structures and beliefs, but that is another issue altogether.

In contrast to Piaget's ideas, it is now established that **the role of the learner in learning is important but not sufficient**. Advocates of the phenomenological approach (DuPlooy *et al.*, 1992:163) emphasized the learners' need for educational support, or in Bruner's view, scaffolding (Moll *et al.*, 2001:102). Vygotsky also emphasised the role of the educator, without which cognitive development and the emergence of higher cognitive processes cannot occur (Estep, 2002). Vygotsky claimed that the learners need educators to help them to function within their *zone of proximal development*. This is the view that a learners' reach will always exceed their grasp. Learners will always be able to understand more than they can express or communicate. Cognitive development always has to 'wait' for an appropriate socio-cultural context to cause the cognitive process to emerge and to become internalised in the learner (Estep, 2002). This is the area in the learners' cognitive growth that is beyond their own unaided ability but is achievable through the **intervention** of a mediator who must prepare and open up the way along which the learner ventures (Griessel *et al.*, 1991). Insightful mastering of subject matter does not occur spontaneously or automatically. Educators must systematically and deliberately **intervene** in the learner's world to interpret, rearrange, and select events for a learner to challenge their constructed world-of-meaning and to facilitate meaningful change (Estep, 2002; Feuerstein *et al.*, 1979, 1980; Griessel *et al.*, 1991). This brings us to consider the construct of intervention. In the following section the construct of *intervention* will be examined.

2.5. INTERVENTION

2.5.1. THE RATIONALE FOR INTERVENTION

For Vygotsky it was self-evident that cognitive development requires deliberate, systematic intervention (Estep, 2002). McCormick and Hickson, (1996:55) have stated that efforts to reduce the negative impact of a cognitive or neurological dysfunction for young learners are evident throughout the world. These efforts may be described as *inter alia* "preschool schooling", "early intervention", "early childhood education" and "special education" (McCormick & Hickson, 1996:55). They remark that "parents, professionals, concerned citizens and community members are actively engaged in these efforts, which are not only indicated in cases of neurological and physiological dysfunction, but also of cognitive dysfunction" (McCormick & Hickson, 1996:55). This last i.e. cognitive dysfunction, is particularly relevant for South Africa, considering the unacceptably high incidence of underachievement (Donald *et al.*, 2002) and learning difficulty (Engelbrecht *et al.*, 1996).

Firstly we need to consider the underlying assumptions and logic behind the construct. Peterson (1987; cited in McCormick & Hickson, 1996:55) suggested eight "principles" which underlie the provision of services for young learners with learning difficulties and those 'at risk' for developing disability status. Although specifically related to *early* (pre-school) intervention, these principles apply to the provision of intervention in general. McCormick and Hickson (1996:55) view these principles as a rationale for intervention. These can be arranged into logical structure as indicated in Figure 2.2.

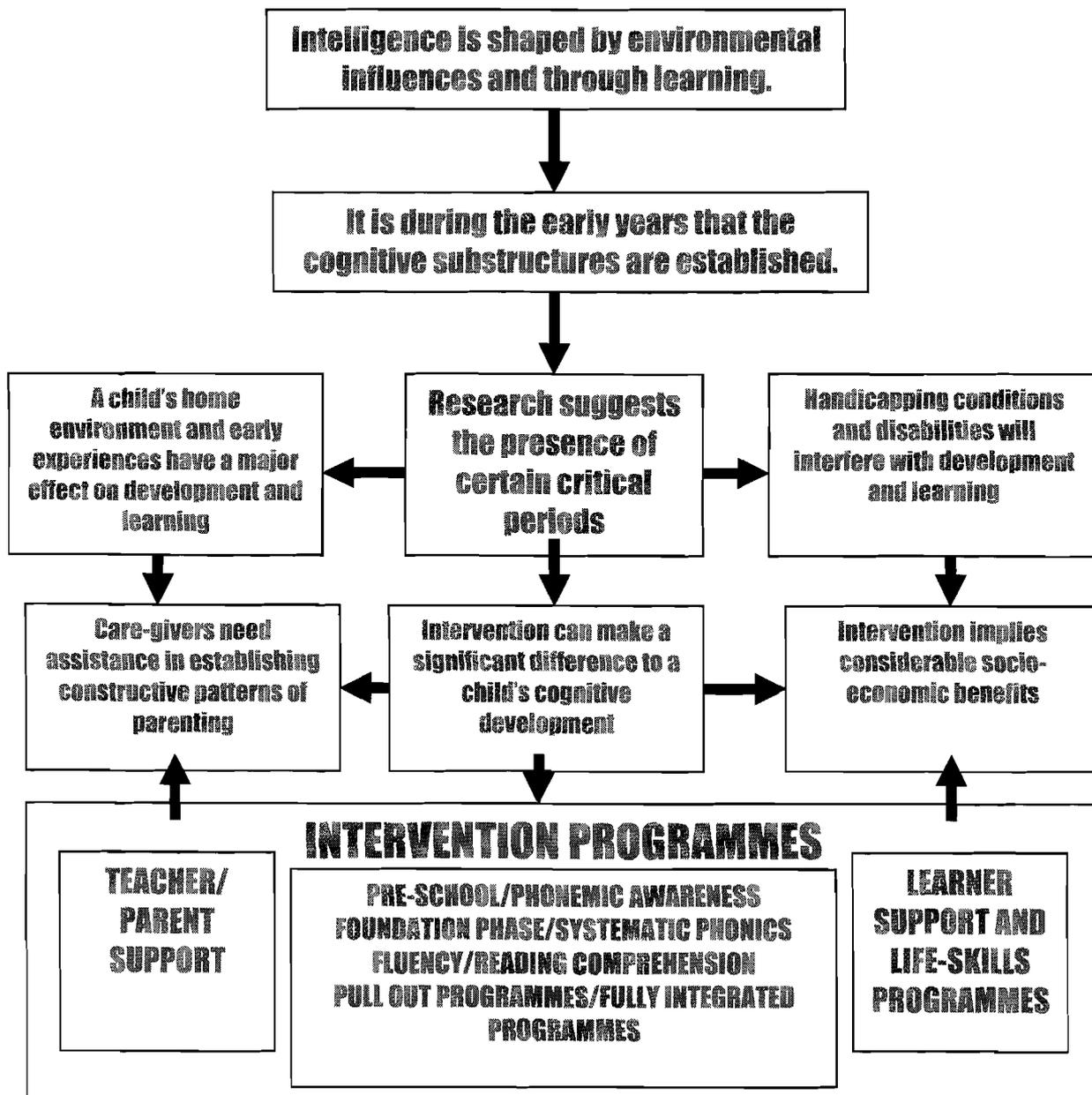


FIGURE 2.2. RATIONALE FOR INTERVENTION

This rationale can be summarised as follows: i) the trajectory of cognitive development is not fixed at birth but is shaped by environmental influences and through learning. The nature/nurture debate is an artificial abstraction. It is always both. Where either are deficient, a disharmonious or dysfunctional dynamic results (Du Toit, 1996). This means that ii) intelligence is not a fixed genetic endowment but a set of learnt cognitive skills or pathways. Vygotsky maintained that it is primarily through language that the initial patterns of learning and intelligent behaviour (that provide the cognitive substructure for all subsequent cognitive development) are established, iii) we know that research suggests the presence of certain critical periods ("window" periods), particularly during the early years (Johnson & Newport, 1989, Woolfolk, 2001:46), when a learner is most susceptible and responsive to learning experiences, but also most vulnerable to the absence of mediation or what Feuerstein *et al.* (1980, 1991) called "cultural deprivation", iv) a learner's cultural environment and early experiences, particularly the degree to which these are nurturing or depriving, have a major effect on cognitive development and learning, v) handicapping conditions and other factors that render a learner 'at risk' for developmental disabilities will interfere with cognitive development and learning to the extent that the original disabilities become more severe and secondary handicaps appear. It follows from the above that, vi) *earlier* intervention can make a more significant difference in the cognitive development of learners, and can do so more rapidly, than later remedial efforts (Foorman, 1996; Foorman, Francis, Winikates, Metha, Schatschneider, & Fletcher, 1997; Stanovich, 1986, 1990). This view contrasts with the maturational lag hypothesis and the 'wait-and-see' attitude. Furthermore, vii) caregivers need assistance and training in establishing constructive patterns of parenting and schooling and viii) intervention implies considerable long-term socio-economic benefits (McCormick & Hickson, 1996:55), an important consideration to offset the enormous costs of intervention programmes at national levels.

During the initial stages of cognitive development, a cognitive dysfunction may not in itself produce a learning deficit, but will interfere with "normal" learning processes (McCormick & Hickson, 1996:55). As Piaget and more convincingly, Vygotsky have argued, cognitive development is an outcome of the interaction that takes place between learners and their environment. Learners with learning difficulties are likely to be less efficient on their own. They may be less adept at engaging their environment, participating in social and object exploration, and initiating such interaction (McCormick & Hickson, 1996:55). This in turn hampers cognitive development.

The purpose of intervention is therefore to provide the 'conducive environment conditions' so that learners are engaged in a developmentally appropriate manner. McCormick and Hickson (1996:55) state that we need to understand i) the limitations imposed by learning difficulty which compromise the quality of the learning environment, ii) the learner's ability to process information from their experience of the environment, and iii) limitations imposed on new learning by the absence or delayed acquisition of prerequisite skills and responsiveness to learning opportunities. For learners with less obvious and more subtle 'soft' disabilities, McCormick and Hickson (op cit.) emphasise that we cannot afford a wait-and-see approach (Foorman *et al.*, 1997).

2.5.2. COGNITIVE DEVELOPMENT AND READING DIFFICULTY

While some learners learn to read with seeming ease, there are still large numbers of learners who experience a tremendous struggle in learning to read and write. These learners come from all socio-economic and cultural backgrounds (Palinscar, 1995). This is particularly true of South Africa (Donald *et al.*, 2002:337; Engelbrecht *et al.*, 1996), with difficulties with reading emerging as an area of urgent need.

Wiechers (1996:175) claims that in the past three decades psychologists and educationists have come to realize that the preschool years are very important for the learner's cognitive development. She quotes Beck (1986:18) as stating; "All learning is likely to be influenced by the very basic learning which has taken place before the age of five or six..." While the importance of preschool (kindergarten) learning is well attested (NRP, 2000), due caution is needed lest we claim too much for *early* (preschool) intervention. Learning does not stop at five or six (Bruer, 1999), and early gains can be quickly lost if not reinforced. It is often reported that the gains following early intervention, though significant, are subject to rapid decay (Troia, 1999; Zigler & Styfco, 1994). This is however, not to be construed as evidence against intervention (Casto & Mastropieri, 1986; Haskins, 1989; Guralnick, 1991; Whitehurst, Epstein, Angel, Payne, Cronje & Fischel, 1994). If intervention involves fostering skills, it would be expected that the skills if not reinforced would decay. Nevertheless, some programmes have reported maintenance of effects many years after the termination of the formal programme (Campbell & Ramey, 1994; Lazar & Darlington, 1982; Lerner, 2003, National Reading Panel, 2000).

Wiechers (1996:175) states that cognitive stimulation takes place through language, and more sophisticated thought patterns are mediated by means of inner speech as language. She explains

the high correlation between verbal ability and cognitive development as a result of the **mediated learning experience** (Feuerstein *et al.*, 1980, 1991) that takes place between the learner and the caregiver. The mediator teaches the learner to observe and interpret, and elicits language usage and concentration from the learner. The mediator assists the learner in creating order out of their experience. In this way the learners' cognitive structure is provided with anchoring ideas and is refined to become more logical and functional.

Wiechers (1996:175) emphasizes that the upbringing of the young learner involves far **more** than just physical care and emotional support. The mediator has a vital task in moulding the learners' thinking, and the quality of their cognitive functioning. Feuerstein *et al.* (1980, 1991) claimed that a major inhibiting factor in respect of learners with learning problems was deficient "mediated learning experience" during the learners' early years of life. Begab (cited in Feuerstein *et al.*, 1980) said that this type of deprivation — the absence of mediators in the learners life who can effectively focus attention and interpret to them the significance of objects, events and ideas in their social surrounding — is the root of most failure.

Wallace-Adams (1996:312) stated that while factors of socio-economic disadvantage undoubtedly contribute to learner underachievement, these factors should be classified as indirect or distal causes of underachievement. The alleviation of disadvantage and the development of support structures, while important in the South African context, need to be more than just the provision of extra facilities or addressing past imbalances. While such provisions will undoubtedly alleviate the distal causes of underachievement, the proximal causes of learner underachievement derive from underdeveloped cognitive functions (Feuerstein *et al.*, 1980, Skuy, 1996:185). This underdevelopment arises from lack of appropriate experiences and the necessary interaction through language-dialogue. Underdeveloped cognitive functions inevitably have an impact on the individual, with direct consequences for each learner's cognitive development, learning, and achievement at school.

Wallace-Adams (1996:312) concludes that improving the overall cognitive performance of such learners demands intervention or mediation, not of specific outcomes or content, but of the **processes** of learning and the development, refinement and crystallisation of **cognitive functions** that underlie effective thinking. In the following section these two constructs will be examined.

Feuerstein *et al.* (1979, 1980) has categorized cognitive functions according to three major phases - namely input, elaboration and output. The 'input', 'elaboration' and 'output' typology is an obvious analogy to computer systems, and the information processing model of learning (Woolfolk, 2001). It also parallels the PASS (Planning, Attention, Simultaneous, Successive) model developed by Das, *et al.*, (1994). The input-elaboration-output analysis of the way learners think (Kozulin & Presseisen, 1995) allowed Feuerstein to progress from a general analysis and description of the causes of inadequate intellectual functioning in learners, to a system of diagnosis and intervention which can be used by educators, parents and other professionals with a limited amount of training (Kriegler & Skuy, 1996:109). Feuerstein *et al.* (1979) noted that a learner's failure to perform a given operation, whether in the classroom or test situation, is often attributed either to a lack of knowledge of the principles involved in the operation or to a low intelligence. However, the deficiency may reside not at the operational level or in the specific *content* of the learners' thought processes, but in the underlying cognitive functions upon which successful performance of cognitive operation depends.

The school's task therefore is to develop the learners' underlying cognitive functions to ensure a functional cognitive apparatus which in turn will ensure the ability to learn and to become an autonomous thinker (Malan, 1996:249; Monteith, 1996:207) and foster intrinsic motivation, love of learning and extension of interests (Botha, 1996:227; Scott, 1996:236). The quality of educator-learner interaction and communication will vitally effect the learners' development of the cognitive and motivational functions needed for learning. Conversely, it is through the lack of or insufficient mediated learning that cognitive deficiencies arise (Wallace-Adams, 1996:312).

Feuerstein claimed that cognitive functions can always be further enhanced (Green, 1996:130). His position has met with some criticism (Frisby & Braden, 1992). However, as Feuerstein *et al.* (1979) himself pointed out, a higher achieving learner is not necessarily one who has developed those cognitive functions needed for autonomous learning in later life. Cognitive ability is relative, and there will be variations both within individuals and between individuals in the degree of competence in any given cognitive function (Das *et al.*, 1994; Kriegler & Skuy, 1996:109; Skuy, 1996:185). There are also those for whom particular cognitive dysfunctions may be extremely difficult to address. In such cases, it is important to adopt a realistic approach, and to foster compensatory cognitive functions and skills by which the learner can achieve the same goals.

Skuy (1996:185) claims that through mediated learning the individual develops efficient thinking skills which enable him or her to become an autonomous and independent learner. However, as Skuy (op cit.) points out, cognitive functions cannot be seen out of their cultural, developmental, situational and emotional contexts. For example, what is considered necessary and/or desirable in one culture, may be seen as irrelevant in another (Wallace-Adams, 1996:312). What may be regarded as a deficiency at one age, will be considered as developmentally appropriate at another (Kriegler & Skuy, 1996:109). A learner may exercise a cognitive function fully in one situation but, for motivational or emotional reasons, negate it in another (Botha, 1996:227; Monteith, 1996:207; Scott, 1996:236). The issue may not relate to the learner's cognitive functions at all, but may pertain to the characteristic demands of the cultural environment.

Kriegler & Skuy (1996:109) maintain that the analysis of cognitive functioning in terms of underlying processes is seen as a more effective alternative to the traditional forms of psychometric assessment providing the educator with a tool whereby to constructively assess and intervene in areas of difficulty. This idea has been successfully operationalised by the PASS model and CAS battery (Das, 2002). Despite the lack of empirical support for the position against the use of psychometric testing (Frisby & Braden, 1992), given the present climate with regard to psychometric testing and even testing in general, alternative strategies might be helpful in providing a way forward in the educational crisis facing the new South Africa. In this regard, Al Otaiba and Fuch's (2002) proposal that a two-phase multi-component reading programme be used as a tool for identifying the 'unresponsive' learner take on particular significance for this study and the potential of the HRSP.

Skuy (1996:185) states that the goal of Instrumental Enrichment (Feuerstein *et al.*, 1991) was to foster autonomous learning and thinking by decreasing cognitive dysfunction, enhancing mediated learning experience, and providing opportunities for fostering intrinsic motivation. An important component of autonomous behavior is self-knowledge, awareness of the need to change, and of mechanisms for evaluating, and monitoring self-change. This brings us to a consideration of **metacognition**.

2.6. METACOGNITION

Donaldson (1978:95 - cited in Moll *et al.*, 2001:115) claimed that: "It turns out that those very features of the written word which encourage awareness of language may also encourage

awareness of one's own thinking and thus be relevant to the development of intellectual self-control. This has important consequences for the development of the kinds of thinking which are characteristic of logic, mathematics and the sciences."

In the view of cognitive learning theory, executive control processes guide the flow of information through the information processing system (Woolfolk, 2001:243). Executive control processes include attention, maintenance rehearsal, elaborate rehearsal, organisation, and elaboration. These executive control processes are also sometimes called metacognitive skills. A term evidently coined by Meichenbaum (1976, 1977), *metacognition* loosely refers to 'thinking about ones thinking', but more specifically refers to the inner speech processes that direct and regulate thinking (Baker & Brown, 1984:253, Baker, Decker & Defries, 1984). There are three essential metacognitive skills - planning, monitoring and evaluation (Woolfolk, 2001:260). These three processes would fall mainly within the areas of **planning** and **attention** in the PASS model (Reid *et al.*, 2002). Metacognition may also be viewed as a 'mindful abstraction' (Woolfolk, 2001:311), described as the deliberate identification of a principle, main idea, strategy or procedure that is not tied to the specific problem or situation but could apply to many. Such abstractions become part of learners' metacognitive knowledge (Woolfolk, 2001:311).

In 1976, Meichenbaum put forward a ***process oriented cognitive-functional approach*** to learning disabilities. The cognitive functional approach emphasises both a task analysis, and an accompanying psychological analysis of the cognitions that subjects employ to perform a task. A functional analysis of the learners thinking processes and a careful inventory of cognitive strategies are conducted to determine which cognitions, under what circumstances, are contributing to or interfering with performance. This approach has become current in the form of dynamic assessment (Archer, Rossouw, Lomofsky & Oliver, 2003:97; Kriegler & Skuy, 1996:109; Reid, Kok & Van der Merwe, 2002). Central to the cognitive-functional approach is the role of the learners' cognitive strategies. A "process-oriented, cognitive-functional" approach emphasises the role of thinking, or inner speech mechanisms, in controlling behaviour and contributing to adequate task performance (Meichenbaum, 1976). Meichenbaum (1976) postulated that learners with learning difficulties differ from non-disabled learners in their thinking processes, cognitive strategies, and in the quantity and quality of their inner speech, or what they say to themselves when confronted with a task. Vygotsky had a similar view on learning difficulty (Das, 1995). Das, Kirby and Jarman (1979), Kirby and Robinson (1987), Kirby, Booth and Das (1996) and Naglieri and Reardon (1993) have reported that learners with reading difficulty show measurable differences in their use of

successive and **simultaneous** coding. Das *et al.* (1995) reported differences in the cognitive process of **planning** distinguished good problem solvers from poor problem solvers. Evidence therefore exists that supports a process-oriented cognitive-functional approach to thinking and learning. It was noted above (chapter 1) that there is evidence for the efficacy of scientifically validated reading instruction in bringing about changes in the functional organisation of the brain (Pugh *et al.*, 2000). It is plausible therefore, that instruction in reading comprehension strategies would be effective in fostering the inner speech of metacognition in the learner. This would in turn lead to i) decreased cognitive dysfunction which issues in an active rather than a passive epistemological stance, ii) enhanced mediated learning experience due to greater openness, and iii) increased intrinsic motivation due to autonomous thinking (Skuy, 1996:185). In the following section the PASS process model of cognition developed by Das and colleagues will be discussed in more detail.

2.7. THE PASS PROCESS MODEL OF COGNITION

The work of Luria (1970), a colleague of Vygotsky, on the functional organization of the brain has suggested the possibility of an interface between the cognitive psychology of the Vygotskian perspective and neuropsychology and brain functional architecture (John-Steiner & Mahn, 1996). Luria's research led to the concept of functional systems, which John-Steiner & Mahn (1996) suggest are very useful in understanding phenomena at the interface of neural and cognitive psychology. Functional systems are dynamic psychological systems in which diverse internal and external processes are coordinated and integrated. Furthermore, Languis and Miller (1992) suggested that the theory of Luria may provide a powerful predictive model for understanding differences in cognitive functioning between learners. They state that the integration of Luria's brain functioning theory, cognitive brain mapping, and levels of task performance suggest an approach to viewing learner differences more positively as modifiable variation in cognitive processing rather than as unmodifiable learning disabilities or deficits (Languis & Miller, 1992).

2.7.1 'BRAIN-BASED' LEARNING AND TEACHING

We live in an era of "brain-based" education (Bruer, 1999), where teachers and parents are told that learning will be optimized if the teachers teach for meaning and understanding (Donald *et al.*, 2002:97, Smith, 1992). To do this teachers should create learning environments that are challenging but not threatening, and learners should be actively engaged in complex, 'real-life' learning experiences (Donald *et al.*, 2002:97, Woolfolk, 2001:329). The reason for this, it is often

claimed, is that research on the brain has indicated that this is the best way to teach (Bruer, 1999, Smith, 1992). Teachers are therefore encouraged to implement 'holistic,' global approaches to teaching such as 'whole-language' methods, 'whole brain' or 'right-brain' approaches, 'multiple intelligence' approaches, social learning approaches and cooperative learning approaches (Donald, *et al.*, 2002:97, Smith, 1992). The point is not whether these methods work in the classroom (this can only be established by well-designed experimental investigation), but whether the claims made for them are in fact supported by evidence from the field of neuropsychology. Bruer (1999) denies that any evidence exists from neuropsychology that has any real practical implications for instruction in the classroom, and advises a more critical stance to many of the claims made in contemporary literature for alternative approaches to teaching. Woolfolk (2001:25) also states that due caution is therefore needed when exploring the possible relations between research on the brain, and language, cognition, cognitive processes and cognitive development. We must go only as far as the evidence allows, and distinguish between the evidence and speculation and conjecture.

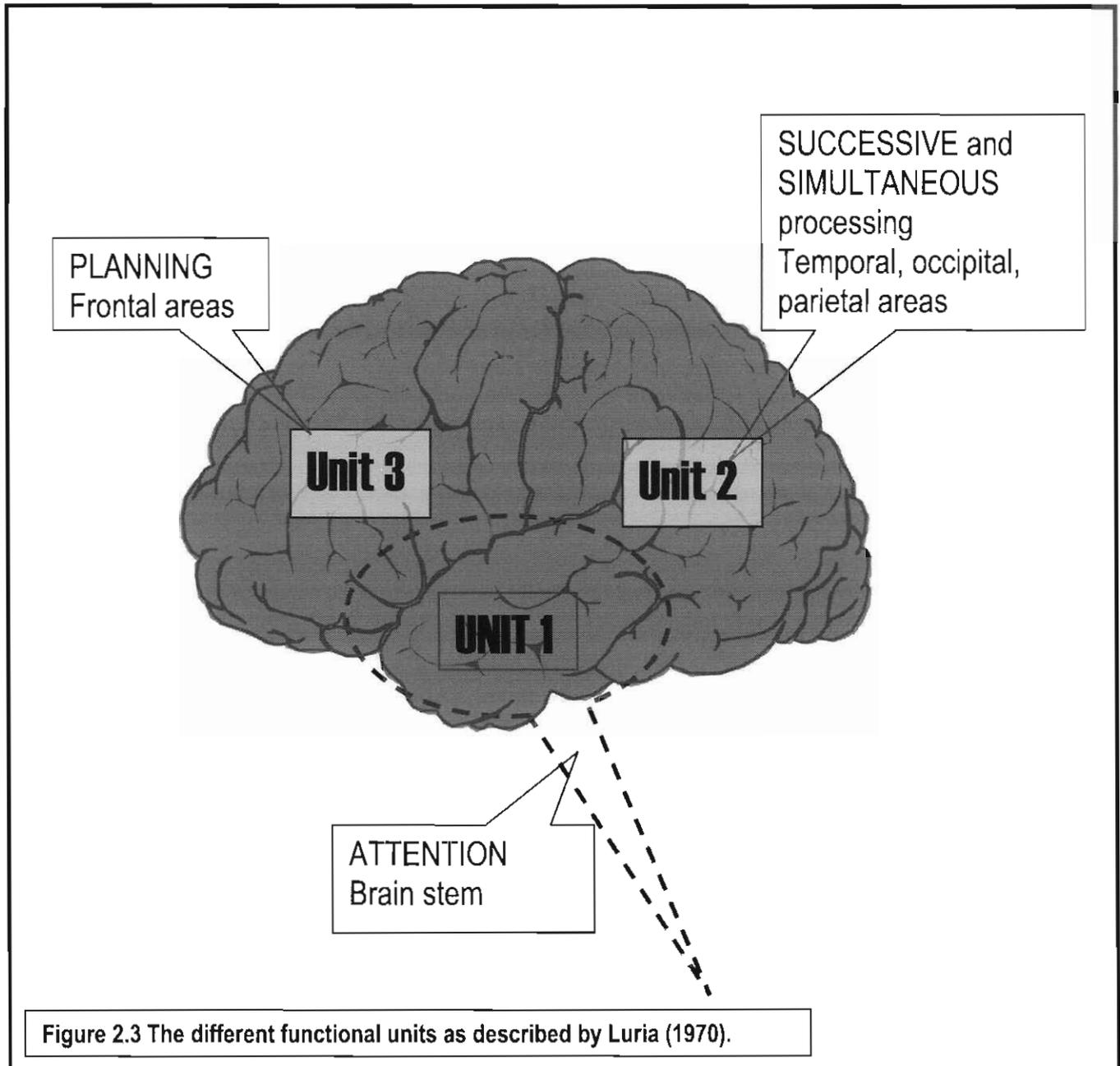
2.7.2. THE PASS MODEL

Das, Naglieri and Kirby (1994) have provided a process model for cognitive development (Das *et al.*, 1977, Das *et al.*, 1994; Das, 2002; Naglieri & Das, 1990). Based on the early work of Luria (1970), they have developed a **cognitive process approach** to studying and measuring intelligence (Kirby & Das, 1990), based on the constructs of *planning*, *attention* and *simultaneous* and *successive* coding called the PASS model. This model is based on the three functional units of the brain delineated by Luria (1970). **Attention** is associated with the brain stem or hindbrain region, including the reticular systems and the limbic systems, and is responsible for sustained attention, motivation and levels of activation. **Planning** occurs in the frontal sections of the cerebral cortex and is responsible for conscious thought, executive control and problem solving, and also exerts a feedback modulation of the attention systems. The **successive** and **simultaneous coding** regions are the areas in the posterior regions of the cortex responsible for perception and organisation of information.

2.7.3. BRAIN STRUCTURE IN RELATION TO COGNITIVE FUNCTION

Luria (1970) described three main components or functional systems of the brain. Figure 2.3 depicts the different functional units. Luria (*op cit.*) emphasised the strongly hierarchical structure of the brain, both in terms of the three units which are functionally arranged as tiers of transcendent operation, each upper level dependent upon the correct function of the lower tier, while the upper

tiers regulate and control the lower tiers. He also noted a hierarchical structure within each functional unit that he described as primary or projection areas, secondary or association areas, and tertiary areas or zones of integration, associated with the highest level of complex mental functioning (Das *et al*, 1979; Kirby & Das, 1990; Das, 2002).



2.7.3.1. The first functional unit

The first functional unit is associated with regulating cortical tone, activation states and maintaining wakefulness, attention and concentration (Reid, Kok & Van der Merwe., 2002). In Luria's view, it

included the upper and lower brain stem, the reticular system and the hippocampus of the limbic system. Dysfunction of this unit causes difficulties with arousal and attention deficits. It is crucial for maintaining the correct cortical tone via the reticular activating system, and is subordinate to the functions of the cortex in the mature individual. Luria emphasised a bilateral association between the arousal unit and the frontal unit. The frontal lobes are dependent of the correct function of the arousal system while the arousal system is modulated and controlled by the frontal cortex (Das *et al.*, 1979).

2.7.3.2. The second functional unit

The second functional unit is involved with the perception, processing and the organisation of sensory information, and the storage of the information in memory (Reid *et al.*, 2002). It includes the temporal, parietal and occipital lobes. The primary zones receive information and analyse it into its components. The secondary zone further organises information and codes it. The tertiary zones organise information to form the basis for complex behaviour. This unit is also involved in the integration of new information, and is associated with the areas of overlap between the temporal parietal and occipital areas. This zone also analyses information spatially, transforming successive stimuli into a simultaneously processed whole. Luria considers this unit to be a cardinal element in reading comprehension and abstract thinking (Das *et al.*, 1979).

An important distinction that Luria made was that the tertiary zones are not modality specific i.e. limited to visual or auditory input. It is rather the primary zones that have the highest modality specificity (Das *et al.*, 1979). This unit also exhibits a progressive lateralisation as one proceeds from the primary to the tertiary levels. Particularly in the development of speech and language, the secondary and tertiary zones of the left hemisphere exhibit increasing lateralisation and specialisation, particularly on exposure of the developing brain to print (Das *et al.*, 1979).

We have already mentioned that the left-right division of the cerebra has led to speculation about its relation to brain function (Bruer, 1999). Luria himself favoured an anterior-posterior functional organisation rather than a left-right dichotomy. Luria (1970) felt that despite the lateralisation, brain function is distributed between both hemispheres for almost all functions and activities, including reading (Das *et al.*, 1994). This has been amply demonstrated by more recent research (Bruer, 1999, Xu *et al.*, 2005). This back-front structure has received empirical support from the results of imaging studies of brain activities (Shaywitz and Shaywitz, 2004a, Pugh *et al.*, 2000, 2001;

Turkeltaub, Gareau, Flowers, Zeffiro & Eden, 2003). These studies also draw our attention to the distribution of functions in both the left and right hemisphere (Bruer, 1999, Xu *et al.*, 2005).

2.7.3.3. The third functional unit

The third functional unit is responsible for planning and executing complex thought processes and behaviour. It is located in the frontal lobes, anterior to the pre-central gyrus. It exerts a regulatory influence on the adjacent motor cortex (Reid *et al.*, 2002). The primary zones are modality specific, while the secondary and tertiary zones are not. The tertiary zone plays a crucial role in the formations of intention and the regulation and verification of the most complex forms of human thought and behaviour (Das *et al.*, 1979). The frontal lobes are also interconnected with ascending and descending tracts of the reticular formation which regulates conscious action, maintaining concentration and goal directed activity. It is also involved in planning and strategic thinking. Correct functioning of the frontal lobes is related to following verbal instructions, scanning for information, and the control and verbal mediation of behaviour. Like Vygotsky, Luria considered speech to be a primary mechanism and substructure of mental functioning, and to play a crucial mediatory role in brain development (Das *et al.*, 1979; Das *et al.*, 1994).

2.7.4. THE APPLICATION OF THE PASS MODEL TO LEARNING AND READING DIFFICULTY

Das *et al.*, (1994) draw on the structure of Luria's functional unit model to construct a model of cognitive functioning as a constellation of processes which function in harmony, but which could also be extricated from each other and operationalised separately in order to evaluate the contribution of each of the processes to the whole. This they have operationalised as the Planning, Attention, Simultaneous, Successive (PASS) model (Figure 2.4.). Appropriate arousal (Unit 1) is required for initiating, directing and evaluating a task. Inappropriate arousal interferes with attentional processes, affects the processes which occur in Unit 2 and also causes a 'deterioration' in the processes of Unit 2. Many subtypes of learning difficulties are described in terms of attention deficits, hyper- or hypoactivity disorders, impulsivity and shallow processing, motivation, inefficient scanning, poor problem solving, and awareness of comprehension (Lerner, 2003:50) all of which have plausible antecedents in the basic cognitive processes of Unit 1. Furthermore, the efficient functioning of Unit 3 is contingent upon a functional simultaneous and successive processing in Unit 2 (Das *et al.*, 1979; Das *et al.*, 1994). Simultaneous processing refers to the synthesis of separate elements into wholes or groups, often in a spatial sense, and is not dependent upon any

sequential ordering of components or elements. Successive processing refers to the integration of information in an ordered, sequential manner (Reid *et al.*, 2002).

The three units operate through three levels: 1) Perception, or sense experience and the effects of selective attention; 2) Organisation and accommodation of information, (upon which the effects of selective inattention, bias, beliefs and prior experience would exert a modulating effect); and 3) the restructuring of information into novel creations of thought and action, the highest level of creative functioning unique to the human organism.

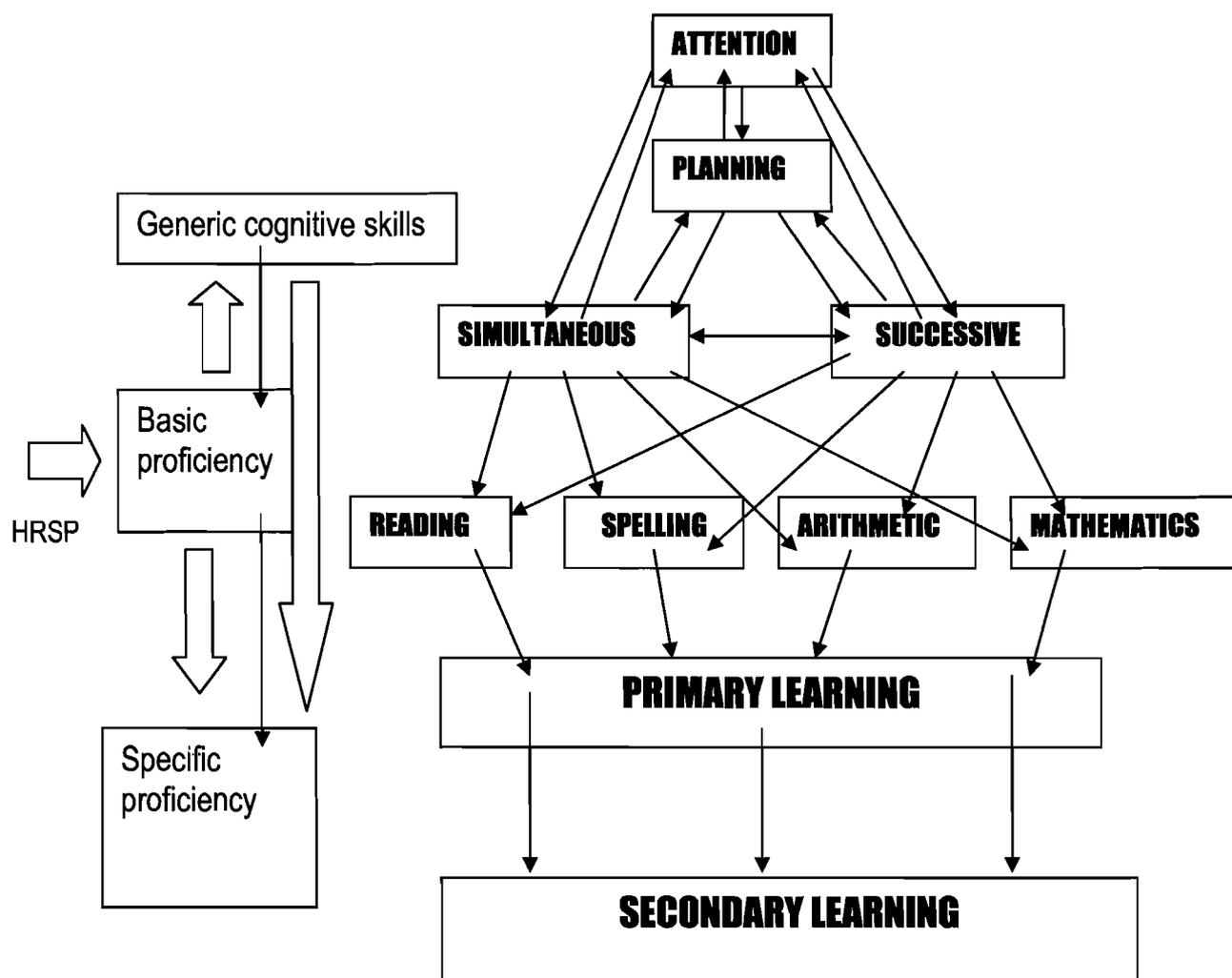


Figure 2.4. The PASS structure of cognition in relation to learning (adapted from Kirby and Williams, 1998). White arrows indicate the intervention model for this study

The PASS model has also been applied to the area of language development and reading. All functions - planning, coding and attention - are implicated in reading. More specifically, simultaneous and planning processes are associated with reading comprehension, while attention and successive processes are associated with word decoding (Reid *et al.*, 2002). The model has also proved helpful in distinguishing between the cognitive functioning of disabled readers and non-disabled readers (Kirby & Das, 1977; Kirby & Robinson, 1987). Research indicates that the disabled reader most commonly exhibits a deficit in the successive coding areas (Kirby *et al.*, 1996). This has been associated by Das (2002) with the development of phonological or encoding ability on the part of the learner (Reid *et al.*, 2002). Research using functional Magnetic Resonance Imaging has supported this view (Shaywitz and Shaywitz, 2004a, Morris *et al.*, 1998), indicating that reading disability centres on a phonological core circuit situated in the left temporo-parietal cortex. Functional Magnetic Resonance Imaging (fMRI) measures regional changes in metabolism and blood flow which reflects glucose utilisation or shifts in blood flow levels within various brain areas depending on the degree to which the particular mental operation requires the support of these areas. The PASS has also proved helpful in distinguishing between the reading disabled learner and other types of learning and reading difficulty, including Attention-deficit/hyperactivity-disorder - such learners have recognisably different PASS profiles (Naglieri, 1999a, 1999b). The different PASS profile in reading disability has been corroborated by the observations of a different pattern of brain activity in reading disabled and non-disabled learners (Turkeltaub *et al.*, 2003). Furthermore, the use of 'scientifically validated' reading instruction was responsible for bringing about measurable changes in brain activity and functional organisation involving precisely these regions of the left cortex (Pugh *et al.*, 2000, Shaywitz *et al.*, 2004). Considered together, this provides a rationale for developing cognitive process skills by using 'scientifically validated' reading instruction. The use of a complete reading programme to foster reading comprehension and phonological skill (spelling) may foster underlying cognitive process skills that would transfer to other areas of cognitive development. This is represented schematically in Figure 2.4 (above).

The results of research therefore support i) the validity of the construct of structural cognitive modifiability and ii) the effective use of 'scientifically validated' reading instruction i.e. literacy intervention, to achieve this. Furthermore, the work of Das and others has demonstrated:

- the feasibility of applying a **cognitive process approach** to understanding cognitive development

- the feasibility of using such an approach to identifying the precise nature of the deficit in learners with learning difficulty in general, and reading difficulty in particular (Das, 2002).
- The feasibility of systematic phonics instruction as part of a complete reading programme as a tool for fostering a functional cognitive apparatus at the psychological and neurological level.

Most tasks require the alternate and concerted use of both simultaneous and successive processes. The PASS model assumes that two modes of processing information are available to the individual. The selection of either or both depends on two conditions i) the individuals habitual mode of processing information as determined by socio-cultural and genetic factors and, ii) the demands of the task (Das *et al.*, 1979).

2.8. FROM THEORY TO INSTRUCTION METHODS

Vygotsky never provided a coherent and articulated theory of instruction, and we have to infer from his writings what he would have considered to be important for classroom instruction (Estep, 2002). John-Steiner and Mahn (1996) caution that this often leads to the tendency to abstract parts of his theory from the whole, and results in distorted understandings and applications. A case in point is the view that Vygotsky favoured discovery learning and 'natural' 'holistic' approaches to learning (Karpov & Bransford, 1995). While Vygotsky emphasised that learning must be **meaningful**, he still insisted on the essential intervention of the mediator in order to foster change in the learners cognitive structure (Estep, 2002, John-Steiner & Mahn, 1996) and the **direct instruction** of what he called 'scientific concepts' (Karpov & Bransford, 1995). We have already noted above the centrality of Vygotsky's concept of **the zone of proximal development** and the crucial importance of the **intervention** of a mediator in education. In this regard his distinction between spontaneous concepts and scientific concepts is relevant to the issue of instruction. For Vygotsky, spontaneous concepts were unsystematic, contextual reflections on common experience, and could be picked up through informal educational contexts or everyday experience. Scientific concepts were logical, systematic, decontextualised, specialised and reflective of formal learning, and could only be attained through deliberately and systematically designed **learning activities** in classroom situations (Estep, 2002).

Vygotsky also emphasised the active role of the learner in the education process (John-Steiner & Mahn, 1996, Palinscar, 1995). However, Vygotsky distinguished between empirical learning and theoretical learning (Karpov & Bransford, 1995). **Empirical learning** is based on observation, comparing, picking out common characteristics, and formulating a general concept on the basis of this self discovery. The main deficiency with this type of learning is that it does not necessarily result in correct concept formation. The many examples of learners developing erroneous concepts as a result of empirical learning illustrate this point (Karpov & Bransford, 1995). **Theoretical learning** by contrast is based on supplying the learner with the psychological tools, that is, general and optimal methods for dealing with certain classes of problems that direct the learners towards the essential (not simply the common) characteristic of the task or problem. The psychological tool is then used for solving concrete problems. In the course of its use, the cognitive processes underlying the tool are internalised (Karpov & Bransford, 1995). From this it seems that a **problem solving approach** together with **direct instruction of specific skills** or tools formed a basis for Vygotsky's view on instruction. The direct instruction of specific skills and the use of a problem solving approach has been advocated with regard to reading instruction, particularly for those learners experiencing reading difficulty (NRP, 2002; Palinscar, 1998; Palinscar & Perry, 1995).

Ericksson (1984:138) advocated an approach to teaching in which cognitive **processes** in thinking – in Luria's terms, planning, coding (successive and simultaneous), and attention processes - operate interdependently in clarifying and developing a construct. Ericksson (1984:138) states that integrated learning follows a sequence of becoming which is in continual movement and balance as each cycle is completed, renewed and extended in the continuous hermeneutical spiral of knowing. According to Ericksson (op cit.), this strategy implies that -

- one be **open to new experiences** and responsive to the environment (perception);
- that one **be aware of** sequences and skills of thinking and learning (learning);
- that one have **access to resources** for collecting and recalling information (knowledge); and that
- one be able to **evaluate one's own progress** and effectively communicate this (communication).

These four strategies can be subsumed within the single construct of 'metacognition'.

Ericksson (1984:76) stated that to develop openness, foster autonomous thinking and elicit active learning, it is clear that there should be three basic instructional elements, i) some interesting

features to respond to in the environment (resources), ii) a learnt strategy for coping with information one perceives (skills) and iii) a self-motivated joy in exploring, discovering and learning (incentive). To develop the intrinsic motivation to pursue independent learning and the strategy of structuring such learning, one needs to clarify:

- What **content** will stimulate the search for meaning - what information will generate questioning and interest (an active epistemological stance)?
- What **process** will be used to explore this content – what strategy will be used to investigate the dynamics of the topic?
- What **outcomes** will be generated from the process – how is one to communicate this experience or learning?

This integrates both **content-based** approaches and **outcomes-based** approaches through a **process-based** approach. This content-process-outcomes sequence is at the same time a hermeneutical cycle, continually growing and developing into knowledge (Erickson, 1984:126). In a process-oriented cognitive-functional approach (Meichenbaum, 1976) to instruction, the **processes** are stressed as being more important than the outcome. Any instructional design must be keyed to specific cognitive functions e.g. fostering phonological awareness is keyed to successive and attentional processes, while fostering word recognition is keyed to successive and simultaneous processing and fostering reading comprehension or metacognition is keyed to simultaneous and planning processes (Das, 2002). This can take place within a 'content free' context, as in Feuerstein's Instrumental Enrichment (Feuerstein *et al.*, 1980) or the Pass Reading Enhancement Programme (Das & Kendrick, 1997; Das, 1999), or it can occur within the context of the mainstream curriculum and focus on specific skills as suggested by Meichenbaum (1976) and operationalised through a complete reading programme such as the HiWay Reading & Spelling Programme. This will be addressed in more detail in chapter 4.

2.8.1. TEXT COMPREHENSION INSTRUCTION

The National Reading Panel Report (2002) concluded that learners should be directly instructed in text comprehension strategies and comprehension monitoring behaviours. The NRP (2000) states "The rationale for the explicit teaching of comprehension skills is that comprehension can be improved by teaching students to use specific cognitive strategies or to reason strategically when they encounter barriers to understanding what they are reading. Readers acquire these strategies informally to some extent, but explicit or formal instruction in the application of comprehension

strategies has been shown to be highly effective in enhancing understanding". Within the HiWay programme the teacher is trained to model such strategies for the learners, until they are able to carry them out independently.

The NRP (2000) identifies seven categories of text comprehension instruction which have a sufficient research basis in the literature for concluding that they improve comprehension in non-impaired readers. These types of instruction are effective when used alone, but are more effective when used as part of a multiple-strategy approach. The types of comprehension instruction identified by the NRP are:

- Comprehension monitoring, where readers learn how to be aware of their understanding of the material;
- Co-operative learning, where readers learn reading strategies together;
- Use of graphic and semantic organisers (including story maps), where readers make graphic representations of the material to assist comprehension;
- Question answering, where readers answer questions posed by the teacher and receive immediate feedback;
- Question generation, where readers ask themselves questions about various aspects of the story;
- Story structure, where readers are taught to use the structure of the story as a means of helping them recall story content in order to answer questions about what they have read; and
- Summarisation, where readers are taught to integrate ideas and generalise from the text information.

The NRP (2000) reports that the multiple strategy approach had the most research support. This approach is designed to take place in the context of dialogue between the teacher and the learners. The teacher guides the learners in applying strategies while reading a passage. The teacher models the strategy in the context of each passage. The four main multiple strategies are 1) question generation, summarization of main ideas, clarification of word meanings and difficult portions, and prediction of what might occur later in the story. In the HRSP, a multiple strategy approach is used. It is essentially the same as described in the NRP (2000) report. However, question answering replaces question generation. In addition, active listening and elicitation of prior knowledge are also used in the HRSP. Additional competencies are also taught, such as previewing, skimming and scanning. In the HRSP teachers are trained to use all of these

components as part of a multiple strategy approach to teaching comprehension. Clearly, this is not accomplished in a single training session, but teachers are trained on an ongoing, in-service basis to improve the effectiveness of their instruction.

One important qualification of the findings of the NRP (2000) on the effects of a multiple strategies approach, and specifically Reciprocal Teaching (discussed below), was that no correlation was found between measures of treatment (e.g. ability to formulate questions) and reading comprehension. This raises the question as to what exactly the multiple comprehension strategies approach is teaching, and what exactly is the relation between comprehension strategies and reading comprehension. Results of research reviewed by the NRP (2000) indicate that there is not a neat causal link between the two. Rather, Rosenshine and Meister (1994) suggest that new strategies enabled and required learners to perform “deep processing” of what they read, to actively engage in making sense of what they read, to be aware of when they do not understand the material, and to engage in additional reading and searching when they encounter comprehension difficulties. The continual emphasis on questioning, summarising, predicting and clarifying activities, forced the learners to move beyond mechanical decoding of text as a sufficient response to the task of reading a passage. The emphasis of deriving meaning fosters an expectation on the part of the learner that the passage should make sense, and the belief that they are able to make sense of the passage.

A method that attempts to operationalise this idea in **reading comprehension instruction** is Directed Reading-Thinking Activity (DRTA) developed by Stauffer (1975, 1980, cited in - Richek *et al.*, 1989:229; Moll *et al.*, 2001:133). This method is based on the prediction of story content. In prediction the learners read a portion of a story, predict what will happen next, and then read further to see if their predictions have been confirmed. Prediction fosters comprehension and sets up an active learning situation, in which learners create the narrative along with the author. To obtain maximum benefit, DRTA must be used on a long-term basis (Moll *et al.*, 2001:133). Stories are divided up into paragraphs or portions. The learners deal with each section at a time generating questions and predictions about the text. DRTA’s essential steps – activating and discussing what learners already know, and predicting, reading and discussing what happened and what was learnt – can be approached in many ways (Moll, *et al.*, 2001:133).

Another method that operationalises this idea is Reciprocal Teaching (RT) developed by Palinscar and Brown (Palinscar, 1986, Palinscar & Brown, 1984, 1989). Reciprocal teaching is a method

based on **modelling** reading comprehension strategies. It aims to help learners understand and think deeply about what they read. To accomplish this goal, learners learn two to four strategies: **summarising** the content of the passage, **asking questions** about the central point, **clarifying** the difficult parts of the material and **predicting** what will come next. To use the strategies effectively, poor readers need direct instruction, modelling and practice in actual reading situations (Woolfolk, 2001:507). Rosenshine and Meister (1994) have reviewed the technique of RT. They concluded that research on the effectiveness of reciprocal teaching indicates that i) procedures for monitoring comprehension must be **directly taught** (Not all learners will develop these strategies on their own, and direct instruction with modelling and opportunity for learner participation is essential.), ii) only a limited number of **strategies** need to be fostered to have an impact on the learner's ability to comprehend texts, iii) the training of these strategies must take place within the **context** of actual reading, iv) reciprocal teaching operationalises the idea of **scaffolding**, moving the learner toward independent and fluent reading.

The above discussion would indicate that the instruction of cognitive processes, in particular the hermeneutical processes at the heart of learning in the human organism (speaking, listening, reading and writing), but also the processes of cognitive development in general, are of more importance than narrowly defined mechanical outcomes (Jansen, 1999:145). Before we can facilitate learning, we must first make learning possible.

2.8.2. TEACHER PREPARATION AND COMPREHENSION STRATEGIES INSTRUCTION

The FRNRP (2000:10) states that "teaching reading comprehension strategies to students at all grade levels is complex. Teachers not only must have a firm grasp of the content presented in text, but also must have substantial knowledge of the strategies themselves, of which strategies are most effective for different students and types of content, and of how best to teach and model strategy use".

The NRP (2000) describe two approaches: direct explanation and transactional strategy Instruction. The **direct explanation** approach focuses on the teacher's ability to explicitly explain the reasoning involved in reading comprehension. Rather than teach specific strategies, teachers help learners: (1) to view reading as a problem-solving task that necessitates the use of strategic thinking; and (2) to learn to think strategically about solving comprehension problems. **Transactional strategy instruction** also emphasises the teacher's ability to provide explicit explanations of thinking processes. Further, it emphasises the ability of teachers to facilitate

student discussions in which students collaborate to form joint interpretations of text. However, the NRP (2000) also indicates that teacher's ability to teach comprehension was inadequate. Teacher education and training is therefore a necessary component of a complete reading programme. There is also a need for **pre-service** education of teachers in the use of appropriate methods for reading instruction.

The results of the NRP review (2000) indicate that: 1) regular class teachers are **not** fully informed of the implications of the results of scientific research on reading comprehension instruction, nor are they adequately trained to implement reading comprehension instruction in the regular classroom situation; 2) regular class teachers **can** be taught to provide effective reading comprehension training in the classroom; 3) in-service training of teachers produces significantly higher learner achievement on a number of outcome measures; 4) pre-service training of teachers **should** include training in the choice and use of phonemic awareness, systematic phonics, fluency, vocabulary building and multiple comprehension strategies.

CIERA (the Center for the Improvement of Early Reading Achievement) in the USA has reviewed research on learning to read and combined the results into 10 principles (cited in Woolfolk, 2001:509). Principles 9 and 10 read as follows:

"9. **Professional opportunities** to improve reading achievement are prominent in successful schools and programs.

Examples: Opportunities for teachers and administrators to analyse instruction, assessment and achievement; to set goals for improvement; to learn about effective practices; and to participate in ongoing communities that deliberately try to understand both successes and persistent problems.

10. **Entire school staff**, not just first-grade teachers, are involved in bringing children to high levels of achievement.

Examples: In successful schools, reading achievement goals are clear, expectations are high, instructional means for attaining goals are articulated, and shared assessments monitor children's progress. Even though they might use different materials and technologies, successful schools maintain a focus on reading and writing, and have programs to involve parents in their children's reading and homework. Community partnerships, including volunteer tutoring programs, are common."

This result indicates that the HRSP could serve a function within in-service and pre-service teacher training by providing a comprehensive tool for the teacher. In this investigation of the effectiveness of the HRSP, in-service teacher training took place on an ongoing basis i.e. training was not a

single session prior to the beginning of intervention, but was aimed at continuous capacity building, both for the teachers directly involved and for the whole school. For programmes like the HRSP to be most effective, the whole school must be involved and it must become part of the school 'culture of learning' (Donald *et al.*, 2002:21).

2.9. SUMMARY

In this chapter, it was attempted to make a case for the centrality of language in general and reading in particular in cognitive development, and following from that the central importance of reading comprehension as a primary learning skill. Following from this is the proposal that the direct instruction of reading comprehension through systematic phonics instruction and comprehension monitoring strategies such as DRTA and RT is a potentially powerful intervention tool for addressing the needs in South African schools. While efficient and fluid reading comprehension is not a panacea, it is a foundational skill that transfers to all areas of personal and social life. Furthermore, a 'two-phase, multi-component' reading programme could also provide an alternative to psychometric means of identification and assessment of learners with reading difficulty. In the next chapter, selected aspects of research on reading instruction will be discussed.

CHAPTER 3

THE NATURE AND APPLICATION OF READING INSTRUCTION IN RELATION TO READING ACQUISITION

3.1. INTRODUCTION

In this chapter the nature and application of reading instruction in relation to research on reading acquisition will be considered. Although reading instruction will be focussed on, this does not mean that the instruction of writing is unimportant. Reading and writing are always linked in literacy development and authentic reading instruction. The outline of this chapter will be as follows:

- Trends in literacy education and literacy research,
- The developmental stages of learning to read, and the cognitive processes and sub-processes of reading,
- Methods of reading instruction, specifically comparing whole language and code-breaking approaches to reading instruction.
- Reading intervention models in South Africa with regard to learners unresponsive to regular literacy instruction.

3.2. TRENDS IN LITERACY EDUCATION AND LITERACY RESEARCH

Smith (1992) has commented that controversies surrounding reading instruction flare up with predictable regularity, a new one erupting almost as soon as the previous one has abated. Teachers are again castigated for their failure to teach reading. They are urged to stop using the 'wrong' method and start using the 'correct' method of teaching children to read. National newspapers, tabloids and television shows carry on the debate in the public arena, with renewed calls for more thoroughgoing transformations and more stringent reforms. Over 20 years ago, Chall (1983) commented that the debate around reading instruction touched on "long-held, strong, differing views that tend to overwhelm us in theory research and practice". This situation does not seem to have abated, with Allington (2002, 2005) speaking of ongoing "reading wars" in the USA.

In this context it is often difficult to sift fact from opinion, or statements made on the basis of research or simply speculation and conjecture.

Over twenty years ago, Chall (1983) noted a number of important trends in literacy instruction in the USA and made some insightful comments of relevance to this research. Firstly, the heady optimism of the 1970's had given way in the 1980's to increased criticism and questioning of the practices of reading instruction in the school context and even the emergence of radical opinions that questioned "the universally accepted idea that it is good to be literate" (Chall, 1983:3). The rise of post-modernistic thinking and the dominance of personal computers, the Internet, television and media in the Information Age were claimed by some to represent the 'beginning of the end' for literacy as we have known it. Chall (op cit.) however argued, more convincingly, that the precise nature of the information age requires more sophisticated and additional literacy skills, placing an even higher advantage on being able to read well.

Bruer (1999) noted that the 1990's were characterised by the call for progressive education reforms. The "factory model of education" (p. 649) in which experts create knowledge, teachers disseminate it and learners are assessed as to how much of it they have absorbed and retained was repudiated as an artefact of the age of reason. Rather, a constructivist, active-learning model was adopted in which learners are actively engaged in learning and guiding their own instruction. It was argued that teachers should teach for meaning and understanding. To do this they must create learning environments that are low in threat and high in challenge, and learners should be actively immersed in complex, 'real-life' experiences. These people advocated 'naturalistic' and 'holistic' approaches to learning such as whole language approaches, co-operative learning, social learning (group work), and competency (outcomes) based assessment. In addition to this there was the growing popularity within the post-modern paradigm of the socio-linguistic approach to reading and learning (Bloome & Green, 1984:395; Rogoff & Chavajay, 1995).

These trends are all mirrored in the South African arena. Firstly, the calls for educational reforms in the face of declining academic performance in the public school system, particularly reading, and a call for 'own-language' instruction in the schools. Secondly, the introduction of an outcomes-based system, and thirdly the shift of emphasis away from the learner as the unit of analysis to the socio-linguistic context in which the learner exists.

In contrast to popular perception, reading is mastered by only a few adults, even in literate societies. Reading is not innate, as is language (Lerner, 2003:340, Shaywitz & Shaywitz, 2004a), but is a complex skill that requires extensive practise of specific sub-skills to achieve mastery. It should not be a surprise then that learning to read constitutes a major challenge and significant accomplishment on the part of the learner. It should also not surprise us that most learners with learning difficulty have a reading related problem (Lerner, 2003:238; Lomofsky *et al.*, 2003:69). Despite notable exceptions, poor reading ability is also highly correlated with social and personal dysfunction, including school dropout rate and juvenile delinquency (Broder *et al.*, 1981; Lerner, 2003:313; Richek *et al.*, 1996:2; Ziglert *et al.*, 1992).

Palinscar and Perry (1995) identify three different perspectives on reading, the developmental perspective, the cognitive perspective, and the socio-cultural perspective. The **developmental perspective** draws on research in the fields of linguistics, psychology and literacy, and aims at characterising literacy development in young learners. This perspective emphasises the construction of meaning by the learner and the role of developmentally appropriate scaffolding. The **cognitive perspective** conceptualises reading as thinking, reasoning and problem solving. This perspective emphasises the role of self-regulation. Self-regulation is the ability to take control and monitor one's leaning. Self-regulation is of particular importance when considering learners with reading difficulty. The cognitive approach has given rise to strategy instruction as a method to address reading difficulty. The cognitive perspective has been influential in determining the goals of reading instruction and understanding the process of becoming an accomplished reader. The aim of strategy instruction is to enable the learner to use the same kind of learning activities that appear to underlie the successful performance of learners performing at or above grade levels. The **socio-cultural perspective** emphasises that meaningful learning must occur in contexts of social intercourse and transactions of meaning. Reading instruction must be made socially relevant and culturally meaningful and be connected to 'real life' tasks (Palinscar & Perry, 1995).

The situation in this country compared to the developed countries of the West is confounded by the persistently high incidence of illiteracy that has hardly been addressed at all within the context of the new political dispensation. Machet (2002) reports that 34% of adults (7.4 million individuals) are functionally illiterate in this country. She states that reading behaviour amongst the majority of South Africans is clearly poorly developed. A recent press report (Caelers, 2005) claimed that there exists a major lack of literacy skills in the majority of school-entering learners in South Africa. Caelers (2005) cited research by Klopp at the University of Stellenbosch that indicated that 60% of

Western Cape learners were not achieving the literacy and numeracy learning outcomes set out in the national curriculum. Grade one learners (six to seven years of age) enrol at schools with a reading age of three to four and a half years. Only 37% of grade three learners were achieving at grade levels. Only 32% of Western Cape grade three pupils could read. Machet (2002) points out that literacy entails far more than the mechanical skills of reading and writing. Literacy derives from interactions with the family or significant others in the socialisation process which in turn is embedded within a larger social context. Prinsloo and Stein (2004) concur, emphasising that learners themselves bring meaning to literary events within their social context and actively make sense of their worlds. Literacy is a complex, multi-layered and highly skilled process, which involves contextually bound linguistic understanding, reflective thinking and strategic cognitive processes for assigning meaning and interpreting the linguistic situation (Prinsloo & Stein, 2004). Literacy is therefore culturally bound and for this reason it is imperative that we view the problem from a broader social perspective (Kunutu, 1996:263; Machet, 2002; Prinsloo & Stein, 2004)

The sociological perspective, however, adopts a descriptive rather than prescriptive approach to literacy research (Prinsloo & Stein, 2004). Prinsloo and Stein (2004) also state that the individual learner is no longer the unit of analysis, but rather the socio-linguistic context. The aim of such an approach is to document various 'portraits' of literary contexts, rather than being prescriptive about concrete intervention. Within the context of pure post-modernism, questions about which pedagogies are more effective would not arise, as all pedagogies are equally right or true (Vieth, 1994). While claiming not to be prescriptive, the sociological approach may however overlook the large body of scientific evidence that is directly relevant to our immediate and urgent needs, namely fostering basic literacy skills such as reading, writing and spelling in the individual. The survey of literature (below and Chapter 1) indicates that although research does provide support for the sociological perspective on the problem, it is precisely the insight of the Vygotskian approach that would lead us to predict that, like the western construct of 'intelligence', literacy is a *specific* cultural tool mediated within a *specific* cultural context (Das *et al.*, 1994, Rogoff & Chavajay, 1995). Indeed, Prinsloo and Stein (2004) do raise the question of which kind of literacy pedagogies are most effective. Bridging socio-linguistic approaches and psychological approaches to learning and reading has proven problematic (Bloome & Green, 1984:395). In South Africa, Donald *et al.*, (2002) attempt to bridge the two approaches, and to draw on the insights of both psychological and socio-linguistic perspectives. This is to be welcomed. Nevertheless, within the cognitive learning approach the aim is specifically not to lose sight of the individual, but precisely to

empower the individual and emancipate the individual from post-modern or other cultural narratives that keep them bound within their 'linguisticity'.

As alluded to above, the last two decades have seen heated debate over teaching reading (Allington, 2002, 2005; Smith, 1992). By the end of the last decade, a tenuous consensus emerged in the USA regarding the central role of systematic phonics instruction in teaching children to read (NRP, 2000). Evidence indicated that reading difficulty centred on a phonological deficit (Morris *et al.*, 1998). This tenuous consensus has changed into scientific fact with the results of neuropsychological research (NRP, 2000; Pugh *et al.*, 2000, 2001; Shaywitz, Shaywitz, Blachman, Pugh, Fulbright, Skudlarski, Mence, Constable, Holahan, Marchione, Fletcher, Lyon & Gore, 2004), indicating the neuropsychological impact of direct instruction of phonics. Research provides a consistent picture concerning the **methods** of teaching reading, with the weight of evidence favouring phonemic awareness and systematic phonics instruction (NRP, 2000). It is important to distinguish between the **methods** of reading instruction and the **processes** learners acquire as they receive instruction and learn to read. Methods of instruction are aimed at helping learners acquire the processes they need to develop proficiency as readers. In considering how phonics instruction promotes the development of reading, it is important first to describe the reading processes that learners must acquire (NRP, 2000). In the next section, evidence for different processes of learning to read will be considered.

3.3. THE COGNITIVE PROCESSES NECESSARY FOR READING ACQUISITION

Research indicates that people use the same language system when *comprehending* spoken and written language (Shaywitz & Shaywitz, 2004a). Results of research also indicate, however, that while there is only one language system associated with comprehension, learning to read is different from learning to speak. The latter is innate and developmentally determined, while the former is neither (Shaywitz & Shaywitz, 2004a). Furthermore, it would be instructive to take cognisance of the *separate* circuits or sub-systems of functional activity for different cognitive processes within reading (Doctor, Dear & Makgamatha, 1996:364; Jansen, 1996:144).

Literacy can be viewed as consisting of four main processes - reading, writing, speaking and listening (Lerner, 2003:340). Of these, the process of **listening** can be subsumed under the process of **reading comprehension**, and the process of **speaking** under the process of **writing**. Each of these cognitive processes will involve a different set of sub-processes (Doctor *et al.*,

1996:144). It would also be possible to postulate different processes in reading based on a **maturational** trajectory - an initial logographic stage, and alphabetic stage, a phonological stage and a lexical stage, each with its own set of sub-systems (Doctor *et al.*, 1996:144, Lerner, 2003:224). In the following discussion, the maturational stages will be considered first as the necessary background for the discussion of the cognitive processes of reading.

3.3.1. THE MATURATIONAL STAGES OF READING ACQUISITION (LEARNING TO READ)

- **Stage 1: Logographic stage** – This is the **emergent literacy** stage and the interventions indicated here are **phonemic awareness** approaches. Phonemic awareness is the insight that words are made up of sound units. Stanovich (1982, 1988, 1990) has postulated that achievement of phonemic awareness is the primary onset mechanism for the development of literacy. Other research (Al Otaiba & Fuchs, 2006, 2002) indicates that phonemic awareness is one of the highest predictors of later literacy and school achievement, even after controlling for intelligence and SES. Stanovich (1986,1990) states that phonemic awareness is more predictive of later reading than IQ, reading readiness and listening comprehension measures, as well as mental age, perceptual styles, handedness, race, and parents education, which are all weak predictors of reading success. The lack of phonemic awareness has also been implicated in the likelihood of failure to learn to read, as it functions to prime the onset of reading acquisition (Stanovich, 1986). Phonemic awareness can be developed in learners by providing rich language experiences that encourage experimentation and manipulation of sounds. These activities lead to significant gains in subsequent reading and spelling achievement. The National Reading Panel (NRP) report (2000) has indicated that phonemic awareness instruction is ready for implementation in instruction programmes at school. The NRP (2000) further emphasises that evidence from diverse studies indicates that despite deeply entrenched opinions, phonemic awareness instruction - and systematic phonics instruction - should be initiated at Kindergarten (i.e. grade R) level. In South Africa, the Revised National Curriculum Statement (RNCS, 2000) lists phonemic awareness as an **assessment standard for learning outcomes 1, 3 and 6** for the learning area Languages and Literacy in Grade R.
- **Stage 2. Alphabetic stage.** The primary insight on the part of the learner here is that the separate sounds of words map onto codes or print. At this stage learners begin to experiment with the world of print. It is at this stage that whole language approaches are indicated. At this stage the learner must understand that sounds map onto signs on paper. Whole language and

language experience based approaches are indicated at this level because research indicates that they are most effective in helping the learner achieve the alphabetic insight (Stahl & Miller, 1989). Learners need to be introduced to the world of books and literacy by exposure to a broad range of print and literary activities. Adams (1990) cautions however, that whole language approaches are often based upon the false premise that proficient readers 'skip, skim and guess' from context instead of reading what's on the page. Research indicates that to the contrary, skilled readers pay particular attention to the details of the text and carefully and meticulously read line by line (Vellutino, 1991). In the RNCS (2002), the achievement of alphabetic insight is an assessment standard for learning outcomes 3, 4 and 6 in Grade R.

- **Stage 3. Orthographic or phonological stage.** At this stage the learner needs to understand the structure of the language and the **regularities of the sound-sign system**. In this stage systematic phonics instruction is indicated. After phonemic awareness, the best predictor of reading ability is the ability to recognise letters, linguistic awareness of sounds, syllables and phonemes and knowledge of print (Speece, Mills, Ritchey & Hillman, 2003). Research has indicated the need for direct, systematic phonics instruction in order to equip learners with the skills to break the code (NRP, 2000). Three strategies are indicated, i) explicit work to help learners understand the sound structure of the language at the phonemic level, ii) intensive and explicit work in sound/symbol associations, and iii) explicit application to connected text with controlled vocabulary. While a mechanical rote or drill approach should be avoided, learners also need to be given direct and intensive instruction and practice in spelling and writing. According to the RNCS (2002), the achievement of phonological awareness receives increasing emphasis in the Foundation Phase, beginning in grade R.
- **Stage 4. Lexical stage** – the learner must acquire a large **vocabulary** that they can recognise on sight. This is essential to make reading automatic so that the learner can concentrate on comprehension. The goal of reading instruction is to make the reading of text fluent and accurate so that the mind is freed to reflect on meaning (NRP, 2000). Research on expert readers indicates that they have a very large vocabulary that they can use fluently and automatically (Woolfolk, 2001:508). Vellutino (1991) reviewed research on the relative efficacy of code-breaking and whole language approaches. He concluded that a) the most basic skill in reading is **word recognition**, b) an adequate degree of fluency in word identification is a basic prerequisite for successful comprehension, c) word recognition in skilled readers is a fast-acting, automatic and modular process that depends little on contextual information for

execution, d) even skilled readers cannot predict the meaning of more than one in four words in sentence contexts, indicating that the predictive role of context must be extremely limited and e) because of limited ability in word identification, beginning and disabled readers are much more dependent on context than advanced readers. Vellutino (1991) recommended that direct instruction of phonics would provide essential skills for acquiring word identification facility. In other words, systematic phonics instruction will lead to improved word recognition, which will lead to improved reading comprehension. This view is consonant with the perspective on reading acquisition outlined above. A functional phonological system is required for the emergence of a functional lexical system. It also emphasise the link between spelling and reading. The learners need phonological skills to analyse words as the prerequisite process for developing a large lexical store of word meanings. In the RNCS (2002), fluency is an assessment standard for learning outcome 3 in Grades 2 and 3.

- **Stage 5. Fluency stage** - reading Comprehension. This is the final stage at which the learner is instructed in reading **comprehension strategies**. Comprehension skills instruction requires students to be critical thinkers when they read by fostering comprehension monitoring strategies and providing opportunities for discussion and questioning and encouraging the reading of authentic texts. Research indicates that explicit instruction in comprehension is needed (NRP, 2000). Such instruction involves teacher modelling and explanation, guided practice, independent practice, and application of strategies in real reading contexts (Nel *et al.* 2004; Pearson, 1989). In the context of the RNCS (2002), reading comprehension (reading for meaning) should be part of literacy instruction from Grade R, but should receive increasing attention from Grade 4.

The cognitive processes of reading acquisition are described next.

3.3.2. THE UNDERLYING PROCESSES OF LEARNING TO READ

Lerner (2003:399) stated that two underlying processes can be distinguished in reading: **word recognition** and **word analysis** or word attack skills (spelling). From the above discussion, it is evident that at the logographic stage, **word recognition** is the primary process in the early reader. Initially, words are recognised as a whole, sometimes referred to as logographic 'reading' (Lerner, 2003:387). This process is automatic and fluid in the maturing child, and seems to rely on both left and right brain activity (Shaywitz & Shaywitz, 2004a, 2004b; Turkeltaub *et al.*, 2003). Later at the

alphabetic stage, the learner begins to rely more on **word analysis** and word attack strategies, a predominately left brain function, and at this point, direct instruction in phonemic awareness and systematic phonics instruction is clearly beneficial to the learner (Lerner, 2003:387; Pugh *et al.*, 2000). In the orthographic stage, the learner moves into a stage where words, morphemes and print patterns become increasingly clear, and reading becomes more fluent and efficient, and less effort is devoted to mechanical aspects of reading (Lerner, 2003:387). Finally the learner achieves a stage where **word recognition** becomes automatic, and the reader can devote their full attention to understanding the text. This is called the lexical stage. These two processes – word analysis and word recognition - remain the two fundamental processes in reading, even in expert readers. Despite the intuitive view, context provides very little cue for the determination of word meaning, and even expert readers can only determine the meaning of one out of four words from context (Vellutino, 1991; Woolfolk, 2001:507). Expert readers rely primarily of the highly automatic skill of **word recognition** or the lexical pathway (i.e. a very large sight vocabulary) and secondarily on **word analysis** strategies. These two processes are the basis of the **dual route hypothesis** (Doctor *et al.*, 1996:364), the view that readers use two distinct systems or circuits for reading, a word analysis or phonological circuit, and a word recognition, or lexical circuit. Fluent readers rely mainly on the word recognition circuit, but fall back on the word analysis circuit when encountering unfamiliar words or text. Furthermore, research suggests that in order to develop fluency the learner has to first engage and develop the word analysis or phonological system in order to engage and develop the lexical system (Shaywitz & Shaywitz, 2004a). Learners with **reading difficulty** have a poorly developed phonological circuit which interferes with reading acquisition (Al Otaiba & Fuchs, 2006).

Related to the cognitive processes of learning to read, is the neurological view of reading acquisition. This is described next.

3.3.3. THE NEUROPSYCHOLOGY OF READING

In the last decade powerful non-invasive technologies became available which allowed a great leap in our understanding of reading and reading difficulty (Fletcher *et al.*, 2000, Lerner, 2003:224; Pugh *et al.*, 2000, 2001). Research using particularly functional Magnetic Resonance Imaging, a technique that allows one to measure localised increased brain activity in response to demand, has provided clear evidence that the individual uses the same language system to read as well as to speak (Shaywitz & Shaywitz, 2004a). What distinguishes reading from speaking is the interposition of a sound-sign association system. Research (Turkeltaub *et al.*, 2003; Pugh *et al.*, 2000) indicates

that there are three main regions associated with reading. Broca's area, or the **inferior frontal gyrus**, is associated with the articulation and **vocalisation of words** and rapid naming. Posterior to this are two regions. Wernicke's area, in the **parieto-temporal region**, is associated with the analysis of words and association between letters and sounds, and is related to **phonological processing** of language and text. Finally, there is a putative word form area in the **occipito-temporal region** that is involved in the automatic recognition of words, making reading fluent and accurate. This is often associated with the **lexical function**. In addition to this there are other cortical regions in both hemispheres that are engaged when reading text for meaning (Xu *et al.*, 2005). All these areas have to be functional and to work in concert for the learner to read easily and automatically (Shaywitz & Shaywitz, 2004a, 2004b).

Having established what reading development involves in the non-disabled learner, it is possible to use this framework to investigate and understand i) the possible causes of reading difficulty and ii) why some learners are unresponsive to intervention. The results of research discussed above indicates that since reading difficulty is not a unitary deficit, different types of reading difficulty would emerge and these would show different types of profiles (Morris *et al.*, 1998; O'Malley *et al.*, 2002). What is of interest here is the proposal of a hypothetical model for accounting for the observed difference between the PASS profiles of the specific reading difficulty learner and the contextually disadvantaged or limited English proficiency learner. Evidence suggest that while specific **reading difficulty** learners show a typical PASS profile of dysfunctional **successive processing**, culturally disadvantaged and limited English proficiency learners seem to show a consistently *different* profile (Fletcher *et al.*, 2000; Tan, Spinks, Feng, Sok, Perfetti, Xiong, Fox, & Gao, 2003), with main deficits being observed in **simultaneous processing** (Greenop, 2006; Das *et al.*, 1979, 1994; Das, 2002; Reid, 2001).

This possibility will be explored in more detail below. A tentative model will be attempted to provide a theoretical framework for explaining why these learners do not respond to regular literacy instruction or intervention as an underlying rationale of the HiWay Reading & Spelling Programme, and for guiding possible further research.

3.3.4. READING AS A COGNITIVE PROCESS

The relevance of the Planning, Attention, Successive, Simultaneous (PASS) model of cognitive processing to language development, literacy instruction and particularly reading has been

intensively explored over that last 20 years by Das, Naglieri, Kirby and Jarman (Kirby & Das, 1990). They initially predicted (Das, Kirby & Jarman, 1979) that the two distinct cognitive processing mechanisms identified as simultaneous and sequential or successive would be apparent within the factor structure of reading behaviour (Naglieri, 1999b). Furthermore, they have made a distinction between the two processes, implicating successive processing in the more ordered analysis of the phonological route and simultaneous processing with the more holistic processing in the lexical route (Das *et al.*, 1994). Research on the nature of the two routes in reading research independent of the PASS model has indicated the same relationship (Frith, 1984; Morris *et al.*, 1998; Spiro & Myers, 1984).

Further research has indicated a more complex situation in reading, i.e. a parallel use of both the phonological and lexical routes and an interdependence between successive and simultaneous processes in reading proficiency (Naglieri & Reardon, 1993, Kirby *et al.*, 1996). However, factorial analysis of reading behaviour suggested that the phonological route is mainly mediated via a successive process while the lexical route is mainly mediated via a simultaneous process (Das & Kendrick, 1997). Further research also indicated the involvement of attentional and planning processes in reading (Reid *et al.*, 2002). Attentional processes seem to load more on phonological functioning, while planning processes load on lexical processes (Das *et al.*, 1994).

Having established that basic factor structure of reading behaviour in relation to the PASS model, these researchers then examined the nature of reading difficulty (Kirby *et al.*, 1996). Results indicated that a consistent pattern was evident, with reading difficulty learners showing dysfunction in predominately successive processing mechanisms. It was suggested (Kirby *et al.*, 1996) that this led to the use of simultaneous processes by the learner for dealing with tasks that could be more effectively solved by using a successive process. Furthermore, because a functional phonological mechanism facilitates the emergence of the lexical process, these learners also have not acquired the lexical reading skills, despite their preference for a more simultaneous cognitive processing style (Das & Naglieri, 1995, Kirby *et al.*, 1996, Reid *et al.*, 2002).

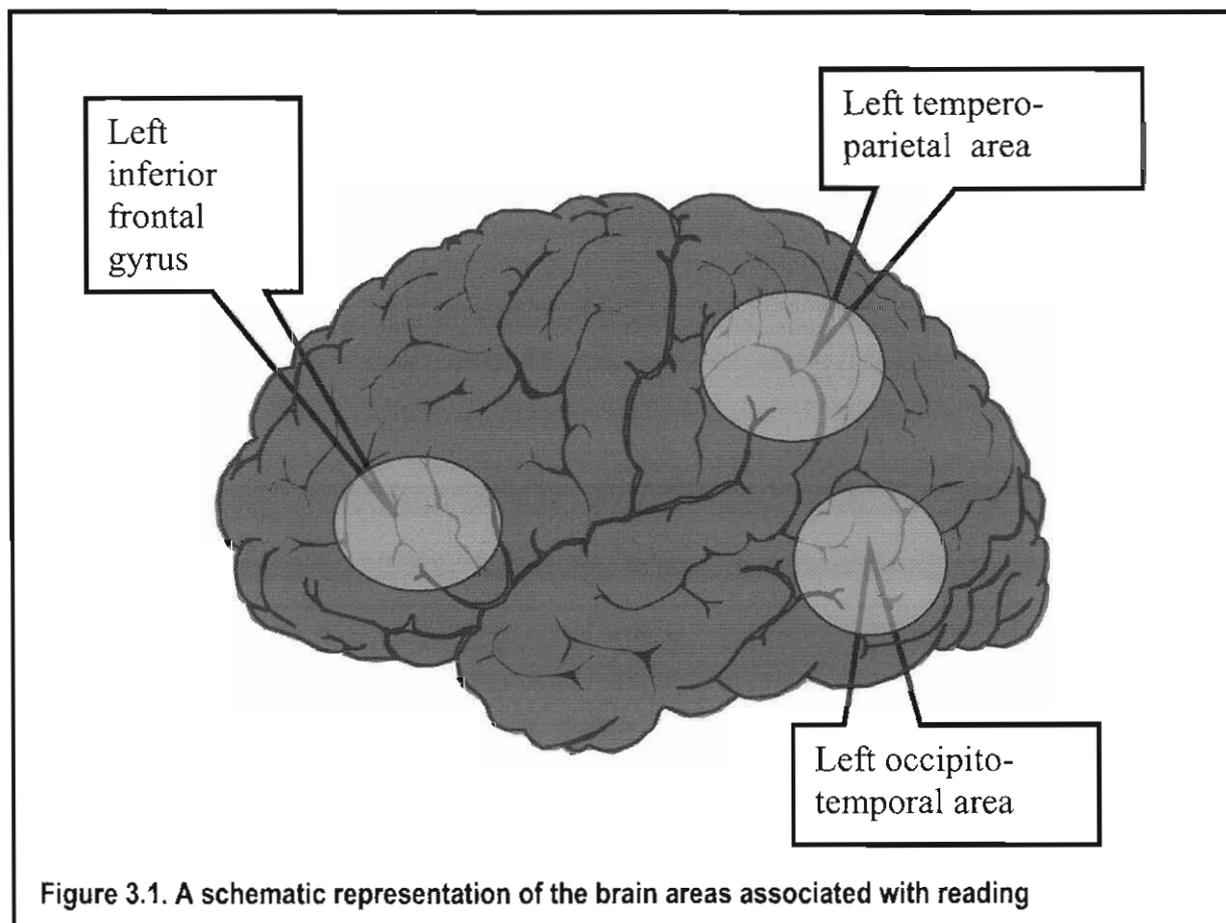
3.3.4.1. Neuropsychological evidence for distinct cognitive processes in reading

A comparable result has been reported by Pugh *et al.* (2000). They state that the posterior reading circuits including the dorsal (temporo-parietal) and the ventral (occipito-temporal) components are disrupted in reading difficulty as indicated by reduced activation of the cortical areas as well as disrupted functional connectivity between these areas. This results in increased reliance on the

inferior frontal gyrus during reading and an increased tendency to engage the right hemisphere homologues of the dysfunctional left hemisphere circuits. They hypothesise that normal development of reading is dependent upon the highly organised integration of phonological and lexical semantic features of words. This integration relies initially on the intactness of the temporo-parietal system, facilitating the development of the occipito-temporal system. Dysfunction of the former will lead to the failure of the lexical word form area to develop normally.

3.3.4.2. Specialisation of cognitive processes and lateralisation of distinct functions

Research (Turkeltaub *et al.*, 2003) also indicates that normal reading development is associated with increased lateralisation and specialisation of the brain, particularly in the left hemisphere of most individuals. Turkeltaub *et al.* (2003) indicated that the early engagement of the temporo-parietal cortex which is modulated by the learner's developing phonological skills was also associated with a *disengagement* from right infero-temporal cortex and engagement of left inferior frontal and middle temporal cortices. A developmentally related decrease in right ventral stream activity was reported. They posit that the progressive disengagement of right ventral extra-striate areas indicates a decreasing reliance on non-lexical form recognition (logographic) systems for



word identification. Failure of this process to develop normally might lead to interference between right and left functioning and result in confusion in recognition and recall, leading to reading difficulty. 'Developmental delay' in the lateralisation process (Das *et al.*, 1994; Stanovich, 1988) has also been implicated in some forms of learning difficulty (Jansen, 1996). Figure 3.1 (above) provides a schematic representation of the brain indicating the three main left hemisphere areas identified by functional Magnetic Resonance Imaging to be associated with reading. The left inferior frontal gyrus (Broca's area) helps the child to vocalise words – silently or aloud. It also starts to analyse phonemes. Together with right brain regions, it is involved in early whole-word recognition and early reading in beginners. The left temporo-parietal area (Wernicke's region) is mainly associated with the complete analysis of written words into phonemes and syllables. It is mainly associated with the functional phonological route in the developing child. The left occipital-temporal area (word form area) is the region of the brain associated with the automatic recognition of words and the development of fluency in the reader.

This mechanism contrasts with the maturational approach popularised by Piaget, in which learners are thought to proceed by a basically deterministic trajectory from one cognitive stage to another (Woolfolk, 2001:27, Donald *et al.*, 2002:63). The basic drive for this was postulated to be largely maturational, with little influence from the environment. In contrast to this, the dual route model would predict that reading does not follow the maturational trajectory deterministically, but that certain events have to be present in the learner's immediate experience to facilitate, mediate and guide the emergence of specific cognitive processes that support reading (Woolfolk, 2001:375, Donald *et al.*, 2002:104). While maturational effects are involved, cognitive circuits that support reading have to develop and this occurs through the learners' engagement with their world and through cultural mediation (Estep, 2002). This is particularly evident in the development of higher level literacy as opposed to simply the mediation of basic interpersonal communication skills with little exposure to print and reading (Lemmer, 1996:325). This strongly supports the Vygotskian view, and further emphasises the crucial role of language and literacy in the unfolding development of the learner's potential (Donald *et al.*, 2002:70). It is consonant with the findings that Piaget's stages are not rigidly tied to maturational milestones, and that most adults do not function at the formal operational level (Woolfolk, 2001:40).

What Piaget has mapped out is a potential trajectory. The extent to which the learners' actual development corresponds to this trajectory is dependent of the quality and quantity of mediation they receive within their own socio-cultural context. While basic cognitive ability may be intact, the

cognitive skills that empower the learner to achieve may be lacking (Das *et al.*, 1994). Thus the premise of Vernon (1969) seems to be supported by the results of empirical research i.e. language mediates cognition, and fostering a high level of reading proficiency may provide a vital tool in providing learners with the cognitive apparatus to meaningfully interpret their existence and actualise their potential (Donaldson, 1978).

Pugh *et al.* (2000) proposed the following hypothesis: the development of left hemisphere posterior circuits, particularly the ventral occipito-temporal area, is dependent on a “highly organised integration of phonological and lexical-semantic features of words within overlapping neural circuits.” Furthermore, Pugh *et al.* (2000) stated that this integration “relies upon the **intactness of processing** in the temporo-parietal learning systems.” (my emphasis) In terms of the PASS model, this would mean that the intactness of successive and simultaneous processing in the temporo-parietal circuits is crucial for the postulated integration of the phonological and lexical-semantic features of words. This in turn is crucial for the development of the ventral word form area, which is essential for the attainment of automaticity and fluency in reading. Furthermore, Pugh *et al.* (2000) propose a model in which “**orthographic processes**” and “**phonological processes**” together with “**phonological assembly**” are cardinal features in the integration of the “**lexical-semantic processes**” which in turn underlie the development of the word form area. In the view of Das *et al.* (1994), the orthographic processes would involve predominately simultaneous processing, while the phonological processes would involve predominately successive processing. A deficit in either successive or simultaneous processing would disrupt the phonological assembly processes, and thus the lexical-semantic processes that are postulated to underlie the development of the ventral circuits of the word form area. This model is summarised in Figure 3.2.

This model is tentative, and further research is needed to clarify the exact relation between simultaneous processing and orthographic and lexical semantic processing. Further research is also needed to clarify the exact location of simultaneous processing within the cortex. Research indicates that the angular gyrus (Pugh *et al.*, 2000), the superior temporal sulcus (Wise *et al.*, 2001) and the temporo-parieto-occipital junction (Xu *et al.*, 2005) are all possible candidates. In fact all three of these regions are implicated as cardinal elements in a wider network of regions (Xu *et al.*, 2005), including left frontal and right cortical regions, associated with a variety of cognitive processes – attention, semantic association, problem solving and mental imagery (Cabeza & Nyberg, 2000) that are likely to be engaged in the comprehension of texts (Xu *et al.*, 2005). This network has also been implicated in a range of cognitive functions such as the ability to attribute

mental states to others (Castelli, Frith, Happe, & Frith, 2002), understanding social concepts (Martin & Weisberg, 2003), and making moral judgements (Greene, Sommerville, Nystrom, Darley & Cohen, 2001; Moll, de Oliveira-Souza & Eslinger, 2003) and on this basis it has been argued to play a central role in social cognition (Xu *et al.*, 2005). This alerts us to the intriguing possibility that proficient interpreters of texts will also be proficient interpreters of life.

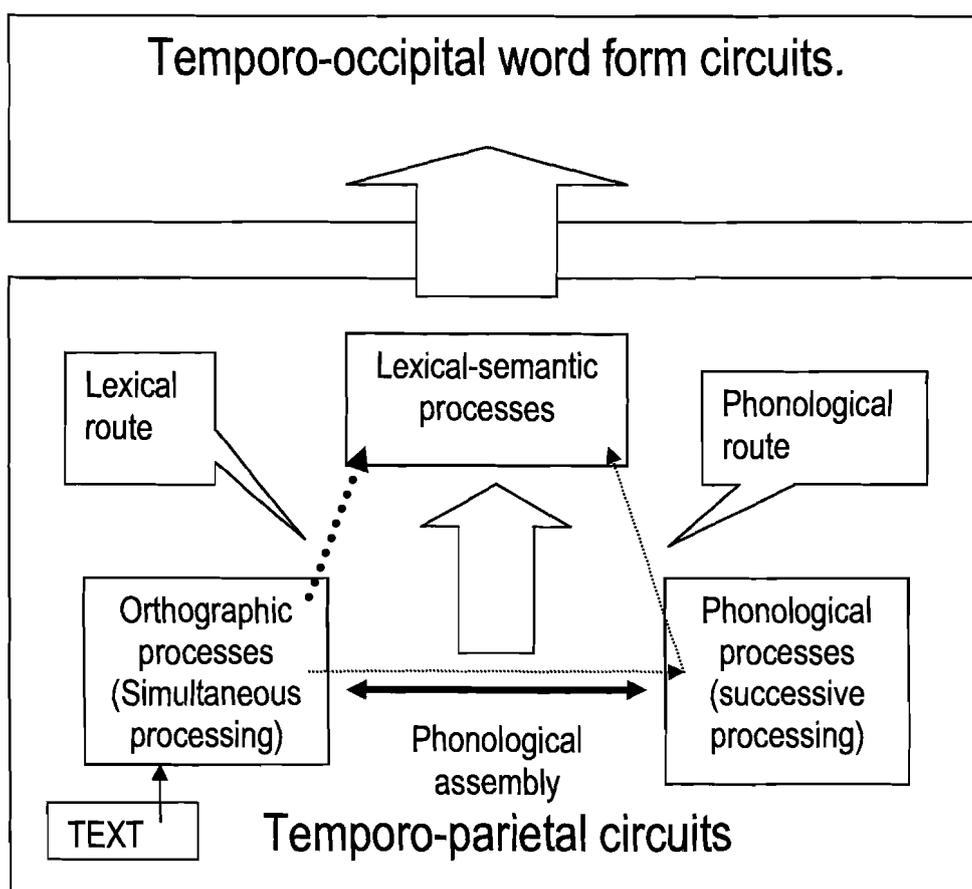


Figure 3.2. Model of phonological assembly. Adapted from Pugh *et al.*, 2000

A consensus has emerged (Pugh *et al.*, 2000, 2001), and an integration of research findings on the nature of reading difficulty (Morris *et al.*, 1998), cognitive processes (Das, 2000) and the neuropsychology of reading (Pugh *et al.*, 2000; Shaywitz & Shaywitz, 2004a) has crystallised. Reading proficiency is based upon two core skills or underlying processes, word recognition and word analysis, which correspond to the lexical and phonological routes respectively. These in turn reflect the cognitive processes of simultaneous and successive processing, both of which are implicated in the functioning of the posterior cortex as described by Luria (Das, 2000), and

corroborated by more recent brain imaging research (Pugh *et al.*, 2000; Shaywitz & Shaywitz, 2004a). Behavioural research indicates that reading difficulty is associated with core deficits in phonological processing (Al Otaiba & Fuchs, 2006, 2002). At the cognitive level, this represents deficits in mainly successive processing, with simultaneous and planning processes being implicated in fluency and reading comprehension (Das, 2000). At the neurological level, this represents deficits in the functioning of primarily dorsal and ventral posterior cortical circuits (Pugh *et al.*, 2000; Shaywitz & Shaywitz, 2004a). More importantly, the integration of these different areas of research allow us to make clear predictions about the nature of deficits and the types of intervention programmes that could be implemented (Das, 2000; Pugh *et al.*, 2000). Furthermore, research (National Reading Panel Report, 2000) indicates that the type of intervention needed to address specific reading difficulty is the same as for addressing most other forms of reading difficulty (Pugh *et al.*, 2000; Shaywitz & Shaywitz, 2004a). A multi-component reading programme is indicated that includes a phonemic awareness approach combined with a systematic phonics approach which leads into a reading comprehension instruction involving developing vocabulary, fluency and comprehension strategies (Al Otaiba & Fuchs, 2006, 2002; National Reading Panel Report, 2000).

Al Otaiba and Fuchs (2006, 2002) state in their review paper that one disadvantage of multidimensional reading programmes is that they prove difficult to implement in the classroom. We need to turn our attention to this problem within the immediate context of South Africa and consider issues of teacher training and implementation of transformational strategies in our schools.

3.4. TEACHING READING WITHIN AN OUTCOMES BASED EDUCATIONAL PARADIGM

It has been repeatedly reported in this country that the implementation of Curriculum 2005 has been frustrated by a number of factors, one of the main ones being the complexity of the approach and the opacity of the jargon associated with it (Donald *et al.*, 2002:24; Jansen, 1999:145). Teachers feel confused and frustrated by the new developments, and there is a general feeling that in-service training of teachers is urgently needed (Lessing & De Witt, 2002). However, teachers who do receive some training express frustration with their inability to implement it (Lessing & De Witt, 2002). The request for in-service training and the need for a reading intervention tool therefore contribute towards the rationale for this intervention programme (HRSP) to be empirically validated towards its practical effectiveness.

Caelers (2005) cited research by Klopp at the University of Stellenbosch that indicated that 60% of Western Cape learners were not achieving the learning outcomes set out in the national curriculum. Only 37% of grade three learners were achieving at grade levels. Furthermore, during the initial stages of the implementation of Curriculum 2005 the perception developed that reading and writing instruction would no longer be necessary, and even that it was 'banned' by the new curriculum (Moll *et al.*, 2001:144). An example of this thinking is given by Moll *et al.* (2001:144).

"A delegation of worried principals from a cluster of junior primary schools in western Soweto posed the following to their District Director as an agenda for a meeting in October 1997: 'the suspension of principals if we do not teach phonics/reading'. In the meeting they told their director that certain teachers, after attending a teachers' union seminar on OBE, had informed them that phonics and reading programmes were part of the legacy of apartheid education, and that the new curriculum would no longer contain them." Moll *et al.* (2001:144)

Moll *et al.* (2001) state that the confusion became so severe that by 2000 the Department of Education had to officially assert its commitment to the fundamental importance of reading in the learning process:

"Reading in its broadest sense is key to the development and sustainability of our fledgling democracy. The notion that the outcomes .. do not promote, expect, or ensure that learners will be able to read and write is a "myth". The learning programme statement on literacy refers to a wider concept of literacy, including: language literacy, cultural literacy, visual literacy; media literacy; numerical literacy and computer literacy." (Mseleku, 2000)

Moll *et al.*, (2001:145) argue that reading and writing are fundamental to learning in educational contexts. Not only must teaching of reading be improved, but the practice of reading and writing must appear explicitly as a critical outcome at all levels..." They reject the notion that learners will construct the skill of reading and writing spontaneously. They argue that the explicit teaching of reading is essential to the successful acquisition of literacy. This is reflected in the Revised National Curriculum Statement: Languages (2002). It states "Languages are an important tool for achieving human rights and social justice. ... the Languages Learning Area Statement seeks to *develop this tool* to its fullest potential. Learners should become *confident bilingual speakers*, who have the *critical tools* to read their world and the texts spoken and written about it. They should be *able to analyse* these texts and 'rewrite' them in ways that expand possibilities in relation to both human and environmental justice." (8, my emphasis) To achieve this, the RNCS (2002) lists six **learning outcomes**.

1. Listening: The learner is able to listen for information and enjoyment, and respond

appropriately and critically in a wide range of situations.

2. Speaking: The learner is able to communicate confidently and effectively in spoken language in a wide range of situations.

3. Reading and Viewing: The learner is able to read and view for information and enjoyment, and respond critically to the aesthetic, cultural and emotional values in texts.

4. Writing: The learner is able to write different kinds of factual and imaginative texts for a wide range of purposes.

5. Thinking and Reasoning: The learner is able to use language to think and reason, and access, process and use information for learning.

6. Language structure and use: The learner knows and is able to use the sounds, vocabulary and grammar of the additional language.

The curriculum advocates a 'balanced approach' to literacy development i.e. the curriculum "begins with children's emergent literacy, it involves them in reading real books and writing for genuine purposes, and it gives attention to phonics" (9). The curriculum says that it is necessary to encourage and support learners "to do wide reading" (10), give learners the opportunities for writing and developing vocabulary and language use, and to help learners discover techniques and strategies that enable them to 'break the code' of sound-sign associations by i) developing word recognition and comprehension skills "such as (sic) phonemic awareness", ii) provide knowledge of letter-sound associations and iii) provide "knowledge of blending" (RNCS, 2002).

Lessing and De Witt (2002) provided a report on the results of a workshop for teachers aimed at empowering teachers to teach reading in an OBE education system. Olivier (1999:21) is quoted by Lessing and De Witt (p. 274) as saying that the "outcomes based learning approach intends to focus on knowledge, skills, and the process of learning and the final outcome/result/product". Donald *et al.* (2002:24) describes the Outcomes Based Education (OBE) approach as a 'competence-based' movement in education. 'Competence-based' means that the emphasis falls on what the learners can do, and not simply what they memorise. Lessing and De Witt (2002) claimed that OBE required a paradigm shift towards process, and deviates from content based approaches in that it focuses on the mastery of processes linked to outcomes as well as acquiring knowledge and skills. The emphasis it is claimed is on active learning and on encouraging a learner-centred environment in classroom instruction. However, the competence-based approach has been criticised for the tendency to limit educational goals, turning outcomes into more and more tightly defined, compartmentalised and artificially delimited elements that the learner must

acquire (Wolf, 1995). Similarly, Kraak (1999:21) pointed out that OBE's claim for the transferability of generic competencies may prove to be more rhetorical than real.

The massive attrition in trained personnel from the education sector has left the Department of Education with untrained teachers who are poorly equipped to cope with the demands of the transformation process in education in South Africa (Mtshali, 2005). This is clearly evident in the results of the Lessing and De Witt (2002) survey, as teacher training emerges as a significant controlling factor in the whole needs structure of the present educational situation, with 96% of teachers in the survey expressing a need for further training in early reading instruction, with Foundation Phase teachers being noticeable in expressing the need for more guidance in this area. The single most significant result of this survey was the finding that specific teacher training in reading instruction is a key factor in the success of reading programmes, a factor predicted by the Al Otaiba and Fuchs (2002) review and emphasised by Shaywitz and Shaywitz (2004b). Before we can train teachers, it is essential that we first establish which approaches or methods of reading instruction have adequate research support. This will be discussed next.

3.5. READING INSTRUCTION

The aim of reading instruction is to equip learners to become efficient interpreters of texts of different kinds (Moll *et al.*, 2001:128; RNCS, 2002). In the South African context, Naicker (2003:12) states that one of the principles of OBE and inclusion is 'high expectation', thus ensuring that standards are not compromised. Similarly, the RNCS (2002:4) states that "in a multilingual country like South Africa it is important that learners reach *high levels of proficiency in at least two languages*, and that they are able to communicate in other languages" (my emphasis). One of the most basic principles in this regard is to equip the reader with the facility to read **fluently** and automatically, so as to allow the mind to focus on the task of interpretation (National Reading Panel (NRP), 2000; Richek *et al.*, 1989:408; Snow, Burns & Griffin, 1998). Secondly, the reader has to read with a very high level of **accuracy** to be able to make sense of what they are reading. Lerner (2003:412) lists three levels of reading accuracy, the *independent level*, where the reader is able to recognise above 95% of the words and to comprehend over 90% of the content. This is the ultimate goal of reading instruction. The learner at this level is an independent learner. The second level is where the reader can recognise over 90% of the words and understand over 70 % of the content. This is the *instructional level*, at which the learner is dependent on and can benefit from direct instruction. The third level is where the reader recognises less than 90% of the words and

understands less than 70% of the content. This is the *frustration level*, at which some form of intervention is needed before the learner is able to make sense of the text (Lerner, 2003).

From the above it is clear that the 'proficient' reader must be able to read at a very high level of accuracy in terms of word recognition, fluency and comprehension order to make sense of the text. For this reason, learners who are able to spell well (i.e. are familiar with the sound-sign generalisations) and recognise words easily and accurately will be at an advantage in all reading tasks. As noted above, there is still debate in the literature as to the best or most effective methods of teaching reading (Allington, 2002, 2005; Allington & Johnston, 2001; Smith, 1992).

- Some favour a whole language approach (Goodman, 1986, 1989). They emphasise that this is basically a philosophy rather than a method, with the goal of helping learners learn to read 'naturally' (Lomofsky *et al.*, 2003:69; Smith, 1992; Stahl & Miller, 1989).
- Others favour a code-breaking approach (Chall, 1983; Smith, 1992) with the emphasis on direct instruction of 'word attack' skills.
- Others try to adopt a middle ground, advocating the use of the strengths of both methods to supplement their weaknesses (Lerner, 2003:387; Richek, *et al.*, 1989:398, Richek *et al.*, 1996). This is also the position of the RNCS (2002).

In the following discussion, evidence for the two different approaches will be considered.

3.5.1. METHODS OF READING INSTRUCTION

3.5.1.1. Whole language approaches

The debate around the teaching of reading at present revolves around two main approaches, what is called 'whole language' approaches, and explicit code-emphasis (phonics) instruction (Allington, 2002; Lerner, 2003; Stahl & Miller, 1989). Of the two, the first seems to enjoy more support in this country (Smith, 1992; Machet, 2002; Lessing & DeWitt, 2002). The basic ethos or **philosophy** of the whole language approach as promoted by Goodman (Goodman, 1986; Goodman, 1989; Goodman & Goodman, 1979; Goodman & Goodman, 1990) is as follows (Lerner, 2000:394).

Whole language instruction:

- Encourages respect for language, for the learner and for the teacher
- Emphasises the meaning - and not the code - in authentic speech and literary events
- Encourages learners to take risks and to use language for their own purposes
- Advocates a flexible, varied approach to language teaching.

Stahl and Miller (1989) list four **characteristics** of whole language/language experience approach.

1. The emphasis is on using learners' own language productions, either through experience charts or through their own writing using invented spelling, as a medium of instruction.
2. The lessons are learner centred rather than teacher centred. In a whole language classroom it is assumed that children's competence will develop out of a need to use language to communicate better.
3. An emphasis on commercial books, rather than basal reading programmes. This is not to say that basal programmes do not use commercial children's literature, but they are not the major emphasis in a whole language approach.
4. Phonics lessons are not directly taught. Lessons in decoding are given incidentally as the need arises in the context of reading whole texts.

The philosophical nature of the whole language approach is clearly evident from these characteristics. Because the whole language approach is rather a philosophy and not a specific method (Smith, 1992; Stahl & Miller, 1989), it is difficult to define in terms of instructional methods. Lerner (2000:394) summarises the **method** under four basic tenets:

1. *Reading is part of the integrated language system of the learner closely linked to other forms of communication and the communication context (Lerner, 2000).*

Whole language advocates emphasise **active experience** of 'authentic language' tasks, and the early exposure of the learner to books and other forms of communication. They also emphasise the importance of **modelling** reading behaviour and aim to foster enjoyment of reading. Most research is in broad agreement with this position (Lerner, 2003). However, research indicates we need to be cautious about the claims that whole language will benefit all learners. Learners from lower socio-economic status (SES) contexts, and those who struggle to read or have a reading difficulty, may be disadvantaged by the method (Stahl & Miller, 1989). It also does not foster phonemic, grammatical and syntactical awareness, which have been shown to be correlated with reading acquisition (Ball & Blachman, 1988; Berninger, 1990; Bus & Ijzendoorn, 1999; Ehri & Wilce, 1985; Fielding & Pearson, 1994; Griffith & Olson, 1992; Hatcher, Hulme & Ellis, 1994; Leong, 1987; Lerner, 2003; Mann, 1993; Mann, Cowin & Schoenheimer, 1989; Rashotte & Torgesen 1985; Rice, 1989; Torgesen, Wagner & Rashotte, 1994; Vellutino & Scanlon, 1987; Vellutino, 1991).

2. *Both spoken and written language is acquired naturally.*

Formal instruction of reading is unnecessary, as learners will pick it up naturally from the social context. Lerner (2003:394) states that the weight of evidence is against such a view. A large body of research clearly indicates that most learners benefit from direct instruction in reading and the teaching of rules based strategies for “breaking the code” (Smith, 1992; Stahl & Miller, 1989). It is also necessary to make a distinction between learning to speak a language and learning to read (and write) a language. The neurological and cognitive bases of these skills are divergent and non-equivalent, often engaging different areas of the brain (Jansen, 1996:144; Lerner, 2003; Shaywitz & Shaywitz, 2004a, 2004b).

3. *The use of authentic literature provides abundant opportunities for expressive literacy.*

Whole language advocates claim that learners from early on need to be engaged with and exposed to a wide variety of books and literature (Goodman, 1986). There seems to be little argument here (Allington, 2002; Allington & Johnston, 2001). The large repertoire of nursery rhymes, poems, children’s stories and children’s songs is clearly an integral part of early childhood development (Lerner, 2003).

4. *The teaching of language as units of sounds and sign combinations, and the use of phonetic grammatical rules interferes with the natural development of language and reading behaviour (Lerner, 2003).*

It is claimed that teaching phonics interferes with reading acquisition by fragmenting the whole process in the learners’ mind and divorcing it from meaning-rich literary contexts, making the assigning of meaning very difficult if not impossible. The whole language approach regards letter-sound correspondences as just one of three cueing systems that are used to read and write text, the others being semantic/meaning and syntactic/language cues. Whole language teachers believe that phonics instruction should be integrated into meaningful reading, writing, listening and speaking activities and taught incidentally when the need arises. As learners attempt to use writing for communication, it is claimed, they will discover ‘naturally’ that they need to know the letter-sound correspondences and how letters function in texts. When the learner reaches this stage the teacher should respond with appropriate instruction (NRP, 2000).

This last tenet is where the most heated debate occurs in the literature (Allington, 2002, 2005; Chall, 1983; Smith, 1992). A recent review of research on reading instruction indicates that there is little empirical support for such a view (NRP, 2000). Moreover, the logical structure of the sign-sound code system is intrinsic to the mastery of the ability to read, and helping learners understand the code is a more parsimonious view. The increasing research support for the importance of fostering phonemic awareness and providing code-breaking strategies in helping beginner and reading disabled individuals to read clearly argues against the above position for whole language instruction (Lerner, 2003; Torgesen *et al.*, 1994; Torgesen, Rashotte & Alexander, 2001). Even in the area of pre-school reading instruction and kindergarten - perhaps the area of most disagreement, and where the whole-language approach may have a slight advantage over the basal reader approach (Stahl & Miller, 1989) - the results of research indicate the effectiveness of introducing systematic phonemic awareness and direct phonics instruction (NRP, 2000). Lerner (2003) goes as far as to say that the question is no longer whether the use of phonics and other code breaking tools should be taught, but what is the best way of teaching them.

Phonemic awareness and systematic phonics instruction is thought to help the learner learn to read because the structure of the English writing system is alphabetic (NRP, 2000). Moreover, due to the many irregularities, this system is not easy to work out. Words have prescribed spelling that consists of graphemes symbolising phonemes in predictable ways. Being able to distinguish the separate phonemes in the pronunciation of words so that they can be linked to graphemes is difficult for the learner. This is because spoken language is seamless and there are no breaks in speech signalling where one phoneme ends and another begins. Rather phonemes are folded into each other and are co-articulated. Discovering phonemic units is helped by the explicit instruction in how the system works. This is supported by research that indicates that people who have not learned to read and write have difficulty distinguishing phonemes. Similarly, people who have learned to read using a non-alphabetic system e.g. Chinese, also have difficulty segmenting words into phonemes (NRP, 2000).

The findings of the review of research Stahl and Miller (1989) on the efficacy of the whole language approach compared to the basal reader approach is relevant to this argument. These authors conducted a review of research to establish the validity of claims for and against the two approaches. They report no difference between the two methods overall. Closer examination of the data revealed some very important observations. Firstly, whole language approaches may have a slight advantage over basal approaches at kindergarten, while basal reader approach was more

effective at first grade. Secondly, whole language approaches produce larger effects at word recognition than reading comprehension, a significant result considering that the emphasis of the whole language approach is on fostering **reading comprehension** i.e. reading for meaning.

Other important findings (Stahl & Miller, 1989) were that more recent research and more rigorous methodologies favoured basal reading approaches over whole language approaches. It was also noted that the whole language approach was *not* more beneficial to low socio-economic status or learning disabled groups. In some cases, it was the middle and upper class groups that benefited more. Furthermore, Stahl and Miller (op cit.) also reported that code emphasis approaches were more effective than either whole language or basal approaches.

Stahl and Miller (1989) summarised their finding by saying that whole language approaches appear to be more effective when used prior to formal reading programmes, while basal reading programmes are more suited to formal instruction of beginning reading. They suggested a stage model of reading development to explain their result. They cite Downing (1979) who suggested three phases in the acquisition of reading, i) a cognitive phase, in which the learner becomes aware of the tasks needed to become a skilled performer, ii) a mastery phase in which the learner develops facility in the skills, and iii) an automaticity phase in which the learner can read without conscious attention. This is consonant with the maturational stages described above. Stahl and Miller (1989) suggest that whole language may more closely approximate the kind of incidental learning characteristic of middle class homes in which pre-school learners are initiated to print and books. Once the print concepts have been mastered, however, the learner will benefit from a more systematic instruction of sound symbol associations.

3.5.1.2. Systematic phonics approaches

The subtitle of this section emphasises the fact that 'systematic phonics' does not represent a monolithic, universally established method, and that great variety is encountered under the term. The National Reading Panel (2000) carried out a rigorous and extensive meta-analysis of research in reading instruction. The report indicated that in order to teach reading effectively, learners must be taught alphabets, comprising both phonemic awareness and systematic phonics instruction, and vocabulary, fluency and reading comprehension strategies. This must be taught deliberately and explicitly. It is not sufficient to present instruction incidentally. Learners must know and master letter-sound correspondences **before** they can develop fluency and build vocabulary (Hook &

Jones, 2002; Kame'enui & Simmons, 2001; Shaywitz & Shaywitz, 2004a). However, they emphasise that systematic phonics instruction must be part of a complete reading programme.

Phonemic Awareness

Instruction in phonemic awareness involves teaching children to focus on and manipulate phonemes in spoken syllables and words. Phonemic awareness instruction qualifies as phonics instruction only when it involves teaching children to blend or segment the sounds in words *using letters*. In contrast to this if children are taught to manipulate sounds in speech *without any letters* this is not strictly speaking phonics instruction.

The *Findings and Determinations of the National Reading Panel* (FDNRP) report (2000:1) stated that "correlation studies have identified phonemic awareness and letter knowledge as the two best school-entry predictors of how well children will learn to read during the first 2 years of instruction". The results of the meta-analysis indicated that teaching learners to manipulate phonemes in words was effective under a variety of instruction conditions. Directly and systematically teaching phonemic awareness to learners significantly improved reading. The effects of phonemic awareness instruction on reading maintained well after the end of training. Phonemic awareness instruction also helped learners learn to spell. However, *phonemic awareness instruction was not effective for improving spelling in disabled readers*. This is consistent with other research showing that disabled readers have difficulty learning how to spell.

The three characteristics of phonemic awareness training found to be most effective in improving reading and spelling skills were i) explicitly and systematically teaching learners to manipulate phonemes *with letters and words*, ii) focusing the instruction on one or two types of phoneme manipulations rather than multiple types, particularly phonemic segmentation and phonemic blending, and iii) teaching in small groups.

The FDNRP (2000) concluded that phonemic awareness instruction is ready for implementation in the classroom. However, they cautioned that phonemic awareness training does not constitute a complete reading programme. Several additional skills such as phonic ability, fluency, vocabulary and text comprehension strategies must be acquired as well to ensure that learners will learn to read and write.

Phonics Instruction

The FDNRP (2000:3) states that “phonics instruction is a way of teaching reading that stresses the acquisition of letter-sound correspondences and their use in reading and spelling. The primary focus of phonics instruction is to help beginning readers understand how letters are linked to sounds (phonemes) to form letter-sound correspondences and spelling patterns and to help them learn how to apply this knowledge in their reading”. Phonics instruction may be provided systematically or incidentally. In **systematic phonics approaches**, a sequential set of phonics elements is outlined and taught with different degrees of explicitness depending on the type of phonics method used. With **incidental phonics instruction**, “the teacher does not follow a planned sequence of phonics elements to guide instruction but highlights particular elements opportunistically when they appear in text”. This appears to be the most common model of phonics instruction in this country (Lessing & De Witt, 2002).

The meta-analysis indicated that systematic phonics instruction produces significant improvements in the ability to read and spell words in learners from kindergarten to grade six, and for learners with reading difficulties. Older learners receiving phonics instruction improved in their ability to decode and spell words and to read text orally, *but their reading comprehension was not significantly improved.*

The FDNRP (2000) noted that systematic, synthetic phonics instruction had a significant effect on disabled readers' reading skills, learners with learning disabilities and low-achieving students who are not disabled. Furthermore, systematic, synthetic phonics instruction was more effective in improving low socioeconomic status learners' alphabetic knowledge and word reading skills than all other instructional approaches. The effect of systematic phonics instruction was strongest for kindergartners and decreased in higher grades. *For poor readers above first grade, the impact of phonics instruction on spelling was not significant.*

Research reviewed by the NRP (2000) did not support the popular notion that kindergarten and grade R learners are not developmentally ready for phonics instruction. The effects of early systematic phonics instruction in kindergarten and the 1st grade indicated that systematic phonics programs should be implemented at those age and grade levels. Furthermore, the FDNRP (2000) indicated that systematic phonics instruction is ready for implementation in the classroom. However, they caution that programmes that focus too much on the teaching of letter-sound relations and not enough on **putting them to use** are unlikely to be very effective. Educators must

ensure that learners **understand the purpose** of learning letter-sound correspondences, and that they are able to apply these skills accurately and fluently in 'real' reading and writing activities.

The FDNRP (2000) stated that all phonics programmes are **not** the same. Teachers must be educated about how to evaluate different programmes and how they can most effectively use these programmes in their own classrooms. There is therefore a need for pre-service and ongoing in-service training to implement appropriate phonics instruction effectively. Finally, the FDNRP (2000) stated that systematic phonics instruction is only one component of a complete reading program. Systematic phonics instruction should be integrated with instruction in phonemic awareness, fluency, and comprehension strategies to create a complete reading programme. The report also cites evidence that repeated oral reading with guidance and feedback is one of the most effective ways to foster fluency and reading comprehension strategies (Torgesen, Rashotte & Alexander, 2001). This receives particular attention in the HRSP.

Shaywitz and Shaywitz (2004b:23) stated that "The past decade has witnessed an unprecedented collaboration between science and education, so that there has now seen a sea of change, not only in understanding the underlying basis for reading and reading difficulty, but perhaps most critically, in the recognition that teaching reading must be driven by science. For the first time it is now possible to begin to talk about evidence based education. The new era in education demands knowledgeable teachers who understand the science of reading and how crucial their own role is in teaching children to read." Shaywitz and Shaywitz (2004b:11) describes a number of criteria that an effective evidence-based reading programme should possess. When evaluating such a reading programme educators should ask the following questions about the programme to ensure it can be implemented effectively:

- Is there scientific evidence that the programme is effective?
- Was the programme or its methodology reviewed by the National Reading Panel?
- Are phonemic awareness and phonics taught systematically and explicitly?
- How are learners taught to approach an unfamiliar word? Do they feel empowered to try to analyse and sound out the unknown word first rather than guess the word from the pictures or context?
- Does the programme also include plenty of opportunity for learners to practise reading, develop fluency, build vocabulary, develop reading comprehension strategies, write and listen to and discuss stories?

Shaywitz and Shaywitz (op cit.) state, “Children are 7 or 8 once in a life time. We cannot risk teaching students with unproven programmes. We now have the scientific knowledge to ensure that almost every child can become a successful reader” (2004b:11).

The whole language versus phonics debate seems to be a perpetuation of another form of the perennial nature-nurture debate within educational psychology (Smith, 1992; Woolfolk, 2002). The approach advocated by Lerner (2003:393) and by Richek *et al.* (1989:398) is an integration of the two approaches in a way that capitalises on the strengths of both. Stahl and Miller (1989) concur here, stating that research seems to point to a combined approach, maximising the strengths of the different approaches and minimising weaknesses. They conclude by saying that the one goal of reading instruction is that learners become efficient interpreters of texts. However, they alert us to the possibility that approaches that always emphasise the construction of meaning may not be the best in achieving that goal. The intermediate phase of learning to read might be best fostered by direct and systematic phonics instruction, but even the most effective phonics approach could work better if learners get opportunities to read ‘whole’ books.

Having established the research support for reading instruction methods, we now need to address the need for reading intervention models to meet the urgent needs of South African learners.

3.6. READING INTERVENTION FOR LEARNERS UNRESPONSIVE TO REGULAR READING INSTRUCTION

The falling matriculation pass rate of the past years (Deacon & Parker, 1999:59) and poor literacy levels in the lower grades (Blaine, 2006; Momborg, 2006) has led to calls for more radical transformation of education policy, particularly for disadvantaged groups and the lower grades. A comparable situation occurred in the USA 20 years ago and was also met with calls for educational reform and the transformation of educational policy. At that time, Chall (1983) however cautioned that this reaction may be premature and even wrong-headed. She argued that “it seems wasteful to cry for a different instructional programme whenever scores drop, when we have little evidence as to what brought it about.” (p. 7). She advocated a historical perspective based and a stage theory of reading development as follows: Prior to grade four, reading is based on an oral tradition, in the text rarely goes beyond the language and knowledge the reader already has through listening, TV and other incidental exposure. She stated that we can view reading beyond grade four as comprising the literary tradition – “when reading matter goes beyond what is already known” (p 6).

Grade 4 is seen as the beginning of a long process of development of increasing facility in the reading of texts that are ever more complex, abstract and technical, and that require more general knowledge and more advanced language and cognitive ability to make possible the interpretation and critical evaluation required. Cummins (1981) made a similar distinction between basic interpersonal communication and cognitive academic language proficiency. But Chall (1983) also postulated that the poor achievement levels of the higher grades might be due to the different demands made on the reader. Earlier reading requires skills in word recognition and analysis, while upper grades require linguistic and cognitive competencies. She also points out that without the foundation skills, the higher skills are not likely to emerge. Chall (1983:6) emphasises that “making inferences as to whether we are teaching correctly from achievement results alone, without relating them to what was taught, is risky”. A similar argument based on research in South Africa was made by Prinsloo and Stein (2004) and Kapp (2004).

Donald (1996:71) states that existing models of service delivery for special needs education are inadequate to meet the needs of the South African situation. He recommends the development of an integrated model for education support services. What he envisages is that “the mainstream itself become the very site and vehicle for specialised educational initiatives” (p 73). He argues further that it is clear that educational support services cannot be an adjunct to the general curriculum. He advocates the principle of curriculum infusion. Health promoting and developmental aspects of education support services should be integral to every level of the general curriculum and its development. He concludes “it is only the notion of a specialised educational service which is integrated and articulated with the mainstream of education that can be seen as meeting the complex and extensive social learning needs of our society” (Donald, 1996:84) These ‘learning needs’ are described next in terms of reading difficulty.

3.6.1. READING DIFFICULTY

Reading difficulty is characterised by a paradoxical difficulty in reading in learners whose other mental functioning such as memory, motivation and achievement are normal or above normal (Lyon, 1995; Shaywitz, 1996). Longitudinal studies (Shaywitz, Shaywitz, Fletcher & Escobar, 1990) indicate that it is a chronic condition that persists into adulthood. It is not a developmental lag but its aetiology can be traced to a deficit in cognitive functioning. It is normally distributed within the population and affecting girls and boys equally (Shaywitz, *et al.*, 1990). Research on the activity of the brain of learners with reading difficulty compared to normal learners has indicated that the

learner with reading difficulty shows a specific inability to access the left temporo-parietal region and the left occipito-temporal region (Shaywitz & Shaywitz, 2004a). These two regions have been implicated in the development of the phonological-orthographic mechanisms and the lexical-orthographic mechanisms respectively (Das *et al.*, 1994). Struggling readers rely more on the left inferior frontal gyrus and compensate by activating homologous areas in the right hemisphere (Shaywitz & Shaywitz, 2004a). This finding explains why a reading disabled learner can exhibit normal and even above average ability in most areas of cognitive functioning, but be unable to decipher text, or do so only slowly. Research on learners with reading difficulty (Morris *et al.*, 1998; Shaywitz & Shaywitz, 2004a) has also indicated that learners who struggle to read all show a similar aetiology. A deficit in the function of these two posterior cortical regions, particularly Wernicke's area, seems to underlie most subtypes of reading difficulty (Morris *et al.*, 1998; Pugh *et al.* 2000, 2001).

Such research has also provided a **phonological deficit model** for understanding the development of reading difficulty (Shaywitz & Shaywitz, 2004a). Beginning readers mainly make use of the frontal regions or Broca's area to recognise and sound out words, mainly as wholes. They then move to a stage where they have to "break the code", and come to understand the association between the sound system of spoken language and the sign system of texts. This stage relies heavily on the Wernicke's area of the brain. The final stage is the achievement of automaticity, which relies on a functional occipito-temporal region to quickly and accurately recognise words and their meaning. This enables the learner to read fluently. Fluency develops as the learner develops memory associations between the written word, its pronunciation and its meanings (Shaywitz & Shaywitz, 2004a, Torgesen *et al.*, 2001).

It is also clear from the evidence of functional Magnetic Resonance Imaging on learners with reading difficulty that this reading trajectory is strongly hierarchical and the intact functioning of the lower regions and connectivity between them is crucial for the emergence of the next stage (Shaywitz *et al.*, 2004; Shaywitz & Shaywitz, 2004a, Turkeltaub *et al.*, 2003). Thus, a deficit in the functioning of the Wernicke's area will result in the lexical pathway for fluency not developing, and the learner would have to compensate by recruiting other areas such as Broca's region and right brain homologues (Hertz-Pannier, Chiron, Jambaque, Reaux-Kieffer, Van de Moostele, Belalande, Folien, Brunelle & Le Bihan, 2002). The learner can still read, but not automatically and reading will always be laboured (Shaywitz & Shaywitz, 2004a)

More importantly, this result (Shaywitz & Shaywitz, 2004a) has also alerted us to the possibility for intervention (Pugh *et al.*, 2000). It has been well established that learners with reading difficulty benefit from direct instruction of phonological skill (NRP, 2000). Shaywitz *et al.*, (2004) subjected learners with reading difficulty to an intensive programme of systematic phonics intervention and after a year reinvestigated the fMRI signature. They found that the Wernicke's area had been engaged, with corresponding disengagement of frontal and right brain regions, and the emergence of activity in the word form area. Moreover, the phonological route also seems to be the only route to achieve fluency in reading (Shaywitz & Shaywitz, 2004a, 2004b; Spear-Swerling & Sternberg, 1994).

These findings indicate that there is only one developmental cognitive pathway in reading acquisition and that systematic phonics instruction is the tool of choice for fostering this pathway (Palinscar & Perry, 1995; Smith, 1992). Furthermore, the application of 'evidence-based' intervention (National Reading Panel, 2000) will ensure measurable improvement in reading proficiency that corresponds directly with the engagement of the Wernicke's area and the word form area in the posterior left cortical regions of the brain.

3.6.2. LEARNERS WHO ARE UNRESPONSIVE TO READING INSTRUCTION

It is important not to claim too much for 'evidence-based' reading instruction and the role of systematic phonics instruction in producing proficient readers (Allington, 2002, 2005). The NRP report (2000) indicated that phonemic awareness instruction was ineffective in helping reading disabled learners to spell. Furthermore, systematic phonics instruction was also ineffective in helping poor readers above first grade with reading comprehension and spelling. Al Otaiba and Fuchs (2006, 2002) reported that research indicates that as many as 30% of children at risk for reading difficulties (Blachman, 1994, 1997; Mathes, Howard, Allen & Fuchs, 1998) and 50% of children with special needs (Fuchs, Fuchs, Thompson, Al Otaiba, Yen, Yang, Braun & O'Conner, 2002; O'Conner, 2000) may not benefit from generally effective phonological and decoding instruction. Al Otaiba and Fuchs (2002) evaluated 23 studies of early literary intervention in order to ascertain the characteristics and needs of learners who do not benefit from the intervention programmes. It was from the same needs base, i.e. providing an alternative intervention for learners who do not benefit from regular intervention programmes, that the *HiWay Reading & Spelling Programme* evolved (Hailstones, 2004). (This programme will be described in more detail the chapter 4).

3.6.2.1. Core deficits in phonological processing

Al Otaiba and Fuchs (2006, 2002) state that research suggests that most reading difficulties are associated firstly with 'core deficits' in phonological processing, and secondly with naming-speed deficits. This implicates both temporo-parietal and frontal circuits (Das *et al.*, 1994). They also point out that deficits in one or both of these areas lead to reading dysfunction (poor word recognition) which in turn impacts reading comprehension. These two basic processes, word recognition and phonological processing, are the two core factors underlying early reading development as indicated in section 3.3.2. of this chapter (Lerner, 2003:399; Stanovich, 1982, 1988). Al Otaiba and Fuchs (2006) also identified a combination of naming speed as measured by the Rapid Letter Naming Test, verbal ability as measured by the Peabody Picture Vocabulary Revised, and sentence imitation as measured by the subtest of the Detroit Learning Aptitudes – 3 as good predictors of unresponsive learners. All of these tests have a strong simultaneous processing component (Das *et al.*, 1994). O'Malley *et al.*, (2002) report that only two skills differentiated IQ discrepant and low achieving readers: letter sound knowledge (a rapid naming i.e. frontal task) and visual-motor integration (a simultaneous task). These tests again implicate **simultaneous processing** as well as **frontal** involvement (planning processes) in speed of articulation. A similar result implicating frontal and simultaneous processing was reported by Speece *et al.* (2003). This may also indicate the finding of Al Otaiba and Fuchs (2006) that problem behaviour as measured by the Achenbach Child Behaviour Checklist was a good predictor of 'unresponsiveness' was related to deficits in **frontal** control of behaviour characteristic of such learners (Hallowell & Ratey, 1994).

Juel (1988) reported that learners in first grade who read poorly were still reading poorly in fourth grade, which is a case in point against retention or a 'wait and see' policy (Shepard & Smith, 1987). Fletcher and Foorman (1994:185) also caution against a 'wait and see' approach. Diamond and Mandel (1996) cite Foorman as saying that reading problems addressed in first or second grade can be remedied 82% of the time, while if left to third to fifth grade, the success rate falls to 46%, and those left to after fifth grade to 15%. Al Otaiba and Fuchs (2002) also cite Stanovich (1986) as reporting a widening gap between poor and good readers over the elementary years. Learners are not likely to catch up with time, but rather fall further and further behind, while addressing reading difficulty becomes increasingly problematic after third grade (or age eight) (Fletcher & Foorman, 1994). Al Otaiba and Fuchs (2002, 2006) emphasise that reading dysfunction persists throughout schooling and into adulthood (Shaywitz & Shaywitz, 2004a), while the observation that learners who begin schooling as efficient readers are likely to experience academic success, graduate from

high school, successfully complete college and find employment is well documented. Proficient reading is therefore a prerequisite life skill for success in and after school (Broder, Dunivant, Smith & Suttan, 1981; Campbell & Ramey, 1994; Zigler *et al.*, 1992).

However, as Al Otaiba and Fuchs (2006, 2002) pointed out, not all learners benefit from regular early literary instruction. This is an issue relevant to the South African educational context. Furthermore, there is some evidence to suggest that it is precisely the learners that need it most i.e. struggling readers and the culturally disadvantaged, that seem to benefit the least (Fuchs *et al.*, 2002, O'Conner, 2000; Stahl & Miller, 1989). It was because of an observed unresponsiveness of learners with reading difficulties from culturally different and traditionally disadvantaged backgrounds that the HiWay Reading & Spelling Programme was *initially* developed. Furthermore, the immediate context that led to the implementation of the HRSP in the mainstream classroom was the decline in literacy scores i.e. *unresponsiveness to regular literacy instruction*, for learners from diverse ethnic backgrounds, SES levels and difficulty status (Hailstones, 2004).

The results of the review by Al Otaiba and Fuchs (2002) are important for this study, as they confirm our experience that not all learners benefit from intervention. Al Otaiba and Fuchs (op cit.) report that in 16 out of 21 reports the authors indicated that *poor phonological awareness* most clearly characterised unresponsive to literary intervention. In six out of nine studies measuring phonological encoding, authors reported that learners unresponsive to literary intervention had difficulty encoding, storing and organising *phonological* information. In six out of seven studies investigating the effects of naming speed, the authors reported that students who did not benefit from the intervention were distinguished by *slow naming speed*. This result implied the potential of systematic phonics instruction in remedying these deficits. Nevertheless, as already reported, unresponsiveness specifically to *systematic phonics intervention* was observed in culturally different and traditionally disadvantages learners (Hailstones, 2004). The need for a specific reading intervention tool to address this problem is therefore evident.

Al Otaiba and Fuchs (2002) concluded from their review that the literature indicates it might be difficult or even impossible to characterise a typical non-responsive student due to their complex profile of strengths and weaknesses. Furthermore, they cite this fact as a rationale for developing "complex, multifaceted interventions that in principle provide something for every struggling reader" (Al Otaiba & Fuchs, 2002:313). This was a primary objective of the development of the HiWay Reading & Spelling Programme (Hailstones, 2004).

3.6.2.2. Multi-component two-phase reading programmes

Al Otaiba and Fuchs (2002:313) also outline recommendations for such a multi-component programme. They cite current research as indicating a two-phase approach. In phase one (primary (preventative) intervention) “one or two of the programmes basic components are implemented by general educators in mainstream classrooms with the expectation that these components will accelerate the learning of most children”. Phase two (secondary (remedial) intervention) involves only those learners unresponsive to phase one instruction. In phase two “additional components are brought into effect with greater frequency and longer duration. Because of its comparative complexity and intensity, Phase 2 instruction is conducted by someone other than the classroom teacher and typically in small student groups” (Al Otaiba & Fuchs, 2002). Al Otaiba and Fuchs (2006, 2002) mention that the Bush administration is at present investigating just such a two-tier approach to identify learners with learning difficulty (Grimes, 2002; Vaughn, Linan-Thompson & Hickman, 2003; Vellutino & Scanlon, 2000; Vellutino, Scanlon, Sipay, Small, Chen, Pratt & Denkla, 1996). “Rather than rely on IQ-achievement discrepancy scores, school personnel would employ this identification process, requiring learners to demonstrate unresponsiveness to both primary and secondary interventions before they are considered eligible for special education” (Al Otaiba & Fuchs, 2002:313).

Therefore the issue of finding a method to help those learners from culturally different and traditionally disadvantaged groups (Lemmer, 1993) who are unresponsive to systematic phonics intervention still needs to be addressed.

3.6.3. ADDITIVE BILINGUAL MODELS IN SOUTH AFRICA

The RNCS (2002:4) states that “In a multilingual country like South Africa it is important that learners reach *high levels of proficiency* in at least two languages, and that they are able to communicate in other languages. The Languages Learning Area Statement follows an *additive approach* to multilingualism. All learners learn their home language and at least one additional official language. They become competent in their additional language while their home language is maintained and developed” (my emphasis).

Despite the claim for the hegemony of English in South African Education (Machet, 2002, Kapp, 2004), there is still a strong preference for English instruction in schools by most parents. Many schools and communities in South Africa experience what is described as subtractive bilingualism

(Donald *et al.*, 2002:218). Subtractive bilingualism is the process by which a first language is gradually displaced in a school context by a second language. Despite the effects of 'subtractive bilingualism', English still enjoys the respect of the majority of South Africans (Lemmer, 1996:325, Wallace-Adams, 1996:312). This is partly because it was closely involved in 'the struggle', and also because it is the international *lingua franca*, and the language of politics, commerce and industry, as well as the language of higher learning globally (Machet, 2002). Recent declines in literacy scores and matriculation pass rate in many schools in South Africa (Blaine, 2006; Momberg, 2006; Caelers, 2005; Deacon & Parker, 1999:59) have, however, caused some to suggest the reintroduction of an own language policy i.e. learners must be taught in their own language by teachers from their own particular ethnic group.

As Chall (1983) cautioned, this reaction might be premature. A review of research on second language learners (Fitzgerald, 1995) indicated that the cognitive reading process of these learners when compared to native learners is essentially the same. Surprisingly, the results of this review indicated that limited English proficient learners did not differ *qualitatively* from native language learners on most measures of reading comprehension strategies, metacognition, sensitivity to context, sensitivity to different types of text, comprehension monitoring, vocabulary use and recall. This is surprising because research on motivation, metacognition and cognitive styles suggest that this is precisely where the differences between the two groups should be expected. Rather the difference was mainly one of quantity i.e. the proficient readers used more strategic processes more frequently.

Where the two groups did differ qualitatively was in 'speed' (possibly due to poor development of the phonological or lexical route), and depressed activation of selected processes, (possibly planning and simultaneous processing). This is a crucial finding because it suggests that intervention aimed at addressing reading achievement levels in limited English proficiency learners that focuses too narrowly on metacognitive strategies and comprehension monitoring might be premature. If the underlying planning, coding, and attentional processes that directly underlie the orthographic and lexical mechanisms are not fully engaged or facilitated, training in metacognition and comprehension monitoring will likely be ineffective.

Furthermore, systematic phonics approaches (approached as part of a complete multi-component reading programme) might plausibly also indirectly facilitate metacognition and the more efficient use of comprehension monitoring strategies by providing the antecedent cognitive apparatus

needed to support higher cognitive processes (Donaldson, 1978). If the orthographic mechanisms of the temporo-parietal regions are necessary for the emergence of a functional lexical mechanism (the occipito-temporal regions), then it seems plausible that the intact functioning of both the phonological and lexical mechanisms (successive and simultaneous processes) might also be a prerequisite for the development of higher critical thinking (or Luria's frontal unit which supports planning) and metacognition. This may also point to the nature of the neurological consequences of environmental and cultural deprivation (Jansen, 1996:144).

Two other important findings were reported by Fitzgerald (1995). Firstly, there was clear support for the construct of Common Underlying Proficiency as developed by Cummins (1981), and evidence that it did transfer to the second language, not only negatively, but also positively. Secondly, there was no support for the hypothesis of a threshold oral-literacy level that must be attained before formal reading instruction could begin (Heugh *et al.*, 1995; Ramirez *et al.*, 1991, Ricardelli, 1992). This is significant in relation to the present debate over mother tongue instruction. While Fitzgerald (1995) did note a strong interaction between schema-construct and cultural difference, Hakuta and Gould's (1987) and Hakuta and Garcia's (1989) earlier report that there is no evidence to support the view that early exposure to English prior to oral fluency in the mother tongue was a threat to normal literacy development is supported by more recent research findings (Heugh *et al.*, 1995; Ramirez *et al.*, 1991).

Research (Lemmer, 1996:325) indicates that an alternative explanation for poor learner achievement may be found in the distinction between BICS and CALP. Basic interpersonal communication skills (BICS) often conceal a deficit in cognitive academic language proficiency (CALP). What this distinction alerts us to is that the issue here is not the choice of one official language over another, but a distinction between the level and quality of language usage, regardless of the particular linguistic code. As Chall (1983) and Cummins (1981) pointed out, a communication level of proficiency often masks the deficit in higher language skills, academic language or the language of learning. The *level* of language usage in the home and the school, rather than the particular language itself, is more crucial to this debate. The notion of common underlying proficiency alerts us to a further point, which is that the underlying skills will usually transfer to a second language (Fitzgerald, 1995). If one does not achieve proficiency in the first language, it is very rarely that one can achieve proficiency in a second language. The skills of the first language transfer to the second (Fitzgerald, 1995).

The phenomenon of subtractive bilingualism (Donald *et al.*, 2002:219, Lemmer, 1996:325) also highlights this distinction. A learner will often be confronted with a choice between two language codes. The inability to express themselves or to communicate adequately in their mother tongue in an educational context will lead them to adopt the second language as their primary language if it provides them with a more effective communication tool. This observation is of particular relevance to the debate surrounding the “language of teaching and learning” i.e. cognitive academic language. The RNCS (2002) states that the *Learning Outcome 5: Thinking and Reasoning* is not included in the assessment standards for additional language. In the light of the above discussion, this seems wrong-headed and will almost certainly compound an already complex problem. In the context of “eleven official languages”, reason would dictate that we settle on a single language of learning and instruction, and in the South African context, English is the most popular choice (Lemmer, 1996:325). English is also likely to be the language of learning and instruction at Senior and FET Phase levels (above sixth grade). Equipping learners with a high level of proficiency in English by the time they reach Grade 6 would therefore emerge as a crucial goal for the national curriculum. It is also implied in the additive approach to bilingualism advocated by the RNCS (2002). While it is agreed that the learners’ home language be used for learning and teaching wherever possible, where learners “have to make a transition from their home language to an additional language as the language of learning and teaching” (5) - and this would probably be the majority of South African children - then “this should be carefully planned”. The curriculum advocates that the additional language be introduced from first grade. The home language should continue to be used alongside the additional language for as long as possible. The curriculum also states “Where learners enter a school where the language of learning and teaching is an additional language, **teachers** and other educators should make provision for **special assistance** and **supplementary learning of the additional language**, until such time as the learner is able to learn effectively in the language of learning and teaching.” (5, my emphasis). As stated by the RNCS (2002:4), “In a multilingual country like South Africa it is important that learners reach **high levels of proficiency in at least two languages**”.

The problem with the ‘own-language’ option is that the language community would have to adopt a policy of own affairs to the strict exclusion of other linguistic communities, with English as an adjunct skill to allow for interaction with the wider international community. This scenario is in effect a perpetuation of the ‘subtractive’ bilingualism model already in place in South Africa (Donald *et al.*, 2002:219). Furthermore, the shift in the type of language that occurs from grade four (Chall, 1983), and particularly from grade seven (Lemmer, 1996:325), would mean that the learner who has not

acquired CALP in an additional language will be at a distinct disadvantage, and be faced with the daunting task of having to acquire CALP in what is for all practical purposes a foreign language.

An alternative model is 'additive' bilingualism (Donald *et al.*, 2002:219), that is, that mother tongue and English enjoy equal status up to grade six or seven. Heugh *et al.* (1995) have reported that bilingualism can have very positive learning and social benefits. Ramirez *et al.*, (1991, cited in Donald *et al.*, 2002) conducted an extensive research programme in a wide range of schools in the USA over an extended period of time. The study looked at the effects of three models of language instruction, a) 'straight for English' model i.e. English as the medium of instruction from school entry, b) an 'early exit' model i.e. English with some Spanish for the first two to three years and c) a 'late exit' model where some Spanish was maintained for six years. Results indicated that in the 'late-exit' model, the general scholastic achievement and language progress of the learners were superior to the 'early exit' or the 'straight for English' models. If English and mother tongue enjoy equal status from Grade R, the negative effects of bilingualism can be largely avoided and the positive effects maximised (Cummins, Bismilla, Chow, Cohen, Giampapa, Leoni, Sandhu & Sastri, 2005; Rolstad, Mahoney & Glass, 2005).

This proposal remains to be tested in the South African context. Furthermore, it will meet with "no easy consensus" as it touches on "long-held, strong, differing views ... that have tended to overwhelm us – in theory, research and practice." (Chall, 1983:7). It also depends on capacity-building in teachers and schools, as well as changing attitudes and practices towards emergent literacy behaviours in the home (Machet, 2002). It does however seem to offer a way forward. Sibaya (1996:88) emphasises the importance of initiatives that would prevent rather than cure problems. We need to "initiate intervention programmes prior to the development of problems." Similarly, Donald (1996:81) argued that -

"most of the learners ... have for one reason or another, not acquired adequate basic educational skills – related most essentially to literacy and numeracy – *at a time in their development when this should normally have occurred*. It is the fundamental relationship of these skills to all other dimensions of the curriculum and the inability of these learners to progress, or to be motivated to progress, without these skills that creates the need for special educational support. *It is certainly possible for this support to be provided within the normal mainstream classroom*. What is not possible, however, is for these learners – who are mostly considerably older than the average first time school entrant – to acquire these skills at a late stage of development in the same way as younger learners might." (Donald, 1996, my emphasis)

Two points need to be made with respect to the RNCS. Firstly, the assumption that learners come to school with a high level of proficiency in their home language is not supported by research (Lemmer, 1996:325). At best, children can only reach 'proficiency' in the basic interpersonal communication skills of the home. The stated goal of the curriculum is to develop language as a tool for learning. Secondly, the statement that the additional language will not be used as a language of teaching and learning seems short-sighted in the South African context, and will inevitably disadvantage rather than empower the learner. As Van der Berg and Naicker (1996:30) warned, we "may end up dooming increasing numbers of learners to failure under the guise of saving them from it."

Das (1995) described Vygotsky's perspective on learning and reading difficulty. He wrote "Development, when it is impeded by a defect, represents a creative process. That is, the child's personality is restructured to overcome the defect. The adaptive functions, such as overreaching, substituting and equalising, create new detours, as it were, for development. Thus, a defective child may cope with the problems with a whole world of new and infinitely diverse forms of development. This is the positive aspect of a deficit such as a learning or an intellectual deficit" (Das, 1995:95). Naicker (2003:12) has commented that by focussing on different learning styles, much can be done to promote successful learning. In the following section, learning and cognitive styles will be considered.

3.6.4. LEARNING STYLES AND READING

The question could be raised as to the possible similarities between the cognitive styles of the contextually disadvantaged and the limited English proficiency (LEP) learner (Ramarumo, 1996). Do traditionally disadvantaged learners have a *deficit* in cognitive function (Van den Berg & Naicker, 1996:21), or do they just use a *different* cognitive style? (Smith, 2002).

Results from research (Das *et al.*, 1994; 1999a) indicate that contextually disadvantaged learners do engage alternative cognitive processes. For example, learners from culturally different environments and limited English proficiency (English additional language) learners show a different PASS profile compared to the learner with specific reading difficulty (Das, Kirby & Jarman, 1979; Naglieri, 1999a). We might predict that this would manifest at the neuropsychological level as well, **and** that this might involve the engagement of right brain areas.

The question that needs to be resolved, however, is whether this cognitive difference is only of a qualitative nature, and whether learners who engage 'alternative' cognitive styles are in no way different in their achievement levels from those who use 'normal' cognitive styles (Rogers, 1990). It is possible that deviation from the normal pattern of cognitive development in learning to read outlined above would place the learner at a disadvantage intellectually (Jansen, 1996:144). This question reduces to whether there is more than one cognitive route to achieve fluency and automaticity in reading comprehension. The weight of evidence from the results of neuropsychological research would indicate that this is implausible (Shaywitz & Shaywitz, 2004a), and that departure from the normal trajectory in learning to read would imply a real, quantitative difference in cognitive ability (Spear-Swerling & Sternberg, 1994) that would manifest as poor achievement in the classroom.

3.6.4.1. Successive and simultaneous processing in reading

The division of the forebrain into two hemispheres continues to engender speculation and conjecture as to its practical implication in the classroom. Reading research using fMRI has clearly supported the lateralisation of **basic reading** processes in the left hemisphere (Pugh *et al.*, 2000; Shaywitz & Shaywitz, 2004a; Turkeltaub *et al.*, 2003), while other research has indicated that **reading comprehension** involves the engagement of regions in both hemispheres (Stowe, Haverkort & Zwarts, 2005; Xu *et al.*, 2005). However, solid experimental support for 'right brain' or 'whole brain' approaches to instruction is lacking and Bruer (1999) and Woolfolk (2001:25) advise caution and a critical stance to claims in the literature about 'brain based' instruction.

Learners begin reading by making use of mainly right brain functions (Shaywitz & Shaywitz, 2004a). Words are perceived as wholes or objects much like a picture or image of the object. Earlier work by Bakker and Licht (1987:87) indicated a differential pathway for reading difficulty. As the learner matures the learner must however "change horses", and engage predominately left hemisphere regions for supporting higher reading functionality. The earlier research of Bakker and Licht (1987:87) suggested that some learners resist this change, and continue to use predominately right hemisphere areas to support reading. Other learners, possibly due to the unavailability of the neural components of the next stage, have to make the 'leap' to next level. Thus they postulate two 'types'. The first type of learner develops a 'perceptual-type' reading difficulty while the latter develop a 'linguistic-type' reading difficulty. In the view of Bakker and Licht (1987:87), perceptual types become slow but accurate readers. Linguistic types become relatively

fast but inaccurate readers. A similar distinction has been made by Stanovich (1988). He claimed that reading difficulty can be seen as a constellation of types within two main axes, a “phonological recoding ability” and a “visual/orthographic ability” dimension. In his view, reading difficulty subtypes can be placed within this two-dimensional space. This corresponds to the distinction made by Das *et al.* (1994) between readers with deficits in successive or simultaneous processing. Furthermore, this distinction between two dimensions or axes has been supported by the results of factor analysis of reading difficulty (Morris *et al.*, 1998), and is also implicit in the dual route hypothesis: a phonological route, and a lexical route.

More recent research (Das, 2002) indicates that the onset of ‘perceptual-type’ reading difficulty, more typical of the contextually disadvantaged learner, may **not** be due to the failure to make the shift to the left hemisphere and the continued reliance on the right or left hemisphere regions for tasks that are more efficiently executed by other regions in the left hemisphere. Das (2002) has observed that the contextually disadvantaged reader often makes use of less efficient **successive processing** tasks that would be more effectively completed using **simultaneous processing**. Bakker (1983:498) maintained that the ‘perceptual type’ reading difficulty has its roots in the functional over-development of the right hemisphere and or the underdevelopment of the left hemisphere. He proposed that ‘over-development’ of the right hemisphere causes excessive sensitivity to the perceptual features of text. As already noted, Stanovich (1988) reported a similar distinction, identifying ‘dysphonetic’ and ‘dyseidectic’ types, corresponding to the linguistic type and the perceptual type respectively. He also made a distinction between **decoding level** and **comprehension level** reading difficulty subtypes. It seems plausible that these two levels or ‘types’ correspond to the phonological and lexical systems, and to successive and simultaneous processing respectively (Das *et al.*, 1994; Reid *et al.*, 2002). Furthermore, evidence for the over-development of the right hemisphere in reading difficulty is equivocal (Kershner & Stringer, 1991; O’Malley *et al.*, 2002, Turkeltaub *et al.*, 2003).

Alternatively, it may be argued that over-reliance on successive processing due to a deficit in simultaneous processing rather than over-development of the right hemisphere might result in a similar difficulty (Das, 2002; Spear-Swerling & Sternberg, 1994). Bakker (1983:498) makes a crucial observation here. ‘perceptual-type’ reading difficulty, (or a deficit in simultaneous processing), may not at first be recognised, as perceptual analysis required in the early stages of the processes of reading would be masked by the use of right brain areas. In fact research (Pugh *et al.*, 2000; Shaywitz & Shaywitz, 2004a) indicates that the use of the right brain areas is an

adaptive feature of the reading difficulty rather than a cause of the difficulty. Furthermore these learners may not experience serious disadvantage within the basic interpersonal communication context, with incidental reading and minimal exposure to more advanced texts (Chall, 1983; Cummins, 1981; Lemmer, 1996:325; Leong, 1987:131).

However, because higher reading requires the application of semantic strategies to be generated by the **simultaneous and planning processes** of the left hemisphere, the 'perceptual-type' would encounter problems in subsequent stages of reading and learning (Spear-Swerling & Sternberg, 1994; Stanovich, 1988). Bakker (1983:498) originally postulated that the 'perceptual-type' reading difficulty may perpetuate the generation of right hemisphere strategies to cope, and will exhibit non-left hemisphere speech control, definite right hemisphere control of form perception, correlated form and letter perception, and time consuming errors. However, more recent research has indicated that many of these functions engage left hemisphere regions as well (Xu *et al.*, 2005; Bruer, 1999) and these learning problems may also reflect deficits in left hemisphere functioning (Pugh *et al.*, 2000, 2001). Nevertheless, this pattern of strengths (visuo-spatial perception) and weaknesses (time consuming errors) may become a stable characteristic of the individual, depending of the teaching methods the learner is exposed to (Spear-Swerling & Sternberg, 1994).

The findings reported by Reid (2001) and Das (2002) suggest a use by the learner of successive processing for tasks more effectively completed by the use of simultaneous processing. It is possible therefore that this **preference for successive processing** strategies in struggling readers from traditionally disadvantaged groups will lead to the incomplete actualisation of the dorsal phonological apparatus and the more crucial ventral word form area, thus **manifesting as a deficit in simultaneous functioning**. Furthermore, any deficits in successive processing might be masked by the use of right hemisphere areas to compensate (Hertz-Pannier *et al.*, 2002; Spear-Swerling & Sternberg, 1994), thus not manifesting as a reading difficulty in the early grades (Lemmer, 1996:325). Failure of the left hemisphere lateralisation or differentiation process to fully develop may in turn lead to interference with frontal development and frontal modulation of attentional and arousal mechanisms (Das, 2002; Kershner & Stringer, 1991; Turkeltaub *et al.*, 2003). The particular instruments used to test for areas of weakness in 'unresponsive' learners reported by Al Otaiba and Fuchs (2006, 2002), O'Malley *et al.* (2002) and Speece *et al.* (2003) all have a strong simultaneous processing component (Das *et al.*, 1994). Moreover, learners assessed using the CAS battery in South Africa from traditionally disadvantaged backgrounds exhibited characteristic deficits in simultaneous processing (Greenop, 2006; Das, 2002; Ried,

2001). All this points to deficits in **simultaneous** processing rather than successive processing as an underlying factor in reading difficulty for 'unresponsive' learners and learners from traditionally disadvantaged groups.

As early as 1977, Moscovitch stated that if the phonetic system of the left hemisphere does not develop normally, lateralisation of function must wait until the development of another symbol system that can sustain language. The absence of a normally developed phonetic system was postulated to permanently affect the process of lateralisation for other functions as well (Muscovitch, 1977:193; Witelson, 1977:213). Moscovitch (1977:206) concluded by saying that lateralisation of certain lower level linguistic functions such as phonological ones is probably complete by the first year of life "so long as the structures mediating those functions receive sufficient stimulation from the environment". While more recent research indicates that Moscovitch was premature in positing complete lateralisation by the first year of life (Hertz-Pannier *et al.*, 2002; Stowe *et al.*, 2005), the consensus of research on the importance of the sub-cultural context and the quality and type of mediation (Das, 1995; Feuerstein *et al.*, 1991; Rogof & Chavajay, 1995) that a learner receives would support the basic proposal of Moscovitch (1977:193) and Witelson (1977:213), namely that lateralisation of early reading acquisition to predominately left hemisphere regions is **externally mediated** (Tan *et al.*, 2003) and *is not an emergent property of maturational processes*, as implied by the maturational approach, and which is an underlying assumption of Outcomes Based Education (Donald *et al.*, 2002:24). This is also the Vygotskian perspective (Estep, 2002).

3.6.4.2. Teaching reading through visual versus auditory modalities

Early research on reading investigated the possibility that learners struggling to read may have deficits in visual or auditory perception. A review of such research however, indicated little support for the idea of teaching to the learner's modality strengths (Larrivee, 1981; Tarver & Dawson, 1978). Differentiating instruction according to modality preference did not facilitate the learning of reading (Larrivee, 1981). Research has consistently provided evidence that the deficit was not at the perceptual level but involved deeper cognitive processes associated with the processing and integration of visual and auditory information (Fisher & Athey, 1987; Kavale, 1981; Spiro & Myers, 1984; Stanovich, 1988).

An alternative approach to reading difficulty research was investigating the relationship between **cognitive style** (Karpov & Bransford, 1995; Friedman, Christie & Tymchuk, 1976:257; Witkin,

Moore, Goodenough & Cox, 1977; Witkin & Goodenough, 1981) and learning difficulty and reading difficulty. It was reasoned that if cognitive processes are not synchronous in their development, continued use of the better developed cognitive apparatus could result in a cognitive style of information processing that would inhibit or interfere with responding via other systems and would effect performance over a wide range of perceptual, learning, and problem solving tasks (Friedman *et al.*, 1976:257). Moreover, when task requirements and cognitive style are incompatible, a 'deficit' in performance would be observed (Green, 1996:130). A more recent version of this idea has also been put forward by Feuerstien *et al.* (1980, 1991) with his constructs of structural cognitive modifiability, cognitive dysfunction and cultural deprivation.

3.6.4.3. Field dependent and field independent cognitive style and reading

The early work on cognitive styles was dominated by Witkin's concepts of field dependence and field independence (Witkin *et al.*, 1977; Witkin & Goodenough, 1981; Woolfolk, 2001:127). Field independent persons displayed a high degree of 'field articulation' or psychological differentiation and are generally more analytic in their approach to cognitive tasks. Field dependent persons showed less psychological differentiation and tend to respond to the total perceptual field and use a more global and less verbal information-processing style (Woolfolk, 2001:127). With respect to reading, earlier research indicated that field independent individuals were better at digit recitation, more task and achievement orientated, better at verbal learning, verbal prediction and fluency measures (Friedman *et al.*, 1976:257).

The relationship between field independence and brain laterality has also been investigated. Earlier writers considered field independence to be primarily a right brain phenomenon (Vernon, 1969:59), but subsequent research indicated more left brain involvement (Friedman *et al.*, 1976:257), while research by Bloom-Feshbach (1980) indicated that field independence is characterised by increased differentiation in the cognitive functions of *both* hemispheres.

Other approaches to cognitive style were the impulsive versus reflective style (Kagan, 1965), deep versus shallow processing, and top-down versus bottom-up processing (Das *et al.*, 1979; Karpov & Bransford, 1995; Woolfolk, 2001:126). More recent research has investigated the possibility of understanding field independence and field dependence within a verbal-imagery/holistic-analytic framework (Riding, 1997), Sternberg's triarchic model of intelligence (Richardson & Turner, 2000) and classroom instruction methods (Angeli & Valanides, 2004). Results of research are equivocal (Woolfolk, 2001) and the constructs are poorly defined (Moran, 1985). For example, it is not clear

whether cognitive style is to be viewed as a *personality* factor or a cognitive *ability* (McKenna, 1983, 1990). The role of cultural difference in cognitive style has also been explored (Smith & Caplan, 1988, Woolfolk, 2001:127), but has proved unpopular (O'Neil, 1990). Nevertheless, research on the influence of culture on cognition continues as socio-linguistic study. Rogoff and Chavajay (1995) state that cross-cultural research on cognition has moved through a transition from looking at culture as an independent variable affecting cognition, to regarding cognitive processes as inherently cultural. Prinsloo and Stein (2004) and Kapp (2004) provide examples of such socio-linguistic work in South Africa. The consensus of this research is that culture and cognition are inextricably linked.

The literature seems equivocal on the construct of cognitive style, and the relationship between cognitive style and learning to read has not been adequately investigated. Further research is clearly needed before we are able to draw definite conclusions about instructional implications of these constructs in the classroom (Woolfolk, 2001:127). However, there seems to be some limited evidence in support of the field dependent-field independent construct, and its relation to learning difficulty and reading instruction (Riding, 1997, Richardson & Turner, 2000). Earlier work (Friedman *et al.*, 1976:257) reported the results of research indicating that learning disabled boys tend to be more field dependent than controls (Guyer & Friedman, 1975 cited in Friedman *et al.*, 1976; Keogh & Donlon, 1972 cited in Friedman *et al.*, 1976). They also pointed out that learners from culturally different or traditionally disadvantaged groups also tend to be more field dependent (Friedman *et al.*, 1976). *Das et al. (1979) stated that the dependence of both field independence and simultaneous processing on the same cortical areas suggested a strong relationship between these constructs.* *Das et al. (1994) also indicated that the Embedded Figures Test, a classic measure of field independence, is related to measures of simultaneous processing.* Jansen (1996:144) reported that it has been found that there are two ways of processing information that could be described as verbal, sequential, analytic and linguistic as opposed to holistic, visio-spatial and simultaneous. The results of this literature survey seem to indicate that, although very little research appears to have been undertaken in the last decade on the relation between reading and field independence/field dependence, the field dependent-independence construct has the most immediate relevance to reading instruction and reading difficulty amongst the different types of cognitive styles. 'Field dependence' in the reading disabled learner is manifest in terms of less differentiation of cognitive processes and less lateralisation of cognitive functions resulting in greater reliance on right brain areas for tasks that would normally be supported by left brain functional areas (Pugh *et al.*, 2000). This is very similar to the description of the 'perceptual-type'

struggling reader of Bakker (1983:498). This results in visual/spatial confusion or interference as manifest in phonological decoding or orthographic deficits (Kershner & Stringer, 1991; Spiro & Myers, 1984:471; Stanovich, 1982, Turkeltaub *et al.*, 2003). This may also account for the phonological deficits observed by Al Otaiba and Fuchs (2006, 2002) and O'Malley *et al.* (2002) in learners who are unresponsive to regular literacy instruction or intervention.

Davis (1987:127, cited in Reiff, 1996) suggested that "field independence has a large influence in the initial acquisition of many reading skills, and continues to exert an influence as these skills continue to develop and new skills are introduced over the course of instruction". Reiff (1996) states that research (Buriel, 1978; Davis, 1987; Rasinski, 1984) indicates that field independent readers are more proficient than field dependent readers. Furthermore, learners identified as poor readers were found to be field dependent. More specifically, when learners in special education or with learning difficulty were compared with the non-disabled learners, in all cases the learners with reading deficiencies were field dependent (Davis, 1987). Research also indicated that field dependent readers seemed to be controlled by the text. They were misled by irrelevant aspects of the surface-level cues in word recognition. In contrast, field independent readers were better able to obtain and use word knowledge because they used cues available in the text. They also monitored and predicted meaning in the text to aid their word recognition (Reiff, 1996). Davis (1987) also reported that field independent learners were better able to recognise both 'minimal contrast' words (e.g. *just* and *must*) and 'maximal contrast' words (e.g. *like* and *what*). He maintained that field independent learners use strategies that help them to focus on the distinguishing characteristics of words, while the field dependent students were more apt to scan and be distracted by irrelevant cues. Furthermore, comprehension abilities were better for the field independent learners, specifically in the areas of paragraph meaning, location of main ideas, and word recognition (Davey, 1983; Rasinski, 1984).

As noted above, Al Otaiba and Fuchs (2006, 2002) reported that certain learners are unresponsive to systematic phonic interventions, and that these learners typically have a core phonological deficit. Unresponsiveness to systematic phonics intervention was also the reason for the development of the HRSP programme, and more specifically for the introduction of the colour code or colour cueing system of the HRSP (Hallstones, 2004). From the above discussion it seems plausible that should these 'non-responsive' learners be predominately 'field dependent' and show deficits in **simultaneous** processing, then adopting strategies for teaching to this cognitive style may provide a means of enabling these learners to benefit from systematic phonics interventions.

3.6.4.4. Instructional strategies for field dependent learners

Reiff (1996) suggested a number of instructional strategies to be used with field dependent learners. Field dependent students need more practice with learning words in context rather than in isolation. Word families or words that look or sound similar confuse the field dependent learner. Konkiel (1981) suggested that field dependent learners benefit from additional visual cues *such as the use of colour cueing*. Vitale (1982) has also reported that colour cueing is helpful for field dependent learners. As reported above, a major component within the HRSP is the use of a colour cueing system.

Rieff (1996) stated further that field dependent learners also have difficulty in separating important information from less important details. Drane, Halpin, Halpin, Von Eschenback and Worden (1989) suggests that the teacher should (a) help the student determine his or her purpose for reading a selection, (b) encourage prediction before reading, (c) provide background for the topic, (d) pose questions on a range of thinking levels, (e) have the students explain their answers, and (f) assist the students to detect the main purpose and overall intent of a text. Modelling and guided practice are also useful strategies for the field dependent learners students (Druyan & Levin, 1996; Good & Stipek, 1983; Stevens & Price, 1992). A reading intervention programme that aims to address the needs of learners unresponsive to literacy intervention will need to include these elements.

3.7. SUMMARY OF CHAPTER

The weight of evidence discussed above indicates that reading difficulty is centred on a phonological deficit. The results of neuropsychological research also indicate a central role for the direct instruction of phonics within a complete reading intervention programme (Shaywitz & Shaywitz, 2004a). However, in order to meet the needs of all learners struggling to read as advocated by Al Otaiba and Fuchs (2006), such a programme would also need to take into account the unique needs of field dependent learners, and to introduce elements that would foster successive **and simultaneous** processing. We now have a good understanding of the development of reading and that it is the same in all learners of all cultures and socio-economic backgrounds. The crucial factors for implementation are the development of 'evidence-based' reading programmes and the thorough training of teachers in the direct instruction of reading.

The National Reading Panel (2000) reported that the use of phonics and phonics based early literacy programmes have clear research support and are ready for implementation in the mainstream curriculum. A similar finding was reported for the extension of literacy programmes to Kindergarten and grade R level. They noted that there was little evidence in support of the popular notion that introducing more formal literacy instruction at kindergarten or grade R level was harmful to the learners' later development. The weight of evidence indicated that such programmes not only do support the learner, but that the long-term benefits of the early training make it almost a prerequisite.

Donald (1996:71) states that existing models of service delivery for special needs education are inadequate to meet the needs of the South African situation. He recommends the development of an integrated model for education support services. What he envisages is that "the mainstream itself become the very site and vehicle for specialised educational initiatives". He argues further that it is clear that educational support services cannot be an adjunct to the general curriculum. He cites the principle of **curriculum infusion**. Health promoting and developmental aspects of education support services should be integral to every level of the general curriculum and its development. He concludes "it is only the notion of a specialised educational service which is integrated and articulated with the mainstream of education that can be seen as meeting the complex and extensive social learning needs of our society"

In the following chapter the rationale and structure of the HiWay Reading & Spelling Programme will be discussed and the results of the qualitative research will be reported.

CHAPTER 4

THE RATIONALE AND STRUCTURE OF THE HIWAY READING & SPELLING PROGRAMME, AND THE RESULTS OF THE QUALITATIVE EVALUATION OF THE HRSP

4.1. INTRODUCTION

In this chapter the HRSP will be described and evaluated to determine if the programme can claim to be a **complete reading programme**. A Vygotskian interpretation of the HRSP will also be attempted. A Vygotskian *interpretation* will be attempted because the HRSP did not begin as a **theory of reading acquisition**, nor is it an attempt to apply a **method** developed in a laboratory or under experimental conditions to the classroom situation. Rather, the HRSP in its present form grew out of the daily needs of the regular classroom teacher faced with finding a way of helping learners who struggle to read, particularly learners who manifest some form of learning difficulty. The chapter is structured as follows:

- The ultimate goals of the HRSP will be delineated, and crucial terms will be defined.
- A Vygotskian model of reading instruction will be described as the rationale for the HRSP.
- The structure of the HRSP is presented.
- The HRSP will be evaluated as to whether it meets the criteria of a comprehensive reading programme using the National Reading Panel Report (2000) as a primary source.
- The feasibility of integrating the HRSP into the mainstream will be evaluated.

The last two aspects represent the results of the qualitative research.

4.2. THE GOALS OF THE HRSP

Spear-Swerling and Sternberg (1994) wrote that mainstream approaches to reading instruction that have a strong decoding component in the early grades would facilitate inclusion of learners with reading difficulty and might also benefit the learner without obvious reading difficulties. Furthermore, the use of such programmes might even prevent reading difficulty. This succinctly summarises the

overarching objective of the HRSP. Additionally, language is an important tool in developing the human potential. The HRSP seeks to develop this tool to empower learners to be able to “read their world” (RNCS, 2002) critically and insightfully, and to be able to analyse and rewrite texts in ways that expand the learners possibilities and emancipate them from socio-cultural narratives that often prevent them from achieving their full potential.

4.2.1. READING PROFICIENCY

The HRSP is a complete reading programme. It is not just another phonic or reading comprehension programme. It is not aimed at simply providing phonemic awareness or systematic phonics instruction. The ultimate aim or goal of the HRSP is to foster **a high level of reading comprehension proficiency** in the learner. The Revised National Curriculum Statement (2002) states that “In a multilingual country like South Africa it is important that learners reach high levels of proficiency in at least two languages.” However, defining what we mean by a high level of proficiency is essential for meaningfully evaluating the HRSP. In the USA, the term ‘proficient’, like the term ‘competent’ has become nuanced as a politically correct term for reading at a ‘grade-appropriate’ level set by the educational authorities (Allington, 2004). A child who reads at this level is declared “proficient” or “competent”. However, proficiency in a first grade learner is not the same as proficiency in a third or sixth grade learner (Spear-Swerling & Sternberg, 1994). The goal of the HRSP is clearly to have learners reading at a grade appropriate levels, but this must have as a final goal the achievement of “highly proficient reading” (Spear-Swerling & Sternberg, 1994). According to Spear-Swerling and Sternberg (1994) “highly proficient readers” are “readers who are insightful, reflective, and analytical. They can make higher order connections within and across texts and can integrate knowledge from many sources”. Highly proficient reading is not an end state, but “a set of higher order comprehension abilities” that continue (or at least should continue) to develop throughout life. Because highly proficient reading is not an end state, it would be impossible for the HRSP to claim to foster in six years what is in effect a life-long process. The goals of the HRSP will therefore have to be the minimum requirement for entry into this level of reading proficiency. Highly proficient reading in sixth graders is not the same as highly proficient reading in twelfth graders.

Spear-Swerling and Sternberg (1994) indicate that this stage should be begun by the end of sixth grade. The defining characteristic of the stage “higher order comprehension abilities” as described by Spear-Swerling and Sternberg (1994), may thus be compared to the assessment standards for

grade six learners in the RNCS (2002). The Learning Outcome 3 states: *The learner will be able to read and view for information and enjoyment, and respond critically to the aesthetic, cultural and emotional values of texts.* In other words, the reader reads with understanding. This outcome is supported by Learning Outcome 5: *The learner will be able to use language to think and reason, as well as access, process and use information for learning.* This in turn is supported by Learning Outcome 6: *The learner will know and be able to use the sounds, words and grammar of the language to create and interpret texts.* This last learning outcome encompasses all six learning outcomes:

- The learner will know and be able to use (LO 5: Thinking and Reasoning)
- the sounds, words and grammar of the language (LO 6: Language structure and use)
- to create (LO 2: Speaking and LO 4: Writing)
- and interpret (LO 1: Listening and LO 3: Reading and viewing) texts.

This reflects the Vygotskian perspective of language as a tool and 'leading' factor in cognitive development (Estep, 2002). The differences between the Spear-Sternberg model (1994) and the RNCS (2002) is that the latter focuses on the **outcomes** (i.e. comprehension) while the former focuses on the **underlying cognitive processes** involved in achieving those outcomes. A salient feature of the HRSP is the fostering of underlying cognitive processes that support comprehension. This approach is also clearly reflected in the assessment standards for grades R to 3. Learning outcome 3 is achieved when the grade 3 learner comments on a story and demonstrates understanding by identifying the main idea, main characters, cause effect relations, conclusions and whether they liked it and why. At this level (grade 3) the learner reads text fluently, accurately and with appropriate expression, begins to use word analysis (i.e. phonics), word recognition and comprehension monitoring strategies, and shows advanced phonological awareness. At this level (grade 3) the learner also develops vocabulary and is engaged in the reading of real books of different genres. Learning outcome 5 is achieved when the learner uses language to develop concepts, to think and reason, to investigate and explore and to process information. Learning outcome 6 is achieved when the learner uses phonics rules to spell correctly, uses prefixes and suffixes to build words and identifies sentence structure and grammar and understands and interprets paragraphs as units of meaning. At this level (grade 3) the learner also must begin to demonstrate a critical language awareness i.e. that language is used for different purposes.

Spear-Swerling and Sternberg (1994) call this the stage of **strategic reading**. Strategic readers make efficient, routine use of diverse strategies to aid comprehension. With the development of metacognition, fluency, increasing knowledge and vocabulary base, and automatic word

recognition, learners become more capable of acquiring strategies to maintain and improve comprehension of diverse texts. A key factor at this level is increasing 'academic demand' (Chall, Jacobs & Baldwin, 1990), that is, that the texts challenge and engage the learner in their zone of proximal development in order to 'lead' further cognitive development (Estep, 2002). Increased academic demand is however also responsible for the reading "slump" noted in fourth graders (Chall *et al.*, 1990), and is a major factor in the sudden increase in the incidence of learners identified with reading difficulty above third grade (Foorman *et al.*, 1996, 1997). The undemanding nature of the curriculum of the early grades (Donald *et al.*, 2002; Kozulin & Presseisen, 1995; Lemmer, 1996:325) often masks a reading difficulty in the learner. **Strategic readers** rely predominately on a large vocabulary and automatic recognition of words, but also have an increasing repertoire of strategies for use when comprehension breaks down, including word analysis skills. Spear-Swerling and Sternberg (1994) describe the main characteristics of the strategic reader as follows; the strategic reader

- has achieved alphabetic insight
- has full letter-sound knowledge
- has an advanced level of phonological awareness
- makes full use of orthographic information to recognise words
- has acquired complete word decoding skills
- has automatic word recognition skills and
- routinely and efficiently uses some strategies to aid comprehension.

The HRSP therefore aims to achieve the level of **strategic reading** by the end of **third grade**, and to have learners engaged in the life-long process of becoming **highly proficient readers** by the end of **sixth grade**. The goal is to produce 'expert' readers, or readers who can read different texts with fluency and automaticity (Snow, Burns & Griffin, 1998). **Proficiency** is sometimes used synonymously with the terms **fluency** and **automaticity**. To avoid confusion the different terms will need clarification. Both terms carry the same essential meaning, with fluency having a semantic bias towards speed and accuracy, while automaticity has a semantic bias towards effortless, unconscious action.

4.2.2. FLUENCY

In reading, fluency is broken into two sub-processes, **accuracy** (a phonological decoding skill) and immediate word recognition or **speed** (a lexical skill) (Lerner, 2000, Richek *et al.*, 1989). Previously,

improved fluency was considered to contribute to improved comprehension by making available more cognitive resources that would otherwise be taken up in trying to decipher the text (NRP, 2000). Increasingly however, fluency has become to be seen more as part of the hermeneutical process of reading comprehension itself. That is, the interpretative process associated with comprehension is already incipient in fluency and that a crucial part of fluency is in fact increasing facility with interpreting texts (NRP, 2000). It is in this latter sense that the term *fluency* is used in the HRSP.

4.2.3. AUTOMATICITY

The debate about reading acquisition in the learner has oscillated between an innatist view favouring holistic, meaning-centred approaches, and a learned skills view favouring direct instruction of specific skills (NRP, 2000). A central emphasis of the HRSP is on the development of cognitive skills. These skills must be learned to automaticity. The concept automaticity in psychology must be distinguished from innate skills that can be performed without having to learn them. Important breakthroughs in methodology and technology combined with well designed experimental research in reading has indicated that reading, in contrast to speaking, is not an innate skill (Shaywitz & Shaywitz, 2004a, 2004b). Reading is only acquired through the practice of a set of cognitive skills. Research has demonstrated that reading cannot be acquired spontaneously by the child by a form of cultural osmosis, but requires deliberate and systematic instruction by an educator. Automaticity is limited to those skills that are acquired only after a period of extensive practice under consistent conditions (NRP, 2000). The emphasis in the HRSP on **practice and consolidation** is based upon this distinction. Automaticity cannot be achieved without extensive and repeated practice of task-specific skills.

Spear-Swerling and Sternberg (1994) indicate that there are three basic constructs that are closely associated with automaticity: the quality of mental representations, the number of connections to words in memory, and modularity. **Modularity** refers to the central feature of word recognition that is independent from higher level cognitive processes such as the use of context or prior knowledge. Learners with automatic word recognition do not need to rely on context or prior knowledge to arrive at the meaning of words. Modularity is thus also related to the extent of the learners' vocabulary. The other two features, **mental representations** and **connections** in memory are related to **domain specific knowledge**. Research in cognitive psychology (Adams, 1989; Woolfolk, 2002:298) has alerted us to the fact that what distinguishes 'experts' from novices

is their knowledge base. This relationship between performance and knowledge emphasises the importance of developing well-differentiated and integrated schemas. Adams (1989) quotes Glaser (1984) in saying that the improvement of cognitive skills "... takes place through the exercise of conceptual and procedural knowledge in the context of specific knowledge domains. Learning and reasoning skills develop not as abstract mechanisms of heuristic search and memory processing. Rather, they develop as the content and concepts of a knowledge domain are attained in learning situations that constrain this knowledge to serve certain purposes and goals. Effective thinking is the result of "conditionalised" knowledge - knowledge that becomes associated with the conditions and constraints of its use" (Glaser, 1984:99). This is also the interface between the social constructivist and cognitive constructivist perspectives (Palinscar, 1998; Palinscar & Perry, 1995). In the context of the HRSP, teaching the basic cognitive processes of reading must take place within the context of **expanding, differentiating and integrating the learners' cognitive structure** through engagement with 'real' and challenging content-rich texts. This receives particular emphasis in the reading component of the HRSP.

Two main theories have been put forward to explain why fluency and automaticity are important for reading comprehension. The first implicates limited cognitive **resources** (NRP, 2000) and the second different cognitive **processes** (Spear-Swerling & Sternberg, 1994). In the first view, the achievement of fluency and automaticity frees cognitive capacity that would be used up in the less proficient reader who was engaged in the more mechanical deciphering of the text. More memory is available for comprehension if the mechanical process of text decoding has become automatic and effortless (Spiro & Myers, 1984, NRP, 2000). This view seems to be the reason for the perception that fluency is a by-product of reading - the more you read the better you get. In this view, fluency need not and indeed cannot be directly taught. Reading more, both in time and volume, will improve reading proficiency. This certainly seems to be the intuitive view, and Allington (2002, 2005) claims that fluency is one of the most neglected aspects of reading instruction. Stanovich (1988) has also written extensively of the hidden dangers of this view, and of what he called 'Matthew effects' in reading: the rich get richer and the poor get poorer. Those who are proficient readers get better; those who are not proficient get worse. Those who do well in reading are more motivated to read, get more practice in reading, have greater expectations imposed upon them, and acquire an expanded vocabulary and comprehension monitoring strategies, all of which leads them to become better readers. In contrast to this, the learner experiencing reading difficulty experiences failure which sets in motion a whole "cascade of academic problems" (Spear-Swerling & Sternberg, 1994:99). A **basic level of phonological and lexical skill** must be attained **before**

the learner will engage in voluntary sustained silent reading (Spear-Swerling & Sternberg, 1994). This is therefore a major emphasis in the HRSP.

This has led to an alternative hypothesis (Spear-Swerling & Sternberg, 1994), which postulated the successive engagement of different cognitive processes as the learner masters reading. In the Spear-Sternberg model, this process is closely tied to the mastery of specific cognitive processes that underlie the specific stages of reading acquisition. A learner moves from an initial **logographic stage** where they use salient features of whole words, recognising them as they would a picture or object, to an alphabetic stage when they begin to become aware of print, words and letters and acoustic analysis (Lerner, 2000, Richek *et al.*, 1989). In the Spear-Sternberg model, the specific cognitive process associated with the logographic stage is phonemic awareness, the insight that spoken words are made up of sound units, and the ability to break spoken words into these sound units. The specific insight of the **alphabetic stage** is that these sound units map onto print. This in turn facilitates the emergence of a **phonological stage** where the learner uses phonological-cue word recognition and begins to learn the regularities of the **sound-sign mapping** system. Mastery of this system is the characteristic of the **orthographic stage**, where the reader analyses words and sounds more thoroughly and develops rules and **code-breaking strategies** for sound-sign associations. This in turn facilitates the emergence of the **lexical stage**, which involves the acquisition of a large **vocabulary** that can be recognised automatically (or unconsciously), and its meaning derived immediately (Shaywitz & Shaywitz, 2004a). This stage makes use of partial cueing, which facilitates **automatic word recognition** and rapid processing of texts (Berninger, 1990; Frith, 1984:453). This is posited to provide the cognitive substructure for higher level reading methods such as skimming, scanning, identifying key words, summarising and critical listening (Rourke & Strang, 1984:473; Das & Naglieri, 1995). This is the stage of **fluency**. The cognitive process of reading development is viewed as strongly hierarchical in nature and relies on intact and functional primary mechanisms for ongoing development (Shaywitz & Shaywitz, 2004a). In the HRSP, this hierarchy provides a **logically sequenced progression throughout grades R to six**, as indicated by Diamond and Mandel (1996) for a complete reading programme.

Furthermore, the emergence of the stage-appropriate cognitive skills is dependent on the quality and quantity of reading instruction, and not on innate ability (Spear-Swerling & Sternberg, 1994). They postulate only a **single route** to achieving highly proficient reading, but claim that learners can “leave the path” to proficient reading at any one of the respective stages. The HRSP uses essentially this model, but to this is added i) a sequential engagement of cortical regions, mainly in

the left hemisphere, and ii) the association of reading acquisition with the planning, attention, successive and simultaneous processing model of Das (2002).

4.2.3.1. The model of sequential engagement of cortical regions

Initially the child relies on the memory of the Broca's region and right brain homologues. As the child is exposed to print, the left temporo-parietal region (Wernicke's region) becomes engaged. This region is associated with the decoding of printed words and in deciphering phoneme-grapheme associations. Finally, a third region in the left temporo-occipital region is engaged. This region (word form area) is involved with the development of the lexical function which allows automatic recognition of words and immediate retrieval of associated meanings (Shaywitz, 1998). The development of the lexical function is hierarchically related to the engagement of the analysis of words and the phoneme-grapheme associations. The child must be able to analyse a word accurately and repeatedly for the memory trace to be transferred to the lexical function (Shaywitz & Shaywitz, 2004a).

In this view, the beginning reader is limited to the use of frontal memory areas. In the early stages of reading this is adequate, but with exposure to more advanced texts, reliance on this region becomes laboured, and the process slow and inefficient. In the view of Shaywitz and Shaywitz, (2004a), the achievement of fluency in reading requires the engagement of the lexical function of the temporo-occipital region. This region will only develop in response to the adequate engagement of the temporo-parietal region (Wernicke's region) associated with word analysis and phoneme-grapheme associations. Pugh *et al.* (2000) and Shaywitz *et al.* (2004) have reported that systematic phonic based instruction will lead to the engagement of the dorsal phonological region, and ultimately to the development of the ventral word form area. In the HRSP, the use of systematic phonics instruction is aimed at **developing the dorsal and ventral posterior reading circuits** as a necessary foundation for fluency and automaticity.

4.2.3.2. Planning, attention, successive and simultaneous processing model

In the dual route mechanism (Doctor *et al.*, 1996:374; Spiro & Myers, 1984:471), reading is mediated by two routes, a phonological route, and a lexical route. The phonological route is principally involved in the analysis of word-sound regularities and patterns, and with other aspects of orthography, while the lexical route is involved with the rapid and automatic recognition of whole

words. It is further claimed that skilled readers rely primarily on the lexical route, while less proficient readers are limited to the phonological route (Shaywitz & Shaywitz, 2004a).

The relevance of the Planning, Attention, Successive, Simultaneous (PASS) model of cognitive processing to language development, literacy instruction, and particularly reading has been intensively explored over that last 20 years by Das, Naglieri, Kirby and Jarman (Kirby & Das, 1990). They initially predicted (Das, Kirby & Jarman, 1979) that the two distinct cognitive processing mechanisms identified as **simultaneous** and **successive** processing would be apparent within the factor structure of reading behaviour. Furthermore, they have made a distinction between the two processes, implicating successive processing in the more ordered analysis of the phonological route and simultaneous processing with the more holistic processing in the lexical route (Das & Kendrick, 1997; Naglieri, 1999a). Further research also indicated the involvement of attentional and planning processes (Reid *et al*, 2002). **Attentional** processes seem to load more on phonological functioning, while **planning** processes load on lexical processes (Das *et al.*, 1994). By seeking to foster successive, simultaneous, and planning processes through reading instruction, the HRSP attempts to operationalise the transformational goals of the RNCS (2002), and to contribute to making the learners not only better learners but also better interpreters of life. While these cognitive processes might not transfer directly, they will provide a learner with the cognitive apparatus, and possibly even the cognitive modifiability, for supporting the acquisition of higher life skills.

When evaluating thinking skills curricula or programmes (and any reading comprehension programme must inevitably be a thinking skills programme) Adams (1989) states that we must distinguish between macrological and micrological approaches. Macrological approaches target such goals as creativity, dealing with complex information and multiple points of view. They attempt to use methods that are 'real world', and present content and context rich, true-to-life problems to ensure transfer. Micrological approaches by contrast aim at fostering generic skills such as observation, integration, classification, sequencing and the like. They attempt to achieve this by using materials similar to psychometric tests: dot matrices, geometric figures and lexical and pictorial multiple-choice items. They specifically attempt to foster 'content free', decontextualised exercises, again to ensure transfer. Adams (1989) evaluated six thinking skills programmes, and concluded that micrological programmes seem to be more successful than macrological programmes with **low achieving** learners. Adams (1989) attributes this to the fact that most micrological programmes include **explicit instruction** and labelling of micrological principles and

processes. Because of this they equip the learner with the conceptual and terminological **scaffolding** to analyse and discuss macrological issues when they do arise. Furthermore, the definitive feature of direct instruction, whether through guided practice or modelling, consists in the explicit treatment of the sub-steps of thought processes and of the considerations pertaining to when and why each of those sub-steps is appropriate. Teaching the *when* and the *why* of the language system is also the essence of systematic phonics instruction. Secondly, the explicit articulation of micro-processes, first by themselves and later as components of more complex or concrete challenges, should lead to a stronger core as well as more differentiated and therefore more transferable interrelations in the schema structures of the learners (Adams, 1989). The main weakness of micrological approaches is that they do not provide the knowledge base to enable the learner to operate within specific knowledge domains, and often do not take into account the context and culture-specific nature of cognitive skills.

Adams (1989) claimed that the following criteria should be aimed for in a thinking skills programme:

- The analytical force and pedagogical range of the micrological approach in order to:
 - Convey explicitly the nature of the basic processes and their interrelationships;
 - Reach the weaker learners without losing the more advanced.
- The epistemological range of content oriented approaches to ensure:
 - That the thinking skills would be thoroughly engaged in conceptual knowledge of direct academic and real world relevance.
- The intellectual complexity and dialectical reflection of the macrological approach;
 - To ensure that thinking skills transfer to tasks outside the confines of the programme and even the classroom.

To achieve this Adams (1989) advocates a content rich, process-centred design within which the macrological is systematically built upon the micrological. A cardinal element in such a programme would be the explicit instruction of the underlying principle for solving the problem task in order to ensure transfer. Adams (1989) describes two types of transfer, direct transfer and mediated transfer. **Direct transfer** involves direct mapping from one problem-solving situation to another and is enhanced by the similarity between the problems, and usually the provision of a 'hint', or prompt. It is highly dependent on context and cannot be trainable in any *generally* useful way i.e. it does not transfer very far (Adams, 1989). **Mediated transfer**, by contrast, is enhanced by the superficial dissimilarity among the training problems and by the provision of such aids as statements of principles and abstract models. Mediated transfer may transcend superficial differences between problems because the insight into a novel problem is not gained through **direct** mapping, but by

applying the principles and procedures that have been abstracted from the training problem. To achieve this, the concepts and processes that the learners are to abstract are developed across a diversity of exercises and thought-provoking challenges, they are verbally summarised, graphically supported and consistently labelled throughout (Adams, 1989).

Adams (1989) states that the basic position in designing a thinking-skills programme is that thinking in any domain involves two basic components: **information** and **interpretation**. This is particularly true in the case of reading comprehension and reading comprehension programmes. In the HRSP it is made explicit in the direct instruction of the key concept that sounds (phonemes) and signs (graphemes) signify something i.e. they have meaning. They contain information that requires interpretation. By introducing the idea that sounds and signs have meaning, even the Grade R learner grasps the concepts easily and quickly without being burdened with the technical terminology. It is relatively easy for them to then grasp that signs (graphemes) signify ('mean') signs (phonemes), which underlies both phonemic awareness i.e. the insight that spoken words are made up of sound units, and alphabetic insight, the understanding that sound units map onto sign units. These (phonemic awareness and alphabetic insight) are also postulated to be the primary onset mechanisms in reading (Stanovich, 1988, 1990). Adams (1989) advocated designing a programme in order to develop a set of *processes*, *concepts*, *strategies* and *attitudes* that support reflective, methodical and productive application of these two components: information and interpretation.

Adams (1989) states that of these, the **processes** serve as the backbone of a thinking skills programme. It is these processes that unify and empower the "grand schema" (in the HRSP the highway, robots, potholes and rules of the road) that the programme is meant to instil in the students. At the first level of this schema is the process of analysing information in terms of **dimensions** (e.g. colour) and the **characteristics** or values of those dimensions (e.g. blue, red and green). Around this core of the 'first-order' processes are built other cognitive processes; in the HRSP: *attention*, *successive* and *simultaneous* processing and *planning*. These processes are the structures for comparing characteristics within or between selected dimensions (Adams, 1989).

Thus the design of a thinking skills programme consists first in explicitly and methodically developing the process of **dimension analysis**. Upon dimension analysis, the 'first order' processes are built. And upon these basic processes, many diverse, content-specific and challenging extensions are added – in the HRSP under the component of **reading**

comprehension strategy instruction. Through these extensions, the basic processes are extended and enriched (Adams, 1989). This naturally extends into the aspect of **concepts**. The HRSP also aims to build the cognitive structure of the learner by differentiating and integrating the schemas by providing challenging and stimulating **information for interpretation**. A number of **strategies** are also developed: in the context of the HRSP the 'rules of the road', or phonic generalisations, and comprehension monitoring strategies. Finally, a thinking skills programme aims to instil certain **attitudes** to learning and reading, and modes of thinking in the learners. According to Adams (1989) these include an appreciation of knowledge and information, and the rewards of self-discipline, intrinsic motivation and a willingness to explore and analyse information, a readiness to critique one's beliefs and points of view - in short **an active epistemological stance** (Gibbs, 1981).

4.2.3.3. Dimension analysis

Adams (1989) states that the ability to parse the world into elementary characteristics and dimensions of variation is fundamental to science and formal logic, and is intrinsic to language systems. Language is a tool for interpreting our world and describing our experience, that is, our perceptions and observations of it (Moll *et al.*, 2002:94). Visual and aural perception are central to learning. The differentiation and integration of our schema constructs takes place through language systems and is carried forward and extended through its most systematised form, reading and writing. For this reason, dimension analysis is aimed at focusing the learner's **attention** on the **characteristics** of the world of things and phenomena. In the context of the HRSP the learner is introduced to the fundamental importance of "using their eyes and ears" in terms of the analogy of driving a car on a road. (In this regard it is interesting to note that Adams (1989:60) claims that "analogy is our most powerful tool for creative thought".) The aim of the HRSP is to foster the observational and perceptual acuity of the learner in relation to the particular problem situation, mapping sounds to print. Next they are introduced to the concept of **dimensions** (sign, sound, colour), and the characteristics of these dimensions, particularly in terms of the colour code (blue, red, yellow and green), and the **reasons** why they change. They are introduced to the regularities and functioning of the language sound-sign system as a 'functional system' in the Vygotskian sense (John-Steiner & Mahn, 1996) and therefore a cognitive tool that must be internalised (Estep, 2002). The following excerpt is taken from the Teacher's Manual (p. 3) for the spelling component of the HRSP.

We, as people, communicate through sounds. For example, we know the meaning of a siren, or a bell or the bark of a dog.

All letters are: SYMBOLS OR SIGNS (VISUAL) of SOUNDS HEARD (AUDITORY).

The skill of **SPELLING** therefore means that the learner must be able to transform sounds into a sign system. This involves at least three steps.

- listen (auditory)
- apply (**encode**)
- write (motor response).

THE EYES MUST '**SEE**' WHAT THE EARS HAVE **HEARD**.

The skill of **READING** means the learner must be able to transform a sign system into sounds. Thus reading also involves at least three steps.

- look (visual)
- apply (**decode**)
- say (motor response)

THE EARS MUST '**HEAR**' WHAT THE EYES HAVE **SEEN**.

From this excerpt the emphasis on the mapping of sounds to print is clear, and the underlying process of **cross-modal coding** is introduced (Pugh *et al.*, 2000). Cross-modal coding is an essential element on phonological assembly and in the lexical-semantic processes that foster the development of the word form area and automatic word recognition (Pugh *et al.*, 2000, Turkeltaub *et al.*, 2003). The underlying role of successive and simultaneous processing is also implicitly introduced into the HRSP in terms of the model outlined in chapter 3 (p. 77).

Adams (1989) describes the introduction of 'first order' processes which build on the basic dimension analysis. In the context of the HRSP, these processes are attention-arousal, successive processing, simultaneous processing, and planning. **Attention** is the basic process for all subsequent processing (Das & Kendrick, 1997). It is a fundamental aspect of perception and observation, and therefore of dimension analysis. The learner must be able to direct their attention to and focus on the perceptual and analytical task, whether it involves listening, speaking, reading or writing. Simultaneous and successive coding occurs during the processing (interpretation) and retention of information. **Simultaneous** processing is involved when information is coded as a

holistic pattern. It is therefore important in recognition of letter names, whole words, patterns in print and text, and grammatical interpretation for higher meaning. It is also implicated in holding an orthographic/phonological representation of a word in working memory for it to be transferred to the long-term-memory lexical system of the word form area (Wise *et al.*, 2001). **Successive** processing is involved in temporal sequencing, such that the elements of information form a chain-like progression or sequence. Each piece of information is coded as a discrete serial element (Das & Kendrick, 1997). For this reason it is a fundamental process in phonological decoding and assembly, and in word analysis, particularly of speech. It also plays a central role, together with planning processes, in spelling, writing and speaking (Reid *et al.*, 2002). **Planning** is a self-organising and reflective activity that integrates information provided by other cortical circuits to create adaptive behavioural responses. Planning is a cognitive function that monitors and regulates the functioning of the other cognitive processes in terms of alerting the reader when understanding has broken down, deciding on a strategy of attack in word analysis, reading comprehension monitoring, text analysis and higher order interpretation and creation of texts (Das & Kendrick, 1997; Reid *et al.*, 2002). It is also central to metacognition (Das *et al.*, 1994). It is upon these cognitive processes that the fostering of **highly proficient reading** rests (Spear-Swerling & Sternberg, 1994).

Vygotsky did not develop a clearly articulated theory of instruction, and we have to infer from his writings what he would have considered to be appropriate (Estep, 2002; John-Steiner & Mahn, 1996). The Vygotskian model of *learning activity* will be described next, as the rationale for reading instruction in the HRSP.

4.3. A VYGOTSKIAN PERSPECTIVE ON INSTRUCTION - LEARNING ACTIVITY

The rationale behind the HRSP described above is operationalised through the direct instruction of specific skills. A Vygotskian perspective emphasising direct mediation of specific skills was chosen (Donald *et al.*, 2002) as this has wide and growing research support (Estep, 2002, Palinscar, 1995), and because it provides a paradigm for operationalising the socio-cultural and transformational goals of the HRSP (Palinscar, 1995; Palinscar & Perry, 1994). The learners must be equipped with the tools they need to achieve at school and in life (RNCS, 2002). While Vygotsky's construct of the zone of proximal development has achieved wide currency in the West (Estep, 2002, John-Steiner & Mahn, 1996), his construct of '**learning activity**' is less well known (Kozulin & Presseisen, 1995). According to Kozulin and Presseisen (1995) the construct has two

main sources in Vygotsky's writing. Firstly, the concept of psychological functions. According to Vygotsky, psychological functions were "engaged by different types of psychological activity becoming their crystallised forms" (Kozulin & Presseisen, 1995). This seems to reflect the view that the acquisition of psychological tools is in essence the acquisition of the processes underlying these tools (Karpov & Bransford, 1995). The second source was the distinction between 'scientific' and 'spontaneous' concepts. **Spontaneous concepts** emerge from the learners' own reflections on their immediate experience. While these constructs are experientially rich, they are unsystematic and highly contextual. **Scientific concepts** are based upon structured and specialised activity in formal learning contexts. They are systematic, logical and decontextualised (Estep, 2002; Karpov & Bransford, 1995).

Learning activity must be distinguished from learning in a generic sense. Learning may be involved in many incidental and informal daily activities. However, learning is not the primary goal of these activities. The goal of learning activity is learning i.e. to make the child into a competent learner (Kozulin & Presseisen, 1995). According to Elkonin (a student of Vygotsky) at the primary school age formal learning becomes, or should become, the dominant form of activity. For adolescents, interpersonal relationships come to dominate, and for older young adults, activities oriented toward vocational or career goals becomes dominant (Kozulin & Presseisen, 1995). The implication of this for the classroom instruction is the importance of learning activity in the primary school. If this activity is not formed in the primary school, it becomes more difficult to form later, because the focus of the learners' interest shifts from learning to interpersonal interests. This view is at variance with most common educational approaches in the West (Kozulin & Presseisen, 1995), where primary school curricula emphasise more the socialisation of the child and general knowledge rather than the acquisition of specific learning skills. In this view, teaching oriented to develop 'scientific concepts' often only appears much later, leaving the learner unprepared for learning (Kozulin & Presseisen, 1995).

Learning activity includes three components: learning task, operations, and methods of evaluation and control (Kozulin & Presseisen, 1995). The learning task is not the concrete reading or writing exercise, but reflects the **general principle** of the formation and transformation of the learning content. Instead of starting with the concrete reading task, the learner should first be exposed to the **fundamental relationships** within the language sound-sign system. These relationships should be studied through manipulation of concrete and symbolic representations (models). As a result, the general principles of problem solving appear **before** and support the subsequent

application to actual tasks. This contrasts with the opposite approach in discovery learning where the learner must abstract the principle themselves from their encounter with the problem (Karpov & Bransford, 1995).

Operations (application) involved in learning activity always take place **after** some paradigmatic example that is presented by the teacher (Kozulin & Presseisen, 1995). The acquisition of learning operations always involves the formation of a preliminary schema of such an operation and an attempt to carry it out. **Control** (monitoring) involves the comparison of the operation with the paradigmatic example. To achieve effective control, the paradigmatic example should have some universal applicability or 'generalisability' to ensure the possibility of comparison with any actual task. Diamond and Mandel (1996) state that "all experts [in reading instruction] emphasise the importance of a systematic and research-based instructional approach aimed at giving students **control** as they learn to read." This **systematic approach** has two cardinal elements: teaching how the **system of language** works and linking instruction in a **logical sequenced progression** throughout the grades. **Evaluation** (self-regulation) in learning activity is the child's own evaluation of their success in accomplishing the task, with emphasis on mastering the general principle or fundamental relations (Kozulin & Presseisen, 1995).

The principles described above may be elucidated in terms of **theoretical learning** (Karpov & Bransford, 1995). Theoretical learning is based on supplying the learner with general principles and optimal methods for dealing with certain classes of problems that direct the learner to the essential or fundamental relationships rather than the general characteristics of the problem (learning task). The psychological tool is then used (operations) for solving concrete problems. In the event, the processes underlying the tool are mastered and internalised by the learner. Karpov and Bransford (1995) provide an example: the analysis of a contour. A contour may be described from the point of view of a 'model' – a series of dots arranged in those positions where the contour changes direction. When teaching to write letters, the teacher gives the learners the generalised method for analysing the contour of a letter and constructing a model of this contour. This method included the following steps: analysing the letter to be copied in order to determine where the contour changes direction; placing the dots in those positions where change occurs.

This may be applied to the HRSP. When teaching the learners to read words, the teacher gives the learners the general method for analysing words and constructing a 'model' of this word using a colour code. This would involve the following steps: analysing the word to determine where the

sound 'changes'; colouring the word to indicate the different sound units in relation to the generalised principle or fundamental relation within the sign-sound system. The learners' acquisition of the sound-sign concept was started by confronting them with a problem. In the context of the HRSP the problem is the sign-to-sound mapping. The learners are confronted with the problem of comparing a parameter (phonemes) of two or more 'objects' (graphemes or words) (e.g. the nature of the sound-sign units in a word) using an appropriate 'model' (the highway, robots and the colour code). On this basis the concepts of *grapheme* and *phoneme* and the fundamental relationships and generalisations associated with them, are introduced to the learner. Sounds (phonemes) and symbols (graphemes) both **signify** (mean) something. Because mechanical drill and memorisation are much less during theoretical learning, the process of learning becomes interesting for the learner. More importantly, the learners' cognitive development is facilitated. Learners learn to differentiate various parameters within objects and to analyse each of these parameters. They begin to make decisions not on the basis of their general observations but on the basis of using the proper means of analysis. Their naïve attitude towards the problem has been transformed into a 'scientific' attitude (Karpov & Bransford, 1995).

The structure of the HRSP is presented next.

4.4. THE STRUCTURE OF THE HRSP

Diamond and Mandel (1996) state that enough is now known about reading instruction that the destructive and often rancorous debates about how to best teach it can and should be laid to rest. Diamond and Mandel (1996) describe the characteristics of a comprehensive reading programme based on the findings of research. All successful reading programmes must:

- Base instruction on accurate diagnostic information
- Develop print concepts
- Develop knowledge of letter names and shapes
- Convey the understanding that spoken words are composed of sounds (phonemic awareness) and that letters correspond to these sounds (alphabetic insight)
- Provide systematic and explicit instruction in sound-symbol relationships (systematic phonics)
- Connect instruction to practice in highly decodable text that contains sounds and symbols taught
- Make use of rich and varied literature and read regularly with and to learners.

In addition:

- Direct instruction and practice comprehending the meaning of texts must start early and build through the grades.
- Instruction in upper grades must extend and build on the skills developed earlier.
- All of these skills must be directly taught as part of a comprehensive approach that includes
 - Varied and abundant print materials,
 - active learning, and
 - the development of written and spoken language through highly engaging activities.

Diamond and Mandel (1996) describe at least three main components of a comprehensive reading programme. A comprehensive reading programme must foster phonemic awareness, automatic word recognition, and comprehension skills. The HRSP consists of three main components:

1) **A nurturing curriculum** (Grade R-1), attempts to foster the two basic onset skills (Stanovich, 1986) for the pre-reader: phonemic awareness, or the insight that spoken words are made up of sound units, and alphabetic insight, the understanding that these sound units map onto symbols (Spear-Swerling & Sternberg, 1994). Simple exercises are effective in fostering phonemic awareness and alphabetic insight (Diamond & Mandel, 1996). These include

- Hearing rhymes and alliteration
- Blending sounds to make a word
- Counting or clapping phonemes in a word
- Identifying the beginning, middle and final sounds in a word
- Substituting one phoneme for another
- Deleting phonemes from words

Phonemic awareness can be developed by providing learners with rich language experiences that encourage active exploration and manipulation of sounds. These activities lead to significant gains in reading and spelling in higher grades (Diamond & Mandel, 1996). Research (Adams, 1990) has also suggested the following guidelines:

- Teach upper and lower case letters separately (This is done in the HRSP)
- Begin with upper case letters, but since most reading involves lower case letters these should be introduced early (This is done in the HRSP)

- Incorporating printing is effective in developing letter recognition (Writing is a crucial component of the HRSP)
- Use letter/key word/picture displays when introducing letter sound instruction.

The following quotation from the HRSP Teachers' Manual: Proper Phonics (pg. 11) illustrates this point. "In the HiWay Programme, the alphabet is introduced as a series of pictures. The learners will be unaware that they are learning the alphabet sequence. If possible, the educator can put up the pictures on the wall as a frieze. These pictures and sounds become **key words** to the Hi-Way Programme. The picture should appear on the wall before any letters are introduced. The learner first learns the vocabulary of the language of instruction."

- Learners must be protected from confusing the sound of a letter with its name.
(This is a major emphasis in the HRSP)

As noted above (p 121), Adams (1989) states that a thinking-skills programme involves two basic components: **information** and **interpretation**. This is particular true in the case of reading programmes. In the HRSP it is made explicit that sounds (phonemes) and signs (graphemes) signify something i.e. they have meaning. By introducing the idea that sounds and signs have meaning, even the Grade R learner grasps the concepts easily and quickly without being burdened with the technical terminology. It is relatively easy for them to then grasp that signs (graphemes) signify ('mean') signs (phonemes), an insight which underlies both phonemic awareness i.e. the insight that spoken words are made up of sound units, and alphabetic insight, the understanding that sound units map onto sign units. This is illustrated by the following excerpt from the HRSP Teachers Manual: Proper Phonics (pg. 11).

The learner should know from experience that sounds have meaning. The educator should spend many lessons using examples of sounds, asking the learner to identify them and saying what they mean. A siren may mean an ambulance in a hurry taking a sick person to hospital, or it may be a police car chasing someone who has broken the law. It may be a burglar alarm. Each learner will give her response from her experiences in the environment in which she has grown up. Many new sounds will have to be taught. Here are some other sounds that may be used.

a hooter	a clock ticking	a bell
a cat mewing	a cock crow	a cry
an engine running	a dog barking	stirring a tea cup
a door closing	sneezing	footsteps
snoring	a page being turned	the wind or rain

The learner must grasp that speech is sound and the sounds have meaning. These sounds have been given symbols. The symbols used are called the alphabet. Learners must be able to recognise these symbols. One way to teach this concept is to teach road safety and use the road signs that they should learn.

In the HiWay Programme, the alphabet is introduced as a series of pictures. The learners will be unaware that they are learning the alphabet sequence. If possible, the educator can put up the pictures on the wall as a frieze. These pictures and sounds become **key words** to the Hi-Way Programme. The picture should appear on the wall before any letters are introduced. The learner first learns the vocabulary of the language of instruction.

2) **A systematic phonics component** (Grades 1 to 3) that fosters the development of phonological awareness and automatic word recognition through phonemic awareness and systematic phonics instruction, vocabulary building, and fluency training. Adams (1990) lists three factors that contribute to reading fluency:

- letter knowledge
- linguistic awareness of words, syllables and phonemes
- knowledge about print.

Systematic phonics instruction allows learners to use the system of language rather than guess. According to Lyon (1995) and Lyon and Moats (1997) research indicates three successful interventions:

- Explicit work to help learners understand the sound structure of the language at the phoneme level
- Intensive and explicit work in sound-symbol associations
- Explicit application to connected text with controlled vocabulary

In the HRSP, the sound unit is introduced based on the methods of phonemic segmenting and phonemic blending, the two most effective methods identified by the NRP (2000) for fostering phonemic awareness. In the HRSP, this is done together with the introduction of letters, a procedure advocated by the NRP (2000) report. The following excerpt is taken from the HRSP Teachers Manual: Proper Phonics (pg. 14).

PHONICS COMPONENT. (GRADES R – 3)

WEEKLY PROGRAMME.

Duration of treatments: 5-15 minutes per day

The week's programme will include four stages.

1. INTRODUCTION OF THE SOUND UNIT.
 - Monday, an oral lesson,
2. CONSOLIDATION AND PRACTICE OF SKILLS.
 - Tuesday, consolidation.
3. REVISION OF THE SOUND UNIT.
 - Wednesday and Thursday. Written work and revision.
4. ASSESSMENT.
 - Friday, an assessment of the week's work.

Introduce the 'a' sound

<p><i>Educator's note;</i> All the consonant letters are in black. Remember they say their sounds and do not change. All robots are shown in blue. Each word should be clearly sounded. e.g. c-a-t. The sentence should be READ. REMEMBERED and WRITTEN. (RRR) The learners check their own work. The words should be repeated for homework and revision. The yellow block is called "Pothole"</p>	<p>cat fat sat can sad sand bad hand</p>	<p>The fat cat sat at the dam.</p>  <p>The man has the van.</p> 
<p>EXPLANATORY NOTES FOR TEACHERS</p>	<p>WORD LIST</p>	<p>DICTIONATION SENTENCE FOR READING/WRITING.</p>

Worksheet 1

1. INTRODUCTION OF A SOUND UNIT.

*In keeping with the **cognitive process approach**, the programme is graded to the level of the learners. The educator should however, not take for granted or assume the learners have reached a certain stage of cognitive development because they are of a certain age or are in a certain grade. In some instances, older learners will have no more phonemic awareness or phonic ability than a Grade R or pre-school learner. Set the level and choose the strategies and methods that are suitable for the learner's level of cognitive development. This programme is flexible and is designed to accommodate learners of different levels of cognitive development. It is designed to empower the teachers, (and the learners) not to bind them.*

*The introduction of a sound unit is designed as a **phonemic awareness** exercise using the manipulation of letters within the context of whole words and sentences. The NRPR (2000) reported that scientific evidence shows this is the most effective means of teaching phonemic awareness. Teaching learners to manipulate phonemes using letters and sound units (graphemes) produced bigger treatment effects than teaching without letters.*

*It was also reported that **phonemic blending** and **phonemic segmenting** instruction exerted a significantly larger effect on reading development than did multiple-skill instruction. The HRSP is focused on the development of these two types of phonological awareness specifically and systematically. The HRSP also makes use of phonemic isolation, phonemic identity and phonemic categorisation (see below for a description of the different types of phonemic awareness instruction).*

3) **A reading comprehension component** (Grades 4 to 6) that focuses on vocabulary building and training in inferential reading comprehension strategies. Pearson (1993) emphasised the importance of explicit instruction for reading comprehension. Such instruction should include:

- teacher modelling and explanation
- guided practice with immediate feedback
- independent practice with feedback
- application of strategies in real reading situations

The following excerpt is taken from the HRSP Teachers Manual: Reading© (pg. 4)

“READING COMPREHENSION COMPONENT GRADES 4-6
GENERAL FRAME OF A MODULE: (ONE STORY).

Time frame. This should ideally take 2 to 3 weeks so that the learners will really benefit from the module. Each module has three main components:

1. Vocabulary building
2. Fluency training.
3. Comprehension strategies training.

Each module consists of a short story divided up into three to five sections. Each section has a list of vocabulary associated with it. For each section, the teacher must include all three components, vocabulary building, fluency training and comprehension strategy training. In addition, there are options (additional competencies) for the teacher to choose. It is not expected that the teacher attempt to do all of these in a single week (that is why we advise that the teacher take 3 weeks per module). However, the teacher should attempt to do at least two additions from each section of the options provided per week.

At the end of the module is a list of questions. These questions have been very carefully formulated to train the reader to think. They should be used once the learners have completed all the sections.

3. Too close for Comfort.

scrambled moments fascinated surrounded
waited pricked started surge released

1. VOCABULARY BUILDING

We scrambled over into the front seat and then sat for some moments fascinated. We were surrounded by a silent ring of dogs. In the glare of the headlights the eyes of those in front of us glowed like coals, their flanks heaved while their jaws were foam flecked. Yet they were far from beaten; their ears were pricked as they warned. A cold shiver ran up my spine and I started the engine. We surged forward, but the dogs in our way only sprang back at the very last moment.



Further on we stopped near a small stream and the young duiker, which had now fully recovered and was ready to take its chance in the kingdom of the wild again.

2. FLUENCY TRAINING

Questions: Too Close for Comfort.

1. At what speed was the writer travelling: seventy, ninety kph; one hundred kph.
2. When the duiker leapt into the road, the wild dog was about 100m behind; disgusted; close behind, bewildered.

3. QUESTION GENERATION

The structure of the HiWay programme is therefore consonant with the structure of a comprehensive reading programme as outlined by Diamond and Mandel (1996). This will be explored in more detail below.

In chapter 3 it was reported that Shaywitz and Shaywitz (2004b) described a number of important criteria that effective 'evidence-based' reading programmes should meet. They claimed that when evaluating a reading programme, teachers should ask the following questions:

1. Is there scientific evidence that the programme is effective?
2. Was the programme or its methodology reviewed by the National Reading Panel (2000)?
3. In reading instruction, are phonemic awareness and phonics taught systematically and explicitly?
4. How are learners taught to approach an unfamiliar word? Do they feel empowered to try to analyse and sound out the unknown word first rather than guess the word from the pictures or context?
5. Does the programme also include plenty of opportunity for learners to practise reading, develop fluency, build vocabulary, develop reading comprehension strategies, write and listen to and discuss stories?

The HRSP needs to be compared to or evaluated against these criteria, as well as the findings and criteria of the NRP Report. The results of the qualitative evaluation of the rest of the criteria listed above is presented next.

4.5. RESULTS OF THE QUALITATIVE EVALUATION OF THE HRSP

4.5.1. INTRODUCTION

The results of the first criterion as listed above is described in chapter 5. The results of criteria 2 to 5 listed above are presented next.

4.5.2. WAS THE PROGRAMME OR ITS METHODOLOGY REVIEWED BY THE NATIONAL READING PANEL (2000)?

A sub-question of this study was to what extent the HRSP meets the criteria of the National Reading Panel Report (2000) for a **complete reading programme**. The HRSP was therefore closely compared with the findings of the NRP with regard to the methods and types of instruction that have research support, in order to establish the **methodological strength** of the HRSP. The qualitative method used in this investigation was *Content or Document Analysis* as described by Ary *et al.*, (2002:354). The main sources of data for this investigation were the *HRSP Teachers Manual – Reading* and the *HRSP Teachers Manual – Spelling*. These documents were examined evaluated in terms of:

- i) the use of phonemic awareness approaches;
- ii) systematic phonics approaches;
- iii) fluency training;
- iv) vocabulary building and;
- v) reading comprehension training

as described in the document *Findings and Recommendations of the National Reading Panel (2000)* for complete reading programmes. To address the second criterion of Shaywitz and Shaywitz (2004b), the document *Findings and Recommendations of the National Reading Panel (2000)* was used to identify criteria for evaluating the HRSP. These criteria were weighted as described by Troia (1999) in the following way:

- A weighting factor of 1 was assigned to a criterion of the NRP for which failure to satisfy the criterion is considered unlikely to seriously threaten the effectiveness of a reading programme (for the purpose of the study – the HRSP).
- Every criterion for which failure to meet the criterion would significantly weaken the effectiveness of a reading programme (e.g. the HRSP) was assigned a weight of 2.
- Those aspects deemed of crucial importance for the effectiveness of a reading programme were assigned a weight of 3.

Each criterion was then given a **value** (cf. Value column in Figure 4.1.), positive or negative in terms of whether the reading programme under evaluation (the HRSP) satisfied the criterion or not. The weighted score was computed by summing the items for all **negatively** evaluated criteria. Thus a **low score** indicates a methodologically strong reading programme. The HRSP was therefore evaluated in terms of weighted score (sum of all **negatively** evaluated items). In addition, the number of **negatively** evaluated criteria assigned a weighting of 3, and total proportion of evaluative criteria met, i.e. those evaluated **positively** as a percentage of the total (50) criteria, was calculated. The results of this process are shown in table 4.1.

Table 4.1. The HRSP compared to the evaluative criteria for the methodological strength of a reading programme.

Criteria	Weight	Value
Phonemic Awareness Instruction		
Instruction in phonemic awareness involves explicitly and systematically teaching children to manipulate phonemes	3	+
Instruction in phonemic awareness involves teaching children to manipulate phonemes in spoken syllables and words	2	-
Instruction in phonemic awareness involves teaching children to blend or segment the sounds in words using letters .	2	+
Instruction in phonemic awareness involves focusing on one or two types of phoneme manipulations rather than multiple types	2	+
Instruction in phonemic awareness involves focusing the instruction of phonemic blending and phonemic segmentation .	2	+
Instruction in phonemic awareness involves teaching children in small groups	1	-
Instruction in phonemic awareness is one instructional component within a complete and integrated reading programme.	3	+
Several additional competencies are taught to ensure that children will learn to read and write.	2	+
Phonics Instruction		
The primary focus of phonics instruction is to help beginning readers understand how letters are linked to sounds	3	+
Phonics instruction is provided systematically .	3	+

A sequential set of phonics elements is delineated and these elements are taught along a dimension of explicitness	2	+
Teaching students unfamiliar words by analogy to known words	1	+
Teaching students to analyze letter-sound relations in previously learned words to avoid pronouncing sounds in isolation.	2	-
Teaching students explicitly to convert letters into sounds (phonemes)	3	+
Teaching students phonics skills by embedding phonics instruction in text reading	1	-
Teaching students to spell words phonemically	2	+
Students are first taught to link an individual letter combination with its appropriate sound and then blend them into words	2	+
Students are first taught whole word units followed by systematic instruction linking the specific letters in the word with their respective sounds.	1	-
Instruction in phonics provides opportunities for applying learned skills in decodable text formats characterized by a controlled vocabulary.	2	+
Instruction in phonics provides opportunities for applying learned skills in decodable text formats characterized by a controlled vocabulary.	2	+
Systematic phonics programmes were implemented at Kindergarten and first grade levels	3	+
Explicit, synthetic, systematic phonics instruction is an essential part of a classroom reading programme.	2	+
The goals of phonics instruction are to provide children with key knowledge and skills and to ensure that they know how to apply that knowledge in their reading and writing.	2	+
in implementing systematic phonics instruction, educators must keep the end in mind and ensure that children understand the purpose of learning letter sounds and	2	+
Teachers should be able to assess the needs of the individual students and tailor instruction to meet specific needs.	2	+
Teachers need to be flexible in their phonics instruction in order to adapt it to individual student needs.	2	+
Systematic phonics instruction should be integrated with other reading instruction in phonemic awareness, fluency, and comprehension strategies to create a complete reading programme.	2	+
It is important not to judge children's reading competence solely on the basis of their phonics skills	1	+
It is important not to devalue their interest in books because they cannot decode with complete accuracy.	1	+
Systematic phonics instruction should be provided in an entertaining, vibrant, and creative manner.	2	+
Fluency		
Reading practice is recognized as an important contributor to fluency.	2	+
Guided repeated oral reading is used,	3	+
which encourages students to read passages orally	2	+
with systematic and explicit guidance and feedback from the teacher.	2	+
Independent silent reading is used, which encourages students to read silently on their own, inside and outside the classroom, with minimal guidance or feedback.	1	+
Vocabulary and Comprehension		
Direct vocabulary instruction is used	3	+

Methods must be appropriate to the age and ability of the reader.	2	+
The use of computers in vocabulary instruction was found to be more effective than some traditional methods in a few studies.	2	-
Vocabulary also can be learned incidentally in the context of storybook reading or in listening to others.	1	+
Learning words before reading a text also is helpful.	2	+
Repetition and multiple exposures to vocabulary items are important.	2	+
Direct instruction should actively engage the student.	2	+
Comprehension monitoring , where readers learn how to be aware of their understanding of the material	3	+
Co-operative learning , where students learn reading strategies together	1	-
Use of graphic and semantic organisers (including story maps), where readers make graphic representations of the material to assist comprehension	1	-
Question answering , where readers answer questions posed by the teacher and receive immediate feedback	2	+
Question generation , where readers ask themselves questions about various aspects of the story	2	-
Story structure , where students are taught to use the structure of the story as a means of helping them recall story content in order to answer questions about what they have read	2	+
Summarisation , where readers are taught to integrate ideas and generalise from the text information.	1	+
Teaching a combination of reading comprehension techniques is the most effective.	3	+

The weighted score (sum of all **negatively** evaluated criteria) for the HRSP was 13. This low score (out of a possible total of 99) indicates that the HRSP is methodologically strong. There were no 'critical flaws' in the HRSP i.e. the **negative** evaluation of those criteria deemed of crucial importance for the effectiveness of a reading programme (weighted 3 in the table 4.1), and the total proportion of evaluative criteria evaluated **positively** was 80%. This result indicates that the HRSP is methodologically strong when compared to the findings of the National Reading Panel (2000).

4.5.3. IN READING INSTRUCTION, ARE PHONEMIC AWARENESS AND PHONICS TAUGHT SYSTEMATICALLY AND EXPLICITLY?

4.5.3.1. Phonemic Awareness Instruction

The National Reading Panel Report (2000) explains that **phonemic awareness** instruction specifically means teaching learners to focus on and manipulate phonemes in **spoken** syllables and words. Phonemic awareness instruction qualifies as **phonics** instruction only when it involves teaching learners to blend or segment the sounds in words *using print*. Phonemic awareness is also frequently confused with **auditory discrimination**, which refers to the ability to recognise

whether two spoken **words** are the same or different, and **phonological awareness**, which refers to awareness of larger spoken **units** such as phonograms and syllables (NRP, 2000).

TABLE 4.2. TYPES OF PHONEMIC AWARENESS INSTRUCTION.

1. Phonemic isolation: which requires recognising individual sounds in words, for example, "Tell me the first sound in <i>cat</i> "
2. Phonemic identity, which requires recognising the common sound in different words. For example, "Tell me the sound that is the same in <i>cat, mat, sat</i> and <i>bat</i> ".
3. Phonemic categorisation, which requires recognising the word with which the odd sound in a sequence of words, for example, "Which word does not belong? <i>Bus, bun, rag</i> "
4. Phonemic blending, which requires listening to a sequence of separately spoken sounds and combining them to form a recognisable word. For example, "What word is <i>/c/ /a/ /t/</i> " (<i>Cat</i>).
5. Phonemic segmentation, which requires breaking a word into sounds by tapping or counting the sounds or by pronouncing and positioning a marker for each sound. For example, "How many sounds are there in ' <i>dog</i> '?"
6. Phonemic deletion, which requires recognising what word remains when a specified phonemic or phonogram is removed. For example, "What is ' <i>brat</i> ' without ' <i>b</i> '?" (<i>rat</i>)

In order to evaluate The HRSP on the first part of criterion three - phonemic awareness instruction - the list of types of phonemic awareness instruction provided by the NRP (2000) was used. According to the NRP (2000) there are six main types of phonemic awareness (Table 4.2.) The NRP (2000) also reported that research indicated that the teaching of one or two types of phonemic awareness was associated with larger effect sizes than multiple approaches. This is in agreement with the approach used in the HRSP. Two types of phonemic awareness are stressed in the HRSP, **phonemic blending**, a decoding skill associated with reading, and **phonemic segmentation**, an encoding skill associated with spelling. These two types of phonemic awareness were also those which produced the greatest effect sizes in reading according to the NRP (2000) report. The HRSP therefore closely corresponds to that type of phonemic awareness instruction indicated by the NRP report to have the most research support. The two types of phonemic awareness are stressed in the HRSP are **phonemic blending**, a decoding skill associated with reading, and **phonemic segmentation**, an encoding skill associated with spelling.

The NRP (2000) also reported larger effect sizes for the teaching of phonemic awareness with letters and whole words. The report indicates that to ensure the effectiveness of phonemic awareness instruction, it needs to include instruction in graphemes as well as the connections between graphemes and phonemes. This is consonant with the approach of the HRSP - in the

HRSP, phonemic awareness instruction is combined with explicitly and systematically teaching learners to manipulate letters and sound units.

It is important to note that the NRP (2000) report states that phonemic awareness instruction does not constitute a complete reading programme. Phonemic awareness is best used as an important component of a more comprehensive reading programme. Phonemic awareness instruction is intended only as a foundational although essential component. Learners also need to be taught to acquire reading and writing competence. This is consonant with the approach and rationale of the HRSP.

The methodology of the HRSP with regard to phonemic awareness instruction is in agreement with the findings of the NRP (2000) on what constitutes effective phonemic awareness instruction, particularly with regard to: 1) type of phonemic awareness instruction; 2) the use of letters with phonemic awareness instruction and; 3) the use of phonemic awareness instruction as a **foundational component** of a **complete reading programme**. The HRSP emphasises the development of phonemic awareness in the context of the regular curriculum, combining phonemic awareness with the systematic and explicit manipulation of letters and words.

4.5.3.2. Systematic Phonics Instruction

The NRP (2000) states that not all phonics programmes are equal. There are a number of different phonics approaches. Phonics instruction may be provided systematically or incidentally. In **systematic phonics approaches**, a sequential set of phonics elements is outlined and taught with different degrees of explicitness depending on the type of phonics method used. With **incidental phonics instruction**, the teacher does not follow a planned sequence of phonics elements to guide instruction but highlights particular elements opportunistically when they appear in text (NRP, 2000).

In **synthetic phonics** approaches, learners are taught to link an individual letter or letter combination with its appropriate sound and then blend the sounds to form words. In **analytic phonics**, learners are first taught whole word units followed by systematic instruction linking the specific letters in the word with their respective sounds. The main emphasis of the HRSP programme is on a synthetic approach when introducing a sound unit for the first time. When the learners have to **apply** the phonic skills during text reading, the analytic approach is frequently

used. The NRP review of 38 research articles since 1970 indicated that larger effect sizes were obtained in studies using the synthetic approach (NRP, 2000).

The NRP (2000) states that phonics instruction can vary with respect to the explicitness by which the phonic elements are taught. Some approaches use **direct instruction** in teaching phonic components, and provide opportunities for applying these skills in decodable texts characterised by a controlled vocabulary. In contrast, **embedded phonics** approaches are less explicit and use decodable text less frequently, although the phonics concepts to be learned may still be presented systematically. The HRSP uses the direct approach in the spelling (phonics) component, while in the reading comprehension component, an embedded approach is used to revise and reinforce already learned skills.

Analogy phonics involves teaching learners unfamiliar words by analogy to known words e.g., recognising that the *rime* (not to be confused with *rhyme*) segment of an unfamiliar word is identical to that of a familiar word, and then blending the known *rime* with the new word *onset*, such as reading brick by recognising that /-ick/ is contained in the known word 'kick', or reading 'stump' by analogy to 'jump'.

'**Phonics through Spelling**' involves teaching learners to segment words into phonemes and to select letters for those phonemes i.e., teaching students to spell words phonemically e.g. 'church' is spelled /ch/ /ur/ /ch/, not 'see'-'aych'-'you'-'are'-'see'-'aych'.

In systematic phonics programmes learners receive **explicit**, systematic instruction in a set of pre-specified associations between letters and sounds, and they are taught how to use them to read, typically in texts containing controlled vocabulary. However, systematic phonics programmes vary in exactly what learners are taught and how they are taught (NRP, 2000). Phonics instruction may differ in several important ways. In order to evaluate part two of criterion three in more detail, i.e. what type of systematic phonics instruction is used in the HRSP, a comparison of the HRSP with the questions listed in the NRP (2000: page 2-103) describing the different types of systematic phonics approaches was undertaken to establish: 1) the type of phonics instruction given in the HRSP and; 2) the characteristics of the HRSP compared with other systematic phonics approaches. Sentences in Italics are quoted directly from the NRP Report (2000), part 2: *Phonics*, page 2-103, and are used as the evaluative criteria for the next section.

1. *How many letter-sound relations taught?* Table 4.3 provides a summary listing of the sound units taught in the HRSP and the sequence taught in relation to the grades R to four. (Shaded columns indicate which grades are involved).
2. *How are they sequenced?* Table 4.3 provides the sequence in which sound units are taught in the HRSP. The HRSP introduces the sound units based on their use in basal literacy instruction, frequency of use in children's literature (Lerner, 2003), and level of difficulty e.g. in the HRSP the /ck/ unit is introduced early followed by frequent revision and consolidation because it is a sound unit that is frequently used in children's books **and** learners typically struggle to master its use.

TABLE 4.3. SOUND UNIT, RULES AND SEQUENCE TAUGHT IN RELATION TO GRADES IN THE HRSP®							
Sequence	Sound Unit	Grades					Consolidation
Week 1: Introduce the highway: Consonant sounds and short vowels							
Week 1: Introduce potholes							
Week 1	'a' sound	R	1	2	3	4	Review
Week 1. V rule							
Week 2	'e' sound						Review
Week 3	'i' sound						Review
Week 4	'o' sound						Review
Week 5	'u' sound						Review
Week 6	Revision: Short vowels						REVISION
Week 6: double l rule, tell, bell							
Week 7	Revision: Short vowels						REVISION
Week 9:	Introduce "ail" family						
Week 9: Introduce 'ck' sound rule							
Week 9:	'ck' sound unit						Review
Week 10: Introduce consonant blends							
Week 11	'br' sound						
Week 12	'dr' sound						
Week 13	'cr' sound						
Week 14	'fr' sound						Review
Week 15	'gr' sound unit						
Week 16	'pr' sound unit						
Week 17	'tr' sound unit						
Week 18	'bl' sound unit						Review
Week 19	'cl' sound unit						

Week 20	'ff' sound unit						
Week 21	'gl' sound unit						
Week 22	'sl' sound unit						
Week 23	'pl' sound unit	R	1	2	3	4	Review
Week 24	'sm' sound unit						
Week 25	'sk' sound unit						
Week 26	'sn' sound unit						
Week 27	'sp' sound unit						
Week 28	'st' sound unit						Review
Week 29	'nk', 'lk', 'sk' sound unit						
Week 30	'ck' sound unit						Review
Week 32	'sh' sound unit						Review
Week 33	'ch' sound unit						
Week 34	'th' sound unit						Review
Week 34. Introduce silent t rule							
Week 35. Introduce old family							
Week 35	Revision			2			REVISION
Week 36	Revision						REVISION
Week 37 Introduce long vowel red robot and "gate" rule.							
Week 37 Introduce Silent e rule							
37	Long 'a'						
38	Long 'i'						
39	Long 'o'						Review
40 Introduce syllables							
40 Introduce "If its blue there must be two" rule							
41	'ing' ending						Review
41 one syllable fisz rule							
42 introduce 'y' rule							
42 y blue robot and y red robot							
42 'es' and 'ed' past tense endings							
42	'y' blue robot						
43	Y red robot						Review
44	"ight" and 'ind' family						Review
45 Introduce double vowels							
45	'ai'	R	1	2	3	4	
46	'ay'						Review
47	'oa'						
48	'ee'						Review

49 Introduce 'le' ending rule						
49	'le' ending					Review
50 Introduce diphthongs - w and r naughty boys rule						
50 Introduce diphthongs – green robot						
50	'ar'					
50 buy rule						
50 marry, berry, hurry rule						
51	'er'					Review
51 er and est ending						
52	'ir'					
53	'or'					
54	'ur'					Review
55	'ow' red low					
56	Revision				3	REVISION
57	Revision					REVISION
58. Introduce compound words						
58. revision o+e and 'old' words						
59	'ui' green					
60	'ew' green					
61	'ue' green					Review
62	'oo' green					
62 u+e rule						
63	'ow' cow					Review
64. Introduce irregular double vowels						
64	'ea' red tea					
65	'ea' blue head	R	1	2	3	4
66	'ea' ee					Review
67	'ea' great					
68	'ea' eam					
69	'ea' heart					
70	'ea' + r					Review
70 bear, pear rule						
71	'oy' green					
72	'oi' green					Review
73. Soft hard c rule						
73. Soft hard g rule						
73.	Soft/hard c and g					
74 red robot before '-ge'						

75	'aw' green law						
76	'au' green cause						Review
77	'ou' loud						
78	'ow' howl						Review
79 Introduce Silent letters							
80 Introduce Syllables and Suffix endings							
81	'ful' ending				3	4	
82	'ness' ending						
83	'ey' ending						
84. 'ti' 'ci' and 'xi' sh rule							
84	'tion' ending						
85	'able' ending						Transition to higher level
86	'ment' ending						Reading skills
87	'ous' ending						Fluency
88	'fy' ending						Critical thinking

3. *Are phonics generalisations taught as well? (e.g., "When there are two vowels side by side, the long sound of the first one is heard and the second is usually silent.")*. In the HRSP, over twenty generalisations are taught. In the HRSP the phonic generalisations are translated into the language of the highway. So instead of teaching the learner:

- "in a word of ONE SYLLABLE,
- where the VOWEL IS SHORT,
- followed by a SINGLE CONSONANT.....
- then double the consonant before adding the ending. e.g. hop hopping hopped"

in the HRSP the learner learns:

- "If it is blue there must be two!"[©]

4. *Are special marks added to letters to indicate their sounds, for example, curved or straight lines above vowels to mark them as short or long?* In the HRSP, a colour code is used.

5. *What is the size of the unit taught (i.e., graphemes and phonemes, or larger word segments called phonograms, for example, -ing, or -ack, which represent the rimes in many single-syllable words)?* In the HRSP, both grapheme-phoneme and larger sub-units are taught.

6. *Are the sounds associated with letters pronounced in isolation (synthetic phonics) or only in the context of words (analytic phonics)?* In the HRSP, both synthetic and analytic approaches are used.
7. *What is the amount and type of phonemic awareness that is taught, for example, blending or segmenting sounds orally in words?* In the HRSP, phonemic awareness instruction is explicit and systematic, using mainly blending and segmentation. Other types of phonemic awareness instruction, such as phonemic categorisation, phonemic isolation and phonemic identity are also used. Below is a description of the basic script/method for the introduction of a sound unit in the HRSP (pg. 12).

Introduction of the BLUE ROBOT (short vowel) e.g. /a/. The first word will be /cat/.
Preparation: Make sets of letters/sound units on cards for each learner or per group.

Step 1. Phonemic awareness instruction with letters. [This is a **phonemic segmentation** exercise]. The learners will use the letter/sound unit cards to analyse the word into sound units.

Step 2. The teacher says "cat," and asks, "What is the first **sound** you **hear**?" [This is **phonemic isolation**. The teacher emphasises the structural components of the task i.e. **hear, sound**]

The learners will answer "c". [Use **only** letter/sound unit sounds. Do not call the letter by its name. It is "ck" not "see"]

Step 3. The teacher then says, "Good". Well done! [The teacher uses both verbal and body language to **build rapport** and to create a **safe environment** for the learner].

Teacher: "Now all **look** for the letter "c". [Emphasise the structural component of the task i.e. **look, letter**. Learners must be actively involved in the task.]

Step 4. Teacher: Good! [Build rapport and confidence] Now what is the next **sound** you **hear**? Learners: "a"

Step 5. Teacher: Good! Now find (**look for**) the **letter** "a".

Step 6. Teacher: Now what is the last **sound** you **hear**? Learners: "t".

Step 7. Teacher: Find the letter "t".

Step 8. Teacher: Good! Now **put your letters together** as I say them [this is a **phonemic blending** activity]. **Listen!** [Emphasise task structure.] Ready?
"c - a - t" [Remember NOT see-ay-tee].

Teacher: Now you have the word "cat."

Repeat until all the words for that day have been completed. Make sure the learners know the **meaning** of each word. Use sounds in words and words in sentences, and provide context.

8. *Is instruction sequenced according to a hierarchical view of learning with the steps regarded as a series of prerequisites (i.e., letters, then letter-sound relations, then words, then sentences) or are multiple skills learned together?* In the HRSP, instruction is sequenced in terms of the sound units and generalisations introduced, based on a hierarchical model of reading acquisition described in chapter 3.
9. *What is the pace of instruction?* In the HRSP, the learners set the pace of instruction. However, there is a general framework that serves as a guide for the teacher, and is provided in the HRSP Teachers Manual for Spelling.
10. *What are the word reading operations that children are taught, for example, sounding out and blending letters, or using larger letter sub-units to read words by analogy to known words?* In the HRSP a variety of operations and strategies are taught, including all of the above.
11. *What is the involvement of spelling instruction?* Because the HRSP used the 'phonics-through-spelling' approach intensively, spelling instruction is very important in the HRSP. Baseline and diagnostic assessment of spelling achievement is one of the measures used to monitor the efficacy of the programme. Learners in DSS are evaluated biannually to assess gains in spelling ability, both in experimenter generated tests and standardised tests. This also forms part of continuous assessment within the regular literacy curriculum.
12. *Do learning activities include extensive oral drill-and-practice, reciting phonics rules, or filling out worksheets?* In the HRSP, extensive consolidation of skills and application of rules is prescribed. Worksheets are also provided for the teacher. The teacher is carefully guided in the use of these worksheets and revision.
13. *Is the vocabulary limited mainly to words containing familiar letter-sound associations or are sight words introduced to help create a meaningful story?* In the HRSP, sight words are introduced from the beginning as 'potholes'.

14. *Is phonics instruction embedded in or segregated from the literacy curriculum?* In DSS, the HRSP is **integrated** into the literacy curriculum, i.e. it remains distinct and yet is part of the daily regular classroom activity.
15. *Does the teaching approach involve direct instruction in which the teacher takes an active role and learners passively respond, or is a “constructivist” approach used in which the learners children learn how the letter-sound system works through problem solving?* In the HRSP, a Vygotskian instruction approach is used. Learners are actively involved in the word analysis tasks. Thinking is modeled and encouraged e.g. the learners must be able to apply ‘the rules of the road’ and to give a reason for what they have done, and a problem-solving attitude to reading and spelling is fostered.
16. *How interesting and motivating the instructional activities are for students?* Experience at DSS indicates that the HRSP is highly motivating for learners. Below is an authentic comment by a grade four learner:
- Learner:** Aren't we going to do any work today?
Educator: We did work today! We did a comprehension (sic), and then we worked with the phonic programme.
Learner: That wasn't work. That was fun.
17. *How interesting and motivating the instructional activities are for teachers?* The results of a teacher questionnaire (Chapter 4, section 4.6) indicated that the HRSP is readily and easily adopted by class teachers. The DSS teachers unanimously reported that the HRSP “works very well” and is “easily integrated” into the mainstream classroom activity. The results of the questionnaire also indicated that the HRSP also builds teacher capacity and confidence to deliver systematic phonics within the normal curriculum as well as reading intervention.

From the above comparison, it was concluded that the HRSP is a *systematic* phonics instruction using *direct instruction* of both *analytic* and *synthetic* phonics, and emphasising a *phonics-through-spelling* approach. The results of the NRP (2000) meta-analysis indicated that synthetic, systematic phonics instruction produced better reading improvement than basal programmes, regular curriculum, whole language approaches, whole word programmes and miscellaneous programmes. The NRP (2000) concluded that systematic phonics instruction constitutes a crucial part of a successful classroom reading programme. This finding is consonant with the approach of

the HRSP, and provides validation for the integration of the programme into the mainstream classroom.

4.5.4. HOW ARE LEARNERS TAUGHT TO APPROACH AN UNFAMILIAR WORD? DO THEY FEEL EMPOWERED TO TRY TO ANALYSE AND SOUND OUT THE UNKNOWN WORD FIRST RATHER THAN GUESS THE WORD FROM THE PICTURES OR CONTEXT?

In the HRSP, the use of an analogy of driving on a road, and the introduction of a colour coding system are key components in the direct instruction of word analysis skills. The rationale for this was finding a method that helped learners **unresponsive** to regular intervention to grasp the sound-sign system of the English language. It is also aimed at assisting **field dependent** learners who have a different cognitive style or approach to learning as described in chapter 3. Finally, it aims specifically at fostering both successive **and simultaneous** processing skills in traditionally disadvantaged learners. The following is an excerpt from the HRSP Teachers Manual (pg.16).

“THE HIGHWAY

The **Highway** is used as the illustration to teach the learner to ‘drive’. Most learners have a pre-understanding of cars, driving and roads. The learners are taught to draw on their own experience. They are told, “A blind man cannot drive a car. He needs his eyes to look out for signs to help him arrive safely at his destination”. In the programme the learner is taught to know the **‘rules of the road’**, to **use their eyes (visual decoding) and ears (auditory encoding)**, and to watch for **‘pot holes’ and ‘robots’**.

THE ROAD - CONSONANTS

ALL THE CONSONANTS ARE ROAD LETTERS. THEY ONLY SAY THEIR SOUNDS.

In the HiWay Programme, all the consonant letters are referred to as ROAD LETTERS. The learner is told that these letters **always** say their sounds. Consonant letters do not give the learners of English much trouble. Although some consonant combinations do have different sounds associations (and in the HiWay Programme the learner will be taught to recognise these), it is the English vowel system that is most variable. When driving a car the driver uses the road but does not pay much attention to it. The ‘driver’ (learner) accepts that the road will stay the same. These consonant letters do the same when reading. The consonants remain constant most of the time.

THE RULES OF THE ROAD

In the HRSP, the learners - and the teachers! - are taught to know and apply a comprehensive set of phonic generalisations. The complete list is given in the teacher’s manual for reference.

THE ROBOTS - VOWELS

ALL VOWELS ARE CALLED ROBOTS. THEY CHANGE FROM BLUE TO RED OR GREEN.

The vowels become the **robots** of the HiWay Reading and Spelling Programme. Unlike the consonants, the vowels change. They can say their sound, or their name, or something else entirely. (In South Africa, traffic

lights are called robots.) The HRSP is centred on the recognition of the **vowels**. The learner is taught to associate the vowels with robots and then relate the relevant **colour** to the vowel.

THE COLOUR CODE IS AN ESSENTIAL FEATURE OF THE HRSP.

THE LEARNERS ARE TAUGHT TO APPLY THE COLOUR CODE TO THE WORDS THEY ARE LEARNING I.E. THEY COLOUR THE ROBOTS (VOWELS) EITHER BLUE, RED OR GREEN, AND THEY COLOUR POTHOLES (SIGHT WORDS) YELLOW.

The short vowels (and vowel combinations) always say their **sound**, and are coloured BLUE.
the long vowels (and vowel combinations) always say their **name** and are coloured RED.
and the diphthongs say neither their name nor their sound and are coloured GREEN.

THE ELECTRICITY THAT CHANGES THE COLOUR OF THE ROBOT

For a robot to change colour (from blue to red) it needs something to make it change. In the HRSP, the silent e is made to stand for electricity that causes the robot to change colour. The silent **e** is coloured grey. It needs to be stressed that it is **silent**.

POT HOLES

In the HRSP, pot holes are all phonetically irregular words (with a few exceptions) and are called 'POT HOLES' because the new "driver" is taught to **watch-out** for them! i.e. if they are not using their eyes they will 'crash'. They can cause the driver to go off the road. They are learned as sight words, which the learner must recognise as a whole word. They do not obey the **rules of the road**. Potholes are coloured yellow."

4.5.5. DOES THE PROGRAMME ALSO INCLUDE PLENTY OF OPPORTUNITY FOR LEARNERS TO PRACTICE READING, DEVELOP FLUENCY, BUILD VOCABULARY, DEVELOP READING COMPREHENSION STRATEGIES, WRITE AND LISTEN TO AND DISCUSS STORIES?

The findings of the NRP (2000) indicated that reading comprehension training must include three components: fluency training, vocabulary building, comprehension monitoring strategies and opportunities to read, write and discuss real texts. The second component of the HRSP is designed to be implemented from Grades four to six. The goals of the HRSP are that the learner should be a **strategic reader** by third grade, and that the process of making the learner into a "highly proficient reader" must have been initiated before sixth grade (Spear-Swerling & Sternberg, 1994). This part of the programme focuses on vocabulary building, fluency and reading comprehension strategies.

4.5.5.1. Fluency

Fluency is the ultimate goal of the HRSP. Fluency is not just speed and accuracy, but also involves an incipient interpretative process that is a component of reading comprehension. The NRP (2000) states that despite the importance of fluency as a component of skilled reading it is often neglected

in the classroom. “If text is read in a laborious and inefficient manner, it will be difficult for the child to remember what has been read and to relate the ideas expressed in the text to his or her background knowledge”.

The NRP (2000) identified two instructional approaches to fostering fluency: 1) **guided repeated oral reading**, which aims to encourage the students to read passages orally with systematic and explicit guidance and feedback from the teacher; 2) **sustained (voluntary) silent reading**, encourages students to read silently on their own, inside and outside the classroom, with minimal guidance or feedback. Both of these approaches receive particular attention in the HRSP. The basic method used in the HRSP for the guided repeated oral reading has been given below.

- ❑ **Read the paragraph together with the learners at a fast pace.**
- ❑ **Repeat this several times.** They will learn the pronunciation, the intonation and flow.
- ❑ It is also very important that their **eyes are trained** to move at the required speed and not to regress or fixate.
- ❑ Let the learners read one sentence each. Keep the pace steady. Be flexible and use row by row, or boys, then girls etc. to help them to concentrate and follow.
- ❑ Introduce **timing**. They read aloud for 1 min and they count the number of words they have read then minus the errors. (This can be done in pairs.) They must keep a record to monitor their progress.
- ❑ Progress towards every learner being confident to read the complete story well.

For **sustained silent reading**, short stories are provided in graded readers, either as whole books or if longer, as separate chapters. Beginning in third grade, learners are required to read the books/chapters at home or in class and answer a set of questions on: a) Title; b) main character; c) summarise the story; d) did they like the story and; e) any new words. A record is kept of the books the learner has read through the year. The NRP (2000) report provided support for the use of guided repeated oral reading in the HRSP as a means of fostering fluency, but not for sustained silent reading. This is not taken to indicate that sustained silent reading should be dropped from the HRSP, but that the relation between fluency and sustained silent reading needs further research and clarification.

4.5.5.2. Vocabulary Instruction

The FRNRP (2000) reports that “reading comprehension is a complex cognitive process that cannot be understood without a clear description of the role that **vocabulary development** and vocabulary instruction play in the understanding of what has been read. Second, comprehension is

an active process that requires an **intentional and thoughtful interaction between the reader and the text**. Third, **the preparation of teachers** to better equip students to develop and apply reading comprehension strategies to enhance understanding is intimately linked to students' achievement in this area" (my emphasis). All three of these areas receive due attention within the HRSP.

The NRP (2000) reported that although many studies have shown a correlation between vocabulary size and reading ability, a causal link between increased vocabulary and reading comprehension has not been demonstrated. It is difficult to demonstrate that improving vocabulary improves reading comprehension.

The main conclusions of the NRP (2000) meta-analysis were: a) vocabulary instruction should be incorporated into reading instruction programmes; b) direct instruction of vocabulary was very effective for building vocabulary; c) the more associations and connections made with the word, the better it is learned; d) pre-reading instruction of vocabulary in reading lessons can have a significant impact on the learning outcomes. (It guarantees that there will be fewer unfamiliar words and concepts in the texts. It also helps making the translation of the print into speech meaningful by ensuring that the words are in the readers vocabulary); e) having students encounter vocabulary often and in various ways can have a significant effect; f) the context in which a word is learned is critical, and needs to be made explicit for the learner; g) engaging learners in an active, problem solving approach improves the gains in vocabulary; h) given the large number of words that readers must acquire, it is impossible to assign class time to directly teaching them all. Implicit teaching of vocabulary is therefore significant and important. In this regard, the fostering of phonological skill that allows the reader to independently analyse words is crucial; i) the use of multiple methods of vocabulary instruction will have a greater effect than single methods.

Throughout the HRSP learners are introduced continuously to new vocabulary both explicitly and directly, and implicitly and indirectly, as the level of text difficulty increases. In the reading component modules, three or four vocabulary sections of given for **direct** instruction. The method of direct vocabulary instruction is given below. Furthermore, **incidental** instruction of vocabulary through engagement with the texts is used to augment the primary lists. By the end of grade 3 the learner will have acquired between 3500 and 4000 words. By the end of grade 6, the learner will have a vocabulary of 5500 to 6000 words. Below is the basic method for vocabulary building in the HRSP.

VOCABULARY BUILDING:

- ❑ Read and break words into **syllables** applying prior knowledge of **phonic skills**.
- ❑ Ask the learners to provide the meaning of the words. If they really cannot do it, explain the meaning of the words.
- ❑ Ask them to use the words in sentences of their own. If they do this in pairs it will help them to **speak** English as well as to **write** it.

4.5.5.3. Text Comprehension Instruction

In the HRSP learners are directly instructed in text comprehension strategies and comprehension monitoring behaviours. The NRP (2000) states “The rationale for the explicit teaching of comprehension skills is that comprehension can be improved by teaching students to use specific cognitive strategies or to reason strategically when they encounter barriers to understanding what they are reading. Readers acquire these strategies informally to some extent, but explicit or formal instruction in the application of comprehension strategies has been shown to be highly effective in enhancing understanding”. Within the HiWay programme the teacher is trained to model such strategies for the learners, until the learners are able to carry them out independently. The teacher models the strategy in the context of each passage. The four most effective strategies identified by the NRP (2000) strategies are: 1) question generation; 2) summarization of main ideas; 3) clarification of word meanings and difficult portions; and 4) prediction of what might occur later in the story. In the HRSP, a multiple strategy approach is used as recommended by the NRP (2000). It is essentially the same as described in the NRP (2000) report. However, **question answering** replaces question generation. In addition, **active listening** and **elicitation of prior knowledge** are also used in the HRSP.

In conclusion, in terms of the evaluating criteria as put at the end of section 4.4, the HRSP would be positively evaluated:

1. Is there scientific evidence that the programme is effective? **Yes**
2. Was the programme or its methodology reviewed by the National Reading Panel (2000)? **Yes**
3. In reading instruction, are phonemic awareness and phonics taught systematically and explicitly? **Yes**
4. How are learners taught to approach an unfamiliar word? Do they feel empowered to try to analyse and sound out the unknown word first rather than guess the word from the pictures or context? **Yes**

5. Does the programme also include plenty of opportunity for learners to practice reading, develop fluency, build vocabulary, develop reading comprehension strategies, write and listen to and discuss stories? **Yes**

The HRSP therefore can claim to be a **comprehensive reading programme**. The evidence for the effectiveness of the HRSP will be reported in chapter 5.

4.6. A QUALITATIVE INVESTIGATION INTO THE FEASIBILITY OF INTEGRATING THE HRSP INTO THE MAINSTREAM AT DSS

Qualitative research seeks to interpret human actions, institutions, events, customs and the like and in so doing construct a reading, or portrayal, of what is being studied. The ultimate goal of this kind of research is to portray the complex pattern of what is being studied in sufficient depth and detail so that someone who has not experienced it can understand it (McCutcheon, 1981). Ary *et al.* (2002:354) lists the major characteristics of qualitative research as follows:

- Qualitative enquiry assumes that human behaviour is context-bound. Human experience takes its meaning from, and therefore is inseparable from, social, historical, political and cultural influences within a particular **context**.
- Because of this qualitative enquiry takes place within a **natural setting** e.g. in a classroom.
- Furthermore qualitative enquiry aims at being **descriptive** rather than prescriptive, and
- relies on interviews, observations and documents for data collection.

Qualitative research suited to establishing the feasibility of integrating the HRSP into the mainstream classroom. The phenomenon under study in this case is the teachers' perceptions of the integration of the HRSP into the mainstream classroom context.

4.6.1. SAMPLING

Ary *et al.* (2002:354) claims that sampling is just as important in qualitative research as in quantitative research. Qualitative researchers cannot observe everything and all aspects of the phenomenon of interest, but they try to obtain a representative sample through **purposive sampling**. Purposive samples are assumed to provide maximum insight and understanding of the phenomenon by providing relevant information on the issue from as many perspectives as possible (Ary *et al.*, 2002:354). For this study, **comprehensive sampling** was used because of the small

sample size (five class teachers) and the need to include all cases to ensure that all viewpoints were represented in the study (**data saturation**).

4.6.2. INSTRUMENT

The data collection method for this qualitative study was a 'structured interview' (Ary *et al.*, 2002:354) in the form of a self-constructed **questionnaire**. The questionnaire consisted of 21 closed-ended questions of scaled items and two additional questions (Appendix 1). According to Ary *et al.* (2002:354) open-ended questions permit a free response rather than restricting the respondents to a choice from among stated alternatives. This format provides opportunity for richer response but is often difficult and time consuming to score. Closed-ended questions ensure that all subjects have the same frame of reference in responding and also makes it easier for respondents to respond. Closed-ended questions are also easier to score and quantify (Ary *et al.*, 2002:354).

The aim of the questionnaire was primarily to obtain information on the fidelity of implementation of the HRSP. The responses of the teachers were subsequently grouped into five themes or categories to obtain information on the teachers' perceptions of the HRSP and on the integration of the HRSP into the mainstream. The **credibility** of the data was determined by the use of this procedure: the results of the questionnaire for each class teacher will be scored and the questions grouped by five identified themes, i) attitude to the HRSP, ii) fidelity of implementation of the HRSP, iii) attitude to systematic phonics instruction, iv) time spent on HRSP instruction in class, and v) attitude to early reading intervention, inclusion and mainstreaming. The score on each question in each theme will be summed for each participating teacher. The results of this procedure were inter-correlated by means of the Pearson Product moment correlation, and also correlated with **effect size** scores for both spelling and reading for each class teacher. To obtain effect sizes for each grade teacher, learners were tested in midyear and again at year-end in both spelling and reading achievement and the results were used to calculate the effect size for the change in spelling and reading score for each grade.

4.6.3. DESCRIPTION OF PARTICIPANTS IN THIS QUALITATIVE STUDY

Teacher 1 is a white, middle aged, female, grade 1 teacher. She is bilingual, English and Afrikaans speaking. English is her first language, but she is also conversant in Zulu. This teacher has formal training in Foundation Phase Teaching and over 10 years experience in classroom practice at DSS. This teacher is involved with the implementation of Phase 1 (preventative intervention) of the HRSP – Spelling component in grade one.

Teacher 2 is a white, middle-aged, female, grade 2 teacher. She is bilingual, English and Afrikaans speaking. Afrikaans is her first language, but she is also conversant in Zulu. This teacher has formal training with over 15 years experience in teaching at the Foundation Phase level. She is Head of Department for Foundation Phase at DSS. This teacher is involved with the implementation of the Phase 1 (preventative intervention) of the HRSP – Spelling component in grade two.

Teacher 3 is a white, elderly, female, Grade 3 English teacher and remedial/learner support specialist. This teacher is English speaking, but also partially conversant in Afrikaans. This teacher has over 20 years experience with special needs education/learner support. She is Head of LSEN Department at DSS and developer and co-ordinator of the HRSP. This teacher is involved with the co-ordination of the implementation of the Phase 1 and Phase 2 of the HRSP in the Foundation and Intermediate Phase and specifically the implementation of the HRSP – spelling component, in grade three at DSS.

Teacher 4 is a white, middle aged, female, Learner Support-Special Needs assistant to teacher 3. She is English speaking. This teacher has informal in-service training as an assistant for teacher 3 responsible for implementation of Phase 2 (remedial intervention) level of HRSP in special needs classroom for grades two and three.

Teacher 5 is a white, middle aged, female, Intermediate Phase English teacher responsible for grades four and five. She is English speaking, and is also conversant in Afrikaans. This teacher had formal training in teaching with over 10 years experience in regular classroom instruction. She also has experience in special needs education. She is Head of Department in the Intermediate Phase, and is involved in the implementation of Phase 1 of the HRSP – Reading Component, in the Intermediate Phase.

The respondents for this analysis were from both **Foundation** and **Intermediate** Phase, from both **regular classroom** contexts and **special needs** contexts. Furthermore, these teachers were involved in the implementation of both the **spelling** and **reading** components of the HRSP, and **Phase 1** and **Phase 2** of the HRSP.

4.6.4. DESCRIPTION OF ITEMS

The questionnaire contained two questions (4 and 5) designed to obtain information about i) the integration of the HRSP into the **curriculum** and ii) the integration of the programme into the daily **timetable**.

4. In which lessons do you use the HiWay programme?

5. At what time of day do you include the HiWay programme?

The rest of the questions are closed questions and were also scored. Scoring is provided in brackets. Questions 1 and 2 were designed to obtain information on the **time** spent on the HRSP in class.

1. On how many days per week on average do you include the HiWay programme?
- One (1)
 - Two (2)
 - Three (3)
 - Four (4)
 - Five (5)

2. How much time do you devote to teaching the HiWay programme per day/lesson?
- Five minutes (1)
 - Ten minutes (2)
 - Fifteen minutes (3)
 - Twenty minutes (4)
 - More (5)

Question 3 was designed to obtain information on **how** the HRSP was used by the teacher.

3. Do you use the HiWay programme
- Systematically (3)
 - whenever it is needed (2)
 - when time allows (1)

Question 6 was designed to obtain information on the **use of the colour code** by the teacher.

6. Do you make use of the HiWay colour system?

- Yes (2)
- No (1)

If No, what system do you use?

Question 7 was designed to obtain information on the **use of the worksheets** by the teacher.

7. Do you make use of the HiWay worksheets?

- Yes (2)
- No (1)

If No, what do you use?

Question 8 was designed to obtain information on the **use of the teacher's manual** by the teacher.

8. Do you make use of the HiWay Teachers manual?

- Yes (2)
- No (1)

If No, what do you use?

Question 9 was designed to obtain an indication of the use **phonemic awareness** training by the teacher.

9. Do you explicitly teach the children that words are made up of sounds?

- Yes (2)
- No (1)

If Yes, what approach do you use?

Questions 10 and 11 were designed to obtain an indication of the use of **systematic phonics** training by the teacher.

10. Do you teach the children to break up words into sounds?

- Yes (2)
- No (1)

If Yes, what approach do you use?

11. Do you foster sight reading (recognising whole words) in your children?

- Yes (2)
- No (1)

If Yes, what approach do you use?

Questions 12 and 13 were designed to obtain information on the **perception of the HRSP** by the teacher.

12. How well do you feel the HiWay programme works?

- Very well (4)
- Well (3)
- With some, not all (2)
- Not at all. (1)

13. Do you prefer another approach to fostering early literacy?

- Yes (1)
- No (2)

If yes, please specify.

Stahl and Miller (1989) and Lerner (2003) reported that whole language proponents consider phonics-based approaches 'unnatural' and 'harmful' to learners, interfering with the normal development of literacy. Question 14 was designed to obtain an indication on the teacher's position with regard to the use of phonics based approaches or whole language approaches.

14. Do you feel that phonics based approaches are

- Very useful (3)
- Not very useful (2)
- Harmful (1)

The National Reading Panel report (2000) indicated that, contrary to the evidence, there is still a strong perception that learners in grade R and grade 1 are still not ready for systematic phonics and phonemic awareness instruction. This is consistent with Chall's (1983:7) earlier observation that the issue of early reading instruction touches on "long-held, strong, differing views that have tended to overwhelm us ..." Smith (1992:432) stated with regard to learning to reading, "we must begin by acknowledging that there are conflicting views about how learning takes place. Question 15 was designed to obtain an indication on the **teacher's position on early reading** instruction.

15. Teaching children to read before Grade 1 is in your opinion

- A futile exercise (2)
- Harmful to the child (1)
- Beneficial for the child (3)

Question 16 was designed to obtain information on the teachers' opinion as to whether the HRSP had been successfully integrated into the mainstream in DSS.

16. Do you feel that the HiWay programme can be easily integrated into the curriculum?

- Yes (2)
- No (1)

If No, please indicate why not.

Questions 17 to 21 were designed to obtain information of the teachers' awareness of and attitude towards learners with learning difficulties.

17. Do you feel there is a need for early literacy intervention for children in your class?

- Yes (2)
- No (1)

18. Do you feel that some of the learners in your class have a reading difficulty?

- Yes (2)
- No (1)

19. What is your position on the policy of inclusion and remediation in the mainstream?

- Favourable (3)
- Might work for some (2)
- Will not work for most. (1)

20. Do you feel competent to remediate children with reading disabilities?

- Yes (2)
- No (1)

If Yes, how would you go about it?

21. Do you feel that it is your responsibility as class teacher to help the children with reading difficulty?

- Yes (2)
- No (1)

Question 22 was designed to obtain information on the attitude of the teacher to the HRSP.

22. If yes, do you feel the HiWay programme would provide a useful intervention tool?

- Yes
- No

Question 23 was designed to obtain information on the use of **additional** phonics programmes other than the HRSP in class

23. Do you teach phonics to your children?

- Yes
- No

If yes, what method do you use?

4.6.5. THEMES IDENTIFIED FROM THE DSS TEACHER QUESTIONNAIRE

Five themes or categories were identified. The above questions were scored as indicated and grouped into these five categories. Teachers 1, 2, 3, and 5 were scored in each category by adding up the scores for each question. Teacher 4 was not a class teacher, but was involved with Phase 2 of the HRSP, and so was omitted from this part of the investigation. Teacher 5 was the literacy teacher for both grades 4 and 5.

Category 1: Time spent on HRSP instruction in class.

This category included the following questions: 2 and 3.

Category 2. Fidelity of implementation of the HRSP

This category included the following questions: 6, 7, 8, 12, 13, 16 and 22.

Category 3. Attitude to the HRSP

This category included the following questions: 3, 12, 13, 16 and 22. In this category an additional point was added if the respondent mentioned the HRSP when unsolicited by any question.

Category 4. Use of and attitude towards systematic phonics

This category included the following questions: 9, 10, 11, 14, 15, and 23.

Category 5. Awareness of need for, and attitude to, early reading intervention and remediation

This category included the following questions: 17, 18, 19, 20 and 21.

The above questions were scored as indicated and grouped into five categories. Teachers 1, 2, 3, and 5 were scored by adding up the scores for each question. The respective scores for each teacher were then inter-correlated to see if any relation was present, and correlated with the effect sizes for pre and post test scores in reading and spelling in grades one to five in DSS.

4.6.6. RESULTS OF THE QUALITATIVE INVESTIGATION OF TEACHER PERCEPTIONS

4. In which lessons do you use the HiWay programme?

All five teachers indicated that they used the HRSP within the Literacy component of the curriculum at both Foundation phase and Intermediate Phase levels. Teacher 2 noted in addition that she used the HRSP in "Literacy – but even in other lessons where we do written work."

5. At what time of day do you include the HiWay programme?

Teacher 1 indicated that she used the HRSP “immediately before/after break.” Teacher 4 used the programme from “9 – 10 a.m.” and Teacher 3 from “10:30 – 11:30”. Teacher 2 used the programme “throughout the day”, while Teacher 5 indicated that her inclusion of the HRSP into Literacy was “variable – depends on timetable.”

1. On how many days per week on average do you include the HiWay programme?

Teachers 3 and 5 indicated that they used the programme 5 days per week. Teachers 1 and 4 used the HRSP four days per week. Teacher 2 commented that she used the programme “Monday to Thursday (Friday I test them.)”

2. How much time do you devote to teaching the HiWay programme per day/lesson?

Teacher 5 used the HRSP for ten minutes per day/lesson, while Teacher 3 used the programme on “average” [emphasised in the questionnaire] fifteen minutes per day. Teachers 1, 2 and four used the programme for more than twenty minutes per day.

3. Do you use the HiWay programme

- Systematically (3)
- whenever it is needed (2)
- when time allows (1)

All teachers said they used the programme ‘systematically’. Teacher 2 noted that she used it both ‘systematically’ and ‘whenever it is needed’.

6. Do you make use of the HiWay colour system?

Teachers 2, 3 and 4 indicated that they used the HRSP colour code. Teacher 1 responded that “Grade 1 does mostly vowels so I don’t use the colour system.” Teacher 5 responded that “I have only concentrated on reading up to now, but will begin working with colour again.”

7. Do you make use of the HiWay worksheets?

All teachers indicated that they used the HRSP worksheets.

8. Do you make use of the HiWay Teachers manual?

Teachers 3, 4 and 5 indicated that they did use the HRSP Teachers' Manual. Teacher 1 said that the manual was "not available" and teacher 2 said it was not applicable "N/A".

9. Do you explicitly teach the children that words are made up of sounds?

Teachers 1 to 4 indicated that they all explicitly taught that words were made up of sound units. Teacher 1 noted that she used "oral sounding" [look-say] method. Teacher five indicated that she did not.

10. Do you teach the children to break up words into sounds?

Teachers 1 to 4 indicated that they all explicitly taught learners to break words up into sound units. Teacher 1 again noted that she used the "oral sounding" method. Teacher five indicated that she did not.

11. Do you foster sight reading (recognising whole words) in your children?

Teachers 1 to 4 indicated that they all fostered sight word recognition. Teacher 1 indicated that she used "Teacher-tell" and "sometimes (the) shape of words." Teacher 2 said she did this by "using flashcards in the reading lesson". Teacher 4 noted that the learners "write from memory – write in the air – then in their books." Teacher 5 indicated that she did not.

12. How well do you feel the HiWay programme works?

All teachers indicated that they felt the HRSP worked "very well."

13. Do you prefer another approach to fostering early literacy?

Teachers 2 to 5 indicated that they would **not** prefer another approach to fostering early literacy. Teacher 1 did not tick either entry, and noted: " – how early? Pre-school/school level?"

14. Do you feel that phonics based approaches are

- Very useful (3)
- Not very useful (2)
- Harmful (1)

Teacher 1, 3, 4 and 5 reported that they felt phonics based approaches were “very useful”. Teacher 2 indicated that she felt they were not very useful “ – if you only use that.”

15. Teaching children to read before Grade 1 is in your opinion

- A futile exercise (2)
- Harmful to the child (1)
- Beneficial for the child (3)

Teacher 2, 3, 4 and 5 felt that teaching learners to read before grade 1 was “beneficial to the child”. Teacher five noted “but not before grade R, because the child can become bored and switched off while the majority of the class are still learning.” Teacher 2 ticked both “beneficial to the child” and “harmful to the child”, with the qualifying comment that “the child can be far beyond class average – become bored + feel superior”. Two teachers expressed the view that early literacy attainment can result in the learner becoming “bored”

16. Do you feel that the HiWay programme can be easily integrated into the curriculum?

All teachers unqualifiedly indicated that they felt the HRSP can be easily integrated into the curriculum.

17. Do you feel there is a need for early literacy intervention for children in your class?

Teachers 1, 2, 4 and 5 indicated that they felt that there was a need for early literacy intervention in their class. Teacher 3 felt that “it has been done in grade 2”.

18. Do you feel that some of the learners in your class have a reading difficulty?

Teachers 1, 2 and 4 responded “yes.” Teachers 3 and 5 responded “no”.

19. What is your position on the policy of inclusion and remediation in the mainstream?

Teacher 1 and 2 indicated that they felt it “would not work for most”. Teacher five indicated that it “might work for some”, while teacher three and four were “favourable” towards inclusion and mainstreaming.

20. Do you feel competent to remediate children with reading disabilities?

Teachers 1, 3, 4 and 5 felt competent to remediate learners with reading difficulty. Teacher 1 commented that “if I had the time, I would attempt it, but remediating a few poorer children would be disadvantageous for others because they would be neglected.” Teachers 4 and 5 said they would “use the HiWay programme.”

21. Do you feel that it is your responsibility as class teacher to help the children with reading difficulty?

All teachers unqualifiedly responded “yes”

22. If yes, do you feel the HiWay programme would provide a useful intervention tool?

All teachers unqualifiedly responded “yes”

23. Do you teach phonics to your children?

Teachers 1, 2, 3 and 4 responded “yes”. Teacher five responded “no”. This was consistent with her response in question 6. Teacher 5 was involved with the implementation of the reading component of the HRSP. Teacher four indicated that she used a “phonic based programme”, teacher five “use(d) phonics based reading programme”, and teacher three “HiWay – phonics based programme” (her underlining). Teacher 2 reported that “at the moment we use the All-in-One and also other phonic books. The [HRSP] phonic books are used for extra worksheets.”

4.6.7. DISCUSSION OF RESULTS OF THE QUALITATIVE INVESTIGATION INTO TEACHER PERCEPTIONS ON THE HRSP

There was complete unanimity between all five teachers on the following Questions.

4. *In which lessons do you use the HiWay programme?* All teachers used the HRSP in the literacy component of the Foundation and Intermediate Phase curriculum.

12. *How well do you feel the HiWay programme works?* All teachers indicated that they felt the HRSP worked “very well.”

16. *Do you feel that the HiWay programme can be easily integrated into the curriculum?* All teachers unqualifiedly indicated that they felt the HRSP could be easily integrated into the curriculum.

21. *Do you feel that it is your responsibility as class teacher to help the children with reading difficulty?* All teachers unqualifiedly responded “yes”

22. *If yes, do you feel the HiWay programme would provide a useful intervention tool?* All teachers unqualifiedly responded “yes”

The greatest variability in response was noted in the following Questions.

4. *How much time do you devote to teaching the HiWay programme per day/lesson?*

8. *Do you make use of the HiWay Teachers manual?*

19. *What is your position on the policy of inclusion and remediation in the mainstream?*

In response to questions 1 and 2, teachers 3 and 5 indicated that they used the programme 5 days per week. Teachers 1 and 4 used the HRSP four days per week. Teacher 2 commented that she used the programme “Monday to Thursday (Friday I test them)”. Teacher 5 used the HRSP for ten minutes per day/lesson, while Teacher 3 used the programme on “average” [emphasised in the questionnaire] fifteen minutes per day. Teachers 1, 2 and 4 used the programme for more than twenty minutes per day. This result indicated that the HRSP had been successfully incorporated within the daily classroom activity. It also indicated that the amount of time the HRSP required was moderate. The RNCS (2000) suggested that for English additional language users, that English be introduced **as a subject** from grade 1. The amount of time used by the HRSP fits comfortably within such a time frame. Furthermore, within an English medium school context, the HRSP would easily be accommodated within the learning area literacy, and would not encroach upon the implementation of the other learning areas i.e. numeracy and life skills.

In response to questions 3, 6, 7 and 8, all teachers said they used the programme ‘systematically’. Teacher 2 noted that she used it both ‘systematically’ and ‘whenever it is needed’. This indicated that the teachers did not use the programme as an adjunct to the regular curriculum or for keeping the learners occupied during ‘down time’, but rather used it as an integral part of the daily instructional procedure. A similar result was noted for use of the colour code and the use of the HRSP worksheets. All teachers indicated that they used the HRSP worksheets. Teachers 2, 3 and 4 indicated that they used the HRSP colour code. Teacher 1 responded that “Grade 1 does mostly vowels so I don’t use the colour system.” The HRSP can be implemented from grade R. Furthermore, the NRP (2000) report indicates that the weight of evidence supports the early introduction of phonemic awareness and systematic phonics training even at grade R levels. This comment indicated that this teacher might not have fully appreciated this. This was brought to this

teacher's attention, with the result that the following year (2005) she made more use of the colour code. This group was reading on average above age levels by year-end 2005. Teacher 5 responded that "I have only concentrated on reading up to now, but will begin working with colour again." Teacher 5 is responsible for the implementation of the HRSP: Reading in grades four and five. This teacher reported later that she felt her learners benefited from the revision of the colour code.

In contrast to this, two teachers said they did not make much use of the Teacher's Manual. Teacher 1 said that the manual was "not available". This indicated a misperception (the Manual was available), which was addressed in a teacher workshop on the HRSP. Teacher 2 said it was not applicable "N/A". This may indicate that they were not aware that there was a manual. Teachers 3, 4 and 5 indicated that they did use the HRSP Teachers' Manual.

In response to questions 9 and 10, teachers 1 to 4 indicated that they all explicitly taught that words were made up of sound units. Teacher 1 noted that she used "oral sounding" [look-say] method. Teacher 5 indicated that she did not teach sound units. This was not unexpected, as this teacher was involved in the implementation of the reading component of the HRSP. This was also consistent with her report that "I was only concentrating on reading up to now ..." Teachers 1 to 4 indicated that they all explicitly taught learners to break words up into sound units. Teacher 1 again noted that she used the "oral sounding" method. Teacher 5 again indicated that she did not break words up into sound units, as she was involved in the implementation of the reading component of the HRSP.

In response to question 11, teachers 1 to four indicated that they all fostered sight word recognition. Teacher 1 indicated that she used "Teacher-tell" and "sometimes (the) shape of words." Teacher 2 said she did this by "using flashcards in the reading lesson." Teacher 4 noted that the learners "write from memory – write in the air – then in their books." Again, teacher 5 indicated that she did not.

In response to questions 12 and 13, all teachers indicated that they felt the HRSP worked "very well." Teachers 2 to 5 indicated that they would **not** prefer another approach to fostering early literacy. Teacher 1 did not tick either entry, and noted: "- how early? Pre-school/school level?" Teacher 1, 3, 4 and 5 reported that they felt phonics based approaches were "very useful".

The National Reading Panel report (2000) indicated that, contrary to the evidence, there is still a strong perception that learners in grade R and grade 1 are still not ready for systematic phonics and phonemic awareness instruction. Questions 14 and 15 evoked some comment. As noted above, this is consistent with Chall's (1983:7) observation that the issue of early reading instruction touches on "long-held, strong, differing views that have tended to overwhelm us..." Smith (1992:432) stated with regard to learning to read, "we must begin by acknowledging that there are conflicting views about how learning takes place." Teachers 2, 3, 4 and 5 felt that teaching learners to read before grade 1 was "beneficial to the child". Teacher 5 noted "but not before grade R, because the child can become bored and switched off while the majority of the class are still learning." Teacher 2 ticked both "beneficial to the child" and "harmful to the child", with the qualifying comment that "the child can be far beyond class average – become bored + feel superior". Although two teachers expressed the view that early literacy attainment can result in the learner becoming "bored", there is no support for this in the literature, while there is strong support for the long-term beneficial effects of pre-school and early literacy programmes (NRP, 2000). All teachers unqualifiedly indicated that they felt the HRSP can be easily integrated into the curriculum (Question 16).

In response to question 17, the majority of teachers indicated that they felt that there was a need for early literacy intervention in their class. Teacher 3 felt that "it has been done in grade 2". This referred to the practice at DSS school that learners identified by Head of LSEN at DSS with reading difficulty (or other forms of learning difficulty) were placed in the second phase of the HRSP and received special education attention. An interesting result was obtained for question 18. Teachers 1, 2 and 4 responded that they felt that there were learners with reading difficulty in their class while teachers 3 and 5 responded "no". This result might be explained by the fact that teachers 1 and 2 were grade 1 and grade 2 teachers respectively, and teacher 4 was the learner support/special education assistant. In all of these cases learners with reading difficulty might be expected, while in grade three, four and five, the Phase 1 and Phase 2 of the HRSP (not to be confused with the Spelling and Reading components of the HRSP) might have successfully addressed most of the problems, as proposed by Fletcher and Foorman (1994) and Al Otaiba and Fuchs (2006, 2002). Al Otaiba and Fuchs (2006, 2002) proposed developing a complete reading programme that will provide something for every struggling reader. In their view, such a programme would be a two-phase intervention programme. In Phase 1 (primary intervention) of the programme, the programme's basic components are implemented by regular educators in mainstream (regular) classrooms with the expectation that these components will enhance the

literacy levels of most learners. Phase 2 (secondary intervention) involves only those learners unresponsive to the Phase 1 instruction. In Phase 2, additional components are brought into effect with greater frequency and longer duration. Because of its comparative complexity and intensity, Phase 2 would be conducted by someone other than the classroom educator and typically in small learner groups.

A similar result was also obtained for teacher attitudes to inclusion (question 19). Teacher 1 and 2 indicated that they felt it "would not work for most". Teacher five indicated that it "might work for some", while teacher three and four were "favourable" towards inclusion and mainstreaming. This result is consistent with the observation that teacher three and four were the learner support and special education staff associated with LSEN, teacher five had some experience in learner support, while teachers 1 and 2 have only regular pre-service training in teaching. Results seem to indicate that the teachers with some experience of learner support are more favourably disposed to the idea of inclusion.

In response to question 20, most teachers felt competent to 'support' learners with reading difficulty. Teacher 1 commented that "if I had the time, I would attempt it, but remediating a few poorer children would be disadvantageous for others because they would be neglected." Teachers 4 and 5 said they would "use the HiWay programme." This result was important in the case of teacher 4, who had no formal teacher training and who had only received in-service training in using the HRSP to address the needs of learners with reading difficulty. It is plausible that the HRSP was responsible for her feeling of adequacy. The HRSP is designed for teachers with little or no specialist training in learner support. By following the simple procedure outlined in the Teacher's manual, the regular class teacher will be able to address most forms of reading and learning difficulty. The HRSP might therefore be an effective tool for in-service teacher training for learner support service delivery in the mainstream context as advised by Donald (1996). All class teachers felt it was their responsibility to help the learners with reading difficulty and that the HRSP was an effective tool for reading intervention (questions 21 and 22).

In response to question 23, all Foundation Phase Teachers said they did teach phonics. They all used the HRSP to supplement the RNCS. This result indicates that the HRSP does not displace the existing literacy curriculum, but supports and improves reading instruction within the RNCS.

4.6.8. CREDIBILITY

A significant correlation ($r = 0.90$) was observed between Category 1: *time spent on HRSP instruction in class* and Category 4: *attitude towards and use of systematic phonics instruction*. This provides corroboration that the questionnaire is reflecting real trends in the particular classroom context of this investigation. Category 2: *Fidelity of implementation of HRSP* and Category 3: *attitude to the HRSP* did not correlate significantly. This was important as these two categories were designed to test *different* constructs. For **reading comprehension**, a significant correlation was observed between the **effect sizes** for grades 1 to five and Category 2: *Fidelity of implementation of HRSP* ($r = 0.91$) and Category 3: *attitude to the HRSP* ($r = 0.90$). For **spelling**, a significant correlation between **effect sizes** for grade 1 to five and Category 1: *time spent on the HRSP* ($r = 0.91$) was found. This result provides strong corroboration of the credibility of the findings of the questionnaire.

The weight of evidence in this qualitative analysis indicates that the HRSP was successfully integrated into the mainstream classroom. This included both the reading and the spelling component of the HRSP and Phase 1 and Phase 2 of the programme, in both the Foundation and Intermediate Phase.

4.7. SUMMARY

The HRSP meets the criteria for a complete reading programme that includes phonemic awareness, systematic phonics, vocabulary building, fluency training and reading comprehension strategy training. The methodology used in the HRSP has been extensively reviewed by the National Reading Panel (2000), and the HRSP can therefore claim to be 'evidence-based'.

In order to read, all learners must be taught alphabets, including phonemic awareness and systematic phonics, vocabulary, fluency and reading comprehension strategies. The HRSP programme includes all of these aspects arranged hierarchically on a developmental trajectory. It is also fully integrated within the mainstream curriculum, and is integrated into the daily classroom activity within the instruction of literacy. It consists of brief periods of instruction (10 to 20 minutes) daily.

The initial goals of the HRSP are that learners will master the letter-sound associations of the English language. This must be achieved by the end of grade three. Once the learner has mastered the basic foundational skills, they move on to the direct instruction of vocabulary, fluency and reading comprehension strategies, beginning in grade four.

Evidence reviewed by the NRP (2000) indicates that there is a strong effect of phonemic awareness training and systematic phonics instruction on the development of reading and spelling ability. The report also indicated that repeated oral reading with feedback and guidance is the most effective method to foster fluency. Fostering vocabulary using direct and indirect methods was reported to improve reading comprehension. Question generation and multi-component strategies that include training in summarising, clarification and prediction are effective in fostering reading comprehension. All the elements within the HRSP are aligned with one another.

The weight of evidence therefore indicated that the HRSP meets the criteria for a complete reading programme. This analysis also indicated that the HRSP was successfully integrated into the mainstream classroom. In the following chapter, the results of the quantitative investigation into the effectiveness of the HRSP to improve literacy in the Foundation and Intermediate Phases of DSS will be reported and interpreted.

CHAPTER 5

THE RESULTS OF THE QUANTITATIVE INVESTIGATION

5.1. INTRODUCTION

In this chapter, the quantitative investigation will be discussed under the following headings:

- The purpose of the quantitative investigation.
- The research design, including;
 - ◆ The method of investigation,
 - ◆ The description of the measuring instruments,
 - ◆ Sampling methods.
- The execution of the quantitative study.
- Results of the quantitative study.

5.2. THE PURPOSE OF THE QUANTITATIVE INVESTIGATION

The primary purpose of this part of the study was to obtain information on the effectiveness of literacy intervention using the HiWay Reading & Spelling Programme (HRSP), conducted with whole intact groups in their classrooms by the class teachers in the Foundation Phase (grades one to three) and Intermediate Phase (grades four to six). To achieve this, five features were deliberately incorporated into this study design.

First, a **long term** intervention programme was employed. The HRSP is designed to be implemented over six years, divided into two components. The first component is a Spelling Programme and includes direct instruction of phonological awareness, sound-sign associations, and vocabulary building in conjunction with controlled vocabulary texts. This component is designed to be implemented over three years from grade one to three. The second component is a Reading Comprehension Programme. This includes fluency training, strategies for improving comprehension such as questioning and predicting, and vocabulary building. This component is designed to be implemented over three years in grades four to six.

Secondly, responsiveness to intervention was evaluated in **normal** school contexts. Foundation Phase and Intermediate Phase teachers rather than graduate staff or professional personnel were trained to conduct scientifically validated literacy interventions to a heterogeneous mix of boys and girls: African and Caucasian; learners from middle class and lower-income groups; and learners with and without learning difficulties.

Thirdly, the **fidelity** with which teachers conducted the interventions and learners implemented the interventions was carefully monitored. Troia (1999) identified the failure to report fidelity of treatment data as a major flaw in current reading intervention research. Fourthly, Troia (1999) also noted that researchers often neglect to provide information of the type of reading instruction given to the **control** group. For this reason, information on the type of reading instruction given to the control group was obtained.

Fifthly, standardised tests to validly and reliably assess learner **responsiveness** were used. The reliability of a test is that it produces the same result under different conditions and over time. The validity of a test is that it measures what it claims to measure (Shaughnessy & Zechmeister, 1990). The validity of such tests in the South African context could be called into question. This limitation was recognised in this study. The rationale for using these tests has been provided in chapter 1. The aim here was to ensure an adequate norm-referenced assessment for evaluating learner responsiveness. Al Otaiba and Fuchs (2006, 2002) reported that the *No Child Left Behind Act* of the *Reading First Initiative* in the USA required that all learners should be reading at grade level by third grade. Using standardised tests made it possible to determine if this goal was achieved. Finally the longitudinal nature of the study made it possible to study the participants over time to meaningfully monitor the effectiveness of the literacy interventions.

5.2.1 PROBLEM STATEMENT

The main question addressed in this study is:

What is the effectiveness of the HiWay Reading & Spelling Programme® (HRSP) for improving reading and spelling achievement in learners from grades one to five in Domino Servite School, KwaZulu-Natal, South Africa?

The following *sub-questions* can be formulated from this main statement:

1.2.1. Does the HRSP meet the criteria stipulated by the National Reading Panel Report (2000) for complete reading programmes?

1.2.2. What is the feasibility of integrating the HRSP into the mainstream curriculum in the Foundation and Intermediate Phases in Domino Servite School?

1.2.3. What is the effectiveness of the HRSP as a tool for improving reading and spelling achievement of grade one to five learners in Domino Servite School?

A hypothesis for this study can be formulated as follows:

Ha: THE *HIWAY READING & SPELLING PROGRAMME*® WILL RESULT IN AN IMPROVEMENT IN THE SPELLING AND READING ACHIEVEMENT OF GRADE ONE TO FIVE LEARNERS AT DSS SCHOOL.

The null hypothesis can be formulated as follows:

Ho: THE *HIWAY READING & SPELLING PROGRAMME*® WILL NOT RESULT IN AN IMPROVEMENT IN THE SPELLING AND READING ACHIEVEMENT OF GRADE ONE TO FIVE LEARNERS AT DSS SCHOOL.

5.2.2. AIM OF THE QUANTITATIVE STUDY

This quantitative study aims to investigate the effectiveness of the HRSP for reading instruction in grades one to five in DSS.

5.3. THE RESEARCH DESIGN

5.3.1. METHOD

This study was part of a longitudinal and larger investigation designed to examine the long-term effects of literacy intervention using the HRSP on learners' reading acquisition. Participating teachers for grades one to five in the school undergoing intervention were trained in an in-service manner to use the HRSP, and the fidelity of implementation assessed by direct observation and questionnaire. In addition, due to the longitudinal nature of the study, the different grades in the participating school received different amounts and intensity of intervention. Participating groups therefore received either a) three years of intervention (grade 3), b) two years of intervention (grade 2), c) one year of intervention (grade 1), and d) between one and two years of intervention

(grades 4 and 5). All participating and non-participating groups used the same curriculum, the Revised National Curriculum Statement (RNCS, 2002), for the respective grade levels. In grades one to three the RNCS (2000) constituted an implicit approach to teaching phonological awareness and systematic phonics combined with whole language approaches (RNCS, 2002). In grades four to six, literacy (spelling and reading) is not explicitly taught within the RNCS. The nature of instruction by class teachers in groups **not** receiving the HRSP in grades one to three were carefully investigated to allow for meaningful comparison of classroom literacy instruction.

The Foundation and Intermediate Phase intervention using the HRSP was by contrast explicit and systematic and they complemented regular-classroom literacy instruction. In the Foundation Phase, the intervention took the form of scientifically validated literacy intervention as the Spelling component of the HRSP, including phonological awareness instruction, systematic phonics instruction, vocabulary building and the reading of controlled texts keyed to the HRSP. The emphasis in this component gradually shifted from a focus on phonological awareness training and sight word (phonetically irregular word) recognition in grade one to vocabulary building and **strategic** reading proficiency in grade three (Spear-Swerling & Sternberg, 1994). Interventions were conducted by class teachers in 15-20 minute sessions four-to-five times per week for the duration of the school year. The intermediate phase interventions consisted of the Reading Comprehension component of the HRSP and took place in 10-20 minute sessions three-to-four times per week for the duration of the school year. Interventions included fluency training, training comprehension-monitoring strategies, and vocabulary building exercises keyed with graded texts. The level of difficulty of texts and vocabulary increased from grade four to grade six. Interventions were conducted by class teachers within the regular English-language lessons.

5.3.2. DEFINING RESPONSIVENESS TO INTERVENTIONS

Standardised tests were used to assess **responsiveness** to interventions and to allow assessment of the achievement of the goals of the HRSP, namely that the learner should be reading at age/grade level from third grade or the strategic level as defined by Spear-Swerling and Sternberg (1994). As whole groups were used, this meant that the group must achieve **on average** at or above chronological age. Due to the confounding effects of maturation, responsiveness was carefully defined as the amount of pre- to post-test difference in scores **over and above** changes due to maturation. Quotient scores were therefore used. Quotient scores (QS) were obtained by dividing raw scores (RS) by chronological age in months (CA), and multiplying by 100 (QS =

RS/CA X 100) thus balancing out the effects of maturation. A score of 100 indicates the learner is at age level.

5.3.3. IDENTIFYING THE NON-EQUIVALENT GROUP

Shaughnessy and Zechmeister (1990) state that in order to effectively conduct this type of quasi-experimental research, a pre-test-post-test non-equivalent control group design using random selection from natural groups is recommended. The two initial steps in the process are 1) identify a group that is like the treatment group that can serve as a comparison group, and 2) obtain pre-test and post-test measures from individuals in both groups (Monteith & Steyn, 2001, Ary *et al.*, 2002). Because the comparison group was not selected based on random assignment, it cannot be assumed that individuals in the treatment and control groups are equivalent in *all* important characteristics. Therefore it is essential that a pre-test were given to both groups that is similar or the same as the dependent variable. In this study the same standardised tests were used for both pre- and post-test measures, and the pre-test measures used to evaluate the 'equivalence' (Shaughnessy & Zechmeister, 1990) of the two groups (schools).

In addition, data concerning other variables, namely a) the ratio of boys to girls, b) the ratios of teachers to learners (class size), c) the racial identity of the learners and d) the learners use of English as a first or second language, e) school infrastructure and facilities, f) school climate and g) type of literacy instruction was obtained and used to derive information on the presence of any potential bias in the groups or differences between the treatment and control groups. Information concerning school infrastructure was obtained through site visits, and information on school climate through personal communication with school staff.

Shaughnessy and Zechmeister (1990) quote Cook and Campbell (1979) who explain the process involved in quasi-experimental research.

"Estimating the internal validity of a relationship is a deductive process in which the investigator has to systematically think through how each of the internal validity threats may have influenced the data. Then the investigator has to examine the data to test which relevant threats can be ruled out. In all this process, the researcher has to be his or her own best critic, trenchantly examining all the threats he or she can imagine. When all of the threats can plausibly be eliminated, it is possible to make confident conclusions about whether a relationship is probably causal. When all of them cannot, perhaps because the appropriate set are not available or because the data indicate that a particular

threat may indeed have operated, then the investigator has to conclude that a demonstrated relationship between the variables may or may not be causal." (Cook & Campbell, 1979)

The above quote succinctly summarises the approach adopted in this investigation.

- The first part of the investigation examines threats to internal validity (5.5.2.)
- The second part of the investigation examines the possible effects of the HRSP (5.5.3).

Shaughnessy and Zechmeister (1990) state that the matched group design is a better alternative than random groups design when a good matching task is available and when only a small number of heterogeneous subjects is available for an experiment that requires separate groups for each condition.

In addition to the above approach, Monteith and Steyn (2001) and Ary *et al.* (2002) recommend the use of the analysis of covariance (ANCOVA), with the pre-test measure as the covariate. This compensates for possible imprecision in the design by employing a pre-existing variable that is correlated with the dependent variable in order to correct the dependent variable.

Shaughnessy and Zechmeister (1990) suggest two other approaches that play an important role in establishing cause and effect relationship within quasi-experimental designs. The first approach is the use of **replication**. Replication not only serves as a useful check on the reliability of experimental findings (by showing that a similar experimental result occurs when the same basic experimental procedures are used) but also plays a role in establishing external validity (by showing that a similar result occurs when slightly different conditions apply). Replication in the first sense was intrinsic to this study, as every new group entering DSS school in effect constituted a replicate. Replication in the second sense will require the introduction of the HRSP in other schools. This would have to be addressed through further research.

The second approach is the use of **interactions** in a carefully designed factorial analysis. This approach requires that individual differences be studied in combination with independent variables that can be manipulated. (This will be explained in more detail later – 5.4.1.10, pg 186).

5.3.4. SAMPLING

The target population for this research was learners in grades one to seven. This was confined to learners in the Greytown area of KwaZulu-Natal, and delimited to two schools in the Greytown area. In this study, **no claim is made for the 'representativeness' of these two schools of grades one to seven** in the entire Greytown area, much less KwaZulu-Natal. Because this study attempted to find evidence for a causal relation between improved literacy in a single school and the HRSP, it was important that a school 'like' (equivalent to) the participating school was used as a 'control'. A qualified claim for the representativeness of the sample of grade one to seven *learners* was made, based on the argument of Shaughnessy and Zechmeister (1990) that we should assume behaviour (in this case, the cognitive process of learners learning to read) is relatively continuous across time, subjects and setting unless we have reason to assume otherwise.

Two independent schools matched on the dependent variables, demographic data and school environment were used in this study. The school participating in the HRSP was the Foundation and Intermediate Phases of Domino Servite School (DSS) and the Foundation and Intermediate Phases of St David's Diocesan (SDD) served as the 'control' group.

Random assignment of subjects to treatment and control conditions was not possible in this study. The main aim of random assignment is to ensure representativeness, that is, that we can be reasonably confident that the group we are testing is representative of the population that we wish to extrapolate our findings to. In this study this has two aspects. First, to what extent were the **subjects** in this study (Grade 1 – 7 learners) typical of a larger population of Grade 1-7 learners? Secondly, to what extent were the **schools** used in this study typical of other schools in a defined area? Because internal validity was the main focus of this study, questions of external validity will inevitably be compromised (Monteith & Steyn, 2002; Shaughnessy & Zechmeister, 1990). The main aim of this study was to establish the basis, if any for attributing a causal relation between the HRSP and reading and spelling **in DSS**.

Matching and a non-equivalent pre-test-post-test control group design were used as recommended by Shaughnessy and Zechmeister (1990) and Monteith and Steyn (2001). Random selection from each group (DSS and SDD) was used only to balance out the effects of differences between subjects other than in the dependent variables, and not to allow extrapolation to the wider

population. As advised by Steyn (2000, 2002), because the whole group (population) was 'surveyable', the use of effect sizes is strongly recommended and thus received particular emphasis in this study. Steyn (2005) comments that:

"By *volledige opnames* (sensusse) waar volledige populasies betrek word, is bepaling van effekgroottes soms al manier om praktiese betekenisvolheid te beoordeel. In die praktyk kom volledige opnames baie voor. 'n Paar voorbeelde is (Steyn, 1999):

(a) 'n Studie om verkragters en gewapende rowers uit 3 beskikbare gevangenisse te vergelyk. Albei dié groepe was so klein, dat almal betrek kon word.

(b) Eerstejaar Psigologiestudente ondergaan 'n psigometriese toets om die geldigheid daarvan te bepaal. In plaas daarvan om 'n ewekansige steekproef te trek en net dié studente te toets, is dit in die praktyk makliker om die hele klas te toets. Die klas is nou 'n studiepopulasie wat volledig getoets word. Al sou 'n ewekansige steekproef gebruik word, sou slegs veralgemeen kon word na hierdie studiepopulasie. **'n Volledige toetsing gee dus die presiese resultate aangaande dié populasie.'** (my emphasis)

5.3.5. INSTRUMENTS

As reported, standardised tests were used to measure improvement in spelling and reading comprehension ability. All learners in all groups were pre and post tested using these Instruments. *The Schonell Graded Word Spelling Test A* (Schonell & Schonell, 1956) was used to obtain spelling age scores for all learners in both the treatment and control school from grades one-to-seven. Two instruments were used for obtaining reading comprehension scores. For grades one-to-three of both schools the *Schonell Silent Reading Test A* (Schonell & Schonell, 1956) was used. For obtaining reading ages for grades four-to-seven, the *Daniels & Diack Test of Reading Experience* (Daniels & Diack, 1976) was used. Groups were tested by the class teacher in the regular classroom setting in the control school and by the class teacher in the regular classroom setting or the programme co-ordinator in the treatment school. Class teachers were trained/instructed to implement the tests correctly. Learners were tested together and not as individual learners. Both schools were tested midyear (May-June) and at the end of year (November). Where feasible, learners who missed a test on a certain day were tested individually later. In this study, subject mortality at any one testing session involved one or two subjects only. Missing data was made up by substituting the group mean for the individual, or for test-retest, the individual's previous score. All scoring was done by the programme co-ordinator and myself. Lastly, practice effects were minimised by testing at six-monthly intervals. The nature of the tests

made the possibility of practice effects unlikely, as no written or oral feedback as to right and wrong responses were ever given to the learners.

5.3.5.1. Schonell Graded Word Spelling Test A

The *Schonell Graded Word Spelling Tests A* consists of graded words that are dictated to the learners. The tester reads the word aloud, puts it in a sentence and repeats the word e.g.

“cat”

The cat sat on the mat.

“cat”

The test was untimed, although the tester could terminate the test session if they noticed that the learners were making repeated errors. The instrument was scored until the learner made five errors in a row. This score was converted to a spelling age using the formula provided with the instrument. This instrument was used for grades one to seven.

5.3.5.2. The Schonell Silent Reading test A

There are two versions of this test, a timed and an untimed test. Al Otaiba and Fuchs (2006) report that timed tests are considered a better measure of reading ability than untimed tests. In this study the timed test was used. The time limit was nine minutes.

This instrument consisted of short sentences or paragraph which the learner had to read and then answer a question on what they read. A short practice using two items was used before each session e.g.

“I have a cat. It is black and white. It is one year old. It sleeps in a box. It likes to play with a ball”.

Where does the cat sleep?

The learners respond in writing. The score was converted to a reading age using the tables provided. It was felt that this instrument sometimes overestimated the learners reading comprehension ability (as an age score), especially in grade 3 learners in DSS. The Daniels &

Diack instrument (see below) was also used to provide an alternative measure of reading ability in grade 3.

5.3.5.3. The Daniels & Diack Test of Reading Experience

This is an untimed instrument consisting of sentences with choices of words. The learner must select the correct word. E.g.

1. Trains can often be seen standing in a railway (engine, driver, box, station).

The test was scored until the learner had five incorrect responses in a row. The score was converted to a reading age using the tables provided. This instrument was used for grade four to seven learners. As the reliability of standardised tests diminish at the extremes of the testing range, the data were monitored for ceiling effects and breakdown of reliability using the Hoyt intra-class reliability estimate and Cronbach alpha. The Daniels & Diack has an upper limit of 14 years. The learners tested were from 10 to 13 years.

5.3.6. FIDELITY OF INTERVENTION

Teachers in the treatment groups were trained to use the HRSP on an ongoing in-service basis. Fidelity of intervention was evaluated by two methods. Firstly, the programme co-ordinator monitored implementation in the respective grades throughout the year. Secondly, the class teachers were given a questionnaire (Appendix 1) designed to provide information about fidelity of implementation of the HRSP.

To obtain reliable information about the type of literacy instruction in grades one to three at SDD, a detailed questionnaire (Appendix 2) was provided to the grade one to three teachers to complete. This questionnaire aimed to assess the use of whole language approaches, systematic phonics approaches, the use of basal reading programmes and implicit phonics programmes, and the practical implementation of systematic phonics in the classroom situation.

5.3.7. REPLICATION

Replication remains one of the most important tests for the reliability of an experimental intervention (Shaughnessy & Zechmeister, 1990). The test-retest scores for three separate groups were evaluated longitudinally over a two to three year period to test for a similar effect of the HRSP in different groups of learners.

5.3.8. THREATS TO VALIDITY

5.3.8.1. Maturation effects

As reported, maturation effects were balanced out by taking quotients. All scores were converted to a quotient by dividing by chronological age. A score of 100 indicated reading or spelling at age-level. This provided a single metric allowing all learners to be compared.

5.3.8.2. Historicity effects

It was reasoned that historicity effects would manifest as extreme scores at both ends of the sample range i.e. very weak and very strong readers. To balance out these effects the method of "Winsorising" described by Howell (1992), where the two highest and two lowest scores were replaced by the next highest or lowest scores and the degrees of freedom adjusted accordingly.

5.3.8.3. Regression to the mean

In a study of this nature, regression to the mean constituted a threat to validity. Especially in the case of very low group scores, improvement may be simply a movement towards the population mean rather than an effect of the HRSP. Group scores were therefore carefully analysed for evidence for regression towards the mean effects. We would expect that should such an effect be evident, it would be observed in both the treatment and control groups. It would also be expected that groups with very low scores would show improvement in the **absence** of intervention.

5.3.8.4. Hawthorne effects

This study was conducted within the normal classroom situation using class teachers, and it was reasoned that it was implausible that the learners would have experienced being the object of special attention. Nevertheless, a Mathematics Age was also obtained for the Grades two and three of the treatment school. It was reasoned that Hawthorne effects would be manifest as an improvement in mathematics scores as well as literacy scores. The instrument used was the formal

Young Group Mathematics Test (Young, 1974). A pre-post test was conducted to determine any improvement in mathematics ability over and above normal maturation.

5.3.8.5. School effects

As reported, the schools were matched both as subjects and as school climate and environment. In addition, it was reasoned that school effects would be evident in differences in the dependent variables in grades six and seven of the respective schools. The grades six and seven of the treatment school (DSS) had not participated in the HRSP. Should school be a confounding factor, it should be evident in these grades after five years of exposure to the respective school conditions. These groups' score on the dependent variable were compared to investigate the presence of any differences.

5.3.8.6. Racial identity

The possible confounding effect of racial identity was also investigated in the two groups. In addition, the two groups were compared to determine racial bias in responsiveness to the HRSP.

5.3.8.7. Gender

Gender effects were investigated to ascertain the possibility of any differences in the proportions of boys and girls between the two schools and the separate groups (grades), and for gender bias in response to the HRSP. The two schools were also compared to ascertain the presence of gender bias.

5.4. DATA ANALYSIS

5.4.1. STATISTICAL METHODS

The statistical package Openstat version 3 was used. Because this is a free statistics package available on the Internet, it was first tested using worked examples in college-level texts on statistical methods to ensure that it was accurate and that the results obtained were identical. Statistical design and interpretation was conducted using Howell (1992), Shaughnessy and Zechmeister (1990), Monteith and Steyn (2001) and Ary et al, (2002). The statistical analyses were also submitted to the Statistical Consultation Service, Department of Northwest University, Potchefstroom Campus, for verification, adjustment and recommendation. It was recommended (Steyn, pers. comm.) that the use of effect sizes receive particular attention, particularly of whole

groups, and that less emphasis be placed on conventional significance testing as the results would only be applicable to the two groups. Furthermore, as recommended by Troia (1999), group means were the unit of analysis. As is dictated by convention, alpha was set a 0.05 to balance for the risks of Type I and Type II errors, (i.e. concluding that there is a difference between means when there is not, and concluding that there is no difference when there is), and a two-tailed test (i.e. testing for any difference) was used. Although in this study a one-tailed test would have been legitimate (this study was looking for an improvement in literacy scores, not just a difference) using a two-tailed test ensures a more stringent test for significance of difference.

5.4.1.1. Matching on dependent variable measures

First, to evaluate the equivalence of schools, 'matching tasks' were performed using analysis of variance (ANOVA) of pre-test scores for both schools. A univariate ANOVA provides a more sensitive test of significance by partialling out variance due to within-subjects error and between-subjects error, and by providing an estimation of the proportion of variance explained by the treatment and other independent variables. Random selection was used to balance out subject effects other than the dependent variables. Statistical significance between group means were determined using the *t*-test or *post hoc* comparisons using the Scheffe method or orthogonal contrasts. The *t*-test is a standard test in inferential statistics that allows for the acceptance or rejection of the null hypothesis (usually no difference) involving pairs of means. The ANOVA tells simply if there is an effect or not. The Scheffe method and orthogonal contrasts allow pair wise comparison of group means within the ANOVA (Howell, 1992).

5.4.1.2. Differences between schools

To ascertain if any significant difference existed between learners in the two groups as a whole, the scores of grades one to five of each school were pooled and a random sample selected from each group. Both simple random sampling and stratified random sampling were used. An ANOVA was conducted to determine any difference between whole groups (schools).

5.4.1.3. Differences between grades

To determine the equivalence of the total group, a factorial ANOVA was used to compare separate means for each grade, with grades (one to seven) and school (DSS and SDD) as factors. Because bias or non-equivalence is what was being tested for, whole intact groups were used. Group (grade) means were also compared using Scheffe *post hoc* comparisons to determine significance of difference.

5.4.1.4. School effects

There is the possibility in this type of study that school and treatment effects will be confounded (Troia, 1999). It is conceivable that the school climate or ecology may be sufficiently different in the two schools to produce a difference in the dependent variables. It was reasoned that should such an influence exist, it would be evident in all round ability between the two schools in grades six and seven, as these two groups had been exposed for five years to the school ecological environment. Furthermore, this difference in all round ability will be reflected in differences in reading and spelling ability. This possibility was tested using t-tests of paired means.

5.4.1.5. Gender and racial differences

The scores of the two schools for grades one-to-five were pooled and a random sample selected. These data were subject to a factorial AVOVA with gender (boys and girls) and school (DSS and SDD – treatment and control), and race (African and Caucasian - language group) and school (DSS and SDD) as factors. Main effects (gender, race and school) were examined for level of significance. Scheffe and orthogonal contrasts were used to compare individual group means.

5.4.1.6. Pre-test-post-test designs

Pre and post test scores for spelling and reading achievement from grades one to five of both schools were pooled and a random sample selected from each group. This was subject to an ANOVA to determine main effects of treatment on spelling and reading comprehension separately. A multivariate analysis of covariance (ANCOVA) was also used with the pre-test score as the covariate to 'correct' for differences between groups in the pre-test scores for both spelling and reading comprehension.

5.4.1.7. Replication

Test-retest scores of spelling and reading comprehension for individual groups were subject to repeated measures ANOVA (Howell, 1992) to determine the presence of a similar effect of the HRSP in different groups. The main advantage of repeated measures designs is that it allows the experimenter to reduce overall variability by using a common subject pool for all treatments, and at the same time allows one to remove subject differences from the error term, leaving the error component independent from treatment to treatment and cell to cell.

5.4.1.8. Fidelity of treatment

Class teachers in grades one to five of the school receiving the HRSP were scored on fidelity of implementation of the HRSP using data obtained from a questionnaire. These scores were used as the basis for two analyses.

First, test-retest (March-November) scores for reading and spelling were analysed (separately) to determine if any relationship existed between fidelity of implementation and the effect of the HRSP. To do this, a random sample of the grades one to five was selected and subject to ANOVA and ANCOVA, as described above, to determine the overall level of significance of difference between the test and retest scores.

Second, effect sizes were calculated for each grade and the scores correlated with the fidelity of treatment scores to establish the presence of any relation.

5.4.1.9. Effect sizes

Effect sizes were calculated for each of the grades one to five for the means of the control and treatment groups. The measure of effect size used in this study was d , which was the same employed by the National Reading Panel (2000) in the meta-analysis of reading interventions. This allowed direct comparison of the effect sizes obtained for this study and those reported in the NRP (2000) report.

$$d = \frac{(\bar{X}_t - \bar{X}_c)}{0.5 * (\sigma_t + \sigma_c)}$$

where

\bar{X}_t is the treatment mean

\bar{X}_c is the control mean

σ_t is the standard deviation of the treatment and

σ_c is the standard deviation of the control.

The use of effect sizes is recommended (Ary *et al.*, 2002; Steyn, 2000, 2002; Ellis & Steyn, 2003) as it is a measure that is free from sample size and provides an estimate of the amount of impact an independent variable has had. Secondly, it allows us to summarise and compare the effects of

an independent variable across different experimental conditions. Thirdly, effect size can be averaged to allow an estimate of the overall effectiveness of treatments like an educational innovation such as the HRSP (Shaughnessy & Zechmeister, 1990). It also allows for the estimation of the power of an experiment, which is a measure of the chance of making a Type II error (Howell, 1992). Effect sizes are categorised as small (0.2), medium (0.5), and large (0.8) by Cohen (Howell, 1992). One important caution about interpreting effect size is that a small effect size is not the same as an insignificant or unimportant effect. Furthermore, small effect sizes can translate into very important consequences (Howell, 1992). These data were correlated with the amount and rigour of intervention received by each group in the treatment school.

5.4.1.10. Causal-comparative design testing for interactions

Shaughnessy and Zechmeister (1990) describe a method that can be used to draw causal inferences in natural group designs. The method involves the use of an individual difference combined with modulation of one or more independent variables. To explain how the method works, the example given by Shaughnessy and Zechmeister (1990) will be used.

They report on the results of research (by Halpern & Bower) on the effect of musical training on memory. These researchers theorised that musical training led musicians to **chunk** musical notation into meaningful units, thereby reducing the amount of information to remember. They furthermore argued that if this process (chunking) were responsible for the difference in memory performance of musicians and non-musicians, then the differences should be greater for melodies with good musical structure than for those with poor musical structure. They therefore designed an experiment in which they manipulated the independent variable (musical structure) to test the theory. They prepared sets of melodies with good, bad or random structure. The critical test was whether an **interaction** would be found for the two independent variables, musical structure of melodies and musical training. Specifically they expected the difference in memory performance between musicians and non-musicians to be largest for melodies with good structure, next largest for melodies with poor structure and smallest for random melodies. Their results confirmed their prediction.

The point of this design is that it allows the experimenter to rule out many alternative hypotheses for the differences in dependent variable scores, in this case memory for melodies between musicians and non-musicians. Such characteristics as the amount and type of general education,

socio-economic status and family background are not plausible explanations for such a systematic relationship between the structure of the melodies and memory performance.

It was possible to apply this method to the present study. The first step was to develop a theory explaining why a difference should occur based on an individual differences variable. In this study we were investigating the spelling ability of two groups, school A and School B. Individuals in school A had been exposed to the HRSP (analogous to musicians having received musical training). Individuals in school B had not received this training. The HRSP specifically trains learners to analyse words for the phonetic structure and to identify phonetically regular and irregular words.

Pugh *et al.*, (2000) and Shaywitz and Shaywitz (2004a, 2004b) have described a theory of reading development. They postulated that reading proceeds via a hierarchical process involving different brain regions. Initially beginning readers use mainly the frontal region of Broca's area and right brain areas for whole word recognition. However, this is an inefficient process that quickly leads to "bottlenecks" in the processing of information for fluent, automatic reading. The learner has to acquire a new set of skills associated with Wernicke's area in the posterior temporo-parietal region. This region is chiefly associated with the analysis of words, and is fostered through systematic phonics instruction (Shaywitz *et al.*, 2004). Furthermore the engagement of this region is crucial for the development of a postulated word form area in the posterior temporo-occipital region, which allows for fluent, automatic reading of text.

From this theory it was reasoned that the individuals exposed to the HRSP would be more likely have access to the posterior regions while those not exposed to the programme may experience bottlenecks in processing. This bottleneck in processing should lead to a difference between group A and B depending on a) the familiarity of a word, b) the phonetic regularity of a word and c) the level of difficulty of a word as determined by number of syllables. It was also expected that maturation effects would also influence the performance difference of group A and group B learners.

By analysing the words in the Schonell Graded Word Spelling Test A, four groups were formed, a) phonetically-regular-one-syllable words, b) phonetically-irregular-one-syllable words, c) phonetically-regular-two-syllable words and d) phonetically-regular-three-or-more-syllable words.

It was reasoned that in grade two, we would observe little or no difference between the two groups in phonetically-regular-one-syllable words. Children at this age/grade level can recognise and spell most of these words from memory. Rather if the HRSP were responsible for the difference in spelling ability, there would be a difference in phonetically-irregular-one-syllable words and phonetically-regular-two-syllable words. In grade three, the greatest difference would be between groups A and B to be in the phonetically-regular-two-syllable words. A similar result was expected for grade 4, with a possible difference between phonetically-regular-three-or-more-syllable words also being evident.

To test this theory, an *ex post facto* experimental design was used. Score sheets of learners on the *Schonell Graded Word Spelling Test A* were analysed for each of the number of words correct for each of the four word categories. The data were then subject to a factorial ANOVA in order to examine the presence of interactions, with **individual difference** (exposure to HRSP or not) and **level of word difficulty** as independent variables, and number correct in each category as dependent variable. The presence of an interaction would greatly increase our confidence in the likelihood of a causal relation between the HRSP and improved spelling scores. This would allow many alternative hypotheses for the differences in dependent variable scores - in this case scores between individuals exposed to the HRSP and those not - to be ruled out. Such characteristics as the amount and type of general education, socio-economic status and family background are not plausible explanations for such a systematic relationship between the structure of the words and exposure to the HRSP.

5.4.2. NON-PARAMETRIC ANALYSES

The responses obtained from the questionnaire provided to the grade one to three teachers of the control school were analysed using non-parametric methods. Three methods were used. Chi-square, Kappa, and Mann-Whitney U. Chi-Square analysis allows us to test for independence of groups as defined by categories. Kappa provides a measure of agreement between respondents adjusted for chance. If agreement between variables is exactly what is expected by chance, kappa = 0. If agreement is less than could be expected by chance, kappa will be negative. If agreement is more than what could be expected by chance, kappa is positive (Ary *et al.*, 2002). Mann-Whitney U is a distribution-free test that uses ranking scores to test for difference between groups. Chi-square analysis was used to assess the level of similarity or difference between the two schools on

demographic data. They were also used to test for differences between the literacy instruction in the HRSP and literacy instruction in grades one to three in the school not receiving the HRSP.

5.4.3. CORRELATION

5.4.3.1. Pearson Product-moment correlation

The Pearson Product-moment correlation coefficient was determined for the relationship between teacher fidelity of implementation of the HRSP and effect sizes for grades one to five between treatment and control groups, and between the amount and intensity of exposure to the HRSP and effect sizes for test-retest scores in grades one to five of the treatment group (DSS).

5.5. RESULTS OF THE QUANTITATIVE INVESTIGATION

5.5.1. SAMPLE DEMOGRAPHIC INFORMATION

Two private schools will participated in this study, which took place during 2004. The one, DSS received the HRSP in grades one to five. This school had 115 learners in the Foundation and Intermediate Phases (grades one to seven). The school is situated on Kwasizabantu Mission, KwaZulu-Natal, drawing learners from both urban and rural backgrounds, of whom 108 (94%) had limited English proficiency (English is an additional language), and were from upper working to upper middle class homes.

The non-equivalent group was St David's Diocesan Primary School (SDD), which served as the control group. This school was matched with DSS for learner and teacher profiles. This school had 118 learners from Grades one to seven that were receiving normal literacy instruction. The school is situated in Greytown, KZN, drawing learners from both urban and rural backgrounds, of whom 116 (98%) had limited English proficiency (English is an additional language), and were from upper working to upper middle class homes. Both schools used English as the medium of instruction. Table 5.1 summaries the demographic data for the two groups. Chi-square analyses revealed no statistically significant differences between DSS and SDD on gender ($\chi^2 = 0.390$, $df = 1$, ns), age ($\chi^2 = 0.483$, $df = 6$, ns), and group (grade) size ($\chi^2 = 0.483$, $df = 6$, ns). However, a chi-square test on racial identity was statistically significant ($\chi^2 = 49.12$, $df = 3$, $p < 0.01$). Because only 2 learners in SDD and 7 learners in DSS used English as a first (home) language, the effect of learning in **English** as a first compared to an additional language could unfortunately not be reliably assessed in this study. Instead, the effects of language group (Caucasian or African) were assessed.

Table 5.1. Demographic data for Domino Servite School and St David's Diocesan Primary School Grades 1-5 of the DSS school (shaded) received the HRSP

	DOMINO SERVITE PRIMARY SCHOOL		ST DAVID'S DIOCESAN PRIMARY SCHOOL	
	No of learners	Average age	Number of learners	Average age
Grade 1	14 (7boys/7girls)	7.53	21 (11b/10g)	7.4
Grade 2	17 (7b/10g)	8.41	21 (10b/11g)	8.44
Grade 3	14 (5b/8g)	9.47	16 (8b/8g)	9.85
Grade 4	24 (12b/12g)	10.75	15 (8b/7g)	10.69
Grade 5	11 (7b/4g)	11.90	14 (7b/7g)	11.67
Grade 6	14 (7b/7g)	13.09	16 (8b/8g)	12.42
Grade 7	21 (7b/14g)	13.89	15 (9b/6g)	13.39
GENDER				
	52 (45%) male	63(54%) female	60 (51%) male	58 (49%) female
RACIAL IDENTITY				
	Caucasian	43 (38%)	Caucasian	2
	African	71 (62%)	African	111(94%)
	Asian	0	Asian	2
	Other	1	Other	3

5.5.2. THREATS TO INTERNAL VALIDITY

5.5.2.1. Pre-test measures for spelling and reading comprehension

In order to test for the presence of any difference between the two schools prior to the introduction of the HRSP, both groups were pre-tested on the same dependent variable of spelling and reading comprehension. The null hypotheses for these analyses were:

Ho 1: No significant difference between the spelling scores of DSS and SDD learners existed prior to the introduction of the HRSP.

Ho 2: No significant difference between the reading comprehension scores of DSS and SDD learners existed prior to the introduction of the HRSP.

The two schools were matched for performance of the dependent variables, spelling and reading comprehension. A random sample of 40 learners was selected from the pooled grades for the respective schools and analysed using a one way ANOVA. In addition, as I was testing for a bias or difference between the groups, whole intact groups were also tested using a one way ANOVA. Table 5.2 summarises the means and standard deviations for the respective groups.

Table 5.2. The pre-test spelling and reading scores for the whole group: DSS – Domino Servite school; SDD - StDavid Diocesan school

Dep. Var.	Spelling			Reading Comprehension		
	DSS	SDD	Significance	DSS	SDD	Significance
Random	88.89 ±12.73	90.87 ±11.11	F(1,79) = 0.68, ns	85.57 ±13.91	88.25 ±12.41	F(1,79) = 0.78, ns
Whole group	86.42 ±12.92	86.17 ±12.17	F(1,224) = 0.02, ns	85.19 ±15.45	84.14 ±12.45	F(1,224) = 0.32, ns

A non-significant result was obtained in all cases. So I was unable to reject the null hypothesis and concluded that there was no evidence that a significant difference existed between the two schools on spelling and reading comprehension scores prior to the introduction of the HRSP.

5.5.2.2. Gender effects

It is often reported that girls are on average better than boys on scores of literacy (Lerner, 2000, 2003; Richek, *et al.*,1989; Richek *et al.*, 1996). It was therefore necessary to test for differences between boys and girls in both groups prior to the introduction of the HRSP. The null hypotheses for this analysis were:

Ho 3: There is no difference between boys and girls in spelling ability in both schools prior to the introduction of the HRSP (the columns in table 5.3).

Ho 4: There is no difference between boys and girls in reading comprehension ability in both schools prior to the introduction of the HRSP (the columns in table 5.3.).

Ho 5: There is no difference in **spelling** ability between **boys** of both schools prior to the introduction of the HRSP (The rows in table 5.3.).

Ho 6: There is no difference in **spelling** ability between **girls** of both schools prior to the introduction of the HRSP (The rows in table 5.3.).

Ho 7: There is no difference in **reading** comprehension ability between **boys** of both schools prior to the introduction of the HRSP (The rows in table 5.3.).

Ho 8: There is no difference in **reading** comprehension ability between **girls** of both schools prior to the introduction of the HRSP (The rows in table 5.3.).

A random sample of 40 learners was selected from both groups and subject to analysis by ANOVA. Table 5.3 summarises the means and standard deviations for the different groups in reading comprehension and spelling.

Table 5.3. Summary of comparison of pre-test group means for girls and boys in DSS and SDD schools

Reading Comprehension	SDD	DSS	Significance
Boys	83.69±11.15	86.27±14.8	Ns
Girls	90.22±12.86	90.55±21.75	Ns
Significance	Ns	Ns	
Spelling Scores	SDD	DSS	Significance
Boys	86.05±14.69	90.36±11.82	Ns
Girls	93.24±8.44	92.88±11.18	Ns
Significance	p = 0.03	Ns	

The results of the ANOVA indicated no significant main effects for either gender or school. Orthogonal contrast comparing group means revealed no significant difference between girls and boys in **SDD** for reading. I therefore was unable to reject the null hypothesis and concluded that no evidence for a difference between the genders in reading scores existed in St David's. In contrast to this, a significant difference was observed between boys and girls in spelling at SDD. I therefore rejected the null hypothesis and concluded that girls were stronger in spelling than boys in SDD.

No significant difference between girls and boys was found in **DSS** for both spelling and reading. I therefore could not reject the null hypothesis and concluded that there was no evidence for a difference between genders in this school.

Comparing girls in both schools, results indicated no significant difference in reading ability. I therefore could not reject the null hypothesis and concluded that there was no evidence that the girls in St David's were stronger in **reading** ability than those in DSS. Similarly, there was no

significant difference between the two schools for **spelling** scores. I could therefore not reject the null hypothesis, and concluded that no evidence existed for a difference in girls spelling ability between the two schools prior to the introduction of the HRSP.

No difference was observed between boys in both schools on either reading or spelling ability. I could not reject the null hypotheses, and concluded that there was no evidence for a difference in spelling and reading ability between the boys in the two schools prior to the implementation of the HRSP.

5.5.2.3. Race/language effects

As reported, there was a significant difference on chi-square between the two schools and the race/language variable. It was therefore important that I test for any possible cultural/language bias or differences between the two schools prior to the implementation of the HRSP. A random sample of 40 learners was drawn from both schools and the data subject to ANOVA to determine the presence of any significant differences between the schools. St David's did not have a significant Caucasian component, and therefore it was also imperative that I compare the African and Caucasian group in DSS and compare these two groups separately with the African group of SDD. The null hypotheses for this analysis were.

Ho 9: There is no difference between the Caucasian and African groups in the DSS group in spelling ability (Table 5.5, 2 and 3).

Ho 10: There is no difference between the Caucasian and African groups in the DSS group in reading comprehension ability (Table 5.4, 2 and 3).

Ho 11: There is no difference between the two schools and spelling ability in the African group. (Table 5.5., 1 and 2)

Ho 12: There is no difference between the two schools and reading comprehension ability in the African group (Table 5.4., 1 and 2).

Ho 13: There is no difference between the Caucasian group in DSS and African groups in SDD in spelling ability (Table 5.5., 1 and 3).

Ho 14: There is no difference between the Caucasian group in DSS and African groups in SDD in reading comprehension ability (Table 5.4, 1 and 3).

Table 5.4 summarises the means and standard deviations for reading comprehension in this analysis.

Table 5.4. The means and standard deviations for reading comprehension in the different language groups in this analysis

READING COMPREHENSION		
Overall significance	F(2,79) = 5.05 p = 0.01	Significance
1. African (SDD)	86.56±12.11	1 and 2 ns
2. African (DSS)	81.21±12.87	2 and 3 p = 0.001
3. Caucasian (DSS)	95.65±20.34	1 and 3 p = 0.013

The ANOVA analysis revealed a significant main effect. Orthogonal contrasts between pairs of means indicated that there was no significant difference in reading ability between the African groups in both schools. I therefore could not reject the null hypothesis and concluded that no evidence existed for a difference between SDD and DSS in learners of African identity prior to implementation of the HRSP. In contrast to this, a significant difference was obtained between the African and Caucasian groups in DSS and between the African group of SDD and the Caucasian group of DSS. I therefore rejected the respective null hypotheses, and concluded that there was evidence for a difference in reading ability in these groups prior to the implementation of the HRSP.

Table 5.5 summarises the means and standard deviations for spelling ability in this analysis.

Table 5.5. The means and standard deviations for spelling ability in the different language groups in this analysis

SPELLING ABILITY		
Overall significance	F(1,79) = 0.97 ns	Significance
1. African (SDD)	89.21±12.73	1 and 2 Ns
2. African (DSS)	89.52±13.16	2 and 3 Ns
3. Caucasian (DSS)	93.64±9.20	1 and 3 Ns

The ANOVA analysis revealed no significant main effect. Orthogonal contrasts between pairs of means indicated that there was no significant difference in spelling ability between the African groups in both schools. I therefore could not reject the null hypothesis and concluded that no evidence existed for a difference between SDD and DSS in learners of African identity prior to implementation of the HRSP. Similarly, no significant difference was obtained between the African and Caucasian groups in DSS and between the African group of SDD and the Caucasian group of

DSS. I therefore could not reject the respective null hypotheses, and concluded that there was no evidence for a difference in spelling ability in these groups prior to the implementation of the HRSP.

5.5.2.4. School effects

There is the possibility in this type of study that school and treatment effects will be confounded (Troia, 1999). It is conceivable that the school climate or ecology may be sufficiently different in the two schools to produce a difference in the dependent variables. It was reasoned that should such an influence exist, it would be evident in all round ability between the two schools in Grades six and seven, as these two groups had been exposed for five years to the school ecological environment. This all round ability would be expected to be reflected in reading and spelling ability. The null hypotheses for this analysis were as follows:

Ho 15: No difference existed between the spelling ability of learners in grades six and seven of the DSS and SDD.

Ho 16: No difference existed between the reading ability of learners in grades six and seven of DSS and SDD.

Tables 5.6 and 5.7 summarises the means and standard deviation for these respective groups.

Table 5.6. The means and standard deviation for reading comprehension in DSS and SDD groups

Reading Comprehension	SDD	DSS	Significance (t-test)
Grade 6	78.15±9.01(n = 16)	83.87±10.52(n = 14)	Ns
Grade 7	76.88±10.26(n = 15)	80.05±15.07(n= 21)	Ns

Table 5.7. The means and standard deviation for spelling ability in DSS and SDD groups

Spelling Ability	SDD	Domino Servite	Significance (t-test)
Grade 6	82.95±12.69 (n = 16)	81.29±11.48 (n = 14)	Ns
Grade 7	78.67± 11.05(n = 15)	78.93±13.41 (n = 21)	Ns

Results of the analysis indicated than in no case was there a significant difference. I was therefore unable to reject the null hypotheses and concluded that there is no evidence that the spelling and reading abilities of the two schools in grades six and seven were different from each other. This

indicated that if there were any differences in school environment, it did not affect spelling and reading quotient scores.

5.5.2.5. The nature of literacy instruction in the control group

In order to obtain reliable information about the nature of literacy instruction in the control school, a questionnaire on reading instruction methods was given to the grades one to three teachers in SDD to complete. This provided necessary information about the type of instruction the control group received and allowed comparison with the treatment groups and the HRSP. This questionnaire yielded data on a) the use of the whole word method, b) the whole language method, c) the teachers attitude to direct systematic phonics instruction, d) the use of systematic phonics instruction as opposed to implicit, indirect approaches to phonics instruction in the classroom, e) the use of basal readers and texts with controlled vocabulary, and f) the fidelity or rigour of implementation of systematic phonics instruction in the classroom. The results of this analysis were compared with the HRSP to assess where similarities and differences lay. The different responses were compared using Kappa, an estimation of **agreement** adjusted for chance (Howell, 1992, Ary, *et al.* 2002), and Kendall's coefficient of concordance (w), also a measurement of **agreement**. To assess **disagreement** or difference, the Mann-Whitney U analysis was used. The null hypotheses for this analysis were formulated as follows:

Ho 17: There is no difference in the type of literacy instruction in Grades one, two and three at SDD.

Ho 18: There is no difference between the type of literacy instruction used in the HRSP and the type of literacy instruction in SDD.

Table 5.8 summarises the results of this analysis. Kendall's coefficient of concordance indicated a significant agreement between the HRSP and Grade 1 of SDD (HRSPxSDDGrade1) and a significant agreement between Grade 2 and Grade 3 of St David (SDDGrade2xSDDGrade3). This result was mirrored by the Mann-Whitney U analysis, which indicated no significant difference between the HRSP and Grade 1 and between Grade two and Grade three. I thus could not reject the respective null hypotheses and concluded that there was no evidence for a significant difference in these cases. This result indicated that literacy instruction in Grade one of SDD was very similar to that of the HRSP (HRSPxSDDGrade1), and that literacy instruction in Grades two was very similar to grade three at St David's school (SDDGrade2xSDDGrade3).

Table 5.8. The results of the comparison of the response scores from the teacher questionnaire on literacy instruction in grade 1 to 3 of SDD school and compared with the HRSP

Table 5.8.	Kendall's W	Mann-Whit U
HRSPxGrade1	0.79 (P=0.006)	Ns
HRSPxGrade2	0.54 (ns)	P < 0.05
HRSPxGrade3	0.44 (ns)	P < 0.05
Grade1x2	0.62 (ns)	P < 0.05
Grade1x3	0.56 (ns)	P < 0.05
Grade2x3	0.72 (P=0.026)	Ns

Mann-Whitney U indicated a significant *difference* in HRSPxSDDGrade2, HRSPxSDDGrade3, SDDGrade1xSDDGrade2 and SDDGrade1xSDDGrade3. This result was mirrored by Kendall's W, which indicated a non-significant *agreement* in these cases. I therefore rejected the null hypothesis for these cases and concluded that evidence for a difference in literacy instruction existed between these groups.

This result was corroborated by the estimations of agreement after adjustment for chance (kappa). Kappa for the whole analysis (all) indicated a 35% agreement adjusted for chance between the HRSP and Grade 1 literacy instruction (HRSPxSDDGrade1). Because the actual classroom practice is what is most crucial, kappa was also estimated for component f) of the questionnaire. Kappa for the fidelity or rigour of implementation of systematic phonics instruction in the classroom (rigour) indicated a 22% agreement for HRSPxSDDGrade1 and a 12% agreement for SDDGrade1xSDDGrade2. A negative value of kappa indicates an agreement less than expected by chance (Ary *et al.*, 2002). A value of -0.55 was found in HRSPxSDDGrade3 indicating a **difference** in literacy instruction between these two cases. HRSPxSDDGrade2, SDDGrade1xSDDGrade2 and SDDGrade2xSDDGrade3 showed no agreement beyond adjustment for chance. Table 5.9 summarises the results of this analysis.

Table 5.9. The results of the comparison of the kappa scores from the teacher questionnaire on literacy instruction in grade 1 to 3 of SDD school and compared with the HRSP

Table 5.9.	Kappa (all)	Kappa (rigour)
HRSPxGrade1	+0.35	+0.22
HRSPxGrade2	+0.063	-0.01
HRSPxGrade3	-0.031	-0.55
Grade1x2	-0.018	+0.12
Grade1x3	-0.019	-0.033
Grade2x3	0.000	-0.033

The above analyses provided an estimation of agreement or difference, but did not provide any information about the exact nature of the differences or similarities of literacy instruction in the different grades compared to the HRSP. To obtain this information the questionnaire was analysed for each component a) the use of the whole word method, b) the whole language method, c) the teachers attitude to direct systematic phonics instruction, d) the use of systematic phonics instruction as opposed to implicit, indirect approaches to phonics instruction in the classroom, e) the use of basal readers and texts with controlled vocabulary, and f) the fidelity or rigour of implementation of systematic phonics instruction in the classroom. Table 5.10 provides a summary of significance of difference (Scheffe) within each component.

Table 5.10. The comparison of the Scheffe comparisons from the teacher questionnaire scores on literacy instruction in grade 1 to 3 of SDD school and compared with the HRSP

	word	language	Phonics	Sys. phonics	readers	Rigour
HRSPxGrade 1	Ns	Ns	Ns	Ns	Ns	Ns
HRSPxGrade 2	Ns	P < 0.05	Ns	P < 0.05	P < 0.05	Ns
HRSPxGrade 3	Ns	P < 0.05	Ns	P < 0.05	P < 0.05	P < 0.05
Grade1x2	Ns	Ns	Ns	Ns	P < 0.05	Ns
Grade1x3	Ns	Ns	Ns	P < 0.05	P < 0.05	P < 0.05
Grade2x3	Ns	Ns	Ns	Ns	Ns	Ns

From the above table, it was possible to draw definite conclusions about the similarities and differences in literacy instruction between the three grades and the HRSP.

a) the use of the whole word method

Ho 19: there was no difference between the three grades and the HRSP in the whole word method.

The data indicated no difference between the three grades and the HRSP on this category. I was therefore unable to reject the null hypothesis and concluded that there was no evidence for a difference in the (non)use of the whole word method.

b) the whole language method

Ho 20: there was no difference between the three grades and the HRSP in the whole language method.

The data indicated a significant difference between grades 2 and 3 and the HRSP on this category. I was therefore able to reject the null hypothesis and concluded that there was evidence for a difference in the use of the whole language method.

c) the teachers attitude to direct systematic phonics instruction

Ho 21: there was no difference between the three grades and the HRSP in the teacher's attitude (positive) to systematic phonics instruction.

The data indicated no difference between grades and the HRSP on this category. I was therefore unable to reject the null hypothesis and concluded that there was no evidence for a difference in the teacher's attitude (positive) to systematic phonics instruction.

d) the use of systematic phonics instruction as opposed to implicit, indirect approaches to phonics instruction in the classroom

Ho 22: there was no difference between the three grades and the HRSP in the use of systematic phonics instruction as opposed to implicit, indirect approaches to phonics instruction in the classroom.

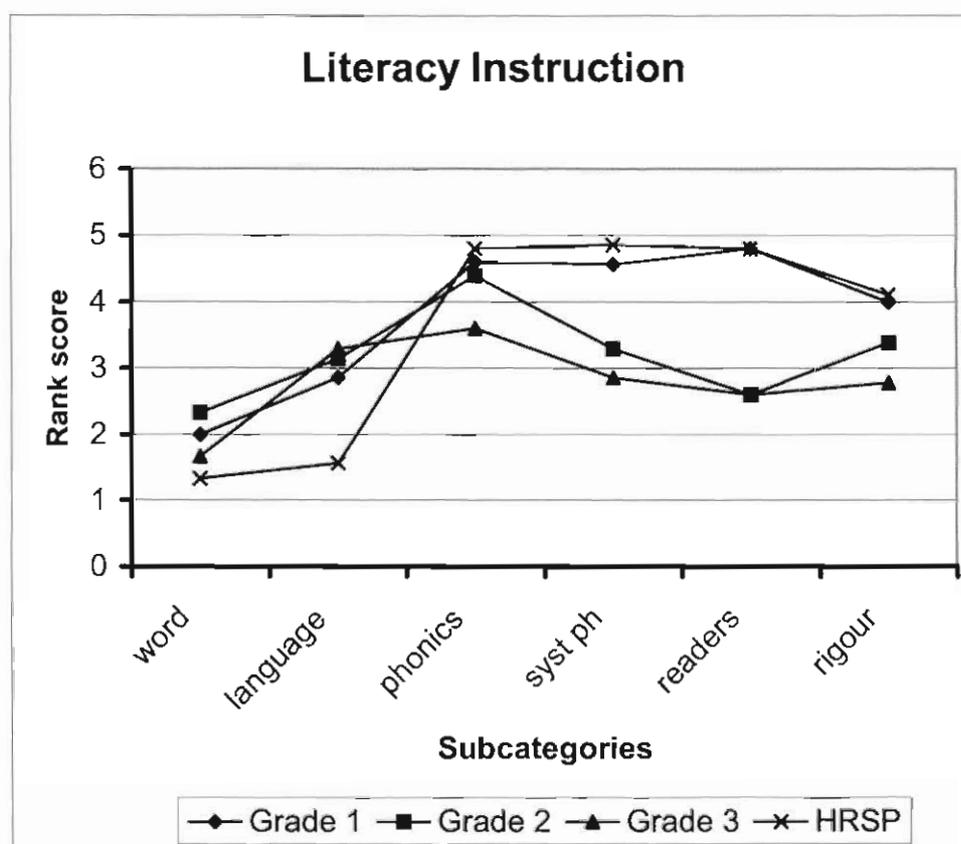
The data indicated a significant difference between grades 2 and 3 and the HRSP, and between grades 1 and grades 3 on this category. I was therefore able to reject the null hypothesis and concluded that there was evidence for a difference in the use of systematic phonics instruction as opposed to implicit, indirect approaches to phonics instruction in the classroom.

e) the use of basal readers and texts with controlled vocabulary

Ho 23: there was no difference between the three grades and the HRSP in the use of basal readers and texts with controlled vocabulary.

The data indicated a significant difference between SDD grades 2 and 3 and the HRSP, and between SDD grade 1 and grade 3, and grade 1 and grade 2 on this category. I was therefore able to reject the null hypothesis and concluded that there was evidence for a difference in the use of basal readers and texts with controlled vocabulary.

Figure 5.1. The relationship between the different SDD grades 1 to 3 on each of the components of literacy instruction. The codes in the figure mean the following: Word – whole word approach, language – whole language approach, phonics – teacher attitude to early systematic phonics instruction, syst ph – the use of systematic phonics in the classroom, read – the use of basal readers and phonetically controlled texts for reading, rigour – the rigour of implementation of systematic phonics in the classroom. Cf. Table 5.10 for significance of difference for each category.



f) the fidelity or rigour of implementation of systematic phonics instruction in the classroom

Ho 24: there was no difference between the three grades and the HRSP in the fidelity or rigour of implementation of systematic phonics instruction in the classroom.

The data indicated a significant difference between SDD grade 3 and the HRSP, and between SDD grade 3 and SDD grade 1 in this category. I was therefore able to reject the null hypothesis and concluded that there was evidence for a difference in the fidelity or rigour of implementation of systematic phonics instruction in the classroom. Figure 5.1 (above) graphically depicts the relationship between the different grades on each of the components.

5.5.2.6. Hawthorne effects

Learners in DSS were pre and post tested for changes in mathematical ability to control for Hawthorne effects. This was replicated in three independent groups, Grade 3 (2003), Grade 2(2004), and Grade 3 (2004). It was reasoned that if Hawthorne effects were operative, then a difference in mathematics ability would be found in these groups. The null hypothesis for this analysis was as follows:

Ho 25: There was no significant difference between pre and post-test scores in mathematics ability in selected groups in DSS. Table 5.11 summarises the means and standard deviations for the three groups in this analysis.

Table 5.11. The means and standard deviations for mathematics scores for the three groups in this analysis

Mathematics score	Grade3(2003)	Grade2(2004)	Grade3(2004)
Pretest (June)	93.05±9.76	103.93±12.91	100.43±14.11
Post-test (November)	92.10±9.06	102.73±12.46	96.57±6.24
Significance (t-test)	Ns	Ns	Ns

In three replications, a non-significant result was obtained. I was thus unable to reject the null hypothesis and concluded that there was no evidence that a difference existed in mathematics scores between pre and post testing. This result makes the operation of Hawthorne effects due to the implementation of the HRSP in DSS implausible. Furthermore, the mainstream context, the intact group design, the use of class teachers and the integrated nature of the programme would lead us to argue that Hawthorne effects would be minimal, and not a threat to internal validity.

5.5.3. THE EFFECTS OF THE HRSP

5.5.3.1. Fidelity of treatment and effect sizes

Fidelity of treatment data was gathered to assess each teacher's attitudes and teaching profile. The items of the questionnaire were grouped according to five themes. Teachers in grades one to five of DSS were scored on a) the teachers attitude to the teaching of systematic phonics in reading, b) the teachers attitude to the HRSP, c) fidelity of implementation of the HRSP, d) time spent on HRSP instruction in class and e) the teachers attitude to early reading intervention programmes. These data were compared with the improvement in spelling and reading ability in test-retest measures for each grade one to five in DSS. Effect sizes (**d**) were calculated for each grade and correlated with the results of the questionnaire using Pearson Product-moment correlation to establish if any relationships existed. The null hypotheses for this analysis were as follows:

Ho 26: There is no correlation between the category scores obtained from the questionnaire.

Ho 27: There is no correlation between the category scores and the effect sizes for test-retest scores in spelling ability in DSS.

Ho 28: There is no correlation between the category scores and the effect sizes for test-retest scores in reading ability in DSS.

Table 5.12 summarises the results of this analysis.

Table 5.12. The Pearson product-moment correlation coefficients for the responses to the teacher questionnaire: Fidelity of implementation of the HRSP (Fid.HW), the teachers attitude to the HRSP (Att.HW), the time spent on phonics instruction in class (time), the teachers attitude to systematic phonics instruction (phonics), and the teachers attitude to early reading interventions (Early Int.)

DSS	Fid.HW	Att.HW	Time	Phonics
Fid.HW	1	Ns	Ns	Ns
Att.HW	Ns	1	Ns	Ns
Time	Ns	Ns	1	0.90
Phonics	Ns	Ns	0.90	1
Early Int.	Ns	Ns	Ns	Ns

The product-moment correlation matrix indicates that **no** correlation existed between the teachers **attitude** to the HRSP (Att.HW) and the **fidelity** or rigour of implementation (Fid.HW) of the HRSP

(in terms of adherence to the teacher's manual, the use of HRSP worksheets, the use of controlled texts keyed to the programme, and the application of the colour coding system). This was important as these categories were designed to test different constructs. A significant correlation ($r = 0.90$) was also observed between the teachers attitude to systematic phonics instruction (phonics) and the amount of time spent on phonics in class (time). I therefore rejected the null hypothesis and concluded that evidence existed for a significant correlation between these categories. No significant correlation was found between the teacher's attitude to early reading intervention and all other categories.

A correlation between test-retest effect sizes for each grade in spelling ability and the different categories indicated a statistically significant correlation ($r = 0.91$) between spelling and time spent on phonics instruction in class. Thus I rejected the null hypothesis and concluded that a significant relationship between d for spelling and time spent on phonics instruction existed.

A product-moment analysis of d for test retest reading in Grades 1 to five at DSS indicated a statistically significant correlation between grade effect size and teacher attitudes to the HRSP ($r = 0.90$) and between grade d and teacher rigour of implementation of the HRSP ($r = 0.91$). I therefore rejected the null hypothesis and concluded that a relationship existed between attitude to the HRSP and implementation of the HRSP and d for reading ability. Table 5.13 summarises the results of this analysis.

Table 5.13. The Pearson product-moment correlation coefficients for the correlation of the grade effect sizes and the responses to the teacher questionnaire: Fidelity of implementation of the HRSP (Fid.HW), the teachers attitude to the HRSP (Att.HW), the time spent on phonics instruction in class (time), the teachers attitude to systematic phonics instruction (phonics), and the teachers attitude to early reading interventions (Early Int.)

DSS	d spell	d read
Fid.HW	Ns	0.91
Att.HW	Ns	0.90
Time	0.91	Ns
Phonics	Ns	Ns
Early Int.	Ns	Ns

The above results indicated a correlation, but did not provide evidence of a significant difference between the test-retest cores in grades one to five in DSS. In order to test this, a random sample was drawn from a pooled group of scores from grade 1 to 5 and subject to repeated measures ANOVA. Effect sizes for the whole group (pooled grades 1 to 5) were also calculated for reading and spelling. The Ho for this analysis was as follows:

Ho 29: There is no significant difference between the test and retest scores in spelling ability in grades 1 to 5 in DSS.

Ho 30: There is no significant difference between the test and retest scores in reading ability in grades 1 to 5 in DSS.

A statistically significant difference ($F(1,40) = 10.317$, $p = 0.003$) was obtained for spelling scores. Reliability was 0.84 (Hoyt) and 0.87 (Cronbach). I therefore rejected the null hypothesis. Evidence indicated there was an increase in spelling scores (adjusted for maturation effects) between the test and retest period. A significant result was also obtained for reading scores ($F(1,40) = 22.12$, $p < 0.001$). Reliability for reading was 0.83 (Hoyt) and 0.89 (Cronbach). I therefore rejected the null hypothesis. Evidence indicated there was a difference in reading scores (adjusted for maturation effects) between the test and retest period.

Table 5.14 summarises the means and standard deviations for the test (June) and retest (November) scores. The effect sizes obtained were moderate to large. The effect sizes for whole group were $d = 0.83$ for reading and $d = 0.76$ for spelling. Both were significant at the 5% level. The means and standard deviations for changes in spelling and reading during the same period are also given for SDD for comparison.

Table 5.14. The means and standard deviations for the test and retest scores for grades 1 to five in DSS. The means and standard deviations for changes in spelling and reading during the same period are also given for SDD for comparison. Effect size for whole group is provided

	Reading comprehension			
DSS	93.79±8.32	100.75±16.43	P < 0.001	d = 0.83
SDD	86.63±12.11	88.43±13.13	Ns	
	Spelling ability			
DSS	93.22±8.32	96.29±9.42	P = 0.003	d = 0.76
SDD	89.87±12.08	90.81±11.34	Ns	

5.5.3.2. Pre-test post-test measures and main effects

The primary aim of this research was to find evidence if any difference existed between the treatment and control school after the implementation of the HRSP. Pre-test-post-test measures were subject to analysis by repeated measures ANOVA and ANCOVA. A stratified random sample ($n = 50$) and a simple random sample ($n = 41$) were drawn from the pooled reading and spelling scores for the respective schools in grades one to five. The null hypotheses for this analysis were:

Ho 31: There was no difference in spelling scores between DSS and SDD after the implementation of the HRSP.

Ho 32: There was no difference in reading scores between DSS and SDD after the implementation of the HRSP.

A simple ANOVA on a **stratified random sample** of post test scores indicated statistically significant difference was present for main effect (school) in **spelling** ability ($F(1,48) = 4.89, p = 0.03$) and **reading** comprehension ($F(1,48) = 10.15, p < 0.01$). I therefore rejected the null hypotheses and concluded that evidence indicated a significant difference between the two schools. A repeated-measures ANOVA on a random sample from the pooled data was also conducted to determine if a difference existed in post test measures in relation to pre-test measures in DSS for both reading and spelling ability. In **spelling** ability a significant result was found for pre-post-test ($F(1,40) = 16.84, p < 0.001$). In **reading** comprehension a statistically significant difference in pre-post-test scores was also obtained ($F(1,40) = 5.16, p = 0.029$). I therefore rejected the null hypotheses and concluded that a difference in spelling ability and reading comprehension **between the two schools**, and between pre and post-test scores in pooled grade one to five **in DSS**, existed after the implementation of the HRSP.

This design (pre-test-post-test matched control group) assumed the equivalence of the pre-test scores. The analysis of variance of a **simple random sample** indicated a significant difference on main effect between schools in both reading ($F(1,40) = 11.97, p = 0.001$) and spelling ($F(1,40) = 4.51, p = 0.04$). An examination of the means of the separate groups indicated that for reading this effect could be accounted for by post-test differences, i.e. the difference was evident only after the implementation of the HRSP (Table 5.15).

Table 5.15 The means and standard deviations for this analysis for pre and post test scores in reading ability. Data for whole groups is provided in brackets for comparison

Reading Ability	Pre-test		Post-test	
DSS	89.29±9.26	(86.88±16.12)	96.77±9.3	(102.18±15.67)
SDD	85.04±11.37	(86.36±12.81)	87.94±11.89	(87.85±10.62)
Significance	Ns	Ns	t = 2.68 p < 0.05 d = 0.83	t = 6.94 p < 0.05 d = 1.09

In spelling scores however, a significant difference existed between the two groups in the pre-test (Table 5.16).

Table 5.16 The means and standard deviations for this analysis for pre and post test scores in spelling ability. Data for whole groups is provided in brackets for comparison

Spelling Ability	Pre-test		Post-test	
DSS	95.53±6.22	(89.47±11.99)	99.47±8.75	(98.02±8.44)
SDD	86.59±10.74	(88.10±11.92)	88.11±9.8	(89.86±9.45)
Significance	t = 3.3 p < 0.05	NS	t = 3.96 p < 0.05 d = 1.22	t = 5.85 p < 0.05 d = 0.91

Thus the post-test differences might be mainly due to prior differences between groups and not the HRSP. A method that allows one to 'adjust' or 'correct' for pre-test differences is the ANCOVA using pre-test as the covariate (Monteith & Steyn, 2001, Ary *et al.*, 2002).

The analysis of covariance (ANCOVA) of **reading** comprehension scores yielded a significant main effect ($F(1,39) = 5.10$ $p = 0.03$) and a significant difference between group means adjusted for pre-test variance ($F(1,39) = 6.102$ $p = 0.018$). The ANCOVA of **spelling** scores yielded a significant main effect ($F(1,39) = 4.87$ $p = 0.033$) and a significant difference between group means adjusted for pre-test variance ($F(1,39) = 5.93$ $p = 0.02$). These data indicate that a significant difference was present between the treatment and control for both spelling and reading comprehension after the implementation of the HRSP when post-test means were adjusted for pre-test variance. The effect sizes obtained in this analysis were large. Spelling scores yielded an effect size of $d = 1.22$ for the random sample and $d = 0.91$ for the whole group. Reading scores yielded an effect size of $d = 0.83$

for the random sample and $d = 1.09$ for the whole group. Taking r_{es} (effect size correlation), it was evident that all these effect sizes were significant at the 5% level.

5.5.3.3. Effects of the modulation of the independent variable on effect size

The grades one to five in the treatment group were subject to different amounts and intensity of the HRSP, a) three years of intervention (grade 3), b) two years of intervention (grade 2), c) one year of intervention (grade 1), and d) between one and two years of intervention (grades 4 and 5). This made it possible to test for the differential effect of different levels of the HRSP. Effect sizes were calculated for each grade and correlated with the different levels of the independent variable. This test was replicated five months later. The null hypotheses for this analysis were formulated as follows:

Ho 33: There was no correlation between the effect size for grades one to five for spelling and the amount of exposure to the HRSP.

Ho 34: There was no correlation between the effect size for grades one to five for reading and the amount of exposure to the HRSP.

The results of a Pearson product-moment correlation indicated a significant correlation between effect size for grades 1 to five spelling scores and exposure to the programme ($r = 0.93$). This result was replicated five months later ($r = 0.91$). A significant correlation between the effect sizes for grades one to five and the exposure to the HRSP was also found for reading ($r = 0.97$). This

Table 5.17. Effect sizes for grades one to five in spelling and reading ability. The analysis was replicated five months apart (A and B)

	Reading Comprehension		Spelling ability		Code (Months)
	Effect size A	Effect size B	Effect size A	Effect Size B	
Grade 1	0.52	0.49	0.62	0.47	12
Grade 2	1.08	1.61	0.78	0.90	24
Grade 3	2.41	2.21	1.39	1.08	36
Grade 4	0.74	0.87	0.75	0.63	18
Grade 5	0.65	0.97	0.57	0.42	18

result was also replicated five months later ($r = 0.98$). Thus I rejected the null hypothesis and concluded that evidence for a significant correlation between effect sizes and the exposure to the HRSP existed for both reading and spelling scores. Table 5.17 (above) summarises the effect sizes for this analysis.

5.5.3.4. Modulation of the independent variable: grade X HRSP interactions

A random sample from the pooled scores of each school was subject to a factorial ANOVA with school (treatment or not) and grades (amount of exposure to the HRSP) as independent variables. Orthogonal contrasts were used to compare group means. The Null hypotheses for this analysis were:

Ho 35: No difference was present between DSS and SDD in spelling ability.

Ho 36: No difference was present between DSS and SDD in reading ability.

Ho 37: No effect of different amounts of exposure to the HRSP was evident in spelling ability.

Ho 38: No effect of different amounts of exposure to the HRSP was evident in reading ability.

A statistically significant difference was obtained for the effect of school (presence or absence of HRSP) for both spelling ($F(1,155) = 18.75$, $p < 0.001$) and reading comprehension ($F(1,155) = 48.18$, $p < 0.001$). I therefore rejected the respective null hypotheses and concluded that evidence for a difference between the two schools in both spelling and reading ability existed.

A significant result was also obtained, for the effect of 'grade' i.e. amount of exposure to the HRSP. This was evident in both reading ($F(6,155) = 20.56$, $p < 0.001$) and spelling ($F(6,155) = 19.22$, $p < 0.001$). A significant interaction was also observed for both reading ($F(6,155) = 9.283$, $p < 0.001$) and spelling ($F(6,155) = 2.69$, $p = 0.016$). The interaction indicates that the effect of 'grade' depends on the difference between 'schools'. Furthermore, the most plausible difference between 'schools' that would account for the difference between 'grades' is the HRSP. *Post hoc* comparisons between grade means indicated significant differences between grades 2, 3, 4 and 5 but not grade 1 in spelling, and between grades 2, 3, 4, and 5, but not grade 1 for reading. I thus rejected the respective null hypotheses, and concluded that evidence existed for an effect of the amount of exposure to the HRSP on spelling and reading ability. Figure 5.2 and 5.3 graphically illustrates the difference between the two schools in grade 1 to 5 scores.

Figure 5.2. The difference between the two schools in grade 1 to 5 spelling scores: A score of 100 represents age level. A score below 90 is equivalent to disability status

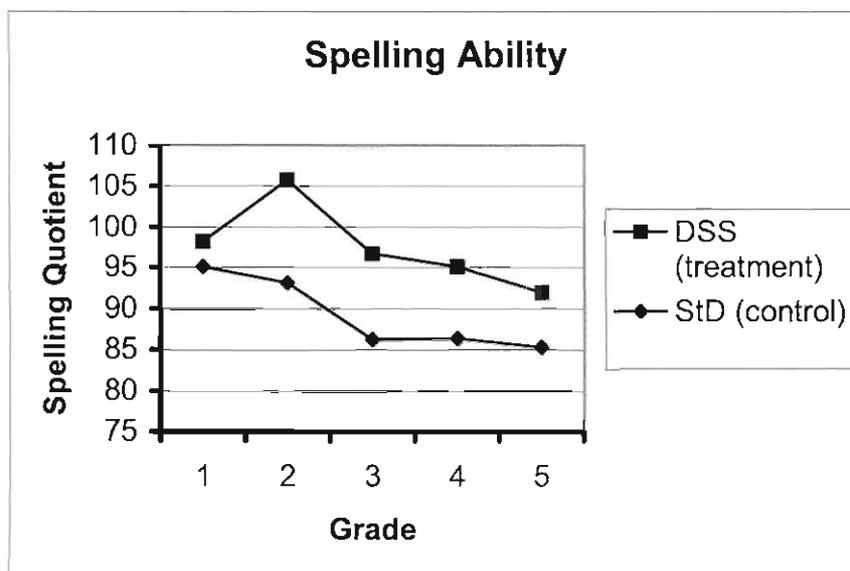
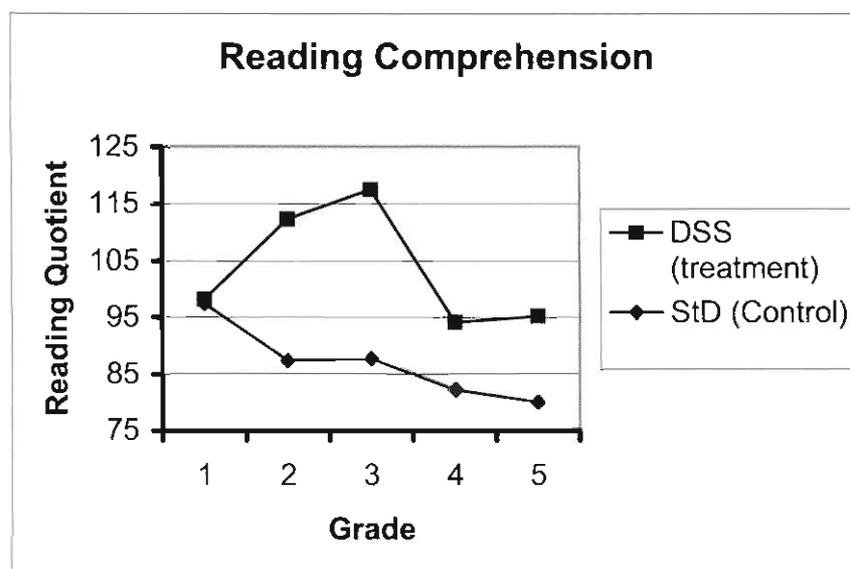


Figure 5.3. The difference between the two schools in grade 1 to 5 reading scores: A score of 100 represents age level. A score below 90 is equivalent to disability status



5.5.3.4. Gender effects

As reported above, it was considered crucial for the internal validity of this study that gender effects be analysed. It is often reported in the literature that there is a consistent difference between genders on spelling and reading ability at the early stages of learning to read (Lerner, 2003, Richek et al, 1989) at this age (5-10yrs). An analysis of reading and spelling pre-test scores were

examined for gender effects in a random sample from each school. No significant difference was obtained between boys and girls in reading ability in either school. A significant difference was found between boys and girls in spelling ability in SDD but no significant difference was obtained between genders for DSS.

In this analysis, a random sample of spelling and reading scores from each school were examined for differences in gender in post- test scores. The null hypotheses for this analysis were:

Ho 39: There is no difference between boys and girls in spelling ability in SDD.

Ho 40: There is no difference between boys and girls in spelling ability in DSS.

Ho 41: There is no difference between boys and girls in reading ability in SDD.

Ho 42: There is no difference between boys and girls in reading ability in DSS.

The results of the overall analysis (ANOVA) indicated a significant main effect for group (school) ($F(1,76) = 16.89, p < 0.001$) but not for gender ($F(1, 76) = 3.49, ns$) in post-test **reading** comprehension scores. Effect sizes obtained were moderate to large. I therefore could not reject the respective null hypotheses and concluded that there was no evidence for a gender difference in post-test reading scores.

Table 5.18. A comparison of the means and standard deviations for reading scores of boys and girls between DSS and SDD

Reading Comprehension	DSS	SDD	Effect Size
Boys	101.51±15.84	84.12±12.18	1.06
Girls	105.86±24.61	93.26±13.53	0.55
Significance	Ns	P = 0.046	

However, orthogonal contrasts indicated that a significant difference between boys and girls reading comprehension was present for SDD. Table 5.18 summarises the means and standard deviations for reading scores. A large effect size was obtained for boys ($d = 1.06$) and a moderate effect size for girls ($d = 0.55$).

The results also indicated a significant main effect for group (treatment) ($F(1,76) = 9.181, p < 0.003$) but not for gender ($F(1, 76) = 2.67, ns$) in post-test **spelling** scores. A large effect size was obtained for boys ($d = 0.85$) and a moderate effect size for girls ($d = 0.35$). Table 5.19 summarises

the means and standard deviations for spelling scores. I therefore could not reject the respective null hypotheses and concluded that there was no evidence for a gender difference in post-test spelling scores in DSS.

Table 5.19. A comparison of the means and standard deviations for spelling scores of boys and girls between DSS and SDD

Spelling	DSS	SDD	Effect size
Boys	96.58±7.05	88.12±13.52	0.85
Girls	99.00±12.35	93.25±8.64	0.35
Significance	Ns	Ns	

5.5.3.5. Language/race effects

The confounding effect of learning in English as a first or additional language could not be assessed in this study. However, language and 'race' (cultural group) effects might also constitute a threat to the internal **and** external validity of this study. It was therefore imperative that I examine the possible confounding effects of culture and language group. A random sample from the pooled post-test scores of each group was subject to an ANOVA. Orthogonal contrasts were used to compare group means. The null hypotheses for this analysis were:

Ho 43: There was no difference in the post-test spelling scores for African language group between SDD and DSS schools.

Ho 44: There was no difference in the post-test reading scores for African language group between SDD and DSS schools.

Ho 45: There was no difference in the post-test spelling scores between race groups in DSS.

Ho 46: There was no difference in the post-test reading scores between race groups in DSS.

Results indicated a significant difference between language groups in reading comprehension ability. ($F(2,79) = 9.88, p < 0.01$). Table 5.20 summarises the means and standard deviations of this analysis.

Table 5.20. A comparison of the means and standard deviations for reading scores of language groups between DSS and SDD

READING COMPREHENSION		
Overall significance	F(2,79) = 9.88 p < 0.01	Significance
1. African (SDD)	88.18±13.41	1 and 2 p = 0.03, d = 0.57
2. African (DSS)	97.06±17.55	2 and 3 p = 0.018
3. Caucasian (DSS)	108.35±22.13	1 and 3 p < 0.001, d = 1.14

Effect sizes were moderate to large. I therefore rejected the respective null hypothesis and concluded that a difference existed between language groups for reading comprehension scores. Similarly, results indicated a significant difference between language groups in spelling ability (F(2,79) = 5.28, p < 0.01). Effect sizes were moderate to large. Table 5.21 summarises the means and standard deviations of this analysis.

Table 5.21. A comparison of the means and standard deviations for spelling scores of language groups between DSS and SDD

SPELLING		
Overall significance	F(2,79) = 5.28 p = 0.01	Significance
1. African (SDD)	90.37±11.79	1 and 2 p = 0.031 d = 0.54
2. African (DSS)	96.18±9.65	2 and 3 ns
3. Caucasian (DSS)	99.78±11.51	1 and 3 p < 0.001 d = 0.81

I therefore rejected the respective null hypothesis and concluded that a difference existed between language groups for post-test spelling scores.

Because a significant language effect was obtained for post-test reading comprehension in DSS, further analyses were carried out to obtain more information on the nature of the differences. Firstly, pre and post-test scores were compared using ANOVA, with orthogonal contrasts for *post hoc* pair-wise comparison of group means. Secondly, the differences between the African and Caucasian language groups in grades six and seven (pooled) in **DSS** were investigated using t-test, and effect sizes calculated for the test-retest period. Thirdly, **post-test** scores for grades six and seven were examined by t-test for differences in spelling and reading between the African language groups in both DSS and SDD.

1. pre- and post-test scores were compared using ANOVA, with orthogonal contrasts for *post hoc* pair-wise comparison of group means. The null hypotheses for this analysis were:

Ho 47: There was no difference between language groups in pre and post-test scores for reading ability in SDD.

Ho 48: There was no difference between language groups in pre and post-test scores for spelling ability in SDD.

Ho 49: There was no difference between pre and post-test scores for reading ability in African groups in DSS.

Ho 50: There was no difference between pre and post-test scores for spelling ability in African groups in DSS.

Ho 51: There was no difference between pre and post-test scores for reading ability in Caucasian groups in DSS.

Ho 52: There was no difference between pre and post-test scores for spelling ability in Caucasian groups in DSS.

No significant difference was observed between the pre and post-test scores for both reading and spelling ability in SDD. I therefore was unable to reject the null hypotheses and concluded that there was no evidence for a difference in reading and spelling between pre-post-test scores for SDD.

In contrast to this finding, a significant difference was obtained for pre-post test scores for both language groups in DSS. It therefore rejected the null hypotheses and concluded that evidence for a difference in pre and post-test scores for spelling and reading ability existed in both language groups. A large effect size was obtained for reading in African learners. Table 5.22 summarises the results of this analysis.

2. The differences between the African and Caucasian language groups in grades six and seven (pooled) in DSS.

The null hypotheses for this analysis were:

Ho 53: There is no difference between the African and Caucasian language groups in the pre-test and post-test spelling scores of the pooled grade six and seven data of DSS.

Ho 54: There is no difference between the African and Caucasian language groups in the pre-test and post-test reading scores of the pooled grade six and seven data of DSS.

Table 5.22. A comparison of pre and post-test scores for reading comprehension and spelling ability in the different language groups

READING COMPREHENSION				
	Pre-test	Post-test	Orthogonal cont.	Effect size
1. African (SDD)	86.56±12.11	88.18±13.41	Ns	
2. African (DSS)	81.21±12.87	97.06±17.55	P = 0.001	d = 1.04
3. Caucasian (DSS)	95.65±20.34	108.35±22.13	P = 0.006	d = 0.59
SPELLING				
	Pre-test	Post-test	Orthogonal cont.	Effect size
1. African (SDD)	89.21±12.73	90.37±11.79	Ns	
2. African (DSS)	89.52±13.16	96.18±9.65	P = 0.035	d = 0.58
3. Caucasian (DSS)	93.64±9.20	99.78±11.51	P = 0.047	d = 0.59

Table 5.23 summarises the means and standard deviations for the groups. A significant difference was obtained for both reading and spelling scores. I therefore rejected the null hypotheses and concluded that there was evidence for a difference in ability between the two language group for both reading and spelling in the pooled grades which had **not** been exposed to the HRSP (grade six and seven). It is also evident from Table 5.23 that there was **no change** in reading and spelling score for either group during the pre-test-post-test period.

Table 5.23. The means and standard deviations for reading and spelling for the pooled grade six and seven scores in the different language groups

DSS			
Pooled grades 6 and 7	African (n = 26)	Caucasian (n = 9)	Significance (t-test)
Reading pre-test (June)	79.54±10.57	92.74±9.34	T = 3.32 P < 0.05
Reading post-test (Nov.)	77.15±9.86	92.65±10.59	T = 3.99 P < 0.05
Spelling pre-test (June)	76.89±10.51	91.73±13.77	T = 3.37 P < 0.05
Spelling post-test (Nov.)	78.60±8.4	89.63±10.36	T = 3.19 P < 0.05

- 'Post-test' scores for grades six and seven were examined by t-test for differences in spelling and reading between the African language groups in the two schools.

The null hypotheses for this analysis were:

Ho 55: There is no difference between the two schools in **spelling** ability in the African language group in grades six and seven.

Ho 56: There is no difference between the two schools in **reading** ability in the African language group in grades six and seven.

Table 5.24 summarises the results of this analysis.

Table 5.24. The comparison between means of the African language groups in DSS and SDD for grades six and seven

READING COMPREHENSION			
	African (SDD)	African (DSS)	Significance (t-test)
Grade 6	78.89±11.74	77.23±8.89	Ns
Grade 7	78.05±9.88	76.72±10.42	Ns
SPELLING			
	African (SDD)	African (DSS)	Significance (t-test)
Grade 6	82.46±10.69	81.95±7.44	Ns
Grade 7	78.74±13.59	75.51±8.54	Ns

No significant difference was obtained in all group comparisons. I was thus unable to reject the null hypothesis, and concluded that there was no evidence for any difference in spelling or reading ability between the African learners in both schools (Grades 6 and 7).

5.5.3.6. Interactions and causal-comparative inference

In order to find evidence for a causal relationship in a natural groups design between the treatment and the effect observed, a design was used as described in the methodology (Shaughnessy & Zechmiester, 1990). A *post hoc* experimental protocol was derived, based on the reasoning that the two groups, control and treatment, would show an 'individual difference' on the grounds of their exposure to the HRSP or not. The two groups were then subject to test conditions (Schonell Graded word Test A). The words in the instrument were categorised in terms of level of item difficulty. These levels were carefully delimited, and it was argued that the two groups would show a variable response to the different levels of word difficulty. If the treatment (the HRSP) was specifically causing the difference, it was reasoned that:

- 1) For spelling achievement scores, a *differential effect* would be observed between the treatment and control groups on measures of ability for phonetically regular two and three syllable words, phonetically regular one syllable words and phonetically irregular words. This differential effect would be evident as an *interaction* in the statistical analyses. An interaction indicates that the response to one independent variable (word difficulty) depends on the level of the other independent variable (exposure to the HRSP or not) (Shaughnessy & Zechmeister, 1990, Howell, 1992).
- 2) The learners exposed to the phonics programme would show a *greater difference* on the phonologically regular words than for the phonetically irregular words. This was evaluated using *post hoc* comparison of means (orthogonal contrasts) and effect sizes.
- 3) This would change with *maturation* so that the learners in Grade 2 would show differences in the one syllable phonetically regular words and the irregular words, while in Grades 3 and 4 learner's the differences would be limited more to phonetically regular words.

This result was obtained.

1. Interactions

A random sample was drawn for each grade and the data subject to a factorial ANOVA with word difficulty and exposure to the HRSP or not as independent variables, and the score on the Schonell A as dependent variable. The null hypotheses for this analysis were:

Ho 57: No interaction was present between word difficulty and exposure to the HRSP in Grade 2.

Ho 58: No interaction was present between word difficulty and exposure to the HRSP in Grade 3.

Ho 59: No interaction was present between word difficulty and exposure to the HRSP in Grade 4.

A significant interaction was obtained for Grade 2 ($F(3,72) = 4.884$ $p = 0.004$) and Grade 3 ($F(3,56) = 3.96$, $p = 0.012$). I therefore rejected the null hypotheses and concluded that evidence existed for an interaction between the independent variables in grade 2 and grade 3. A non-significant result was observed for grade 4. I therefore could not reject the null hypothesis and concluded that no evidence for an interaction was present in grade 4.

2. Differences in response to word difficulty categories

A random sample was drawn for each grade and the data subject to ANOVA. *Post hoc* pair-wise comparison of means was carried out using orthogonal contrasts. Effect sizes were also calculated for each word category in each grade. The null hypotheses for this analysis were:

Ho 60: No difference in response to different levels of word difficulty was observed in grade 2 between the learners exposed to the HRSP and learners not exposed to the HRSP.

Ho 61: No difference in response to different levels of word difficulty was observed in grade 3 between the learners exposed to the HRSP and learners not exposed to the HRSP.

Ho 62: No difference in response to different levels of word difficulty was observed in grade 4 between the learners exposed to the HRSP and learners not exposed to the HRSP.

Grade 2

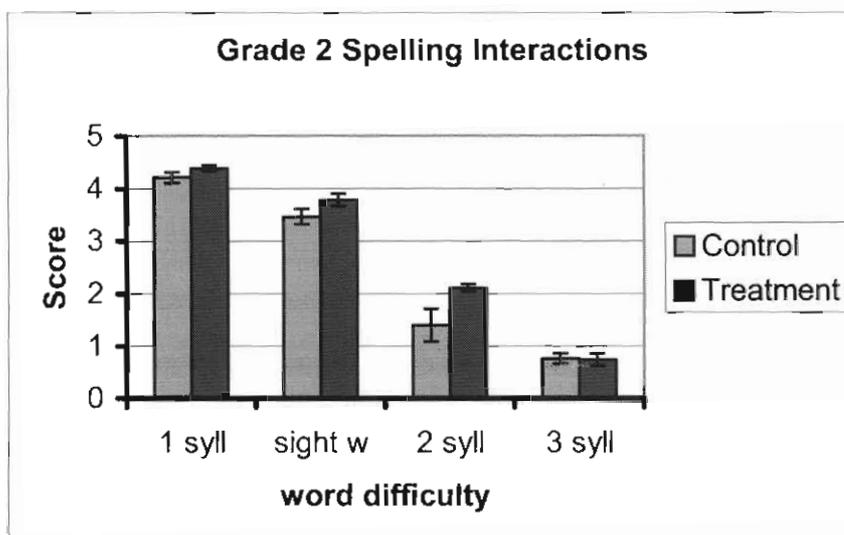
A significant difference was obtained for sight words and phonetically-regular-two-syllable words. The two-syllable-regular word category had the largest effect size, followed by the sight words and the one-syllable-regular words. Comparison with the effect sizes for whole groups (in brackets) indicated a similar pattern in the data. The largest effect sizes were obtained for sight words ($d = 1.45$) and phonetically regular two-syllable words ($d = 2.15$). I therefore rejected the null hypothesis, and concluded that evidence for a difference in response between the four word categories existed for grade 2. Tables 5.24 summarise the results for this analysis.

Table 5.25. A comparison of means between the grade 2 learners exposed to the HRSP and those not and the scores for different word categories

Grade 2	Not HRSP	HRSP	Orthogonal contrasts	Effect size
1 syllable reg.	4.21±0.18	4.38±0.87	Ns	0.32 (1.07)
Sight words	3.47±0.27	3.79±0.17	P = 0.013	1.45 (1.28)
2 syllable reg.	1.40±0.57	2.11±0.09	P < 0.001	2.15 (1.36)
3+ syllable reg.	0.76±0.16	0.74±0.17	Ns	-0.12 (0.18)

Figure 5.4 graphically depicts these data for grade 2.

Figure 5.4 A comparison between grade two learners exposed to the HRSP and those not for mean scores of different word categories. Standard error bars are included



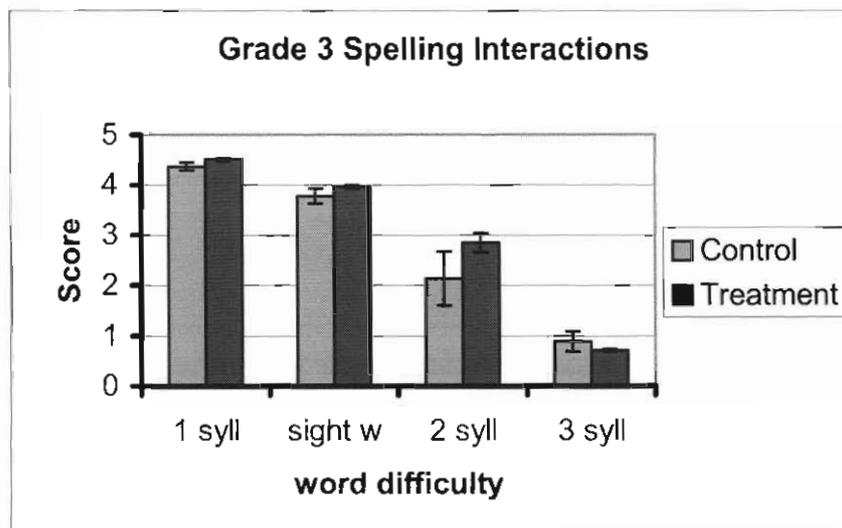
Grade 3

A significant difference was obtained for phonetically-regular-two-syllable words only. The one-syllable-regular word category had the largest effect size ($d = 1.56$), followed by the two-syllable-regular words ($d = 1.23$). Comparison with the effect sizes for whole groups (in brackets) indicated a similar pattern in the data. I therefore rejected the null hypothesis, and concluded that evidence for a difference in response between the four word categories existed for grade 3. Tables 5.25 summarise the results for this analysis. Figure 5.5 graphically depicts these data for grade 3.

Table 5.26. A comparison of means between the grade three learners exposed to the HRSP and those not and the scores for different word categories

Grade 3	Not HRSP	HRSP	Orthogonal contrasts	Effect size
1 syllable reg.	4.37±0.14	4.51±0.04	Ns	1.56 (1.22)
Sight words	3.78±0.24	3.97±0.08	Ns	1.18 (0.71)
2 syllable reg.	2.14±0.89	2.85±0.28	$P < 0.001$	1.23 (1.32)
3+ syllable reg.	0.88±0.35	0.71±0.04	Ns	-0.87 (0.003)

Figure 5.5 A comparison between grade three learners exposed to the HRSP and those not for mean scores of different word categories. Standard error bars are included



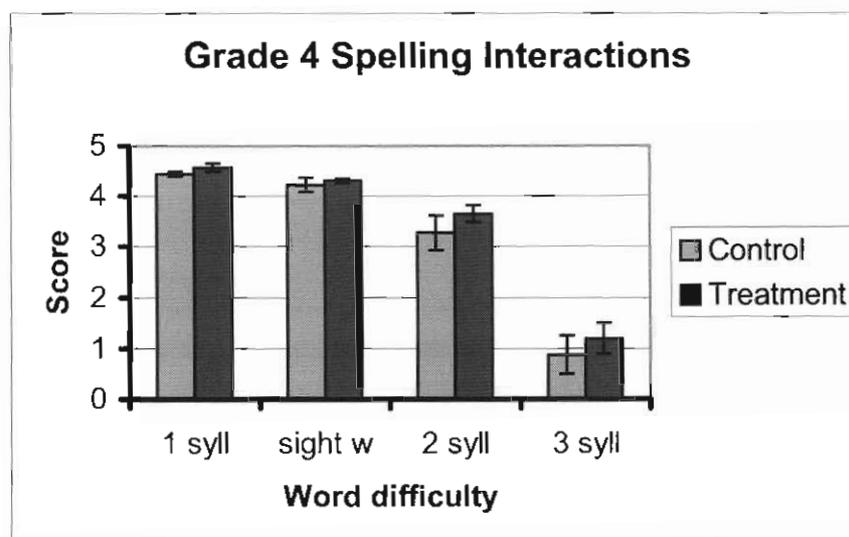
Grade 4

A significant difference was obtained for phonetically-regular-two-syllable words and phonetically-regular-three-syllable words. The one-syllable-regular word category had the largest effect size ($d = 1.14$), followed by the two-syllable-regular words ($d = 0.95$). Comparison with the effect sizes for whole groups (in brackets) indicated a similar pattern in the data. I therefore rejected the null hypothesis, and concluded that evidence for a difference in response between the four word categories existed for grade 4. Tables 5.26 summarise the results for this analysis. Figure 5.6 graphically depicts these data for grade four.

Table 5.27. A comparison of means between the grade four learners exposed to the HRSP and those not and the scores for different word categories

Grade 4	Not HRSP	HRSP	Orthogonal contrasts	Effect size
1 syllable reg.	4.45±0.08	4.57±0.13	Ns	1.14 (2.59)
Sight words	4.23±0.22	4.31±0.09	Ns	0.52 (0.80)
2 syllable reg.	3.27±0.53	3.65±0.27	P = 0.010	0.95 (1.15)
3+ syllable reg.	0.88±0.61	1.20±0.47	P = 0.021	0.59 (0.53)

Figure 5.6 A comparison between grade four learners exposed to the HRSP and those not for mean scores of different word categories. Standard error bars are included



3. Maturation effects

A pooled random sample of the three grades were subject to a three way factorial analysis of variance with grade 2, 3 and 4 (maturation), word difficulty, and exposure to HRSP or not as independent variables. The null hypotheses for this analysis were:

Ho 62: There was no interaction between maturation and the HRSP.

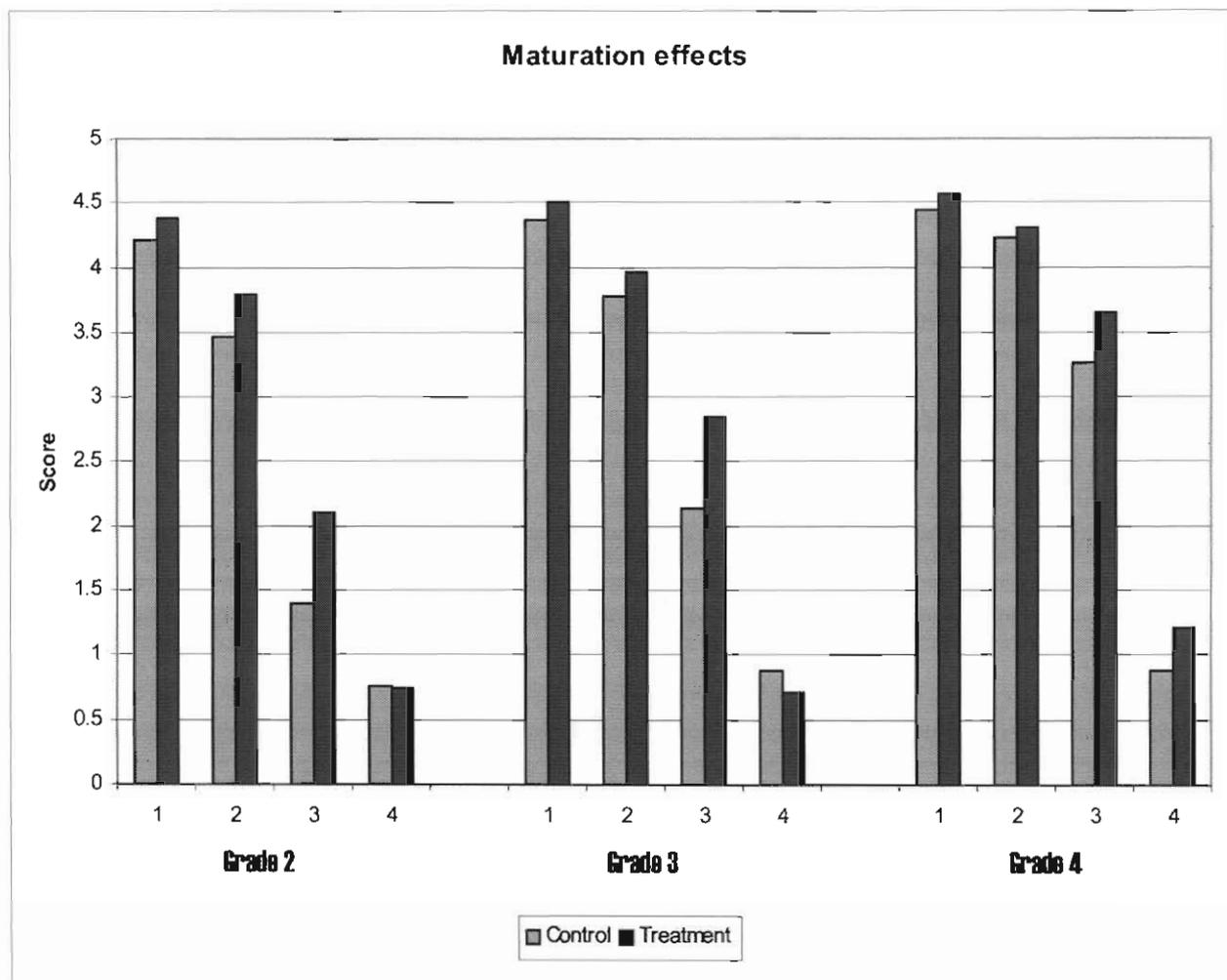
Ho 63: There was no interaction between maturation and word difficulty.

Ho 64: There was no interaction between word difficulty and the HRSP.

A non-significant result ($F(2,168) = 0.43$, ns) was obtained for the interaction between maturation and the HRSP. Therefore I could not reject the null hypothesis and concluded that there was no evidence for an interaction between maturation and the HRSP.

A significant result was obtained for an interaction between maturation and word difficulty ($F(6,168) = 15.36$, $p < 0.001$) and for an interaction between word difficulty and the HRSP ($F(3,168) = 4.02$, $p = 0.007$). I therefore rejected the respective null hypotheses and concluded that evidence existed for an interaction between these factors. Figure 5.7 summarises the effects of maturation on response to word difficulty.

Figure 5.7. Maturation effects for DSS grades 2, 3 and 4 and the response to different levels or word difficulty: 1 – one syllable phonetically regular words; 2 – phonetically irregular words; 3 – two syllable phonetically regular words; 4 – three syllable phonetically regular words



5.5.3.7. Partial replication

Replication remains one of the most important tests for the reliability of an experimental intervention (Shaughnessy & Zechmeister, 1990). Data from three groups, reception year 2000, 2001 and 2002, were analysed by repeated measures ANOVA to establish the presence a similar effect of the HRSP in the respective groups. The null hypotheses for this analysis were:

Ho 65: There is no difference in the test-retest scores in spelling ability of 2000 group.

Ho 66: There is no difference in the test-retest scores in reading ability of 2000 group.

Ho 67: There is no difference in the test-retest scores in spelling ability of 2001 group.

Ho 68: There is no difference in the test-retest scores in reading ability of 2001 group.

Ho 69: There is no difference in the test-retest scores in spelling ability of 2002 group.

Ho 70: There is no difference in the test-retest scores in reading ability of 2002 group.

2002 reception year

A significant result was obtained for spelling ($F(3,42) = 22.99, p < 0.001$) and reading ($F(3,42) = 4.503, p = 0.008$). I therefore rejected the null hypotheses and concluded that a difference between test-retest scores existed for both spelling and reading. Reliability estimates for spelling were 0.90 (Hoyt Intra-class reliability estimate) and 0.96 (Cronbach Alpha). Reliability estimates for reading were 0.82 (Hoyt Intra-class reliability estimate) and 0.85 (Cronbach Alpha).

2001 reception year

A significant result was obtained for spelling ($F(3,36) = 5.705, p = 0.001$) and reading ($F(3,36) = 75.27, p < 0.001$). I therefore rejected the null hypotheses and concluded that a difference between test-retest scores existed for both spelling and reading. Reliability estimates for spelling were 0.85 (Hoyt Intra-class reliability estimate) and 0.89 (Cronbach Alpha). Reliability estimates for reading were -1.55 (Hoyt Intra-class reliability estimate) and 0.39 (Cronbach Alpha).

2000 reception year

A significant result was obtained for spelling ($F(3,84) = 4.36, p = 0.003$) and reading ($F(3,84) = 6.63, p < 0.001$). I therefore rejected the null hypotheses and concluded that a difference between test-retest scores existed for both spelling and reading. Reliability estimates for spelling were 0.96 (Hoyt Intra-class reliability estimate) and 0.96 (Cronbach Alpha). Reliability estimates for reading were 0.90 (Hoyt Intra-class reliability estimate) and 0.92 (Cronbach Alpha).

5.5.3.8. Effect sizes for the study

Effect sizes allow us to estimate the **power** of a particular analysis. Estimates of power provide an indication of the probability of correctly rejecting the null hypothesis (Howell, 1992:204). A power of 0.32 means that there is a 68% chance of making a Type II error i.e. concluding there is no difference when there is a difference. This means that one can use effect size to obtain a reliable indication of the 'robustness' of an experimental design for a particular sample size. For $\alpha = 0.05$ (two tailed test), a power of .80 and above is usually considered adequate (Howell, 1992:216).

From Tables 5.15 and 5.16 (p. 206), the effect sizes for the analysis of the effect of the HRSP on reading and spelling of the whole groups ($N_h = 83$) were $d = +1.09$ and $d = +0.91$ respectively. These results would yield a power in excess of 0.99 i.e. a very robust design. From Table 5.17 (p. 207), the average effect size for the analysis of the effects of amount of exposure to the HRSP and effect size was $d = +1.12$ for reading comprehension and $d = +0.76$ for spelling. These results would indicate an 11% chance (power = 0.89) of a Type II error for reading comprehension and a 40% chance (power = 0.60) for spelling (Table 5.28). Overall this indicates that given the effect sizes obtained, the sample sizes were adequate, but that for smaller effect sizes, larger sample sizes would be necessary, particularly in the case of spelling achievement.

Table 5.28. Effect sizes and power estimates for this study

Reading		Spelling	
$d = +1.12$	$\delta = 3.2$ power 0.89	$d = +0.76$	$\delta = 2.12$ power 0.60

In this chapter the methodology of the quantitative analysis was described and the results reported. In the next chapter these results will be interpreted and discussed.

CHAPTER 6

INTERPRETATION AND DISCUSSION OF THE RESULTS

6.1. INTRODUCTION

This study aimed at investigating the presence of a causal relation between a specific, comprehensive, two-phase, multi-component reading programme and selected achievement measures. This study consisted of a qualitative and a quantitative component. The main areas of qualitative investigation addressed in this study were:

- a) the evaluation of the HRSP against the results of the meta-analysis of reading instruction research as published in the National Reading Panel Report (2000), and
- b) the feasibility of integrating the HRSP within the mainstream literacy curriculum.

The main areas of quantitative investigation were:

- a) can the efficacy of the programme be adequately demonstrated, and
- b) what do the simple effects and interactions indicate about the causal relation between the HRSP and selected achievement measures.

In this chapter the results of this research will be interpreted and discussed.

6.2. THE LITERATURE REVIEW IN RELATION TO THE RATIONALE OF THE HRSP

As described in Chapter 2 and 4, the HRSP is based upon a Vygotskian perspective emphasising direct mediation of specific skills (Estep, 2002; Donald, *et al*, 2002, Moll et al., 2001; Woolfolk, 2001). The structure of the HRSP is based upon the **cognitive process model** of reading outlined in Chapter 3 and 4 (Diamond & Mandel, 1996; Lerner, 2003). Spear-Swerling and Sternberg (1994) described a **phonetic-cue word recognition** stage where the child learns what print and texts are all about, a **controlled and automatic word recognition** stage where the child masters basic word attack and word analysis skills, and a **strategic reading stage** where the child can read fluently and with little conscious effort, and attention can be directed to interpretation of texts. In the

HRSP, this hierarchy is integrated with the findings of neuropsychology on reading acquisition and reading difficulty, and the planning, successive, simultaneous and attention (PASS) model of Das (2002).

Reading difficulties have been identified as a major underlying cause of learning difficulty in South Africa (Lomofsky *et al.*, 2003). As described in Chapter 2 to Chapter 4, the rationale behind the development and implementation of the HRSP was the need to provide the learners with the cognitive tools they need to achieve **fluency** in reading (Shaywitz & Shaywitz, 2004b; Wallace-Adams, 1996). This is consonant with the goals of the RNCS (2002), which aims to foster a **high level of proficiency** in at least two languages. Evidence in the literature suggests that the cognitive processes underlying this basic skill might transfer to other learning areas (Das, 2002). Undue emphasis on the maturational approach advocated by a Piagetian perspective (Chapter 3) can lead to children being perpetually “in progress”, but in reality falling further and further behind (Fletcher & Foorman, 1994; Stanovich, 1982, 1990). The results of the quantitative research in this study support this. Learners who did not receive the HRSP showed an ever widening gap between reading or spelling age and chronological age.

6.3. INTERPRETATION AND DISCUSSION OF THE RESULTS OF QUALITATIVE RESEARCH

6.3.1. THE QUALITATIVE EVALUATION OF THE HRSP AGAINST THE RESULTS OF THE META-ANALYSIS OF READING INSTRUCTION RESEARCH AS PUBLISHED IN THE NATIONAL READING PANEL REPORT (2000)

6.3.1.1. Phonemic Awareness Instruction

The Findings and Recommendations of the National Reading Panel (FRNRP) Report (2000:1) states that “there is currently much interest in phonemic awareness training programs among teachers, principals, parents, and publishers because of claims about their value in improving children’s ability to learn to read.” The HRSP emphasises the development of phonemic awareness in the context of a nurturing curriculum, combining phonemic awareness, systematic phonics instruction, and the use of ‘authentic’ literature and reading tasks (Stahl & Miller, 1989) to introduce the child to the world of books and text. The FRNRP (2000:1) states that “correlation studies have identified phonemic awareness and letter knowledge as the two best school-entry predictors of how well children will learn to read during the first 2 years of instruction. Such evidence suggests the potential importance of phonemic awareness training in the development of reading skills”. In the

HRSP, by using a **dimension analysis** approach (Adams, 1989) and the Vygotskian perspectives on **learning activity** (Kozulin & Presseisen, 1995) and **theoretical learning** (Karpov & Bransford, 1995), the basic alphabetic sound system is introduced at this stage (Grade R/1), and is keyed with the rest of the programme and will not change throughout the programme i.e. the 'a' sound is keyed to 'ant', and this does not alter from grade R to 3. Teachers are trained to use the same key word for the same key sound throughout the programme. Activities like the 'Post Box' game are used to foster and reinforce auditory discrimination and develop facility in sound-sign correspondences. The learner is also introduced at this stage to the basic 'narrative' or story of the programme - driving a car on a road.

The HRSP uses the analogy of a driving on a road for bridging the cognitive skills to the learner. Reading is likened to driving on a road - you need to think, use **both your eyes and ears**, and you need to know **the rules of the road**. The road itself does not change – and in the HRSP the consonant sounds do not change. The **robots** (vowels) do change. The learner is taught to “watch for robots” (vowels) and to colour them according to the colour code of the HRSP: blue if it “says its sound” and red if it “says its name”, and green if “it says neither its sound nor its name”. The programme teaches the learner phonic generalisations via the road narrative as “rules of the road” e.g. about when the 'robot' (vowel) changes colour, and to “watch out for **potholes**” (phonetically irregular words which in the HRSP are taught as sight words). This simple but effective tool was specifically designed to assist the unresponsive learner that does not learn by the 'traditional' modalities, i.e. verbal instruction or 'chalk and talk' (Donald *et al.*, 2002, Moll *et al.*, 2001, Naicker, 2003). It emphasises 'learning-by-doing' - the learners actively colour the *robots* and *potholes* themselves - and fosters a 'thinking skills' approach to learning to read, e.g. the learner is required to give reasons for their application of the particular *rules of the road* to a particular word analysis or reading task.

6.3.1.2. Phonics Instruction

The FRNRP (2000:3) states that “phonics instruction is a way of teaching reading that stresses the acquisition of letter-sound correspondences and their use in reading and spelling. The primary focus of systematic phonics instruction is to help beginning readers understand how letters are linked to sounds (phonemes) to form letter-sound correspondences and spelling patterns and to help them learn how to apply this knowledge in their reading”. The FRNRP report (2000:3) indicated that all phonics approaches are not alike. Phonics instruction may be provided systematically or incidentally. In **systematic phonics approaches**, a sequential set of phonics

elements is outlined and taught with different degrees of explicitness depending on the type of phonics method used. This is the approach of the HRSP. With **incidental phonics instruction**, “the teacher does not follow a planned sequence of phonics elements to guide instruction but highlights particular elements opportunistically when they appear in text”. This appears to be the most common model of phonics instruction in this country (Lessing & De Witt, 2002). The FRNRP (2000) also distinguishes between the following approaches:

- ❑ **Analogy Phonics**—Teaching students unfamiliar words by analogy to known words
- ❑ **Phonics through Spelling**—Teaching students to segment words into phonemes and to select letters for those phonemes (i.e., teaching students to spell words phonemically).
- ❑ **Analytic Phonics**—Teaching students to analyse letter-sound relations in previously learned words to avoid pronouncing sounds in isolation.
- ❑ **Synthetic Phonics**—Teaching students explicitly to convert letters into sounds (phonemes) and then blend the sounds to form recognisable words.
- ❑ **Embedded Phonics**—Teaching students phonics skills by embedding phonics instruction in text reading, a more implicit approach that relies to some extent on incidental learning.
- ❑ **Direct instruction**—Teaching phonics components and provide opportunities for applying these skills in decodable text formats characterised by a controlled vocabulary.

The main emphasis of the HRSP is on a direct, systematic, synthetic, phonics-through-spelling approach. Evidence seems to indicate that larger effect sizes are obtained the synthetic approach (FRNRP, 2000). The HRSP makes use of the other approaches such as analogy phonics, analytic phonics and embedded phonics by incorporating them into the natural course and flow of the lesson. Systematic phonics skills are not taught in isolation but are integrated within authentic literacy instruction.

The FRNRP report (2000) recommended that systematic phonics approaches not be seen as a complete approach to teaching reading, but as an important component of a comprehensive reading programme. In line with this recommendation, the HRSP is not only a systematic phonics programme. The teaching of ‘authentic’ reading and writing (and not only word analysis) is integrated with systematic phonics instruction from the outset, and a reading comprehension phase of the programme focuses on fluency, vocabulary building and reading comprehension.

6.3.1.3. Fluency

The FRNRP (2000:6) states that “Fluent readers are able to read orally with speed, accuracy, and proper expression. Fluency is one of several critical factors necessary for reading comprehension”. They report that despite the importance of fluency as a component of skilled reading, it is often neglected in the classroom. The HRSP particularly emphasises the importance of fluency and the learners are trained to read quickly (together with the teacher), without regression, pointing or unnecessary pauses using the integrated techniques of **neurological impress** (the teacher reads aloud **with** the learners) and **guided repeated oral reading** (Lerner, 2003). The rationale for this is as the FRNRP (2000:6) states: “If text is read in a laborious and inefficient manner, it will be difficult for the child to remember what has been read and to relate the ideas expressed in the text to his or her background knowledge”.

The FRNRP (2000:6) reports that “reading practice is generally recognised as an important contributor to fluency”. Despite this, the report alerts us to the fact that there is almost no experimental evidence demonstrating a **causal** relation between encouraging learners to read more and fluency. This may be due partially to the paucity of research aimed at demonstrating a causal relation between encouraging learners to read more, and fluent reading. The FRNRP (2000) identify two instructional approaches most frequently used to foster fluency. The one - **guided repeated oral reading** - which aims to encourage the learners to read passages orally with systematic and explicit guidance and feedback from the teacher. The other - **independent (voluntary) silent reading** - which encourages learners to read silently on their own, inside and outside the classroom, with minimal guidance or feedback. Of the two, only the first approach has (limited) research support. As indicated above (chapter 4), both of these approaches receive attention in the HRSP, with particular emphasis on the direct instruction of fluency through guided repeated oral reading. Although a relation between fluency and the HRSP was not empirically investigated in this study, the weight of evidence would suggest that the HRSP was causally related to the learners observed proficiency in reading. This is clearly an area in need of further research.

6.3.1.4. Comprehension

The FRNRP (2000:8) states that “Comprehension is critically important to the development of children’s reading skills and therefore to the ability to obtain an education. Indeed, reading comprehension has come to be the “essence of reading” (Durkin, 1993), essential not only to academic learning in all subject areas but to lifelong learning as well”. The FRNRP reports (2000:8)

that "... reading comprehension is a complex cognitive process that cannot be understood without a clear description of the role that **vocabulary development** and vocabulary instruction play in the understanding of what has been read. Second, comprehension is an active process that requires an **intentional and thoughtful interaction between the reader and the text**. Third, the **preparation of teachers** to better equip students to develop and apply reading comprehension strategies to enhance understanding is intimately linked to students' achievement in this area." All three of these areas receive attention within the HRSP.

1. **Vocabulary Instruction.** The NRP (2000) noted the need for more research in this area of reading instruction. This may be partially due to difficulty of developing instruments to reliably estimate the readers' vocabulary. There is also the question of whether vocabulary is a cause or consequence of reading proficiency, whether it can be directly taught, and if so, what are the most reliable methods of teaching vocabulary. Initial findings suggest that vocabulary can - and therefore should - be taught directly and explicitly. Within the HRSP, learners are introduced continuously to new vocabulary - both explicitly and directly, and implicitly and indirectly - as the level of text difficulty increases. Further research is necessary to establish a causal relation between vocabulary building and reading interventions like the HRSP. Verbal feedback from learners, teachers and parents (Hailstones, 2004) would lead us to predict that the HRSP does directly foster vocabulary.

2. **Text Comprehension Instruction.** In the HRSP, learners are directly instructed in text comprehension strategies and comprehension monitoring behaviours. The FRNRP (2000:9) states "The rationale for the explicit teaching of comprehension skills is that comprehension can be improved by teaching students to use specific cognitive strategies or to reason strategically when they encounter barriers to understanding what they are reading. Readers acquire these strategies informally to some extent, but explicit or formal instruction in the application of comprehension strategies has been shown to be highly effective in enhancing understanding". In addition, in South Africa there is an identified need to foster inferential comprehension skills, a very strong predictor of academic achievement at tertiary level (Andor, Broom & Greenop, 2006). This receives particular attention within the HRSP in the **question answering** component (chapter 4).

The FRNRP (2000) identified seven categories of text comprehension instruction that have research support for concluding that they improve comprehension in non-impaired readers. These types of instruction are effective when used alone, but are more effective when used as part of a multiple-strategy method. The types of instruction identified by the FRNRP are:

- ❑ Comprehension monitoring, where readers learn how to be aware of their understanding of the material;
- ❑ Co-operative learning, where students learn reading strategies together;
- ❑ Use of graphic and semantic organisers (including story maps), where readers make graphic representations of the material to assist comprehension;
- ❑ Question answering, where readers answer questions posed by the teacher and receive immediate feedback;
- ❑ Question generation, where readers ask themselves questions about various aspects of the story;
- ❑ Story structure, where students are taught to use the structure of the story as a means of helping them recall story content in order to answer questions about what they have read; and
- ❑ Summarisation, where readers are taught to integrate ideas and generalise from the text information.

In the HRSP, teachers are trained to use *Question answering*, *Summarisation*, and *Story Structure* components as part of a multifaceted approach to teaching comprehension. In addition, *Elicitation of prior knowledge*, *Prediction* and *Clarification* methods were also used (Rosenshine & Meister, 1994). Within the HRSP the teacher is trained to model such strategies for the learners, until they are able to carry them out independently. Clearly, this is not accomplished in a single training session, but teachers are trained on an ongoing, in-service basis to improve the effectiveness of instruction (Duffy, 1993). In the HRSP, this is probably the most demanding aspect for the teacher, but is also crucial in raising the learner from the level of strategic reader to highly proficient reader by the end of grade six, as advocated by Spear-Swerling and Sternberg (1994).

3. Teacher Preparation and Comprehension Strategies Instruction. The FRNRP (2000:10) stated that 'teaching reading comprehension strategies to students at all grade levels is complex. Teachers not only must have a firm grasp of the content presented in the text, but also must have substantial knowledge of the strategies themselves, of which strategies are most effective for different students and types of content, and of how best to teach and model strategy use'. The report states that "teachers must be skilful in their instruction and be able to respond flexibly and opportunistically to students' needs for instructive feedback as they read". Results of this research indicate that the HRSP may provide an effective tool for in-service teacher training and school capacity building.

6.3.1.5. A complete reading programme

The HRSP is not limited to systematic phonics instruction, but it is designed as a **comprehensive reading programme** aimed at building an advanced level of strategic reading and automaticity in the learner (NRP, 2000, Spear-Swerling & Sternberg, 1994). The ultimate goal of the programme is to foster "highly proficient readers" (Spear-Swerling & Sternberg, 1994) in English by grade 6 to

equip the learner with the cognitive tools needed to achieve at Senior, Further Education and Training, and Higher Education levels. It therefore also fosters fluency, vocabulary, and comprehension monitoring strategies (Moll *et al.*, 2001; NRP, 2000). This is also consonant with the stated policy of the Revised National Curriculum (RNCS, 2002) that “in a multilingual country like South Africa it is important that learners reach **high levels of proficiency** in at least two languages...” However, the RNCS (2002) statement that “learners come to school with prior knowledge and a **high level of proficiency** in their mother tongue” does not have literature support and overlooks the crucial distinction between basic interpersonal communication skills and cognitive academic language proficiency (Cummins, 1981, Lemmer, 1996). Furthermore, the stated aim of achieving **high levels of proficiency** (RNCS, 2002) in at least one additional language seems to be at variance with the statement that, with specific reference with Learning Outcome 5: Thinking and Reasoning, the RNCS (2002) does not aim to prepare learners to use the additional language as a language of teaching and learning. In the light of the literature review of this study, this will almost certainly disadvantage the learner within the multilingual context of South Africa. Nevertheless, the statement: “The Languages Learning Area Statement follows an additive approach to multilingualism” is to be applauded and encouraged as this approach has clear research support (Heugh *et al.*, 1995; Ramirez *et al.*, 1991). What the RNCS (2002) lacks is a clearly articulated, ‘evidence-based’ rationale and programme of implementation for achieving the stated goals. The results of this study indicate that the HRSP could provide a key methodological component within the broad framework outlined in the RNCS (2002) for the introduction of an additional language: “Where learners have to make a transition from their home language to an additional language as the language of learning and teaching, this should be carefully planned:

- The additional language should be introduced as a subject in **Grade 1**.
- The home language should continue to be used alongside the additional language for as long as possible.
- When learners enter a school where the language of learning and teaching is an additional language for the learner, **teachers and other educators should make provision for special assistance and supplementary learning of the additional language**, until such time as the learner is able to learn effectively in the language of learning and teaching” (RNCS, 2002:5, my emphasis).

The HRSP fits comfortably within such a framework of implementation, which also very closely approximates the situation at Domino Servite School. “All learners learn their home language and

at least one additional official language. They become **competent** in their additional language while their home language is maintained and developed.” (RNCS, 2002:4). Research is therefore necessary to explore this possibility further.

6.3.1.6. Summary

The reading instruction approaches used in the programme has been extensively reviewed by the National Reading Panel (NRP, 2000), and the HRSP can therefore claim to be a complete reading programme. All methodological components within the HRSP are aligned with one another. In order to read, all children must be taught ‘alphabets’ (including phonemic awareness and systematic phonics), vocabulary, fluency and reading comprehension strategies. The HRSP includes all of these aspects arranged hierarchically on a developmental trajectory. It is also fully integrated within the mainstream curriculum, and is incorporated into the daily classroom activity within the instruction of literacy. It consists of brief periods of instruction (15 to 25 minutes) daily. Within the programme, the above mentioned components are deliberately, explicitly and directly taught. Evidence indicates (NRP, 2000) that it is not effective to teach these aspects incidentally. The initial goals of the programme are that learners will know and master the letter-sound associations of the English language. This must be achieved by the end of grade three (Spear-Swerling & Sternberg, 1994). Once the learner has mastered the basic foundational skills, they move on, beginning in grade four, with the direct instruction of vocabulary, fluency and reading comprehension strategies, as indicated by the NRP (2000).

6.3.2. THE QUALITATIVE INVESTIGATION INTO THE FEASIBILITY OF INTEGRATING THE HRSP WITHIN THE MAINSTREAM LITERACY CURRICULUM

6.3.2.1. Overall result

All teachers in DSS used the HRSP in the literacy component of the Foundation and Intermediate Phase curriculum. All teachers indicated that they felt the HRSP worked “very well.” All teachers unqualifiedly indicated that they felt the HRSP could “be easily integrated into the curriculum”. All teachers unqualifiedly reported that the HRSP is a useful reading intervention tool. Results of this study indicated that the HRSP is motivating and empowering for the teacher as well as the learner. This would be an important area of further research, as emphasised by the National Reading Panel (2000). This result is important in the light of the NRP (2000) recommendation that “it will also be critical to determine objectively the ways in which systematic phonics instruction can be optimally incorporated and integrated in complete and balanced programs of reading instruction. Part of this

effort should be addressed at pre-service and in-service education to provide teachers with decision making framework to guide their selection, integration and implementation of phonics instruction within a complete reading program." (6)

6.3.2.2. Credibility

A significant correlation ($r = 0.90$) was observed *between time spent on HRSP instruction in class and the attitude towards and use of systematic phonics instruction*. This provided corroboration that the questionnaire is reflecting real trends in the particular classroom context of this investigation. Category 2: *Fidelity of implementation of HRSP* and Category 3: *attitude to the HRSP* did not correlate significantly. This was important as these two categories were designed to test *different* constructs. A significant correlation was observed between the effect size for grades 1 to 5 for **reading comprehension** and Category 2: *Fidelity of implementation of HRSP* ($r = 0.91$) and Category 3: *attitude to the HRSP* ($r = 0.90$). Furthermore, a significant correlation between effect size for grade 1 to 5 **spelling** scores and Category 1: *time spent on the HRSP* ($r = 0.91$) was obtained. This result provides strong corroboration of the credibility of the qualitative findings of the questionnaire.

The HRSP combines both a preventative and intervention programme, and is designed to be an inclusive rather than a 'pull-out' approach. As suggested by Donald (1996), for reading programmes to provide effective learner support services in the South African context, the programme needs to be fully integrated into the mainstream and inclusive i.e. it is not a 'pull-out' programme. In Phase 1 of the HRSP, the learners stay in the regular classroom context and are instructed by the class teacher during the regular literacy instruction. As Van den Berg and Naicker (1996) pointed out, when only one or two learners in a class of twenty to thirty are struggling to learn to read, it can be treated as a 'private trouble', but when 25 of the 30 children are struggling to learn to read, it is a 'public problem' that cannot be addressed by taking the learners out of the mainstream classroom. The needs of these learners must be met within the mainstream context (Donald, 1996). The HRSP is integrated into the mainstream daily classroom, so all learners participate and all learners benefit.

6.3.2.3. A multi-component, two-phase approach

An important emphasis of the programme is the prevention and not just the support of reading difficulties (Sibaya, 1996). The survey of the literature indicates (Donald, 1996; Moll *et al.*, 2001; Wallace Adams, 1996) that there is a need for reading programmes like the HRSP for addressing

the poor state of literacy education in schools in South Africa. The programme aims to **both** prevent **and** support learning challenges. The HRSP has been designed to integrate into the mainstream from Grade R to address early the needs of all learners struggling to read, as recommended by Fletcher and Foorman (1994) and McCormick and Hickson (1996). Al Otaiba and Fuchs (2006, 2002) described a multi-component two-phase approach. In **Phase 1**, one or two of these programmes basic components are implemented by general educators in mainstream classrooms with the expectation that these components will accelerate the learning of most children. **Phase 2** involves only those children unresponsive to phase 1 instruction. In Phase 2, additional components are brought into effect with greater frequency and longer duration. Because of its comparative complexity and intensity, Phase 2 instruction may be conducted by someone other than the classroom teacher and typically in small groups. The HRSP corresponds to this format.

Al Otaiba and Fuchs (2006) also alert us to the possibility of using responsiveness to generally effective reading interventions as an alternative form of assessment. Instead of relying on IQ discrepancy scores, only learners who are unresponsive to both Phase 1 **and** Phase 2 interventions will be considered eligible for further evaluation. In this study, the group receiving the HRSP had only 37% struggling readers i.e. readers reading at least 1 year below age, compared with 76% in the group not receiving the HRSP. Of that 76%, 47% were not responsive to reading instruction, compared to only 7% of the 37% in the group receiving the HRSP. Of that 7%, all were responsive to Phase 2 intervention, showing improvement in spelling scores. Further research is therefore necessary to establish the validity and reliability of such an approach to assessment in the South African context.

6.3.2.4. OBE compatible

Although not directly tested, the results of this research suggest that the HRSP is compatible with the implementation of the Revised National Curriculum Statement (2002) and the outcomes-based approach. Lessing and De Witt (2002) list the main characteristics of OBE as follows:

- *Developmental, as it encompasses both what the learners learn and are able to do at the end of the learning process.* In the HRSP, the learners must be able to read and spell at age/grade level.
- *Emphasises high expectations of what all learners can achieve.* In the HRSP, learners are expected to spell and read at age or grade levels. The learners are also encouraged to further develop their reading skills and their love of reading and books. The learners are not held back

because they are reading above the class average or age/grade levels, or because of unsubstantiated fears that their cognitive development will be harmed (NRP, 2000; Woolfolk, 2001).

- *Learner-centred*. The learner must be actively involved in the learning process, but they determine the pace at which they progress. The HRSP is specifically designed for the learners who do not respond to regular instruction (Al Otaiba & Fuchs, 2006, 2002), by using direct instruction, a colour code, peer assisted learning, and group work (Reiff, 1996).
- *Shapes the learning process through outcomes*. In the HRSP the learners are assessed on a continuous basis using curriculum based assessment of authentic tasks (Archer & Green, 1996; Archer, Rossouw, Lomofsky & Oliver, 2003), specifically spelling and reading comprehension ability, but also of related tasks such as writing and speaking.
- *Is activity based* (in the HRSP the learners are actively engaged in colouring and other activities e.g. 'Read-Remember-Write', 'Post Box' game) *and designed to promote problem solving* (in the HRSP the learners are taught to see spelling and reading as a problem solving exercise through the narrative story line and the 'rules of the road') *and critical thinking* (in the HRSP, the learners are required to give reasons for their choice of rules or strategies e.g. "if it is blue there must be two" for addressing a problem).

The programme builds on and consolidates **competence** in spelling and reading i.e. reading and spelling at age- or grade-appropriate levels, a primary goal of outcomes based education (Donald *et al.*, 2002), thus ensuring that early gains are not lost, a weakness of intervention programmes (Troia, 1999; Zigler & Syfco, 1994). The programme directly aims to increase learners' **motivation** to learn by helping them 'break the code', monitoring their own progress, and find pleasure in reading (Monteith, 1996; Scott, 1996). The programme aims to be fully **inclusive**. All children participate and all children benefit. This fits more comfortably within the African cultural paradigm by not singling out the individual (Machet, 2002). The programme empowers the **contextually disadvantaged** learner. It was designed specifically for the learner who does not respond to regular literacy instruction (Al Otaiba & Fuchs, 2006, 2002). The programme caters for children of different **cognitive styles** (Naicker, 2003; Reiff, 1996) by introducing a colour-coding system, thus aiming to foster both successive **and simultaneous** processing (Das *et al.*, 1994).

6.3.2.5. Teacher in-service training and school capacity building

The results of this study indicated that the HRSP was easily learned and applied by regular class teachers who received only in-service training in the use of the HRSP. The results of this study

suggest that in-service training of teachers is feasible, and the basic skills of the programme are quickly learned by teachers of diverse capabilities and backgrounds. The programme did not add to the teacher's workload. In all cases it was integrated into the regular literacy programme and all teachers reported that it worked "very well". In the short term, the programme will take only about 20 minutes a day of normal teaching time. In the long term the programme will save time by making learners more competent, motivated learners. This was an important consideration, given the workload of teachers in schools in South Africa, and the results of research on what manuals recommend and what teachers actually do (Durkin, 1984). According to Durkin, most teachers mentioned time constraints as a major determinant of what they did or did not do with the learners, along with a concern for classroom management. Pressley (1998) reported that more recent research shows that there has been little progress in integrating the results of reading instruction research into the classroom since Durkin's earlier (1984) work.

Duffy (1993) stated that effective reading instruction is associated more with independent teacher actions than with the implementation of basal text descriptions. Developing metacognitive skills in readers requires that teachers themselves are aware of their reasoning (NRP, 2000). Duffy (op cit.) claimed that helping teachers become effective strategy instructors will require important changes in what and how teacher educators train pre-service teachers. He comments that much of the course content in the USA does not directly address the need, and what training exists is incidental to the main curriculum and does not adequately prepare teachers for this task. He calls for a revision of teacher training practices to bring it into line with the complexity involved in training both teachers and their prospective learners to be strategic.

The NRP report (2000) indicated that due to the paucity of research on the issue of teacher training with regard to the implementation of reading instruction programmes, few recommendations could be made. The report states that more research is needed in several areas:

- What is the optimal combination of pre-service and in-service education?
- What are the effects of pre-service education on in-service performance?
- What is the appropriate length of in-service and pre-service education?
- What are the best ways to assess the effectiveness of teacher education and professional development?
- How can teachers optimally be supported over the long term to ensure sustained implementation of new methods and to ensure student achievement?

The results of this study suggest that in-service teacher training might be a feasible option within the context of a complete reading programme fully integrated into the mainstream. Donaldson (1978:95 - cited in Moll *et al.*, 2001) claimed that: "It turns out that those very features of the written word which encourage awareness of language may also encourage awareness of one's own thinking and thus be relevant to the development of intellectual self-control. This has important consequences for the development of the kinds of thinking which are characteristic of logic, mathematics and the sciences." The NRP (2000) states that to be effective teachers of reading comprehension, teachers must know **and use** the comprehension strategies themselves. If this is correct, then the HRSP could plausibly play a fundamental role in developing **both** strategic **teachers** and strategic **learners**. Further research is needed to test this possibility.

6.3.2.6. Methodological considerations

Internal validity was a major emphasis in this study. Troia (1999) undertook a meta-analysis of the methodology of phonemic awareness programmes in order to assess the methodological rigour and scientific validity of the claims for the effectiveness of the different intervention protocols. None of the research articles reviewed by Troia (1999) evaluated the effects of classroom based intervention. The NRP (2000) subsequently reported that the efficacy of phonemic awareness and systematic phonics instruction within classroom contexts has been amply demonstrated. However, the report also indicated the need for further research to establish the effects of intervention programmes of longer duration. Two studies not included by Troia (1999) that did investigate *classroom* intervention on a longitudinal (2 to 3 years) basis were Blachman, Tangel, Ball, Black and McGraw (1999) and Torgesen, Wagner, Rashotte, Rose, Lindamood, Conway and Garvan (1999). Both of these studies reported significant gains in reading achievement measures over controls up to the end of grade two. They, however, did not extend their investigation beyond grade two. The HRSP was successfully implemented up to the end of grade five in this study, and subsequently to the end of grade 6. This observation indicates that the HRSP is uniquely positioned to make an important contribution to our knowledge of the area and to address precisely the questions raised by Troia (1999) and the NRP (2000).

Given the quasi-experimental nature of this study and the whole intact group design, the weight of evidence of the qualitative analyses indicates that the HRSP was methodologically strong in terms of internal validity, **and** was successfully integrated into the mainstream classroom. This included both the reading and the spelling component of the HRSP and Phase 1 and Phase 2 of the programme, in both the Foundation and Intermediate Phase (grades 1 to 5).

6.4. INTERPRETATION AND DISCUSSION OF THE RESULTS OF QUANTITATIVE RESEARCH

6.4.1. THREATS TO INTERNAL VALIDITY

6.4.1.1. Demographic details

The two private schools that participated in this study had equivalent teacher-to-learner ratios, and equivalent total numbers of learners. The one, DSS had 115 learners in the Foundation and Intermediate Phases (grades one to seven) and St David's Diocesan Primary School had 118 learners from Grades one to seven. Both schools were situated in the Greytwn area of KwaZulu-Natal, drawing learners from both urban and suburban backgrounds. In DSS 108 (94%) and in SDD 116 (98%) had limited English proficiency (English as an additional language), and both schools drew their learners from upper working to upper middle class homes.

Chi-square analyses revealed no statistically significant differences between DSS and SDD on gender, age, and group (grade) size. However, a chi-square test on racial identity was statistically significant. Demographically there was strong support for the assumption of equivalence between groups. Only in language/race factors was there a possibility for a bias (discussed below in 6.4.2.4.)

6.4.1.2. Pre-test measures for spelling and reading comprehension

In order to test for the presence of a difference between the two schools, both groups were pre-tested on the same dependent variables of spelling and reading comprehension. The two schools were matched for performance on the dependent variables, spelling and reading comprehension. There was no evidence that a significant difference existed between the two schools on spelling and reading comprehension scores prior to the introduction of the HRSP.

6.4.1.3. Gender effects

It is often reported that girls are on average better than boys on scores of spelling and reading (Lerner, 2003). It was therefore necessary to test for differences between boys and girls in both groups prior to the introduction of the HRSP. No evidence for a difference between the genders in **reading** scores existed in SDD. In contrast to this, girls were stronger in **spelling** than boys in SDD. There was no evidence for a difference between genders in **DSS** for both spelling and reading prior to the introduction of the HRSP.

Comparing girls in both schools, results indicated that there was no evidence that the girls in SDD were stronger in **reading** ability than those in DSS. Similarly, no evidence existed for a difference in girls **spelling** ability between the two schools prior to the introduction of the HRSP. There was also no evidence for a difference in spelling and reading ability between the boys in the two schools prior to the implementation of the HRSP. These data indicated that the two schools were equivalent in gender scores and that gender was not a confounding factor in spelling and reading ability in **DSS**.

6.4.1.4. Race/language effects

As reported above (6.4.1.1. Demographic data) there was a significant difference on chi-square between the two schools and the race/language variable. It was therefore important to test for any possible racial bias or differences between the two schools prior to the implementation of the HRSP. St David's did not have a significant Caucasian component, and therefore it was also imperative to compare the African and Caucasian group in **DSS**, and to compare these two groups separately with the African group of SDD. No evidence existed for a difference in **reading** comprehension **between SDD and DSS** in learners of **African** identity prior to implementation of the HRSP. For **spelling** ability, no evidence existed for a difference **between SDD and DSS** in learners of **African** identity prior to implementation of the HRSP.

In contrast to this, there was evidence for a difference in **reading** ability between the African and Caucasian groups in **DSS**, and between the African group of **SDD** and the Caucasian group of **DSS**, prior to the implementation of the HRSP.

These data indicated that while the two schools were equivalent in the African component, a race/language difference did exist between learners of African origin and those of Caucasian origin prior to the implementation of the HRSP. The implications of this finding for the interpretation of results will be addressed below (6.4.2.4.).

6.4.1.5. School effects

There is the possibility in this type of study that school and treatment effects will be confounded (Troia, 1999). It is conceivable that the school climate or ecology may be sufficiently different in the two schools to produce a difference in the dependent variables. It was reasoned that should such an influence exist, it would be evident in all-round ability between the two schools in Grades six and seven, as these two groups had been exposed for five years to the school ecological

environment. This all-round ability would be expected to be reflected in reading and spelling ability. Results of the analysis indicated that there was no evidence that the spelling and reading abilities of the two schools in grades six and seven were different from each other. This indicated that if there were any differences in school environment, it did not affect spelling and reading quotient scores.

6.4.1.6. The nature of literacy instruction

In order to obtain reliable information about the nature of literacy instruction in SDD, a questionnaire on reading instruction methods was given to the grades one to three teachers in SDD to complete. The HRSP was also scored using the same questionnaire. This provided necessary information about the type of instruction the control group received and allowed comparison with the SDD groups and the HRSP. This questionnaire yielded data on a) the use of the whole word method, b) the whole language method, c) the teachers attitude to direct systematic phonics instruction, d) the use of systematic phonics instruction as opposed to implicit, indirect approaches to phonics instruction in the classroom, e) the use of basal readers and texts with controlled vocabulary, and f) the fidelity or rigour of implementation of systematic phonics instruction in the classroom. The results of this analysis were compared with the HRSP score to assess where similarities and differences lay. Results indicated that literacy instruction in Grade 1 of SDD was very similar to that of the HRSP (HRSPxSDDGrade1), and that literacy instruction in Grade 2 was very similar to Grade 3 at St David's school (SDDGrade2xSDDGrade3). In contrast to this finding, evidence for a difference in literacy instruction existed between groups HRSPxSDDGrade2, HRSPxSDDGrade3, SDDGrade1xSDDGrade2 and SDDGrade1xSDDGrade3.

A comparison of literacy instruction between grades 1 to 3 of SDD and the HRSP score indicated an agreement, adjusted for chance, between the HRSP score and Grade 1 literacy instruction in SDD. Because the actual classroom practice is what is most crucial, agreement was also estimated for component f) of the questionnaire i.e. the fidelity or rigour of implementation of systematic phonics instruction in the classroom. Results indicated an agreement for HRSPxSDDGrade1 and an agreement for SDDGrade1xSDDGrade2. An agreement less than expected by chance was found in HRSPxSDDGrade3 indicating a difference in literacy instruction between the HRSP and SDD Grade 3. HRSPxSDDGrade2, SDDGrade1xSDDGrade2 and SDDGrade2xSDDgrade3 showed no agreement beyond adjustment for chance. This result indicated that the initial agreement between reading instruction in SDD and the HRSP was strong for Grade 1 only, and above first grade the agreement quickly waned.

The above analyses provided an estimation of agreement or difference, but did not provide any information about the exact nature of the differences or similarities of literacy instruction in the different grades compared to the HRSP. To obtain this information the questionnaire was analysed for each component: a) the use of the whole word method; b) the whole language method; c) the teachers attitude to direct systematic phonics instruction; d) the use of systematic phonics instruction as opposed to implicit, indirect approaches to phonics instruction in the classroom; e) the use of basal readers and texts with controlled vocabulary; and f) the fidelity or rigour of implementation of systematic phonics instruction in the classroom. From the results, it was possible to draw definite conclusions about the similarities and differences in literacy instruction between the grades 1 to 3 at SDD and the HRSP:

- a) The use of the whole word method. The data indicated that there was no evidence for a difference in the use of the whole word method, i.e. no teachers in SDD used of this method. This is also not a strong component within the HRSP. The National Reading Panel Report (2000) noted that the whole word method has been largely displaced in classroom instruction by the whole language and language experience methods. This trend was corroborated by the results of this investigation for SDD.
- b) The whole language method. The data indicated that there was evidence for a difference in the use of the whole language method. This was mainly due to the difference between the HRSP and the grade three SDD teacher. The data suggest that this teacher made use of the whole language approach extensively within daily classroom practice. Phonics instruction in this grade seems to have been incidental and implicit. In contrast to this, while the HRSP does not exclude the use of the whole language approach, it is not a major emphasis of the programme in grades one to three. The grade one teacher of SDD did not make use of this method exclusively, rather combining it with systematic phonics instruction and the use of basal reading programmes. The grade two teacher made less use of systematic phonics and more use of a whole language approach. As will be noted later, these findings are clearly reflected in the spelling and reading comprehension differences between SDD and DSS.
- c) The teachers' attitude to direct systematic phonics instruction. The data indicated that there was no evidence for a difference in the teachers' attitude (positive) to systematic phonics instruction. All teachers indicated strong support for systematic phonics instruction. That this attitude did not translate into classroom practice in all cases is an important result in this study. Durkin (1984) and Pressley (1998) have reported a discrepancy between what teachers agree are good teaching practices and what they actually do in class.

- d) The use of systematic phonics instruction as opposed to implicit, indirect approaches to phonics instruction in the classroom. The data indicated that there was evidence for a difference in the use of systematic phonics instruction as opposed to implicit, indirect approaches to phonics instruction in the classroom. The grade one teacher made most use of direct, explicit systematic instruction of phonics. In contrast to this, the grade three teacher used implicit indirect approaches. The grade two teacher used a mixture of both, but this would naturally mean less time devoted to explicit systematic instruction.
- e) The use of basal readers and texts with controlled vocabulary. The data indicated that there was evidence for a difference in the use of basal readers and texts with controlled vocabulary. Clearly the grade one teacher made extensive use of these materials, while the grade two teacher less so and the grade three teacher hardly at all. This is partly due to the nature of the curriculum. Emphasis naturally shifts from the mechanics of reading to understanding and the use of children's books. It is not necessarily wrong. However, if we assume that the grade three teacher is typical of many other grade three teachers in South Africa (and there is no reason to doubt this assumption) it does highlight the possibility that reading as a skill is not explicitly taught from grade three onwards. Considering how important reading is in learning, this result may highlight an area of urgent intervention. In contrast to this, the explicit teaching of reading is a central feature of the HRSP up to grade six.
- f) The rigour of implementation of systematic phonics instruction in the classroom. The data indicated that there was evidence for a difference in the rigour of implementation of systematic phonics instruction in the classroom. This was noticeable between grade one and grade three of SDD and between the HRSP and the grade three teacher of SDD.

Overall, these data indicated that the grade one teacher at SDD showed the most agreement with the HRSP, and the grade two teacher less so. In contrast to this, there was a clear dissimilarity between the grade three teacher's approach to literacy instruction and the HRSP. This result is clearly mirrored in the comparison of reading and spelling scores for grades one to three in the two schools. No difference was observed in the two schools in both spelling and reading for grade one, but an increasing difference was noted for grades two and three. (Cf. effect sizes in Table 5.17, pg. 207 and differences in Figures 5.2 and 5.3, pg. 209).

6.4.1.7. Hawthorne effects

It was reasoned that if Hawthorne effects were operative, then a difference in mathematics ability would be found in these groups. In three replications, there was no evidence that a difference

existed in mathematics scores between pre and post testing. This result makes the operation of Hawthorne effects due to the implementation of the HRSP in DSS implausible. Furthermore, the mainstream context, the intact group design, the use of class teachers and the integrated nature of the programme, would lead us to argue that Hawthorne effects would be minimal, and not a threat to internal validity.

These data also provided indirect evidence for a plausible relation between the HRSP and mathematics achievement. It was argued (Kirby & Williams, 1998) in chapter 2 that underlying cognitive processes, particularly successive and simultaneous coding, but also planning and attention processes, underlie school achievement (Chapter 2 pg. 53). It was also postulated by Das *et al.* (1994) that both simultaneous and successive processes underlie mathematics achievement, but that simultaneous processing is more important. A significant correlation between simultaneous processing and selected achievement measures has been reported by Reid (2001) for South African learners. It was also postulated in chapters 2 and 3 that by fostering these processes through reading instruction, it is plausible that the underlying cognitive apparatus would transfer to other areas as well. Furthermore, a central role for simultaneous processing was suggested, particularly for traditionally disadvantaged and English additional language groups. In this study, a significant correlation was obtained between mathematics achievement and reading comprehension, measured both as a raw score ($r = 0.55$) and as a quotient score ($r = 0.61$). This result was repeated five months later ($r = 0.68$ and 0.80 respectively). A non-significant result was obtained for spelling measures. This finding is in agreement with the relation between reading, mathematics and simultaneous and successive processing outlined above (Das *et al.*, 1994; Kirby & Williams, 1998; Reid, 2001; Reid *et al.*, 2002), and provides indirect evidence that the fostering of underlying cognitive processes through a comprehensive reading programme will transfer to other areas of academic achievement (Crano & Johnson, 1991; Reid *et al.*, 2002). Further research is therefore needed to explore more adequately whether a causal relation between the HRSP and mathematics achievement exists.

6.4.1.8. Fidelity of treatment

A questionnaire was given to the grades 1 to five DSS teachers to obtain information on fidelity of treatment. Five themes or categories were identified. These data were used to assess each teacher's attitude and teaching profile. Teachers in grades one to five of DSS were scored on: a) the teacher's attitude to the teaching of phonics in reading; b) the teacher's attitude to the HRSP; c) fidelity of implementation of the HRSP; d) time spent on phonics (HRSP) instruction in class; and e)

the teacher's attitude to early reading intervention programmes. These data indicate that a significant correlation existed between the teachers' attitude to the HRSP (Att.HW) and the fidelity or rigour of implementation (Fid.HW) of the HRSP (in terms of adherence to the teachers' manual, the use of HRSP worksheets, and the application of the colour coding system). A significant correlation was also observed between the teachers' attitude to systematic phonics instruction (phonics) and the amount of time spent on phonics-HRSP in class (time). This result contrasted with the questionnaire given to the SDD teachers where attitude to phonics instruction did not translate into classroom practice in all cases. However, no significant correlation was found between the DSS teachers' attitude to early reading instruction and all other categories.

A correlation between pre-test-post-test effect sizes for each grade in spelling ability and the different categories indicated that a significant relation between effect size (**d**) for **spelling** and *time spent on phonics instruction* existed. This result provided confidence in the reliability of the questionnaire and indirect support for a causal relation of the HRSP to spelling ability. A relation existed between **d** for **reading** ability, and both the **attitude to the HRSP** and **fidelity of implementation** of the HRSP. This result provided support for a causal relation between the HRSP and reading comprehension scores.

The results of this study indicated declining effect sizes for **spelling** from grade one to five. This result is consonant with the finding of the NRP (2000). In contrast to this, effect sizes for **reading** comprehension did **not** show a similar decline, and were related to the fidelity of implementation of the HRSP. *This result is of particular importance in the light of the NRP (2000) report of a review of 38 studies from which 66 treatment-control group comparisons were derived indicating that systematic phonics instruction did not improve reading and spelling ability in poor readers above first grade.* This finding can be explained in terms of the longitudinal nature of the HRSP intervention. Spelling (systematic phonics) is explicitly taught up to third grade, and reading is explicitly taught up to sixth grade. This contrasts with the strong focus on Kindergarten and first grade programmes in the literature (NRP, 2000). It also addresses some of the questions raised by the NRP (2000) review, namely:

- How many months or years should a phonics programme continue?
- If phonics has been systematically taught in kindergarten and first grade, should it continue to be emphasised in second grade and beyond?
- How long should single instruction sessions last?
- How much ground should be covered in a programme?

- How many letter sound associations should be taught?
- And how many different ways of using these relations to read and write words should be practised for the benefits of phonics to be maximised?

These questions remain for further research. At this point it can be concluded that the way the HRSP grew and developed within the real classroom context would lead us to predict that the HRSP is well positioned to address the questions raised above.

The above results indicated a significant **correlation** between **effect size in each grade** and **fidelity of treatment** measures, but did not provide an indication of the actual level of significant difference between the pre-test-post-test scores in each grade (1 to 5) in DSS. In other words, was there really a statistically meaningful increase in reading and spelling from June to November? Evidence indicated there was a statistically significant increase in **spelling** scores (adjusted for maturation effects) between the pre-test (June) and post-test (November) period. Evidence also indicated there was also a significant difference in **reading** scores (adjusted for maturation effects) between the pre-test and post-test period.

6.4.1.9. Regression towards the mean

The major remaining threat to internal validity in this study was regression towards the mean. It could be argued that the scores for the DSS learners were below their population average and those for the SDD were above their population average (Ary *et al.*, 2002). One would in this case expect an improvement in DSS learners and a decline in SDD learners simply because of regression to the mean. A number of observations however, argue against such an interpretation. Firstly, no changes were observed in the quotient scores of the SDD learners as predicted by this claim. Secondly, no changes were observed in the grades not receiving the HRSP in DSS. Thirdly, regression towards the mean effects would be assumed to operate in mathematics ability also, and not only reading and spelling. No change in mathematics quotient scores were observed in three replicates in DSS learners exposed to the HRSP. Fourthly, if regression towards the mean was a factor, then scores should exhibit a ceiling effect. In contrast to this, both spelling and reading scores continued to improve in learners that were reading and spelling above age/grade level. The weight of evidence therefore argues against the operation of regression towards the mean effects.

6.4.2. THE EFFECTS OF THE HRSP

The primary aim of this research was to find evidence if any difference existed between the DSS and SDD after the implementation of the HRSP. Pre-test-post-test measures indicated a significant difference between the two schools. I therefore rejected the null hypotheses for this study and concluded that a difference in spelling ability and reading comprehension between the two schools existed after the implementation of the HRSP.

This design (pre-test-post-test matched control group) assumed the equivalence of the pre-test scores. The analysis of covariance (ANCOVA) indicated that a significant difference was present between the treatment and control for both spelling and reading comprehension after the implementation of the HRSP when post-test means were adjusted for pre-test variance. This result makes it less plausible that the differences in spelling and reading comprehension between DSS and SDD was due to confounding factors and variables within the population prior to the implementation of the programme.

6.4.2.1. Effects of the modulation of the independent variable

The grades 1 to 5 in DSS were subject to different amounts and intensity of the HRSP: a) three years of intervention (grade 3); b) two years of intervention (grade 2); c) one year of intervention (grade 1); and d) between one and two years of intervention (grades 4 and 5). This made it possible to test for the differential effect of different levels of the HRSP. Effect sizes were calculated for each grade and correlated with the different levels of the independent variable. This test was replicated five months later. The results of a Pearson product-moment correlation indicated a significant correlation ($r = 0.93$) between effect size for grades 1 to 5 and exposure to the programme. This result was replicated five months later ($r = 0.91$). A significant correlation between the effect sizes for grades 1 to 5 and the exposure to the HRSP was also found for reading ($r = 0.97$). This result was also replicated five months later ($r = 0.98$). Thus I concluded that evidence for a significant correlation between effect sizes and the exposure to the HRSP existed for both reading and spelling scores. This result provides very strong support for a causal relation between the HRSP and reading and spelling ability.

This result is in contrast with the NRP (2000) report that systematic phonics instruction did not improve reading and spelling ability in poor readers **above first grade**. Pre-test scores in this study indicate that most learners were reading well below age levels prior to the introduction of the HRSP

i.e. they were poor readers. The large effect sizes obtained for both spelling and reading ability above first grade in relation to the number of years of exposure to the HRSP is therefore an important finding of this study.

6.4.2.2. Main effects

Effect sizes provide information on the 'practical significance' (Steyn, 2005) of the research, but do not provide information about the statistical significance of difference. A random sample from the pooled scores of each school was subject to a factorial ANOVA with school (DSS and SDD) and grades (number of years of exposure to the HRSP) as independent variables. Evidence for a difference between the two schools in both spelling and reading ability existed.

A significant result was also obtained for the effect of 'grade' i.e. number of years of exposure to the HRSP. A significant interaction indicates that the effect of 'grade' depends on the difference between 'school'. The most plausible difference between 'school' that would account for the difference between 'grade' is the HRSP. Therefore I concluded that evidence existed for an effect of the number of years of exposure to the HRSP on spelling and reading ability in DSS.

6.4.2.3. Gender effects

As reported above (6.4.1.3.), it was considered crucial for the internal validity of this study that gender effects be analysed, since it is often reported in the literature that there is a consistent difference between genders on spelling and reading ability at the early stages of learning to read (Lerner, 2003, Richek *et al*, 1989). An analysis of reading and spelling pre-test scores were examined for gender effects in a random sample from each school. No significant difference was obtained between boys and girls in **reading** ability in either school. A significant difference was found between boys and girls in **spelling** ability in SDD but no significant difference was obtained between genders for DSS.

In this analysis, random samples of spelling and reading scores from each school were examined for differences in gender in post-test scores. There was no evidence for a gender difference in post-test reading and spelling scores. Therefore, there seems to be little reason to consider gender to be a confounding factor in this analysis.

6.4.2.4. Language/race effects

Language and race effects also were a threat to the internal validity of this study. It was therefore imperative that the possible confounding effects of race and language be examined. Due to the large component of Caucasian learners in DSS, it could be argued that the differences in reading and spelling ability were due primarily to gains amongst this group of learners.

Results indicated a significant difference between language groups in reading comprehension and in spelling ability. Because a significant language effect was obtained, further analyses were carried out to obtain more information on the nature of the differences.

- Firstly, pre and post-test scores for both DSS and SDD were compared using ANOVA, with orthogonal contrasts for *post hoc* pair-wise comparison of group means to establish group response to treatment.
- Secondly, the pre-test and post-test differences between the African and Caucasian language groups in **grades six and seven** (pooled) in DSS were investigated using t-test to investigate changes in groups not exposed to the HRSP.
- Thirdly, post-test scores for grades six and seven separately were examined by t-test for differences in spelling and reading between the **African** language groups in the two schools to establish whether pre-test equivalence between the two groups was still evident in the post-test.

No significant difference was observed between the pre and post-test scores for both reading and spelling ability in SDD. In contrast to this finding, a significant difference was obtained for pre-post test scores for **both** language groups in DSS. This result indicated that **both** language groups responded to the HRSP, in contrast to no change in the SDD group. The results of the evaluation of pre-test and post test scores in the DSS grades that had **not** received the HRSP (grades six and seven) indicated the same result as for SDD – there was **no** change over the testing period, even though a significant difference between the language groups persisted. Furthermore, **African** learners in grades six and seven separately showed **no** difference in the reading and spelling scores between schools. This result would argue against the claim that the gains in DSS were due to gains in the Caucasian learners only. The data do not support such a contention. Furthermore, the claim of the HRSP to address the needs of English-additional-language learners, particularly African learners, is supported by the findings of this study. Both language groups showed significant increases in spelling and reading ability. In **spelling**, the two groups were equivalent in amount of change as measured by effect size ($d = 0.58$ and 0.59) and average score in post-test

scores. Effect sizes for pre and post-test scores indicated that most of the gains in **reading** scores in DSS learners was contributed by the **African** learners ($d = 1.04$ compared to 0.59). A similar result was observed for gender. In this case most of the gains was contributed by boys for both spelling ($d = 0.85$ compared to 0.35 for girls) and reading ($d = 1.06$ compared to 0.55 for girls). The possibility that the HRSP may be closing race and gender differences in reading and spelling achievement is a very important result that would necessitate further research.

6.4.2.5. Interactions and causal-comparative inference

In order to find evidence for a **causal** relationship in a natural groups design between the treatment and the effect observed, a design was used as described in the methodology (Shaughnessy & Zechmeister, 1990): A *post hoc* experimental protocol was derived, based on the reasoning that the two groups, control and experiment, would show an 'individual difference' on the grounds of their exposure to the HRSP or not. The two groups were then subject to test conditions (Schonell Graded Word Test A). The words in the instrument were categorised in terms of level of item difficulty. These levels were carefully delimited, and it was argued that the two groups would show a variable response to the different levels of word difficulty. If the treatment (the HRSP) was specifically causing the difference, it was reasoned that:

- 1) for spelling achievement scores, a *differential effect* would be observed between the treatment and control groups on measures of ability for phonetically regular two and three syllable words, phonetically regular one syllable words and phonetically irregular words.
- 2) the learners exposed to the phonics programme would show a *greater difference* on the phonologically regular words than for the phonetically irregular words.
- 3) this would change with *maturation* so that the learners in grade two would show differences in the one syllable phonetically regular words **and** the irregular words, while learners in grades three and four, the differences would be limited more to phonetically regular words.

This result was obtained.

The results of the above analysis (interactions) were also consonant with the findings of the NRP (2000) which indicated moderate to large effect sizes for the impact of systematic phonics instruction of reading phonetically regular real and nonsense words, and small to moderate effect sizes for phonetically irregular words. This result provided further support for a causal relation between the HRSP and the reading and spelling scores in grade one to five of DSS. It was considered implausible that other variables would have caused such a systematic and predictable variation in the data.

This result also provided indirect support for the *phonological assembly* model of reading acquisition and reading difficulty described in Chapter 3 (pg. 77). The results obtained in this experiment were consonant with this model. This model anticipates a shift from the predominant use of the phonological route to the predominant use of the lexical route at about third grade. It was evident that the correlation between spelling (a predominately phonological circuit relying on successive processing) and reading comprehension (a predominately lexical circuit relying on simultaneous processing) was typically strong in grade 2 ($r = 0.83$). This was interpreted to mean that the reading and spelling tests reflect a cognitively unitary process (phonological processing) at the early stages of reading acquisition as suggested by Spear-Swerling and Sternberg (1994), Turkeltaub *et al.* (2004) and Das (2002). However, in grade 3, this correlation broke down ($r = 0.42$). Nevertheless, the group **as a whole** had a reading age of 10.8 years on the Schonell compared to an average chronological age of 9.1 years, a statistically significant difference. Similarly, by grading books that the learners in this group **had actually read**, it was evident that this group were on **average** capable of reading at a grade level of 5.2 compared to an expected grade level of 3.5, also a significantly different result. This was interpreted to indicate that a shift to lexical circuits had occurred (as indicated by the high levels of actual reading achievement). Furthermore, by providing a more demanding comprehension test (Daniels & Diack) the correlation with spelling scores can be restored ($r = 0.74$), suggesting a shift back to the phonological circuits when reading more demanding texts, as predicted by the model. This result indicated that the goal of the HRSP to have learners reading **on average** at age/grade levels by grade three was achieved. Furthermore, the evident facility of the learners to shift between lexical and phonological circuits provides indirect support that the level of **strategic reading** had been attained (Spear-Swerling & Sternberg, 1994).

6.4.2.6. Partial replication

Replication remains one of the most important tests for the reliability of an experimental intervention (Shaughnessy & Zechmeister, 1997). Data from three groups, reception year 2000, 2001 and 2002, were analysed by repeated measures ANOVA to establish the presence a similar effect of the HRSP in the respective groups. A significant result was obtained in all cases. The breakdown in the reliability coefficients for reading in grade 3 was interpreted to be due to the learner's level of reading skills exceeding the reliable limits of the instrument. The underlying reasons for this were suggested above (6.4.2.5.). This result provides support for the reliability of the HRSP, as well as indirect support for the external validity of this study with respect to grade one to five **learners**. It was reasoned that **learners** are equivalent in the cognitive process of

learning to read. In that sense (only) the results of the study apply to all learners (Shaughnessy & Zechmeister, 1997).

The external validity of this study with regard to **schools** needs further mention. No claim was made in this study that either DSS or SDD were typical of **schools** in the Greytown area, much less KwaZulu-Natal. These schools were chosen because they were 'normal' not typical. Normal in this context means that teaching and learning were possible. In contexts where this is not the case the effectiveness of the HRSP may be compromised.

This is not to argue that the HRSP is ineffective in dysfunctional school environments. In fact the results of this study may argue for the reverse. In contexts of poor reading and spelling ability, the HRSP may very likely lead to a notable effect. Furthermore, given the strong correlation between literacy and delinquency (Broder *et al.*, 1981; Ziglert *et al.*, 1992), the possibility exists that addressing deficits in literacy might alleviate many of the social problems that young people experience. The HRSP can be seen as part of a normalising whole-school programme and culture of learning. It is anticipated that a more effective interpreter of texts i.e. a highly proficient reader, will be a more effective interpreter of life (Xu *et al.*, 2005). According to the Revised National Curriculum Statement (2002) reading is a life skill. For this reason, the HRSP might possibly play a central role in a normalising process within a Health Promoting School programme (Brandon-Muller & Elias, 1991).

6.4.2.7. Effect sizes for the study

The average effect size for this study was $d = +0.96$ for reading comprehension and $d = +0.80$ for spelling. These effect sizes are large according to the estimate of Cohen (Howell, 1992). These effect sizes compared favourably with the effect sizes for the overall impact of systematic phonics on reading ($d = +0.41$) reported by the NRP (2000). The result of this study also compared well with the effect sizes obtained for decoding phonetically regular words ($d = +0.98$) for younger learners (prior to second grade), but were larger than the effect sizes reported in the NRP (2000) for spelling ($d = +0.67$) and reading ($d = +0.51$) in Kindergarten and first grade. The results of this study contrasts sharply with the effect sizes reported (NRP, 2000) for: i) decoding phonetically regular words ($d = +0.49$); ii) spelling ($d = +0.09$) and iii) reading comprehension ($d = +0.12$) **beyond first grade**. In this study the effect sizes for **phonetically regular words** were $d = +1.07$ (grade 2), $d = +1.22$ (grade 3) and $d = +2.59$ (grade 4). Effect sizes for **spelling** were $d = +0.90$

(grade 2) and $d = +1.08$ (grade 3). Effect sizes obtained in this study for **reading** were $d = +1.61$ for second grade and $d = +2.21$ for third grade. As most learners in this study were reading and spelling one or more years *below* age for both reading and spelling prior to the implementation of the HRSP, they would be classified as **low achieving readers** (Lerner, 2003). The results obtained in this study therefore also contrast sharply with the effect size reported by the NRP (2000) for the impact of systematic phonics on low achieving readers ($d = +0.15$).

The results of this study compare well with two longitudinal studies (Kindergarten to grade two). The first (Blachman, Tangel, Ball, Black, & McGraw, 1999) was similar to this study in design features. Each 30-minute lesson consisted of five steps.

- Teaching new sound symbol correspondences with vowels highlighted in red.
- Teaching phoneme analysis and blending.
- Reading phonetically regular words, phonetically irregular words and high frequency words on flash cards to develop automaticity.
- Reading text containing phonetically controlled words.
- Writing four to six words and a sentence to dictation.

Blachman *et al.* (1999) reported effect sizes of $d = +0.71$ for Kindergarten, $d = +0.64$ for grade one and $d = +0.36$ for grade two for the impact of phonemic awareness training and systematic phonics instruction of low SES, inner-city children. In a second longitudinal study on 180 children with poor phonemic awareness and letter knowledge from 13 schools, Torgesen, Wagner, Rashotte, Rose, Lindamood, Conway and Garvan (1999) reported effect sizes of $d = +0.33$ (kindergarten), $d = +0.75$ (first grade) and $d = +0.67$ (second grade) on measures of phonemic awareness, decoding, and word reading accuracy. The effect sizes for this study were $d = +0.49$ for reading comprehension and $d = +0.47$ for spelling in first grade, and $d = +1.61$ for reading and $d = +0.90$ for spelling in second grade. Given that these results were obtained using standardised tests designed for English first language learners, this is a notable result. Standardised tests are reported (NRP, 2000) to typically yield lower effect sizes than experimenter generated tests. Furthermore, most learners in this study (94%) used English as an additional language. The results obtained in this study therefore compare very well with the effect sizes obtained in similar research in the USA. The moderate to large effects sizes obtained in this study also attest to the practical significance of the HRSP (Steyn, 2005).

6.5. SUMMARY OF RESULTS

The weight of evidence from the results of this study clearly support a causal role for the HiWay Reading & Spelling Programme in the significantly higher reading and spelling scores obtained in grades two to five of DSS. Hawthorne effects could be statistically ruled out, and maturation effects and historicity effects controlled for. The internal validity of the study was adequately established. External validity rests on other factors as has already been discussed, and will be further addressed in the final chapter. This result is consonant with findings reported elsewhere (NRP, 2000), and indicates that the HRSP can claim to be a comprehensive, evidence based, multi-component, two-phase reading programme as proposed by Al Otaiba and Fuchs, (2006, 2002). Furthermore these results indicate that the HRSP is ready for piloting within the mainstream curriculum on a much wider basis.

In this chapter, the results were reported and interpreted. These results will be summarised in the next chapter in relation to literature in this field.

CHAPTER 7

SUMMARY AND RECOMMENDATIONS

7.1. INTRODUCTION

This study aimed at investigating the presence of a causal relationship between a specific comprehensive reading programme and selected achievement measures. In chapter 3 it was reported that Shaywitz and Shaywitz (2004b) described a number of criteria that effective 'evidence-based' reading programmes should meet. They claimed that when evaluating a reading programme, teachers should ask the following questions:

- Is there scientific evidence that the programme is effective?
- Was the programme or its methodology reviewed by the National Reading Panel (2000)?
- In reading instruction, are phonemic awareness and phonics taught systematically and explicitly?
- How are learners taught to approach an unfamiliar word? Do they feel empowered to try to analyse and sound out the unknown word first rather than guess the word from the pictures or context?
- Does the programme also include plenty of opportunity for learners to practice reading, develop fluency, build vocabulary, develop reading comprehension strategies, write and listen to and discuss stories?

7.1.1. THE MAIN FINDINGS

The main findings of this study were consonant with the large body of research implicating the central role of direct instruction of phonemic awareness, systematic phonics, fluency, vocabulary and reading comprehension (FRNRP, 2000). Large effect sizes were obtained in this study using standardised tests. This result contrasts with the medium to small effect sizes reported for standardised tests in the NRP report (2000). This finding also adds further support for the flexibility and effectiveness of the programme within the actual classroom context. The significant result obtained within the context of a 'natural' whole group design also indicates that the HRSP can be successfully integrated within the mainstream and function within the normal classroom context.

7.1.2. NON EQUIVALENT GROUPS DESIGN

In accordance with recommended practice (Steyn, 2005), effect sizes were calculated for whole groups to evaluate the practical significance of this study. Effect sizes obtained in this study were typically moderate to large.

The design of the study was a pre-test-post-test non-equivalent group design. More emphasis was placed on internal validity, and for this reason an attempt was made to carefully match the two groups (schools) on socio-economic background, school size and infrastructure, teacher-pupil ratios, teacher training and teacher commitment. In order to test the assumption that the two schools did not differ from each other, pre-test groups and groups not subject to the HRSP (grades 6 and 7) were compared to control groups on measures of the dependent variables, i.e. reading comprehension achievement and spelling achievement.

Furthermore, an investigation via questionnaire was made to accurately establish the type of instruction the grade one to three of the control groups received. The findings of this questionnaire reveal that the grade one class did have a systematic phonics approach and basal readers, very similar to the grade one group of DSS. Grade two and three of the control groups however departed more from a systematic phonics approach and dependence on basal readers, and adopted a more embedded phonics approach combined with whole language/language experience approaches. This contrasted distinctly with the systematic, direct instruction approach of the HRSP.

It was assumed that the Revised National Curriculum Statement (2002) controlled the structure of the instruction taking place in grade four to seven of SDD. Results of this study suggested that reading was not explicitly taught above grade 2. With the exception of grade 1, the type of reading instruction used in the HRSP was not used in the control groups. In fact, reports have shown that teachers do not generally use such strategies (Durkin, 1984; Lessing & De Witt, 2002; Pressley, 1998), even if they are aware of them and have been trained in them, a factor of vital concern to the implementation of the HRSP. Durkin (1984) reported that the types of reading comprehension tasks that characterised the classroom instruction she observed was limited to "self study", completing comprehension "worksheets", and preparation of spelling and reading (memory) work for "assessment" (seatwork). She also found little to no previewing, questioning, modelling, or direct instruction of comprehension strategies. Teachers named time constraints as reasons for deviating from the manuals or the recommended instructional designs, and classroom

management factors in handling groups of different abilities in their choice of approach. These findings were confirmed more recently by Pressley (1998). Teacher training has emerged as a crucial component in the delivery of comprehensive reading programmes (NRP, 2000, Lessing & De Witt, 2002).

Shaughnessy and Zechmeister (1990) stated that it is preferable to match controls using the tests of the dependant variables that are to be used in the study. Grades one to seven of both schools were pre-tested using the same instruments used to determine the effects of reading instruction with or without the HRSP. Furthermore grade six and seven of both the control and treatment school did not receive the HRSP, and were tested at the beginning and end of 2004. Results demonstrated that no significant difference between grade one to seven on pre-test scores and grade six and seven on post-test scores was obtained for the two groups (schools) on both reading and spelling achievement scores. This result gives us confidence that a good matching task was available and that the two groups can be considered similar in spelling and reading ability prior to the implementation of the HRSP.

The non-significant difference in post-test scores of spelling and reading between DSS and St David at grade six and seven was interpreted as being because these grades did not receive the HRSP. The grade one group at DSS did not show a significant difference from the grade one group in St David. On investigation, it was found that in the grade one group of DSS and the grade one group of St David had a systematic phonics approach using a basal reading programmes. The two groups were therefore very similar in instruction conditions, and the non-significant result reflects this.

7.1.3. CAUSAL RELATION BETWEEN THE HRSP AND ACHIEVEMENT MEASURES

7.1.3.1. Spelling achievement

The results of the analysis of the differential response to level of word difficulty in relation to whether the learner had received the HRSP or not indicated a causal relation between improved spelling scores and the programme. It would be implausible to explain the observed pattern of the data in the interaction between level or word difficulty, and exposure to the HRSP or not, in terms of the amount and type of general education, socio-economic status, or family background. Both groups were closely matched and statistically tested for equivalence using the dependent

variables. Maturation effects could also be discounted because both groups would have been subject to equivalent maturation effects.

The failure to find a difference between the two schools in grade two and three on their spelling of phonetically regular, three syllable words was surprising, but may alert us to the need for more direct instruction and practice on this skill. The programme developer and co-ordinator indicated (Hailstones, 2004) that she noticed from personal observation in the classroom that there was a need for more direct instruction and practice in syllabication.

7.1.3.2. Mathematics achievement

It was reasoned that Hawthorne effects would not be present to a degree that threatened internal validity of this study due to the normal classroom nature of the intervention. Firstly, learners did not receive any special attention and were not taken out of the normal classroom situation. Secondly, they received the intervention from their class teacher to whom they were accustomed. However, it was considered important to test for Hawthorne effects by measuring achievement on mathematics ability. It was reasoned that if no difference were obtained in mathematics scores over the same period as a significant difference was observed for reading and spelling scores, the possibility of Hawthorne effects would be further minimised, and the treatment validity of the intervention would be further strengthened (NRP, 2000). Results indicated that no significant difference was observed in mathematics quotient scores between June and November. This adds further corroboration to the claim that the HRSP is in fact causing the specific difference (increase) in spelling and reading ability.

7.1.3.3. Effect size and fidelity of treatment measures

In order to evaluate fidelity of treatment, the DSS class teachers were required to fill in a questionnaire assessing fidelity of treatment. The results of this questionnaire were grouped into five themes or categories: time spent per day on phonics, attitude to phonics, attitude to the HRSP, and attitude to early intervention and fidelity of implementation of the HRSP. These data were correlated with **effect size** scores for each of the grade one to five groups. Two measures, the teacher's **attitude to the HRSP** and the **fidelity of implementation** of the HRSP were significantly correlated to effect sizes for improvement in measures of **reading** in grade one to five in DSS. It is notable that the effects on reading were not related to **time** spent on phonics, but only to the

faithful implementation of the programme. In addition, a significant correlation between effect size for **spelling** and **time spent on phonics** was observed. Furthermore, the results also indicated a significant correlation between **effect size** for both reading comprehension and spelling ability and **the number of years** of exposure to the HRSP. This result provided further support for a causal relation between the HRSP and the differences in spelling and reading comprehension achievement scores.

Estimates of power provide an indication of the probability of correctly rejecting the null hypothesis. For grade two reading, for example, a power of 0.32 means that there is a 68% chance of making a Type II error i.e. concluding there is no difference when there is a difference. These results indicate only a 4% chance ($\delta=3.71$, power 0.96) of a Type II error for reading comprehension and a 13% chance ($\delta=3.09$, power 0.87) for spelling.

7.1.4. THE RESULTS OF THE QUALITATIVE ANALYSIS

The results of the qualitative enquiry indicated that the HRSP is a comprehensive, multi-component reading programme that meets the requirements stipulated by the NRP report (2000) and Shaywitz and Shaywitz (2004b). Results also indicated that the HRSP can be easily and successfully integrated into the mainstream. The HRSP therefore meets the description of the model for learner support service delivery within the mainstream as proposed by Donald (1996). Results also indicate that the HRSP could meet the need for in-service and pre-service teacher training in evidence-based reading instruction and learner support provision within the mainstream as indicated by the NRP (2000) and Lessing and De Witt (2002), and provide an alternative assessment protocol for identifying the learners with learning difficulties by means of unresponsiveness to primary and secondary interventions (Phase 1 and 2 of the HRSP) as suggested by Al Otaiba and Fuchs (2006, 2002).

7.2. CONCLUSIONS OF RESEARCH

Shaywitz and Shaywitz (2004b) described five criteria that 'evidence-based' complete reading programmes should meet:

1. Is there scientific evidence that the programme is effective? **Yes**
2. Was the programme or its methodology reviewed by the National Reading Panel (2000)? **Yes**

3. In reading instruction, are phonemic awareness and phonics taught systematically and explicitly? **Yes**
4. How are learners taught to approach an unfamiliar word? Do they feel empowered to try to analyse and sound out the unknown word first rather than guess the word from the pictures or context? **Yes**
5. Does the programme also include plenty of opportunity for learners to practice reading, develop fluency, build vocabulary, develop reading comprehension strategies, write and listen to and discuss stories? **Yes**

The results of this study indicated that the HRSP would be positively evaluated in all of these questions. The results of this study adds support to the well established role in reading acquisition of direct instruction of phonemic awareness, phonics instruction, fluency, vocabulary and reading comprehension strategies as outlined by the National Reading Panel Report (2000). The results of this study show that explicit systematic phonics instruction improved learners' ability to read and spell in grades one to five more than basal programmes and regular literacy instruction that was less focussed on teaching alphabetic knowledge and word reading skills. The HRSP was particularly effective in producing an improvement in reading and spelling ability in poor readers beyond first grade, something which most systematic phonics programmes failed to do (NRP, 2000).

Several features of the HRSP were noteworthy and may underlie its effectiveness. The same programme continues over grades one to six, thus ensuring consistency and continuity in learning the phonic generalisations and how to use them to read and spell. The programme was designed to begin in grade R/1 with the alphabetic code instruction. Phonics instruction is graded to age-appropriate levels of ability. Learners were explicitly taught phonemic awareness and letter-sound relations, which they used to analyse words and text. Delivery of instruction was designed to enable all learners to benefit from and complete the programme. Tests were given biannually to assess learners' progress and to distinguish those learners who needed more intensive instruction from those who did not. Instruction in systematic phonics was not limited to only sounding out and blending words but included various reading and writing skills in authentic literacy tasks. Learners also were given practice in spelling, reading and writing words from memory. An extensive set of letter-sound relations was taught and applied to various reading and writing tasks. Phonics instruction provided the basis for, and was combined with, fluency training, vocabulary building and comprehension strategy building. Learners were given practice in reading and interpreting

phonetically controlled texts. Teachers were provided with ongoing in-service training to provide correct instruction and to understand the reading process and the importance of systematic phonics instruction as a component of a total reading programme. Further research is needed to examine the separate contribution of each of these factors to the effectiveness of the programme.

This study provided support for the feasibility of integrating the HRSP into the mainstream classroom. The credibility of the qualitative research was adequately established.

This study also provides support for the efficacy of the HRSP as a complete intervention tool as the first and second phase of the multi-component two phase programme for identifying learners unresponsive to regular literacy instruction (Al Otaiba & Fuchs, 2006, 2002).

7.3. RECOMMENDATIONS

The results of this study do alerted us to the need for expanding the programme into the grade R/Kindergarten level. The NRP (2000) report cites numerous research papers indicating that the early implementation of phonemic awareness and systematic phonics intervention is crucial and that it should be begun at grade R level. Secondly, the crucial importance of early reading instruction is emphasised by claims by Foorman et al. (1997) of the National Institute of Child, Health, and Human Development (NICHD) in the USA that delaying intervention until age seven will result in 75% of children continuing to struggle. Foorman (cited in Diamond & Mandel, 1996) states that if reading problems are addressed in grade two, 82% can be remedied, while leaving interventions until grade three to five will help only 46% of the children with problems. Attempts at addressing problems from grade six onwards will only have a 10-15% success rate.

It has been reported (Lerner, 2003) that children who do not receive any intervention fall further behind with increasing age. It is clear from the control groups in this study that both spelling and reading ability don't keep pace with the developmental progress of the child. This is evident in declining quotient scores for both groups, particularly the reading comprehension scores. This belies the 'wait and see' approach advocated by some and would cause us to question the 'in progress' status of OBE assessment in South Africa.

The results of this study support the conclusion that the observed achievement in reading and spelling ability is not a fixed characteristic of the individual, but is particularly amenable to change

(Feuerstein *et al.*, 1980, 1991). This study indicated that the gradual decline in performance in spelling and reading achievement compared to chronological age observed in the control group can be prevented and reversed, to the extent that learners can, with appropriate evidence-based, systematic interventions of just fifteen to twenty minutes per day, achieve at a level two years in advance of their age. We are of the opinion that reading and spelling at high levels of proficiency is not only the child's true potential but also their right, and regret that this is often lost sight of within the ideologically clouded jargon surrounding the debate about the teaching of reading and the language of instruction in South Africa. Our children can achieve if we provide the right interventions. The results of this study affirm the cognitive equivalence of all children, regardless of race, sex or socio-economic status.

Troia (1999) undertook a review of the methodology of phonemic awareness intervention programmes in order to assess the methodological rigor and scientific validity of the claims for the effectiveness of the different intervention protocols. None of the research articles examined by Troia evaluated the effects of **classroom based** intervention. He suggested that such programmes may be impractical or too complex for implementation and that the positive effects observed may be compromised by classroom conditions. He concludes that in the absence of such information it is not clear to what extent intervention programmes can tolerate modifications or variations in routine administration without diminishing treatment effectiveness (Troia, 1999). Troia (1999) states further that **classroom research** is what is most needed to inform and improve educational practice. He comments, "although investigators should not disregard their responsibility for employing sound research methods, the educational community must be prepared to accept compromises and innovations in experimental methodology and alternative investigative paradigms so that ecologically valid treatments are available for field use". This observation indicates that this present study is uniquely positioned to make an important contribution to our knowledge of the area and to address precisely the questions raised by Troia (1999).

The results of this study were consonant with findings reported elsewhere (NRP, 2000), and indicated that the HRSP can claim to be a complete, evidence-based, multi-component, two-phase reading programme. Furthermore, these results indicate that the HRSP is ready for implementation within the mainstream curriculum. Two changes were indicated. Firstly, more direct instruction in syllabication and secondly, the greater extension of the programme into grade R. Finally, in-service teacher training emerged as a crucial correlate of the effectiveness of the programme.

The results of this study clearly implicate a causal role for the HRSP in the significantly higher reading and spelling scores obtained in the DSS group. Hawthorne effects could be statistically ruled out, and maturation effects and historicity effects controlled for. External validity with respect to the learners rests on the argument that all children learn to read in the same way. The weight of evidence argues for a single route or mechanism for reading, and not multiple routes (Spear-Swerling & Sternberg, 1994). The results of this study indicated that both genders, English-additional-language learners, and children from diverse linguistic backgrounds and cultures benefited from 'scientifically validated' reading instruction. The results of this research lead us to **predict** that the programme has external validity for **learners**.

With regard to the **schools**, no claim was made that the schools involved in this research were typical of schools in the Greytown area, much less South Africa. These schools were chosen because they were normal not typical. Our discussion with teachers in the Greytown area has revealed a growing sense of urgency that something must be done to address the alarming drop in basic literacy skills in most schools. Combined with this is an expressed need on the part of the teachers for a simple yet effective tool that they can implement in the classroom to address this need. They are frustrated by a lack of effective intervention programmes. For this reason, it is argued that there is an urgent need for the implementation of such programmes within the mainstream context. It is proposed that the HRSP be seen as part of a normalizing programme within a whole-school development approach. It remains that the educational authorities see the vision and understand the potential of 'evidence-based' interventions in order to generate the political will to operationalise the results of this and similar research in terms of teacher training and whole-school capacity building.

The major line of research that still needs to be addressed is the initial proposal at the beginning of this thesis: Can instruction in reading comprehension also provide a tool for life-skills development? The basic premise is that higher reading is an interpretative process, and that good interpreters of texts may be also good interpreters of life (RNCS, 2002; Xu et al., 2005). This may foster better decision making, problem solving, critical thinking, and lead to the formulation of more constructive and realistic goals (Moll *et al.*, 2001; Scott, 1996; Skuy, 1996). It may also render the individual more active in their epistemological stance to existence (Gibbs, 1981) and more open to reality and truth (Paul & Elder, 2005). The results of this study indicate that the HRSP may provide a powerful tool in operationalising this proposal. Exploratory research has already been initiated to test this, and initial results are encouraging, but further work is necessary to empirically establish

the plausibility of such a thesis and to extend 'evidence based' intervention into the realm of life skills intervention and character building. "The search for excellence in schools is the search for excellence in people." (Clark – cited in Ainscow, 1991:9)

7.4. SUMMARY

7.4.1. THE RESULTS OF THE QUALITATIVE INVESTIGATION

The HRSP is both a preventative and intervention programme, and aims at an inclusive rather than a 'pull-out' approach. All learners participate, all learners benefit. The methodology used in the programme has been reviewed by the National Reading Panel (2000). In order to read all children must be taught phonemic awareness and systematic phonics, vocabulary, fluency and reading comprehension strategies. The HRSP includes all of these aspects arranged hierarchically on a developmental trajectory. The HRSP can therefore claim to be 'evidence-based'. The results of the DSS teacher questionnaire indicated that the HRSP was successfully integrated within the literacy component of the mainstream. It is fully integrated within the curriculum, and is incorporated into the daily classroom activity within the instruction of literacy. It consists of brief periods of instruction (10 to 20 minutes) daily. Within the programme the above mentioned components are deliberately, explicitly and directly taught. Research (NRP, 2000) indicates that it is not effective to teach these aspects incidentally. The initial goals of the programme are that learners will master the letter-sound associations of the English language by the end of grade three. Once the child has mastered the basic foundational skills, they move on, beginning in grade four, to the direct instruction of vocabulary, fluency and reading comprehension strategies. All elements within the HiWay programme are aligned with one another and decodable booklets are provided to give the learners practice in mastering specific skills.

7.4.2. THE RESULTS OF THE QUANTITATIVE INVESTIGATION

The main effects obtained in this study were consonant with the large body of research implicating the central role of direct instruction of phonics and reading comprehension. The significant result obtained also indicates that the HRSP can be successfully integrated within the mainstream and function within the normal classroom context. Large effect sizes were obtained in this study using standardised tests designed for English First-language learners. This result contrasts with the medium to small effect sizes reported for standardised tests in the NRP report (2000). This is all

the more remarkable as most learners in DSS (94%) use English as an additional language. Moderate to large effect sizes were obtained for poor readers beyond first grade. This finding provides further support for the flexibility and effectiveness of the programme within the regular classroom context.

7.4.3. CONTRIBUTIONS TO THE FIELD

1. This study operationalises the recommendations of the NRP (2000) report with respect to complete reading programmes.
2. This study extends 'evidence-based' reading research and intervention into the mainstream classroom context.
3. This study extends reading intervention beyond grade 1. The HRSP improved spelling and reading in learners struggling to read above grade 1.
4. This study operationalises the proposed model of Al Otaiba and Fuchs (2006) for 2-phase interventions within the regular classroom context.
5. The HRSP provides an alternative means of dynamic assessment (test-teach-test) for identifying learners with reading difficulty in the South African context.
6. This study addresses the needs of learners unresponsive to regular intervention through a multi-sensory, active-learning, thinking-skills approach aimed at fostering the cognitive process skills of successive and simultaneous processing, planning and attention.
7. The HRSP meets the needs of all learners struggling to read in an inclusive paradigm.
8. This study addresses the need to find 'what works' in the South African context in order to reach the stated goals of the RNCS i.e. a high level of reading proficiency in at least two languages.

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APPENDIX 1

Teacher Questionnaire (Note: the information you provide in this questionnaire will be regarded as strictly confidential. I really appreciate you giving up your time to help me. Thank you.)

Teacher name.....Grade(s) taught.....

1. On how many days per week on average do you include the HiWay program?
 - One
 - Two
 - Three
 - Four
 - Five

2. How much time do you devote to teaching the HiWay program per day/lesson?
 - Five minutes
 - Ten minutes
 - Fifteen minutes
 - Twenty minutes
 - More

3. Do you use the HiWay program
 - systematically
 - whenever it is needed
 - when time allows

4. In which lessons do you use the HiWay program?

.....

5. At what time of day do you include the HiWay program?

.....

6. Do you make use of the HiWay colour system?
 - Yes
 - No
 If No, what system do you use?

.....

7. Do you make use of the HiWay worksheets?
 - Yes
 - No
 If No, what do you use?

.....

8. Do you make use of the HiWay Teachers manual?
 - Yes
 - No

If No, what do you use?

.....

9. Do you explicitly teach the children that words are made up of sounds?

Yes

No

If Yes, what approach do you use?

.....

10. Do you teach the children to break up words into sounds?

Yes

No

If Yes, what approach do you use?

.....

11. Do you foster sight reading (recognising whole words) in your children?

Yes

No

If Yes, what approach do you use?

.....

12. How well do you feel the HiWay program works?

Very well

Well

With some, not all

Not at all.

13. Do you prefer another approach to fostering early literacy?

Yes

No

If yes, please specify.

.....

14. Do you feel that phonics based approaches are

Very useful

Not very useful

Harmful

15. Teaching children to read before Grade 1 is in your opinion

A futile exercise

Harmful to the child

Beneficial for the child

16. Do you feel that the HiWay program can be easily integrated into the curriculum?

Yes

No

If No, please indicate why not.

.....

17. Do you feel there is a need for early literacy intervention for children in your class?

Yes

No

18. Do you feel that some of the learners in your class have a reading disability?

Yes

No

19. What is your position on the policy of inclusion and remediation in the mainstream?

Favourable

Might work for some

Will not work for most.

20. Do you feel competent to remediate children with reading disabilities?

Yes

No

If Yes, how would you go about it?

.....

.....

.....

21. Do you feel that it is your responsibility as class teacher to help the children with reading disability?

Yes

No

22. If yes, do you feel the HiWay program would provide a useful intervention tool?

Yes

No

23. Do you teach phonics to your children?

Yes

No

If yes, what method do you use?

.....

Thank you very much for your time and co-operation.

APPENDIX 2

Early Literacy Learning Questionnaire

The following questionnaire consists of a number of statements related to teaching early literacy. Read each statement and then mark one of the following choices on the answer sheet:

Key				
1	2	3	4	5
Not at all like me	Not very much like me	Fairly much like me	Much like me	Very much like me

Please completely cross the appropriate numbers that best describe you. For example, cross the 3 if you feel that the statement is fairly typical of you.



1	2	3	4	5
---	---	---	---	---

Try to rate yourself according to **how well the statement describes you**, not in terms of how you think you should be or what others do. There are no right or wrong answers to these statements. Please work as quickly as you can without being careless and **please complete all the items**.

1. Children are taught to read words as wholes much like Chinese logographs.
2. Children practice reading words until they had acquired perhaps 50 to 100 words in their sight vocabularies. Only after this accomplishment, which occurred toward the end of 1st grade, does phonics instruction begin.
3. Discussion of letter-sound relations was delayed for a considerable length of time.
4. These included synthetic phonics programs which taught children to sound out and blend words,
5. I use linguistic programs which teach decoding through patterned words and phonetically controlled texts
6. I use analytic phonics programs which teach children to analyze letter-sound relations in previously learned words so as to avoid pronouncing sounds in isolation
7. Teachers should not wait until a certain point before teaching children about letter-sound relationships.
8. I believe that phonics should be taught directly
9. I believe that skills instruction should be combined with literature and language-rich activities.
10. I believe that R through 2 teachers should integrate phonics instruction into their lessons (with some extra isolated phonics).
11. I believe that phonics should be taught as a separate part of word study.

12. I typically provide some instruction in phonics, usually as part of invented spelling activities or through the use of graphophonemic prompts during reading
13. My approach is to teach phonics unsystematically and incidentally in context as the need arises.
14. My approach regards letter-sound correspondences, referred to as graphophonemics, as just one of three cueing systems (the others being semantic/meaning cues and syntactic/language cues) that are used to read and write text.
15. I believe that phonics instruction should be integrated into meaningful reading, writing, listening, and speaking activities and taught incidentally when I perceive it is needed.
16. As children attempt to use written language for communication, they will discover naturally that they need to know about letter-sound relationships and how letters function in reading and writing.
17. I believe the teaching of vowels is central to phonics teaching and is essential for enabling children to decode
18. I believe teaching children to say the sounds of letters and blend them to decode unfamiliar words is central to phonics teaching and is essential for enabling children to decode.
19. The phonics programs I use teaches children an extensive, pre-specified set of letter-sound correspondences or phonograms
20. The phonics programme I use teach a more limited set of letter-sound correspondences, in context, as needed.
21. The phonics programs I use teach phonics explicitly by delineating a planned, sequential set of phonic elements and teaching these elements explicitly and systematically.
22. The phonics programs I use also uses controlled vocabulary (decodable text) to provide practice with a planned, sequential set of phonic elements.
23. Exposing children to letter-sound relations as they read text will foster incidental learning of the relations they need to develop as readers.
24. The early literacy instruction I use is a program prescribed by the school or district.
25. The early literacy instruction I use is a program consisting of a whole package of books and supplementary materials that are used to teach reading.
26. I work from a manual that details daily lesson plans based on a scope and sequence of the reading skills to be taught.
27. Students are given workbooks to practice on skills.
28. Tests are used to place students in the proper levels of the program and to assess mastery of skills
29. Children receive explicit, systematic instruction in a set of prespecified associations between letters and sounds,

30. Children are taught how to use them to read, typically in texts containing controlled vocabulary.
 31. many letter-sound relations are taught, they are sequenced, phonics generalizations are taught as well (e.g., “When there are two vowels side by side, the long sound of the first one is heard and the second is usually silent.”), special marks are added to letters to indicate their sounds, for example, curved or straight lines above vowels to mark them as short or long
 32. The size of the unit taught is small i.e., graphemes and phonemes.
 33. Larger word segments called phonograms, for example, -ing, or -ack which represent the rimes in many single-syllable words are taught.
 34. The sounds associated with letters are pronounced in isolation (synthetic phonics)
 35. The sounds associated with letters are pronounced only in the context of words (analytic phonics)
 36. Phonemic awareness (teaching children to differentiate sounds or phonemes, but not using letters) is taught, for example, blending or segmenting sounds orally in words like “cat”.
 37. Instruction is sequenced according to a hierarchical view of learning with the steps regarded as a series of prerequisites (i.e., letters, then letter-sound relations, then words, then sentences)
 38. Multiple skills are learned together
 39. The pace of instruction is determined by the learner.
 40. The pace of instruction is determined by the programme.
 41. Children are taught sounding out and blending letters,
 42. Children are taught to use larger letter subunits to read words by analogy to known words
 43. Literacy instruction involves spelling instruction
 44. Literacy learning activities include extensive oral drill-and-practice, reciting phonics rules, or filling out worksheets
 45. The type of vocabulary control provided in text is the vocabulary limited mainly to words containing familiar letter-sound associations
 46. Sight words are introduced to help create a meaningful story.
 47. Phonics instruction is embedded in the literacy curriculum
 48. Phonics instruction is segregated from the literacy curriculum
 49. My teaching approach involves direct instruction in which the teacher takes an active role and students passively respond,
 50. My teaching approach involves a “constructivist” approach is used in which the children learn how the letter-sound system works through problem solving
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