

**A COMPARISON
OF A NON-SPOKEN RESPONSE MODE
AND
A SPOKEN RESPONSE MODE
IN A TEST OF
PHONOLOGICAL AWARENESS**

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OPSOMMING

Die doel van hierdie studie was die vergelyking van twee verskillende responswyses wat gebruik kan word vir die assessering van kinders met erge gestremdhede en geen of baie min funksionele spraak. Agt-en-veertig tipies ontwikkelende Graad Een kinders is op lukraak wyse in twee groepe verdeel. Daar is van hulle verwag om individueel te reageer op negentig fonologiese bewustheidsvrae d.m.v. 'n gesproke "Ja/Nee" of 'n onuitgesproke "Ja/Nee" antwoord deur hul keuse met die oë uit te wys (eye-gaze) op 'n uitwys oordragbord (E-tran). Al die kinders het die helfte van die vrae geantwoord in elk van die drie fonologiese bewustheidstake in die gesproke en die ongesproke respons modaliteit. Kinders in Groep Een wat eers op die gesproke en daarna op die ongesproke modaliteit geantwoord het is vergelyk met die kinders in Groep Twee, wat eers op die ongesproke en daarna op die gesproke modaliteit reageer het. Die respons modaliteite is vir orde effek gekontroleer en geanaliseer deur gebruik van ANOVA. Geen statisties betekenisvolle verskille is gevind nie, wat die gelykwaardigheid van die twee respons modaliteite bevestig het. Uitwys met die oë het geen onregverdigde voor- of nadele aan die deelnemers besorg nie. Hierdie bevindinge dui dus daarop dat a.g.v. die vergelykbaarheid van die respons modaliteite, uitwys met die oë gesien kan word as 'n billike en geldige respons modaliteit in die assessering van "Ja/Nee" response by kinders. Hierdie bevinding het betekenisvolle implikasies vir verdere ondersoek na die gebruik van hierdie respons modaliteit by kinders met erge gestremdhede en min of geen funksionele spraak.

Sleutelterme

- Aanvullende of alternatiewe kommunikasie
- Uitwys met die oë
- Geen of min funksionele spraak
- Fonologiese bewustheid
- Toets akkommodasies
- Toets geldigheid

ABSTRACT

The aim of this study was to compare two different modes of response, which could be used in the assessment accommodations of children who have severe disabilities and with little or no functional speech. Forty-eight typically developing Grade One children from four classes were randomly assigned into two groups. They were individually required to respond to ninety phonological awareness questions using either a spoken "Yes/No" response or a non-spoken "Yes/No" response by using eye-gaze to indicate their choice on an Eye-gaze transfer board (E-tran). All the children answered half of the questions in each of the three phonological awareness tasks presented in the spoken and the non-spoken mode of response. Children in Group One, who answered the spoken mode first and the non-spoken mode second, were compared with children in Group Two, who responded in the non-spoken mode first and the spoken mode second. Other children in Group One, who answered in the non-spoken mode first and the spoken mode second, were compared with children in Group Two, who responded in the spoken mode first and the non-spoken mode second. The response modes were controlled for order effect and analysed using ANOVA. No statistically significant difference was found, which confirmed the equivalence of the two modes of response. Eye-gaze provided the participants in this study with neither unfair advantage, nor unfair disadvantage. Hence, the findings suggest that due to the comparability of the response modes, eye-gaze can be seen as an equitable and valid response mode in the assessment of "Yes/No" responses in children. This finding has significant implications for exploring the use of these response modes on children with severe disabilities and who have little or no functional speech.

Key terms

- Augmentative or alternative communication
- Eye-gaze transfer board (E-tran)
- Little or no functional speech
- Phonological awareness
- Test accommodations
- Test validity

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CHAPTER ONE
INTRODUCTION TO THE STUDY

1.1 PROBLEM STATEMENT

As the South African educational system operationalizes the values of dignity, equality and freedom, as enshrined within the Constitution of South Africa (Republic of South Africa, 1996), and moves away from segregated policies based on race and disability, the practices, structures and philosophies contained both within the Constitution and the Education White Paper 6: Building an Inclusive Education and Training System (National Department of Education, 2001) permeate current thinking. The theoretical framework, assumptions, practices and tools have been replaced by a more ethical system, which is in line with current international trends.

Change, however, occurs slowly and mindsets need time to alter in order to embrace transformation. Because the Department of Education (DoE) recognizes this, a twenty-year time frame has been developed by which time the system of inclusive education should be comprehensively implemented. For this transformation process to take place it is imperative that the conceptual framework is put into operation. This is particularly important in the field of assessment where the Education White Paper 6: Building an Inclusive Education and Training System (National Department of Education, 2001) states that all learners must be assessed within the same curriculum and framework. Watered-down and/or alternative curricula are no longer permitted as they act as a causal agent for further discrimination against individuals with moderate to severe disabilities. This discrimination, in turn, leads to the maintenance of marginalization of this particular cohort.

The transformational process, however, is a major challenge for teachers who may have children in their classes who have neither sufficient spoken language nor constructive motor responses at their disposal to engage equally in the assessment

process alongside their typically developing peer group. To minimize the risk of discriminating against the child who may be one of the emerging population of South African individuals who use augmentative and alternative communication (AAC) as a means of expressive communication, it is necessary to devise appropriate and valid assessment procedures. AAC is an instructional approach that can facilitate students with little or no functional speech (LNFS) towards optimally reaching their potential (Lloyd, Fuller & Arvidson, 1997). It has further been defined as the supplementation or replacement of natural speech and/or writing using aided (e.g. graphic line drawings) and/or unaided (e.g. gestures) symbols to enhance the communicative skills of persons with severe communication difficulties (Lloyd et al., 1997).

Appropriate assessment procedures can be achieved through the use of assessment accommodations. Assessment accommodations refer to the manner in which the assessment is changed in either its administration by the tester or the way in which the testee responds to the questions posed. These accommodations are used to compensate for the discrepancy between the learners' output, which may be linked to the nature of the disability and not to the level of cognitive skill or other construct being tested (Thurlow, Elliott & Ysseldyke, 2003; Wagner, 1994).

While some alternate response modes have been investigated for the population of individuals who experience severe disabilities, such as direct selection versus scanning (Arvidson, 2000), and answering "Yes" or "No" as opposed to pointing to the correct picture (Wagner, 1994); using eye-gaze as a mode of response by the testee has thus far neither been tested nor validated. Here, the respondent uses eye-gaze as a means of direct selection to indicate from an array of items, the item of choice, in other words the answer to the question posed. For the tester to accurately determine to which item the testee is referring (without the use of either auditory scanning or partner assisted scanning), it is necessary to make use of an E-tran (Eye - gaze transfer board). Typically, this is a rectangular sheet of Perspex or Plexiglass out of which a central square hole has been cut to facilitate both good eye contact between the tester and the testee, as well as a clear view of the direction in which the

eye of the testee is moving to indicate the selection of an answer (Goossens' & Crain, 1987). The correct answers as well as the distracters are placed in an appropriate configuration, which best meets the physical needs and abilities of the individual who is being assessed.

However, this mode of response had to be field-tested in order to ascertain whether the test results remained a valid and indeed, an accurate transfer of the knowledge from the testee to the tester. Contaminating factors which would either advantage or disadvantage the testee in relation to his peer group needed to be explored and/or ruled out.

Because of the relatively low cost of the implementation of this tool as a means of assessment as well as the relative simplicity in its administration, it was felt that it would provide an excellent means of ensuring that even the most physically disabled of the children with severe disabilities and who have LNFS, from urban, peri-urban, rural to deep rural schools, could be included within the assessment and accountability systems of any South African school in which they are present.

This study assessed the first two levels of phonological awareness described by Adams (1990), namely rhyme recognition and the identification of the sameness of firstly, the initial and secondly, the final sounds within uni-syllabic words. The response mode was both a spoken "Yes" and "No" and non-spoken "Yes" or "No" via eye-gaze using an E-tran. The two response modes were then compared for consistency. The order in which the items were presented to each child was altered so that the study controlled for order effect. The purpose was to establish the accuracy and consistency between the spoken and non-spoken response mode, in a test of phonological awareness in order to explore the validity of the response modes.

In light of the overwhelming evidence that the relationship between phonological awareness and reading ability is a robust one (Adams, 1990), it appears reasonable to identify the strengths and weaknesses of phonological awareness in Grade One

children with LNFS, so that they may be afforded the opportunity of receiving appropriate educational intervention. An investigation of this nature will provide educators with an answer to the question of whether the use of eye-gaze as a response mode is a valid alternative to the spoken Yes/No response mode when assessing children who are unable to use spoken language as a means of expressive communication.

The results of this study will make a considerable contribution to the field of education, because many children with LNFS are taught basic literacy skills via the sight method only. This is because it is erroneously thought that the teaching and development of phonological and phonemic awareness attempts to build upon the children's weaknesses and not their strengths. Appropriate literacy teaching beginning in the Reception Year or Grade Naught, as well as from Grade One, is imperative for children with LNFS as reading is so vital for the improvement of their quality of life (Beukelman, 1991).

1.2 DEFINITION OF TERMS

The following frequently used terms require clarification.

1.2.1 Alternate Assessment

Alternate assessment refers to assessments which are provided to children who are unable to meaningfully participate in the regular assessment procedures alongside their typically developing peers, despite having the opportunity of receiving test accommodations. These children frequently have different instructional goals, even though they are working towards the same content standards (Thurlow et al., 2003).

1.2.2 Augmentative and Alternative Communication

Augmentative and alternative communication is the “supplementation or replacement of natural speech and/or writing using aided or unaided symbols in order to enhance the communication skills of persons with little or no functional speech” (Lloyd et al., 1997, p.524).

1.2.3 Eye-gaze Transfer Board (E-tran)

A communication board consisting of a rectangular sheet of Perspex or Plexiglass out of which a central square hole has been cut for the purpose of facilitating both good eye contact between the tester and the testee, as well as a clear view of the direction in which the eye of the testee is moving to indicate the selection of an answer (Goossens’ & Crain, 1987).

1.2.4 Little or No Functional Speech

This study refers to the term “little or no functional speech” as the state of spoken competence of an individual who is able to speak less than fifteen intelligible words (Burd, Hammes, Bornhoeft & Fisher, 1988).

1.2.5 Phonological Awareness

Phonological awareness is the term used to describe the metalinguistic skill whereby an individual has an explicit awareness of the phonological units within words. Further, it is also described as the ability of the individual to manipulate the phonological units within words – especially the phonemes (the smallest units of sounds) represented in an alphabetic orthography (Blachman, 1991; Blischak, 1994).

1.2.6 Test Accommodations

Test accommodations refer to the manner in which tests are altered in either the administration of the test for the testee or the manner in which the testee responds to the items presented (Elliott, Kratochwill & Schulte, 1998).

1.2.7 Test Modifications

Test modifications are considered to be changes to the content of the test administered, which, by the very nature of the changes, leads to a change in what the test measures (Elliott, McKevitt & Kettler, 2002).

1.2.8 Test Validity

The validity of a measuring instrument is the degree to which the instrument measures what it claims to measure (Leedy & Omrod, 2001).

1.3 OUTLINE OF CHAPTERS

Chapter One provides the problem statement as well as the motivation for the study. A definition of key terms, abbreviations used within the text and an outline of the chapters is supplied.

Chapter Two examines the problems experienced by educators in the assessment of children with severe disabilities and in particular those who have LNFS. The issues of test accommodations as well as the validity of these test accommodations for this population group are explored. The relationship between the development of good literacy skills in both typically developing children and their peer group with LNFS and who use AAC strategies to express themselves is examined. Furthermore, it looks at the role of phonological or phonemic awareness and its assessment in relation to

literacy development, as well as the difficulties that often occur in emergent readers. This then leads to the identification of alternate response modes, namely spoken and non-spoken, to assess phonological awareness in children with LNFS.

Chapter Three describes the methodology of the study. This includes a description of the aims, sub-aims, research design, pilot study, the schools, children, materials and equipment used in the study, the data collection procedures and finally the data analysis and statistical procedures employed.

Chapter Four describes and discusses the results in relation to the aims of the study. A comparison between the two groups as well as between the individuals themselves is described and compared.

Chapter Five provides a summary of the results obtained in the study. A critical evaluation of the study is presented, followed by the strengths and weaknesses of the study and finally recommendations for future research.

1.4 ABBREVIATIONS

AAC	Augmentative and Alternative Communication
DoE	Department of Education
EFL	English First Language
ESL	English Second Language
E-tran	Eye-gaze Transfer Board
GRS	Graphic Representational System or Set
LNFS	Little or No Functional Speech
TOPA	Test of Phonological Awareness (Torgesen & Bryant, 1994)
MRS	Manual Representational System or Set
PALS	Phonological Awareness Literacy Screening (Invernizzi, Meier, Swank & Juel, 1999 – 2000).
SD	Standard Deviation

1.5 SUMMARY

This chapter provides the rationale for the study, highlighting the current situation with regard to test accommodations and the need to validate alternate response modes for children who are unable to respond orally. The chapter concludes with a definition of key terms, abbreviations used within the text, as well as an outline of the chapters that follow.

CHAPTER TWO
LITERATURE STUDY

2.1 INTRODUCTION

2.1.1 Aims of this Chapter

This chapter examines problems experienced by educators in the assessment of children with severe disabilities and in particular children with LNFS. The issues of test accommodations as well as the validity of these test accommodations for this population group will be explored. The importance of the development of good literacy skills in typically developing children as well as their peer group who have LNFS and who use AAC strategies to express themselves will be stressed. The role of phonological or phonemic awareness and its assessment in relation to literacy development as well as the difficulties that often occur in emergent readers will be described. After this, alternate response modes, namely spoken and non-spoken response modes, will be identified to assess the phonological awareness of children with LNFS.

2.2 BACKGROUND

2.2.1 Assessment

Assessment is a vital procedure by which both data and information are gathered in order to make intervention and/or management decisions (Lloyd et al., 1997). The reasons for this are twofold: firstly, to obtain information regarding the children's strengths, weaknesses and learning styles and, secondly, to critically reflect on the effectiveness of the teaching strategies utilized in the classroom situation so that each

child can develop to his full potential within the curriculum (UNESCO, Open File on Inclusive Education, 2001).

Assessment, in the educational context, refers to the broad category of data collection, which, amongst others, includes portfolios, observations, interviews and testing. Classroom testing typically refers to pen and paper tasks by which an individual is required to answer multiple choice, forced choice (true or false) and/or open response (essay or paragraph) types of questions (Thurlow, Elliott & Ysseldyke, 2003).

The process of assessment presented a significant challenge to teachers throughout the last century (Wagner, 1994). While this issue has been minimized for typically developing children, it remains problematic for children with sever disabilities. The White Paper on an Integrated National Disability Strategy (INDS) (Office of the Deputy President, T.M. Mbeki, 1997) adds to this problem by highlighting the fact that there is a lack of reliable information available regarding the nature and prevalence of disability in South Africa. The INDS, however, states that a conservative estimate places this figure at 5% of the total population. Appropriate and accurate assessment that closely reflects the knowledge and abilities of the children is vitally important for both the children and their teachers in any schooling system. Because of the complex set of attributes within the child, the context and the material or task used during the assessment process, this results in assessment being deemed one of the several challenging aspects of the teachers' daily activities.

2.2.2 Assessment of Children with Little or No Functional Speech

On the whole, assessment of children who use AAC is even more challenging as they are a heterogeneous population (Light, 1988) presenting with an array of strengths and weaknesses which may include physical, fine-motor, language, learning, cognitive or visual impairments – or any combination of these simultaneously (Beukelman & Mirenda, 1998; Bedrosian, 1992). This may result in difficulties in determining the children's true level of functioning due to the lack of effective means

of communication (Goossens', 1989). Lloyd, Arvidson, Bennett and McLaughlin (2002) stress that in the assessment of both the potential and the capabilities of children with disabilities, it is necessary to firstly evaluate the input, processing and output needs of the child and, secondly, the input, processing and output of the task required. Pivotal to these two issues is the clarity of understanding of the influence that the altered or modified aspects of the assessment procedure has on the process of the input, processing and output of the assessment in its totality.

In the cases of children who use AAC, there are often significant disparities between the input and output modalities of language (Goossens' & Crain, 1987; Smith, 1996). The more severe the expressive difficulties of the individual learner, therefore, the greater the challenge in minimizing a mismatch between ability and performance because as Smith (1996) and Goossens' (1989) point out, despite having the capability of creating fairly complex utterances, individuals who use aided graphic representational systems or sets (GRS's) tend to produce output patterns which are significantly restricted in nature. Von Tetzchner et al.(1996) explain the issues around the input–output asymmetries in language development of children who use AAC. For children who can hear and understand spoken language, but who rely primarily on an AAC system for expressive language, the primary mode of reception is through the unaided aural modalities, while the primary mode of expression is not oral but either an aided graphic representational system or set (GRS), an unaided manual representational system or set (MRS), or, in many instances, a combination of both representational systems or sets.

This input–output mismatch can have either a superficial or a profound impact on the learning and assessment of the child who uses AAC. Unless timed responses, fine motor responses and/or spoken responses are minimized, the risk of discrimination against this population cohort remains extremely high (Lloyd et al., 2002; Thurlow et al., 2003; Wagner, 1994). This is even more significant in South Africa, because for so long children with LNFS and those who use AAC have been excluded from mainstream and specialized education. This has resulted in a conservative estimate of

more than 280 000 children with disabilities being marginalized, displaced and receiving no literacy training nor any formal education at all during their formative years (National Department of Education, 2001).

The sensitive and appropriate use of assessment and testing accommodations can, therefore, be a fitting course of action for increasing the relevant participation of children who had previously been excluded from the large-scale accountability assessments within the schooling system, and also to increase the possibility of valid and reliable test scores being obtained (Elliott, McKivitt & Kettler, 2002; Thurlow et al., 2003).

2.2.3 Assessment Reform in South Africa

Recent educational reform efforts endeavour to qualitatively and quantitatively alter the nature of teaching and learning so that *all* South African learners, including those with disabilities, whether children, youths or adults, develop to their full potential within all bands (i.e. from the Foundation Phase through to Band Eight) of the educational system (National Department of Education, 2001). This educational reform acknowledges the premise that all learners require support, and that the support necessary for the achievement of this goal should be provided whenever, wherever and to whoever is in need of such support. One of the barriers experienced by children with disabilities, which in the past has led to a large dropout rate or, more insidiously, to a large “push-out” rate, has been that of assessment (National Department of Education, 2001; Open File on Inclusive Education, 2001). But now that the Constitution of South Africa (Republic of South Africa, 1996) requires that the State provides basic education as well as adult education to all its citizens, including those with disabilities, there is an emergence of people with disabilities who are advancing within the educational system and are therefore required to participate in the assessment and accountability structures within the various bands.

Accountability refers to the system of collecting, analysing and using that information to hold individual schools, educators, Departments of Education as well as others responsible for the performance of the children and the education system in general. By this it is inferred that the education of children with disabilities should be embedded within the regular educational curriculum and standards (Thurlow et al., 2003). In order to achieve this, it is imperative to have standardized tests so that important skills can be measured as intended (Phillips, 1994).

Standardized tests dictate uniform procedures for administering and scoring of the measuring instruments (McMillan & Schumacher, 2001). Furthermore, according to Wagner (1994), they have been created for, and strictly standardized on a population of typically developing individuals, who are able to construct satisfactory spoken, written or volitional motor responses. While they remain a valid form of assessment in certain instances, for example exit levels from school, or in determining whether children can be promoted from one band of education to the next, they can act as barriers for children with disabilities. Therefore, a shift from standardized tests to more informal and, in some cases, individualised evaluation procedures used within the classroom, has subsequently been encouraged (UNESCO, Open File on Inclusive Education, 2001).

In an effort to redress past inequalities of the South African Educational system, the Education White Paper 6 (National Department of Education, 2001) has emphasized the implementation of an inclusive education and training system that identifies curricular and institutional barriers, and thereafter, how to remove them. The barriers to learning stated in this document are inaccessible environments, curricula, assessment, learning materials and instructional methodologies.

Of these, assessment remains an area that, according to Salend and Salend (1985) could, and still does, continue to pose as an obstacle to the successful performance of children with disabilities within the classroom context. It would be more satisfactory to develop tests with flexible and simple response requirements. This would decrease

the propensity to discriminate within the parameters of the tests' standardization. Appropriate accommodations in which the results will be influenced primarily by cognitive variables rather than by output modes should be developed (Thurlow et al., 2003; Wagner, 1994). It is therefore imperative that children with LNFS who use AAC be afforded multiple pathways for both learning and the assessment of that learning (Dalton, Tivnan, Riley, Rawson & Dias, 1995; Thurlow et al., 2003). Within these pathways, both the accommodations and modifications of the manner in which the work is presented to the children as well as the way in which it is assessed by the teachers should be guaranteed. Teachers can then obtain the necessary feedback from their students, which will indicate whether or not they have acquired the particular skill or whether more time should be spent on the concept in question (Arvidson, 2000; Thurlow et al., 2003).

2.3 TEST ACCOMMODATIONS, MODIFICATIONS AND ALTERNATE ASSESSMENT

To clarify any confusion with regard to the terminology used for this study, an explanation follows:

- i. Test accommodations, according to Thurlow et al. (2003), refer to the changes in testing materials or procedures that allow individuals with disabilities to undertake the assessments in a way that ensures that their abilities rather than their disabilities are assessed.
- ii. Test modifications on the other hand, are considered to be changes in the content of the test which leads to a change in what the test measures (Elliott, McKeivitt & Kettler, 2002).

- iii. Alternate assessment refers to those assessments which are provided to children who are unable to meaningfully participate in the regular assessment alongside their typically developing peers, despite having the opportunity or receiving test accommodations. These children often have different instructional goals, even though they are working towards the same content standards (Thurlow et al., 2003).

2.3.1 Test Accommodations

Test accommodations and modifications are highly complex procedures, especially when dealing with the population of individuals with moderate to severe disabilities. While much research is available for children diagnosed with learning disabilities, there is not much evidence to support the validity of test accommodations for learners with moderate to severe disabilities, (Grise, Beatie & Algozzine, 1982; Lloyd et al., 2002) and in particular for those learners who have LNFS and who use AAC to express themselves. Further, prior to the release of the Draft Guidelines for the Implementation of Inclusive Education (National Department of Education, 2002), procedures in South Africa regarding acceptable testing accommodations were sketchy and often perpetuated the continued disadvantage of children with disabilities.

The Draft Guidelines for the Implementation of Inclusive Education (National Department of Education, 2002) cite that adapted assessment refers to any change to either the standard criteria of the assessment or the conditions under which the assessment occurs in order to accommodate the functional differences of some children. The purpose here is to minimize the impact of the barriers upon the performance of the children, while simultaneously engaging them, in the same manner as the general education children, in the assessment and accountability programmes from which they had previously been excluded (Arvidson, 2000).

Four principles of assessment accommodations, as discussed in the Draft Guidelines for the Implementation of Inclusive Education (National Department of Education, 2002), should be adhered to. Firstly, the same academic requirements and standards should be applied to all children. The child receiving the test accommodation should not be granted any unfair advantage over his peer group. This implies that the standard of the assessment should not be lowered to accommodate the child with special educational needs. Secondly, these assessment accommodations are aimed at equalizing the opportunities for all learners by addressing the barriers to learning and not to provide them with any additional advantages over their peer group. Thirdly, these adaptations, modifications and accommodations should be put in place early on in the child's schooling career, and the child should be very familiar with the strategies and techniques afforded to him before any external examinations take place. Fourthly, test accommodations should be custom-made to the individual learner with a disability and not merely to the traditional category of the disability. In addition to these four points, Phillips (1994) emphasizes that it is imperative to ensure that the scores obtained with and without accommodations are equivalent. The question that needs to be answered is: "Do the test scores obtained from the accommodated administration of the test infer the same meaning as scores from the standard test administration?" In other words, does the integrity of the assessment remain intact?

According to Elliott, Kratochwill and Schulte (1998), testing accommodations refer to the *manner* in which tests are altered in either or both the administration of the test for the testee and/or the manner in which the testee *responds* to the items presented. Elliott et al., (1998), Grise et al., (1982) and Thurlow et al., (2003) proceed to state that these accommodations aim to compensate for the distortions in the learners' test results which may be linked to the nature of the disability and not to the intrinsic knowledge and ability of the learner. Thurlow, Ysseldyke and Silverstein (1995) add two factors in explaining test accommodations. These are: the *setting* of the test (which refers to the place where the testing occurs and whether the testing is conducted in a group or alone) and the *timing* of the test (which includes extended

time, more breaks during the testing process and extending the testing over a number of days or sessions). Thurlow et al., (2003) add *scheduling* (subtests in different order, specific time of day) and *other* accommodations, which do not fall into the above stated five categories. These would include special test preparation, alternative testing and out-of-level testing.

Of the six major types of changes that can be made, there is firstly, changes to testing setting; secondly, changes to the timing; thirdly, changes to the mode through which the testee responds; fourthly, changes to the presentation; fifthly, changes to the scheduling and sixthly, changes that do not fit into the aforementioned categories. There is very little research on the impact that these alternative response modes have on the performance of children who have LNFS. Although it is widely accepted and reported that teachers modify instructional and assessment materials to make them more accessible to the child with moderate to severe disabilities, the data on the acceptability of making these modifications remains limited (Arvidson, 2000; Lloyd et al., 2002).

One of the response accommodations used, but not yet validated by teachers of children with LNFS is that of eye-gaze. Eye-gaze communication is a skill that develops from early infancy. More sophisticated communication means replace eye-gaze as the typical infant matures. However, for children who fall along the disability continuum, gesture or natural speech may not become a viable option for effective communication. Therefore, eye-gaze frequently remains a viable avenue for communication exchange. The extent to which eye-gaze is used for communication will vary, depending on the physical needs of the individual. For some, eye-gaze techniques may be the primary means of communication and, for others, it may be used to supplement communication techniques (Goossens' & Crain, 1987).

Of the research available, Wagner (1994) reported that using a Yes/No response or binary communication has the potential for accurate communication of the inherent knowledge of the child. He cautions, however, that uncritical acceptance of answers

can in some instances lead to invalidating these results, especially since Siegelman, Budd, Spanhel and Schoenrock (1981) reported that individuals whose intelligence scores fall within the lower range of the intelligence quota continuum, tend to answer “Yes” under conditions of ambiguity.

In his research, Wagner (1994) queried whether assessment on the standardized form of the Peabody Picture Vocabulary Test–Revised (PPVT-R) (Dunn & Dunn, 1981) would render comparable scores when the test was administered in the binary communication mode. Twenty-five participants (fourteen male and eleven female) with a mean age of 28.8 (standard deviation [SD] = 7, range = 19–53) took part in the study. The IQ’s of the participants fell within the range of 24 to 98. All of the participants were assessed via the standard administration of the PPVT-R on Form M and the non-standard administration of the PPVT-R on Form L. The results of the standard administration provided a mean of 59.16 (SD = 19.13, range = 21–88), whereas for the adapted binary format administration, the mean was 56.36 (SD=19.15, range = 21–92). The Pearson Product Moment Correlation Coefficient between the two sets of results was significant, ($r[25] = .95, p < .001$). These results led him to the conclusion that the binary format was justified as a practical alternative to the standard PPVT–R administration.

Arvidson (2000) conducted a study to establish whether the performance of a test of multiple choice questions would render the same results if children used a scanning response mode as opposed to direct selection as a response mode on the Science and Technology Test from the 1999 Massachusetts Comprehensive Assessment System (MCAS). Forty-eight nine and ten year old children without disabilities in the Fourth Grade participated in the research. The findings indicated that neither unfair advantages nor unfair disadvantages occurred as a result of using the scanning mode of response as opposed to direct selection as a response mode. Phillips (1994) suggests that when considering whether a proposed test accommodation is valid or invalid, the assessor should carefully consider the purpose of the test, the skills to be evaluated and what inferences the assessor wants to make from the test score.

The validity of a measuring instrument is the degree to which the instrument measures what it claims to measure (Leedy & Omrod, 2001). McMillan and Schumacher (2001) refer to test validity as the degree to which inferences and uses deduced as a result of the test scores are reasonable and appropriate. “Validity is a judgement of the appropriateness of a measure for specific inferences, decisions, consequences or uses that result from the scores that are generated.” (McMillan & Schumacher, 2001, p.181). By this they infer that validity is specific to a situation: it is dependent on the reason for the test, the participants and the environmental factors in which the measurement takes place.

For the basic fairness requirements of any testing situation to be in place, it is important for the test to be valid for the purpose for which it is intended. This implies that any accommodation that seeks validity must ensure that such accommodations do not undermine the purpose for which the test was originally intended (Phillips, 1994). A clear understanding of the impact that the specific accommodation has on the assessment process is therefore imperative (Lloyd. et al., 2002; Thurlow et al., 1995; Wagner, 1994).

This is particularly true when endeavouring to assess literacy skills in children who have LNFS. Literacy, which Koppenhaver, Coleman, Steelman and Yoder (1992) refer to as reading and writing, is a highly complex process, which requires the synthesis of both visual and auditory information (Ellis & Large, 1987; Swank, 1994). While the literature acknowledges that both visual and auditory information impacts significantly on the successful acquisition of literacy skills, much debate in the literature still revolves around the degree to which each modality contributes to reading competencies and/or reading difficulties (Smith & Blischak, 1997).

2.4 LITERACY ISSUES: The Importance of Phonological Awareness.

Although a conservative estimate states that 5% of the South African population have a disability (White Paper on an Integrated National Disability Strategy, 1997), the prevalence of the population that is unable to communicate via spoken language is far higher in South Africa than in the rest of the world. In a study by Alant and Emmett (1995), 39% of children with severe mental retardation, in specialized education in the Pretoria area, were found to be non-speakers. Furthermore, the amount of time spent on literacy instruction in these schools was reported to be alarmingly low, with only 18% of the teachers indicating that they spent a “fair amount of time” on reading instruction, 4% indicating that they “mostly spent their day” on literacy instruction and 1% indicating that they spent “all the time” on reading instruction. The other 78%, that is, in excess of three-quarters of all the respondents participating in the study, reported that little or no time was spent on reading instruction during their daily classroom routine. Thus, one of the advantages of learning an alphabetic script, which, according to Hanley, Reynolds and Thomson (1997) provides children with the opportunity to correctly read words which they had previously not encountered, is to a large extent lost on this schooling cohort.

It is of vital importance for individuals with LNFS to develop good literacy skills in order to fully and independently interact with a wide range of communication partners on diverse topics and in various settings (Light & Kelford-Smith, 1993; Koppenhaver, 2000; Smith & Blischak, 1997). Without mature literacy skills, people with LNFS will be disadvantaged in that they will not be able to utilize many of the dedicated, sophisticated high, or low technological AAC systems, which are available and which can support educational, vocational and social experiences throughout the person’s lifespan (Foley & Pollatsek, 1999). Without the necessary literacy skills, people who use AAC will not be able to enrich their life experiences, nor will they be able to develop their conceptual potential to the full (Light & Kelford-Smith, 1993). Furthermore, Smith and Blischak (1997) point out that many people who are unable to speak, concomitantly have severe physical limitations. This, in turn, limits their job

choices as well as the job opportunities to those who require fair to good literacy skills in primarily office-type environments over the semi-skilled or unskilled jobs that primarily require only manual or physical skills.

In literate communities, 75–80% of the children who are taught reading skills will read in spite of the method of instruction (Swank, 1994). It is the 20–25% of children, and in particular those who have LNFS, and who are unable to read, that cause educators to speculate about different strategies for instruction. Thorstad (1991) suggests that educators need to pay more attention to what is being taught and then to reflect on the effect it has on the speed and efficiency of their children's literacy skills. The acquisition of mature literacy skills, however, is possible by individuals with LNFS (Blischak, 1994; Light & Kelford-Smith, 1993), despite the often irregularity of instruction in this area (Alant & Emmett, 1995; Beukelman & Mirenda, 1998) as well as the fact that English orthography is variant and less predictable than many languages. Yet it is well documented that people who have LNFS have much greater difficulties than their peers, although they have sufficient receptive language and intellectual ability, in developing the necessary skills essential for good reading ability (Beringer & Gans, 1986a; Beringer & Gans, 1986b; Smith & Blischak, 1997). Reading is a complex process, which requires the acquisition of a number of cognitive and linguistic abilities (Ellis & Large, 1987; Koppenhaver et al., 1992; Snow, Scarborough & Burns, 1999; Swank, 1994). The reading process places many complex cognitive demands on the reader, and it is thought that difficulties may arise from a number of sources and for different reasons (Beringer & Gans, 1986b; Ellis & Large, 1987). One cause of the problem, for instance, may be deficits in phonological awareness (Blachman, 1989; Blischak, 1994; Beukelman & Mirenda, 1998; Ellis & Large, 1987). Deficits in phonological awareness, which is sometimes referred to as phonemic awareness in the literature (Gilbertson & Bramlett, 1998; Smith & Blischak, 1997), arises due to a significant lack of awareness of the phonological structure of the spoken language (Beukelman & Mirenda, 1998; Beringer & Gans, 1986a; Koppenhaver & Yoder, 1992). This, in turn, makes it an extremely arduous task to learn the correspondence between the alphabetic letters on the printed page

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and the speech sounds that must be produced for these same letters to represent morphemes, words, phrases and sentences (Catts, 1989). Although this phenomenon can persist well into adulthood, Foley and Pollatsek (1999), Vandervelden and Siegel (1999) and Bishop and Robson (1989) point out that children with LNFS are able to acquire awareness of the sound structure of their spoken language, notwithstanding the severe limitations in their articulatory abilities. Phonological awareness includes many different abilities, which vary in degree of difficulty and present progressively and with higher levels of sophistication during the child's linguistic development (Dahlgren Sandberg & Hjelmquist, 1996).

As the inquiry into literacy proficiencies has developed, the responsibility of the 1960's concept of visual acuity (Hodson, 1994) as well as visual perceptual problems (such as visual figure ground, form constancy, visual discrimination, visual analysis and synthesis) as a causal agent for literacy difficulties has diminished, and the focus has shifted to investigating problems within the domain of language (Smith & Blischak, 1997). Of the three components of language, namely semantic processing, syntactic processing and the metalinguistic processing of phonological/phonemic awareness, Adams (1990) and Gillam and van Kleeck (1996) claim that there is overwhelming evidence that instruction in phonemic awareness is invaluable. This view is supported by Wagner, Torgesen and Rashotte (1994). They point out that the awareness of phonemes may assist in learning an alphabetic writing system such as English in which the letters of the text roughly correspond with the phonemes. Booth, Perfetti and MacWhinney (1999) support this claim: their study suggests that children make quick, automatic and general use of both orthographic and phonological information to identify text. Phonological information is activated early in the visual word recognition process and this activation occurs hand in hand with the orthographic activation. The implication here is that the lack of phonological awareness training can in fact significantly impede the acquisition of mature literacy skills. This is supported by Hanley, Reynolds and Thornton's (1997) comment that one of the primary differences between children diagnosed with developmental surface dyslexia and developmental phonological dyslexia seems to be that the

outcomes of surface dyslexics is less impaired with regard to phonological awareness tests than that of phonological dyslexics.

2.5 ISSUES IN PHONOLOGICAL AWARENESS

Wagner and Torgesen (1987) state that there are three phonological processing skills that have a causal relationship in the acquisition of mature reading skills. These are firstly, phonological awareness; secondly, phonological recoding in the identification of written words and, thirdly, phonological coding to maintain information in working memory. Felton and Wood (1989) as well as Wood and Felton (1994) consider these skills to be separate processes that are able to develop independently of each other. For the purpose of this study, only one of the three processing skills, namely that of phonological awareness, was examined.

Phonological awareness - which is sometimes referred to interchangeably in the literature as phonemic awareness (Gilbertson & Bramlett, 1998; Smith & Blischak, 1997) - is the term used to describe the metalinguistic skill by which an individual has an explicit awareness of the phonological units within sentences, phrases and words (Bishop, Rankin & Miranda, 1994). Further, it is also described as the ability of the individual to manipulate the phonological units within words - especially, the phonemes (i.e. the smallest units of sounds) represented in an alphabetic orthography (Ball, 1994; Blachman, 1991; Blischak, 1994; Beukelman & Miranda, 1998). Phonological awareness can be subdivided into analysis and synthesis. Analysis refers to the ability to split - or break - up words and syllables into their smaller or smallest speech units and synthesis refers to the ability to blend or reconstruct these same small speech segments into syllables or words (Wagner, Torgesen, Rashotte, Hecht, Barker, Burgess, Donahue & Garon, 1997).

According to Adams (1990), the U.S. Office of Education (USOE) Cooperative Research Programme in First Grade Reading was undertaken between 1964 and 1967

under the direction of Guy L Bond and Robert Dykstra. Their analysis of the data collected indicated that the best predictor of the acquisition of reading in the Grade One year is letter name knowledge and the second best predictor of the acquisition of reading in the First Grade is the ability to discriminate between phonemes (those sounds that are smaller than a syllable and correspond roughly to individual letters). Adams (1990) goes on to point out that follow-up investigations have added to this finding, and that it is the awareness that phonemes exist as abstract components that can be manipulated, that is significant.

It is this knowledge of phonological awareness that facilitates the development of grapheme-phoneme correspondence (sound-symbol correspondence) in written word decoding, which leads to the development of reading. In order to use letters, children must develop a conscious access to phonemes. Furthermore, it is imperative to understand that speech in which the phonemes are co-articulated can be segmented into units that are represented in an alphabetic script (Blachman, 1991). Due to the abstractness of this concept, it is fair to say that phonological awareness develops slowly. When speech is analysed on a spectrograph, the three phonemes in the word “dog” will not be represented separately from each other in an acoustic signal, but instead will be merged together into one syllable. It is impossible to separate them without some acoustic distortion. It is for this reason that the actual sound of the phoneme can change slightly depending on the specific vowel or consonant with which it is co-articulated (Torgesen & Bryant, 1994).

Adams (1990) suggests that phonemic awareness skills do not develop spontaneously, but must rather be trained in the beginner reader. Specific instruction in phonological awareness has a positive impact on later reading achievement (Gillam & van Kleeck, 1996; Rivers & Lombardino, 1998; Swank, 1994), especially when letter names and sounds are combined with the instruction (Beukelman & Mirenda, 1998). Booth Perfetti and MacWhinney (1999) propose that in learning to read, the child must develop the orthographic form together with the already acquired phonological, semantic and syntactic information and that it is the utilization of letters as symbols

for the sounds in words that is vital to the reading process. Although the relationship between reading acquisition and phonological awareness appears to be one in which causation is bi-directional or reciprocal in nature (Rivers & Lombardino, 1998; Wagner, Torgesen & Rashotte, 1994), it appears as if the causal connection at the beginning stages of the reading process is strongest from phonological awareness to better reading skills (Stanovich, Cunningham & Cramer, 1984).

Wagner et al., (1997) state that in children whose phonological awareness is still in the developmental phase, certain characteristics can be observed. These are that the awareness of sounds becomes progressively more refined in relation to shorter and more abstract units of speech. Adams (1990) divided phonemic awareness into five different levels. These include at the most primitive level the knowledge of nursery rhymes. The second level involves tasks in which the child has to compare and contrast the sounds of words for rhyme or alliteration. Blending and syllable splitting are the skills required for the third level. The fourth level task involves analysis of words on demand. At the fifth level, the children should be able to manipulate the phonemes so that they are able to add, delete or move any given phoneme in order to regenerate a word. The first two levels are much more related to reading development than the 3rd, 4th and 5th (Ellis & Large, 1987). If educators are to provide effective literacy instruction to learners with LNFS, it is critical that they are able to assess each of the above-mentioned areas.

2.5.1 Phonological Awareness in Children with LNFS

Bishop and Robson (1989) describe the two routes to travel for the successful acquisition of spelling, namely, the direct and the indirect route. The former refers to when the orthographic specifications of the word is accessed directly from the lexicon, whereas the latter involves accessing a phonological representation and using knowledge about phoneme–grapheme correspondence to convert this to graphemes. The indirect route has the advantage in that it enables a speller to spell unfamiliar

words where no orthographic specification is available. In order to then be a proficient speller in English, an individual must build up a body of knowledge about specific orthographic characteristics about a specific word. While this knowledge is developing, children tend to rely heavily on the indirect route. The problem then posed is: “Is the articulation of an individual with disarthric or anarthric speech sufficient for the acquisition of and use of an articulatory code?” They found that it is not necessary to be able to be articulate in order to spell via the indirect route. They point out that while it is possible to work out grapheme–phoneme correspondences, people who are anarthric do have difficulties with spelling.

Vandervelden and Siegel (1999) investigated phonological processing in children with congenital speech impairments. They found that the AAC user and speech-impaired group performed significantly poorer in all areas of phonological processing, when compared to the control groups. However, although the AAC group scored lower than the controls, on the section of phonological awareness, the means were above chance for all measures, indicating that they have the ability to develop phonological awareness.

Dahlgren Sandberg (2001) conducted a longitudinal study on reading, spelling and phonological awareness abilities over three to four years. The results indicated that these children’s performance [as with the Vandervelden and Siegel (1999) study] were significantly lower in respect of reading and spelling than their speaking peers. However, the children in both groups performed almost equivalently on a test of phonological awareness.

The above studies indicate that although limited in expressive abilities the children with LNFS are able to develop phonological awareness skills. Phonological awareness assessment is vital in the cohort of children with LNFS so that the appropriate input is received by the individual.

2.5.2 Assessment of Phonological Awareness

The assessment of phonological awareness in the population of learners with LNFS is a problem for teachers. Koppenhaver et al., (1992) state that the limitations in research for literacy learning in individuals who use AAC is as a result of the focus being too narrow in nature. They suggest that it is necessary to focus on a broader model of literacy learning, which encompasses speaking, listening and AAC contexts, situational contexts and sociocultural contexts. They propose that poor development of phonological awareness may be the result of deficits in the listening/speaking contexts (e.g. school environments where sound play is absent), the situational context (e.g. lack of instruction), the sociocultural context (e.g. poor self-image) or a combination of factors. In the expansion of the AAC context, the child would more than likely be using a Graphic Representational System (GRS), rather than speech, during the emergent literacy period. McNaughton and Lindsay (1995) point out that a GRS, as an aided system or set, is accessed as a different entity, both motorically and cognitively, by the learner. This asymmetry in input and output places added processing requirements on the child, as he has to simultaneously assimilate one mode of communication and produce another (Von Tetzchner et al., 1996). Due to this factor, as well as the difficulties in separating the performance on the additional task requirements from demonstrating the skill at hand, Blischak (1994) urges that tasks which require the least adaptations be chosen when conducting assessments of phonological awareness for persons who use AAC. Moreover, cognizance needs to be taken of the phonological similarity effect as described by Conrad (1964). This is, that the ability to recall items, which are phonologically similar to each other, is disrupted when presented together in the same test.

It is for this reason that the study explored ways to accurately represent the innate knowledge of children with LNFS by the construction of a test that would establish whether spoken response modes would deliver equivalent results to non-spoken response modes in a Yes/No test of phonological awareness.

2.6 CONCLUSION

In the light of overwhelming evidence that the relationship between phonological awareness and reading ability is a robust one, it appears reasonable to identify the strengths and weaknesses of phonological awareness in Grade One children with LNFS, so that they may be afforded optimal opportunities through receiving the correct therapeutic and educational intervention. In order to achieve this, it is imperative to obtain empirical evidence that verifies that test accommodations using a spoken and a non-spoken response will in no way advantage nor disadvantage the child. An investigation of this nature will give educators a valid tool by which they will be able, based on the outcome of this investigation, to assess the phonological awareness skills of children who are unable to use spoken language as a medium through which to respond.

2.7 SUMMARY

This chapter highlighted the issues and the importance of assessment as well as assessment accommodations for individuals with LNFS. It looked at issues relating to test validity in order for the results to be deemed credible. It considered the importance of literacy development for children with LNFS. It focussed on the role that phonological awareness or phonemic awareness plays in the acquisition of mature literacy skills. Further, it explored reasons why test accommodations and modifications of assessments are necessary for the population of children with severe disabilities and with LNFS.

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

The research methodology of the study is described in this chapter. The research question, aims and sub-aims of the study are presented. These are followed by a discussion of the research design. Discussion of the pilot study with regard to the results and recommendations is then presented. The participants, materials and equipment, which were used in the study, are discussed. Lastly, the procedure for data collection and data analyses is described.

3.2 RESEARCH QUESTION

Does a non-spoken response (eye-gaze) deliver equivalent results to a spoken response in a test of phonological awareness in typically developing Grade One children?

3.3 AIMS OF THE STUDY

3.3.1 Main Research Aim

The aim of this study was to investigate whether a non-spoken response mode (eye-gaze) would render equivalent results to a spoken response mode in a test of phonological awareness in typically developing English First Language and English Second Language, Grade One children.

3.3.2 Sub-aims

The main aim of this study was realized by means of three sub-aims. These were:

- i. To determine the spoken and non-spoken responses of typically developing Grade One children in a test of phonological awareness which only required a "Yes" or "No" response.
- iii. To compare the non-spoken results with the spoken results of the target population.
- iii. To determine whether the order of presentation of the spoken versus the non-spoken response mode, the order in which the tasks were presented and the order in which the task items were presented affected the outcomes of the assessment.

3.4 RESEARCH DESIGN

3.4.1 The Research Design

This study utilized a quasi-experimental crossover and within group design between two groups of typically developing Grade One, English First Language and English Second Language children. A crossover design enables a within group comparison (Jones & Kenwood, 1989). Its aim was to ascertain whether the children's performance on a phonological awareness assessment battery (requiring only a "Yes" or "No" answer) using both a non-spoken and a spoken mode of response was equivalent. The non-spoken mode of response required the children to answer the questions using eye-gaze only (by looking at the top left hand corner of the E-tran board to indicate "Yes", or by looking at the bottom right hand corner of the E-tran to indicate "No"). The spoken mode simply involved the children responding with a verbal "Yes" or "No".

Table 3.1 provides a visual representation of the research design for the three reading cohorts within Group One and Group Two.

Table 3.1 Visual Representation of the Research Design for the Above-Average, Average and Below-Average Cohorts.

<u>Group One</u>			<u>Group Two</u>
Above-average reading cohort			
Task 1 Spoken Response Non - Spoken Response	↑	Inter - group - comparison -	↑
Task 2 Non - Spoken response Spoken response	Within Group Comparison		Within Group Comparison
Task 3 Non - Spoken response Spoken response	↓	Inter - group - comparison -	↓
Total number of questions: 90		Total number of questions: 90	
Average reading cohort			
Task 3 Spoken Response Non - Spoken Response	↑	Inter - group - comparison -	↑
Task 1 Non - Spoken response Spoken response	Within Group Comparison		Within Group Comparison
Task 2 Non - Spoken response Spoken response	↓	Inter - group - comparison -	↓
Total number of questions: 90		Total number of questions: 90	
Below-average reading cohort			
Task 2 Spoken Response Non - Spoken Response	↑	Inter - group - comparison -	↑
Task 3 Non - Spoken response Spoken response	Within Group Comparison		Within Group Comparison
Task 1 Non - Spoken response Spoken response	↓	Inter - group - comparison -	↓
Total number of questions: 90		Total number of questions: 90	

3.4.2 The Research Steps

The research steps, which followed a linear course, are as follows:

- i. Development of a phonological awareness test based on the literature, which focuses on assessing the first two levels of phonological awareness, namely: rhyme recognition, and recognition of the sameness of initial and final sounds in monosyllabic words. See Section 3.5 for a description and discussion of the test.
- ii. Identification of a school in the Pretoria area which has 100 children on the roll in Grade One and whose medium of instruction is English.
- iii. Conducting a pilot study to pretest the phonological awareness test. The information gleaned from the pilot study indicated that certain minor organizational changes were necessary for smoother flow. See Section 3.4.3.1 for a discussion of the pilot study.
- iv. Conducting the main study. The fieldwork was undertaken over a period of five consecutive days. Data collection procedures are discussed in Section 3.6.
- v. Data capture and analysis. Raw data was coded in pre-designed blocks on the data collection sheet to facilitate data capturing by the computer (See Appendix B). The data was coded according to age, race, gender, group, home language, reading cohort, time, mode of response, order of items presented and language group (See Appendix C). Once the results had been computerized, statistical analysis using ANOVA and the Mann-Whitney Test was conducted. An interpretation and discussion of the data, highlighting the relevance of the study, then followed.

3.4.3 Pilot study

3.4.3.1 Objectives

A pilot study was conducted using three typically developing Grade One children whose results were excluded from the main study. These three children came from different

classes in one school in the Pretoria district. Each child represented one reading ability cohort, namely the above-average, the average and the below-average reading cohorts. The objectives of the pilot study were:

- i. To determine whether the test instructions were understood by the participants.
- ii. To determine whether the presentation steps in the spoken and non-spoken modes were appropriate.
- iii. To determine the amount of time required to complete the test as well as for the changeover from one participant to the next.
- iv. To determine the consistency of responses by using the different response modes.
- v. To determine the number of items necessary for the test to render consistency.
- vi. To determine whether the coding strategies were appropriate.
- vii. To control for random behaviour.

3.4.3 School Selected for the Pilot Study

The pilot study was conducted in the same school as the one that was selected for the main study. It is a privately funded school for typically developing children in the Pretoria area. The medium of instruction is English. See Section 3.5.1 for a description of the school and participants.

3.4.3.3 Procedure

The pilot study followed the same format as the one discussed in the main study (See Section 3.5). The pilot study, however, made use of a video set on a tripod, which was not used during the main study.

A pilot study was undertaken to pre-test the assessment as well as the assessment procedures. The resulting information required certain changes to be made to the organizational aspects of the assessment.

3.4.3.4 Aims, Methods and Results

The aims, methods and results of the pilot study are presented in Table 3.2

Table 3.2 Pilot Study: Aims, Methods, Results and Recommendations

AIMS	METHODS	RESULTS	RECOMMENDATIONS
To determine whether the test instructions were understood by the participants.	Present the test, as it would be for the main study.	The subjects understood the questions well.	Instructions were not altered.
To determine whether the randomized order in the spoken and non-spoken modes were appropriate.	The response modes were randomized prior to commencement of the test.	No difference was found between the order of the spoken vs. the non-spoken response modes.	Randomization was not altered.
To determine response Reliability between English First Language (EFL) and English Second Language (ESL).	Two EFL children and one ESL child were used. Children in English medium South African schools are often ESL but are assessed in the language of instruction.	No difference was found between the children from the two language groups.	EFL and ESL children were used for the main study.
To determine the amount of time required to complete the test.	A stopwatch was used to time the children for the duration of the test.	It took an average of 20 minutes to complete the test. An average changeover time of six minutes was needed	A randomized list was given to the teacher to accelerate changeover rate.
To determine how consistently the students responded by using the different modes as well as to control for random behaviour.	Each response was recorded on the record sheet. I meant correct and 0 meant incorrect. Observation for random behaviour was conducted.	Consistency was high. The number of correct responses was almost identical for each mode. No random behaviour occurred	Any random behaviour that might occur should be written down on the response sheet.
To determine whether the number of items for the test would be too fatiguing to administer in one day.	The three tasks were carried out as shown in Appendix A.	The number of items in the test was managed by the children w/m all three reading cohorts.	The three tests should be conducted on one day.
To determine how easy it would be to administer the test with the various randomization factors.	Observation and awareness of possible pitfalls that may have arisen due to the ordering effect of the test was conducted,	Test questions should be placed in files according to the order in which they will be given to the children. This will eliminate some administrative confusion.	The tests were set out in the order in which they each reading cohort

3.4.3.5 Summary

Some minor organizational modifications were necessary for smooth implementation of the test. Due to the randomization of the order in which the tasks were presented to the children from the different reading cohorts, it was necessary to have the order of the tasks for the three reading cohorts prepared on separate colour-coded sheets to ensure that the tester presented tasks in the correct order. See Table 3.1 for the order of tasks presented to the three reading cohorts.

3.5 MAIN STUDY

3.5.1 Description of the School and Participants

A convenience sampling was used. The study took place in Pretoria in the Gauteng Province, South Africa. The school is a private English medium school. Children who attend this school are from diverse cultural backgrounds, many of them being from families working within the diplomatic corps. Nine different mother tongues were recorded for the purpose of this study.

Forty-eight subjects from four different mixed abilities classes at one school in the Pretoria district were asked to participate individually in the study. Because the population of children with LNFS is heterogeneous in nature (Higginbotham & Bedrosian, 1995; Light 1988), a non-disabled population was chosen for greater homogeneity of the subjects. This would then assist the researcher in comparing the two response modes.

Two of the Grade One classes were randomly assigned to Group One and the remaining two classes assigned to Group Two, in order to counter-effect any contaminating factors that may have arisen because of the possibility of one of the teacher's emphasis on phonological awareness teaching and training in her daily interactions with the children in her class. From the pool of participants within each participating class, the names of individuals were randomly selected from the list of potential subjects. Final selection was

related to parental approval for participation. The order in which the tasks were presented to the children was randomized according to the reading ability cohorts of above-average, average and below-average, as assessed by the classroom teacher. This was to ensure that in comparing the two modes of response across the two groups, the randomization of the spoken and non-spoken response modes were equal and comparable. The two groups were equally matched according to reading ability cohorts, to counter one group obtaining better scores on the assessment due to better literacy skills. Further, they were matched according to English First Language and English Second Language, so that proficiency in the medium of assessment would not impact on the results obtained.

3.5.1.1 Selection Criteria for all Participants

Of the ninety-eight consent forms that were sent out, eighty-three forms were returned to the school. Three parents would not give consent for their children to participate in the study. Of those three, two provided no reason for their refusal and the third mother contacted the teacher and indicated that her child had recently been through a battery of tests and she did not want her child to have to undergo any more. A summary of the population follows in Table 3.3.

Table 3.3 Visual Representation of Pruning of Participants

Total population in the grade	98
Total of returns	83
Total refusals to participate	3
Sample size	48

Of the eighty children whose parental consent forms returned to the school (See Appendix E), twenty-four children were randomly chosen from Group One. Twenty-four children from Group Two were matched according to reading ability and English First Language or English Second Language.

3.5.1.2 Comparability of Experimental Groups

The mean age of Group One was 85.17 months (SD = 3.62) while the mean age of Group Two was 84.17 months (SD =4.21). The median age for Group One was 85 months and the median age for Group Two was 84 months. The maximum age for both groups was 93 months and the minimum age for Group One and Group Two 76 and 75 months respectively. The Mann-Whitney Test indicated a p-value of 0.3150, thereby indicating no statistically significant difference at the 5% level of significance.

The participant selection criteria and procedures are described in Table 3.4.

Table 3.4 Participant Selection Criteria, Method and Motivation for Inclusion

SELECTION CRITERIA	METHOD	MOTIVATION
They must be enrolled in the regular curriculum of the Grade One year.	Class lists were obtained from the principal of the school.	The tasks were aimed at assessing children in the early months of the foundation phase. Typically developing children were chosen so as not to place unnecessary pressure on children who were already experiencing academic difficulties.
The language of instruction must be English. Receptive and expressive language must be at a Grade One level.	This information was obtained from the principal as well as the class teachers of the school.	The test material was in English.
They must be six or seven years old at the time of assessment.	This information was obtained from the teachers' register.	This is in accordance with the school entrance policy of the Department of Education.
They must have normal hearing, vision and speech.	This information was obtained from the teachers.	Normal hearing, vision and speech were required for the implementation of this study as the children had to follow instructions aurally and respond via the speech or visual mode.
Children with ADHD must be effectively medicated	This information was obtained from the teachers.	Children diagnosed with ADHD and not medicated often display erratic performance, which is not an accurate reflection of ability.

The experimental Groups One and Two were matched according to the criteria delineated in Table 3.4. The groups were matched according to reading cohorts of above-average, average and below-average to ensure an even spread of literacy competency across groups. Further, the groups were matched according to EFL and ESL.

3.5.2 Material and Equipment Used in the Study

3.5.2.1 Measuring Instruments: Phonological Awareness Test

The material used in this study was a phonological assessment battery. The main aim of this battery was to answer the research question, *"Does a non-spoken response (eye-gaze) deliver equivalent results to a spoken response in a test of phonological awareness in typically developing, Grade One children?"* To meet the requirements set out by the research question and design, the following phonological awareness battery and response forms were developed (See Appendices A and B). The researcher endeavoured to adhere to the suggestions made by Blischak (1994), which is to provide tasks, which require the least adaptations when assessing persons who use AAC. The words in each of the tasks were chosen to decrease the phonological similarity effect, as described by Conrad (1964), as he found that when items presented together were phonologically similar to each other the ability for accurate recall diminished. An example of an item from each task is shown in Table 3.5. The assessment had a total of 90 items divided into three tasks.

This will now be described.

A Phonological Assessment Battery, that required only "Yes" or "No" responses, was developed for the purpose of this study. The subtests were drawn from the Phonological Awareness Literacy Screening (PALS) (Invernizzi, Meier, Swank & Juel, 1999-2000) and the Test of Phonological Awareness (TOP A) (Torgesen & Bryant, 1994). It included the following sub-sections:

- i. Task 1 - *Rhyme* *recognition* taken from the Phonological Awareness Literacy Screening (Invernizzi et al., 1999- 2000)
- ii. Task 2 - *Initial sound same* taken from the Test of p~ Awareness «Torgesen & Bryant, 1994).
- iii. Task 3 - *Ending sounds-same* taken from the Test of Phonological Awareness (Torgesen & Bryant, 1994).

Table 3.5 provides a description of the questions posed in the phonological awareness assessment. The task instruction, type of question asked and motivation are provided. See Appendix A for the full text.

Table 3.5 Summary of Questions Posed in the Phonological Awareness Assessment

TASK	INSTRUCTION	QUESTION	MOTIVATION
RHYME RECOGNITION	Listen to this word - man . One of these words that I am going to say will rhyme with man. Listen carefully. - Five, bed, can.	1. Do man & five rhyme? 2. Do man & bed rhyme? 3. Do man & can rhyme?	Developmentally, this is the easiest level of phonological awareness. The closed-ended manner in which the questions are posed requires very little load on working memory.
INITIAL SOUND-SAME	Listen to this word bat . One of these words that I am going to say will begin with the “b” sound just like the “b” sound you hear in bat. Listen carefully. - Bird, lips, ring.	1. Do bat and bird begin with the same sound? 2. Do bat and lips begin with the same sound? 3. Do bat and ring begin with the same sound?	Developmentally, this is the next easiest level of phonological awareness. The manner in which the questions are posed requires very little load on working memory.
ENDING SOUND-SAME	Listen to this word - ball . One of these words that I am going to say will end with the “l” sound just like the “l” sound you hear in ball Listen carefully. – Smile, horn, duck.	1. Do ball and smile end with the same sound? 2. Do ball and horn end with the same sound? 3. Do ball and duck end with the same sound?	Developmentally, this is the next easiest level of phonological awareness. The manner in which the questions are posed requires very little load on working memory.

3.5.2.2 Equipment

- i. Recording sheets and pencil (See Appendix B for recording sheet).
- ii. Teacher's chair and table, as well as a child's chair.
- iii. An E-tran attached to an adjustable stand on wheels. An E-tran is a rectangular transparent sheet of plexiglass with a central square cut out of the middle of the sheet. The answer for "Yes" indicated by a tick as well as the written word was placed on a green cardboard square and was stuck on the top left hand corner of the E-tran with Prestik, while the answer depicting "No" indicated by a cross and the written word was placed on red cardboard and was stuck with Prestik on the bottom right hand corner.

3.6 DATA COLLECTION PROCEDURE

3.6.1 Test Procedure

- i. Identification and selection of a junior primary school in the Pretoria area with a roll of 100 Grade One children, whose medium of instruction is English.
- ii. Establishment of personal contact with the school was achieved and the nature and purpose of the study was discussed with the school principal as well as with the senior management of the school (See Appendix D). Permission was requested to conduct the study at this school.
- iii. The researcher requested the principal to seek permission from the Regional Head Office of his school to conduct the study in one of their schools.
- iv. The four Grade One class teachers were approached as a group and permission was requested to select participants from within their respective classes. They were asked

to provide a class list of the children in their classes as well as the reading cohorts into which each child is placed. The nature of the study was described, outlining the purpose, procedures as well as benefits of the study. The researcher explained that the children would be answering three tasks on a phonological awareness test under two conditions, namely a spoken Yes/No response and a non-spoken Yes/No response using eye-gaze on an E-tran. It was explained that the children would be tested for both response modes individually in a quiet room away from the classroom. The researcher also showed the teachers the E-tran board and demonstrated how the children would use it in order to respond to the questions posed.

- v. The teachers were requested to hand out a letter with a detachable consent form to the parents of all the children in their classes (See Appendix E). They were asked to collect the detachable consent forms for the researcher's records.
- vi. Dates and times for data collection, which would result in minimal disruption to the learning outcomes of the children, were mutually agreed upon.
- vii. The children were individually tested in a quiet assessment room that was made available by the principal and head of department of the junior phase of the school for purposes of the assessment.
- viii. The three tasks were individually administered to each participant. Each task was expected to take five to six minutes to complete, making the total time for each test an average of fifteen to twenty minutes. This was confirmed during the administration of the pilot study.
- ix. The children were told that the object of the research was to find out how children think about words and sounds. They were told in a scripted format that the researcher wanted to see whether it is easy for children to "speak with their eyes" by looking at the E-tran to indicate "Yes" or "No". This ensured that each participant was given the same rationale for the rest and that they understood their role in the

procedure. The following was said: "Thank you for coming to help me today. You are going to answer some questions. Sometimes you will answer by saying "Yes" or "No" and sometimes you will answer by looking at the "Yes" square on the top left hand side of the board and sometimes you will answer "No" by looking at the bottom right hand. After every answer you must look at me through the hole in the middle of the board. At any time that you feel you don't want to do this any more you may tell me, and you may go back to your classroom. Would you like to start?"

- x. Identical instructions were given to each child. For all tasks, three practice trials were provided. Here corrective feedback was given to the child. The practice trials were repeated once if necessary. Thereafter the test proceeded. None of the questions were repeated once the practice trials were completed. It was explained to the children that the researcher would no longer be able to assist them and that they must try their best to give the correct answer. The subjects were told that if they did not know the answer they should guess. No feedback was provided to the participants once the practice trials for each task were completed
- xi. Children in the above-average reading cohort received the tasks in the following order: Task 1, Task 2 and Task 3. Children in the average reading cohort received the tasks in the following order: Task 3, Task 1 and Task 2, while the children in the below-average reading cohort received the tasks in the following order: Task 2, Task 3 and Task 1. Further, the order in which items within each task was presented was randomized to rule out, firstly, that a learning effect would elevate the results obtained, and secondly, that issues relating to fatigue or boredom would decrease the results obtained. Here the items within each task were presented in either of the following two orders namely: 1-5; 6-10 or 6-10; 1-5.
- xii. The ten items within each task were randomly presented to the participants in Group One in the sequence of the spoken mode followed by the non-spoken mode (or vice-versa). The participants in Group Two then received the test in the sequence of the non-spoken mode followed by the spoken mode (or vice-versa). Group One and

Group Two were matched according to reading cohorts as well as English First Language (EFL) and English Second Language (ESL).

- xiii. The sequence of the testing of participants was randomized. The researcher prepared and matched the order of the tasks and the sequence of the items to be presented to the participants based on the reading cohorts and language groups prior to the commencement of the assessment. During the administration of the assessment, the researcher was thus not aware of which children from Group One were matched with those in Group Two.
- xiv. Both inter-group as well as within group comparisons were made by comparing the performance across both groups and within one group respectively. Table 3.1 provides a visual representation of the research design.
- xiv. The subjects' score for each of the three phonological awareness tasks was the total number of correct responses, with the maximum score for each test being 30. In total, each subject was asked ninety questions. As all tests provided the subject with three options, the correct option was placed randomly and occurred with approximately equal frequency in all positions.
- xv. The phonological assessment battery was then administered and the responses clearly recorded on the response sheet. A one (1) indicated a correct response and a zero (0) indicated an incorrect response- See Appendix A for verbatim information on the instruction for the testing.

3.6.2 The Use of an Assistant

An assistant was present during the test procedure. For the first two days both the researcher and the assistant scored each participant's responses. A comparison of the responses was undertaken to ensure that equivalence of scoring was achieved. Inter-rater reliability was 100%. Thereafter the researcher and the assistant administered the test on their own.

It took five days to complete the study. Days one and two saw the completion of seven tests respectively. These were administered by the researcher and co-scored by the assistant. Days three and four saw the completion of fourteen tests respectively. The researcher administered seven and the assistant seven tests on both days. Day five saw the completion of the remaining six tests by the researcher.

3.7 DATA ANALYSIS AND STATISTICAL PROCEDURES

3.7.1 Data Capturing

Coded answer forms were used to record the responses of each participant. Each child was given a code, which represented his participation number, race, gender, group, home language, reading cohort and time taken to complete the assessment (See Appendix C). The researcher graded each of the answers on the answer form. The data was then captured by the data typist and a hard copy was printed out. The researcher then compared the data from the printed hard copy with the original data on the coded answer forms to rule out possible printing errors. All demographic information answers were checked for accuracy. The data was organized into groups and analyzed using SAS software. ANOVA and the Mann-Whitney Test were used to analyze the data.

The Mann-Whitney Test was used to obtain a p-Value of the means obtained in the comparison of the ages of Group One and Group Two

The one-way analysis of variance (ANOVA) was used in the study. ANOVA answers the question, "Are there statistically significant differences between the population means?" This study required that two or more sample means were compared on one independent variable. In using the ANOVA procedure, the researcher was able to test the different variables both individually and in combination between both groups, thereby making more accurate probability statements than would be possible if using a series of separate *t-tests*. ANOVA uses the analysis of variance and because the statistical formula uses the groups' variances and not the groups' means to calculate a value, this captures the difference in the means (McMillan & Schumacher, 2001).

3.8 SUMMARY

In this chapter, the methodology of the study was described. It included the aims and sub-aims as well as the objectives reached. The research design was explained. The selection criteria, descriptive information, material and equipment that were utilized during the pilot and main study were discussed. Finally, data collection procedures and data analysis were discussed.

<p style="text-align: center;">CHAPTER FOUR</p> <p style="text-align: center;">RESULTS AND DISCUSSION</p>

4.1 INTRODUCTION

The results of this study will be discussed according to the sub-aims outlined in Chapter Three.

The discussion will include the following:

- i. A comparison of the mean scores obtained for the combined performance of the two groups of participants in both the spoken and the non-spoken modes of response on a test of phonological awareness.
- ii. A comparison of the mean scores obtained for the performance of Group One and Group Two respectively in both the spoken and non-spoken modes of response.
- iii. A comparison of the mean scores obtained for the performance of Group One and Group Two respectively on each of the tasks.
- iv. A comparison of the means and a comparison of the analysis of variance, ANOVA, for the combined groups to ascertain whether the order in which the tasks were presented influenced the results.

The purpose of this study was to explore the validity of eye-gaze as an alternative response mode to answering “Yes/No” questions via speech in a phonological awareness test. As the South African educational system moves towards operationalizing the policy of inclusion, more students with severe disabilities, and in particular those who have LNFS, will be proceeding through the educational bands and thus be required to participate in assessment as part of the accountability criteria set down by the Department of Education (National Department of Education, 2001).

Four Grade One classes were randomly assigned to two groups, namely Group One and Group Two, and twenty-four children were randomly chosen from Group One and Group Two. The reason for using two groups was to ascertain whether the children’s performance on a phonological awareness assessment battery, using both non-spoken and spoken modes of response, was equivalent. The non-spoken mode of response required the children to answer the

questions using eye-gaze only (by looking at the top left hand corner of the E-tran to indicate “Yes”, or by looking at the bottom right hand corner of the E-tran to indicate “No”). The spoken mode simply involved the children responding with a verbal “Yes” or “No”. The two groups were matched according to the reading cohorts of above-average, average and below-average as well as to mother tongue of English First Language or English Second Language.

All forty-eight children answered all ninety questions.

4.2 RESULTS AND DISCUSSION

4.2.1 An Overview of Group One and Group Two on All tasks.

Figure 4.1 provides an overview of the general performance on the two modes of response for Group One and Group Two. The figure depicts the mean scores for Tasks 1a and b, Tasks 2a and b as well as Tasks 3a and b. See Appendix F for specific data.

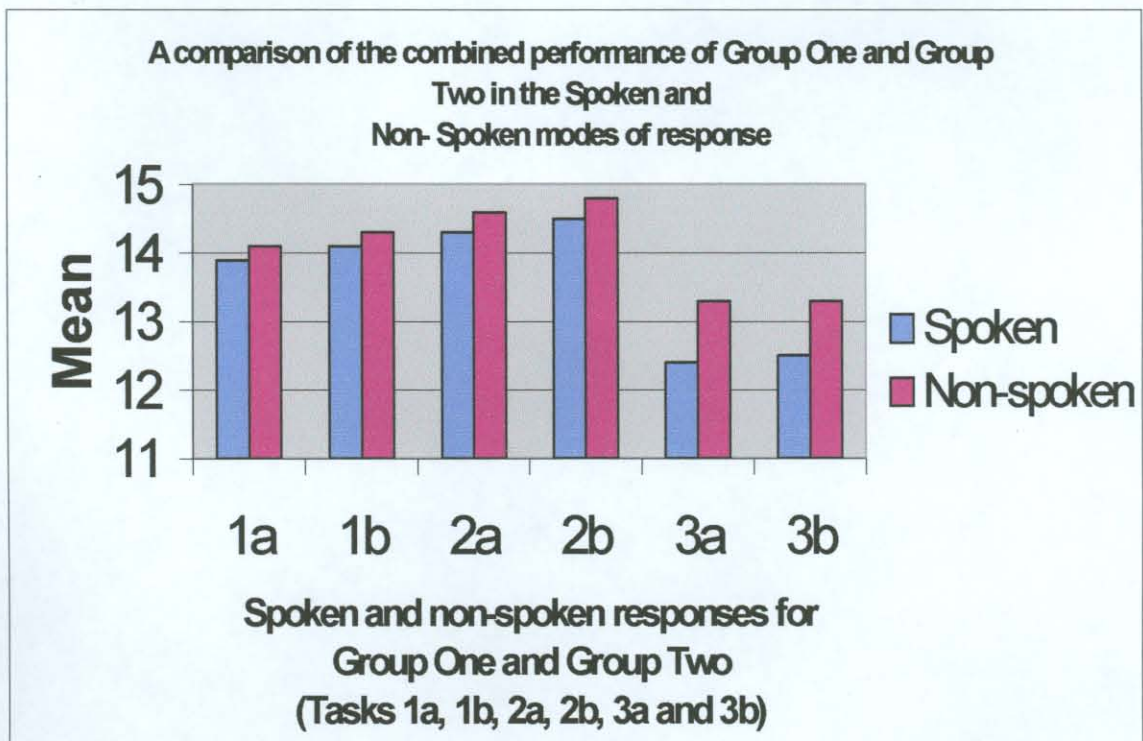


Figure 4.1 An overview of the Mean Scores obtained by Group One and Group Two for Tasks 1a and b, 2a and b and 3a and b.

Figure 4.1 shows that as expected, there are no statistically significant difference at the 5% level of significance. Slightly better scores were consistently obtained for all the non-spoken responses. See Table 4.4.1 to Table 4.4.6 in Appendix F for the Mean, Standard Deviation and p-values which are represented in Table 4.1.

The cognitive and physical demands did not appear to impact either positively or negatively on the performance of these school children as they performed comparably under both conditions. One reason for this finding could be that eye-gaze was in fact a natural response mode for these children (Goossens', 1989) and, as it precedes the verbal response mode in typically developing children, it is therefore comparable in terms of ease of production in relation to the spoken mode of response. It is interesting to note that Tasks 3a and 3b, which are developmentally more difficult than Tasks 1a, 1b, 2a and 2b, rendered higher means (although not statistically significant) for the non-verbal response modes. This may be due to the fact that under difficult conditions and where the cognitive demands are greater, children revert to a previous and more immature level of response mode in order to accurately give the tester their answers.

Another reason for this finding could be the novelty aspect of the response mode, which encouraged greater attention to detail, as well as sustained levels of attention and concentration. There may also have been an element of motivation as the children were asked to help the researcher to ascertain whether answering by means of their eyes would help children who were unable to speak, so that they may also participate in the schooling experience as they do themselves. Further, all the children were volunteers and appeared to have "bought-in" to the testing procedures, as they were informed that they may withdraw at any point, and none did. Although the general performance in both modes was not statistically significant, the consistency in the pattern is evident and warranted further investigation.

4.2.2 Analysis of the Mean for Group One and Group Two on All Tasks.

Figure 4.2 presents an overview of the comparison of the mean for Group One and Group Two on Tasks 1a and b, Tasks 2a and b, Tasks 3a and b.

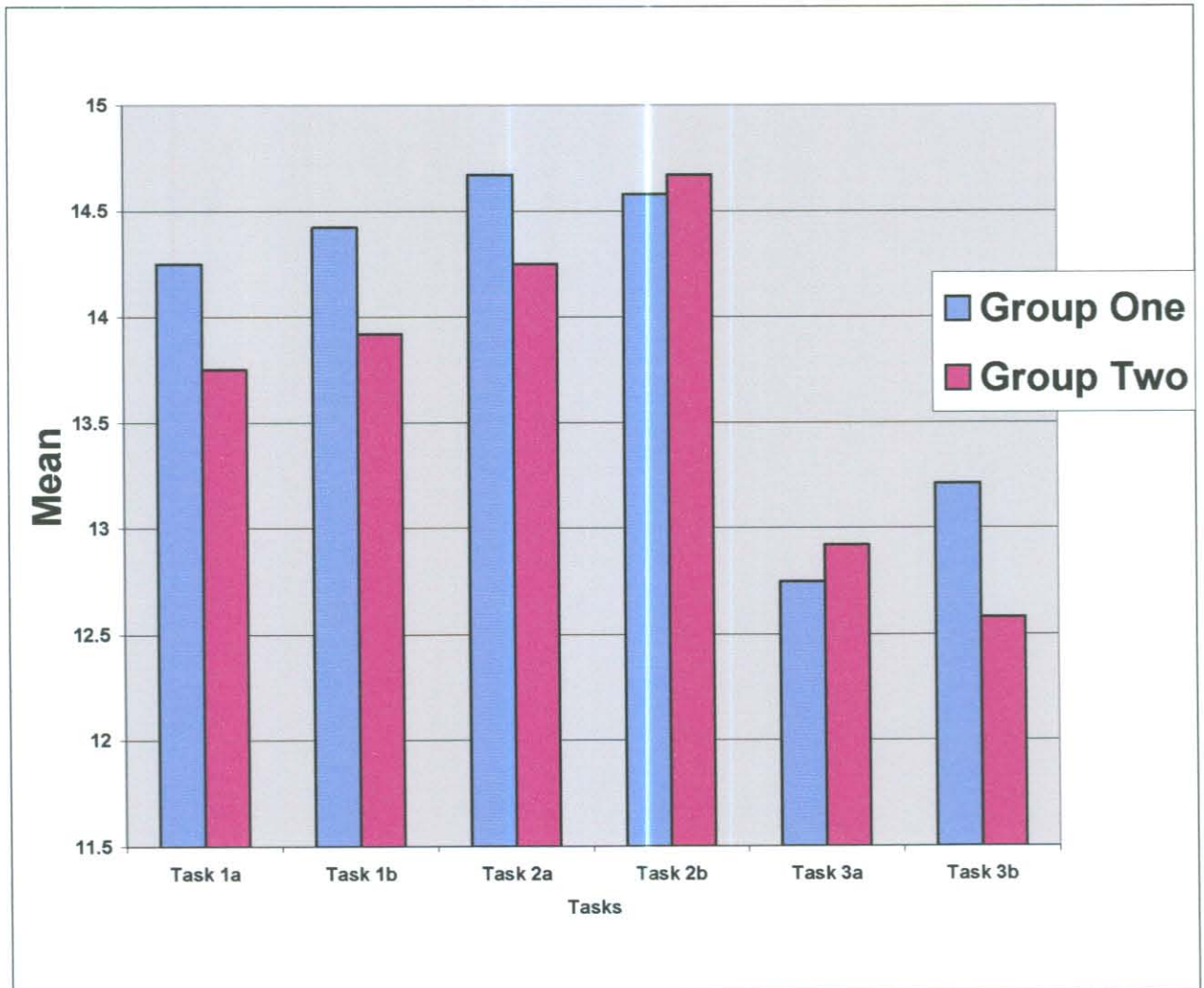


Figure 4.2 Analysis of the Mean for Group One and Group Two on Tasks 1a and b, 2 a and b, 3 a and b

Figure 4.2 indicates that Group One obtained higher mean scores for Tasks 1a, 1b, 2a, and 3b. Group Two obtained higher mean scores for Tasks 2b and 3a. The scores, however, are statistically insignificant at the 5% level of significance. See Table 4.5.1 in Appendix G for the Means and Standard Deviations for the spoken and non-spoken modes of response on all tasks. The results for neither group followed expectations, as Adams (1990) points out that rhyming

knowledge precedes knowledge of identification of phonemes in words. These results indicate that the children were better in recognising the sameness of initial phonemes than identifying whether words rhymed. The results, however, obtained for Tasks 2a and 2b may be as a result of the emphasis of the instruction in the alphabetic script that is taught in the early periods of Grade One. Tasks 3a and 3b show poorer results overall, but this was expected, as recognition of the sameness of final sounds is a more difficult task (Adams, 1990).

4.2.3 Analysis of Spoken and Non-Spoken Modes for Group One and Group Two per Task.

Figure 4.3 provides an overview of the general performance on the two modes of response for Group One and Group Two. The table depicts the mean scores for Tasks 1a and b, Tasks 2a and b as well as Tasks 3a and b.

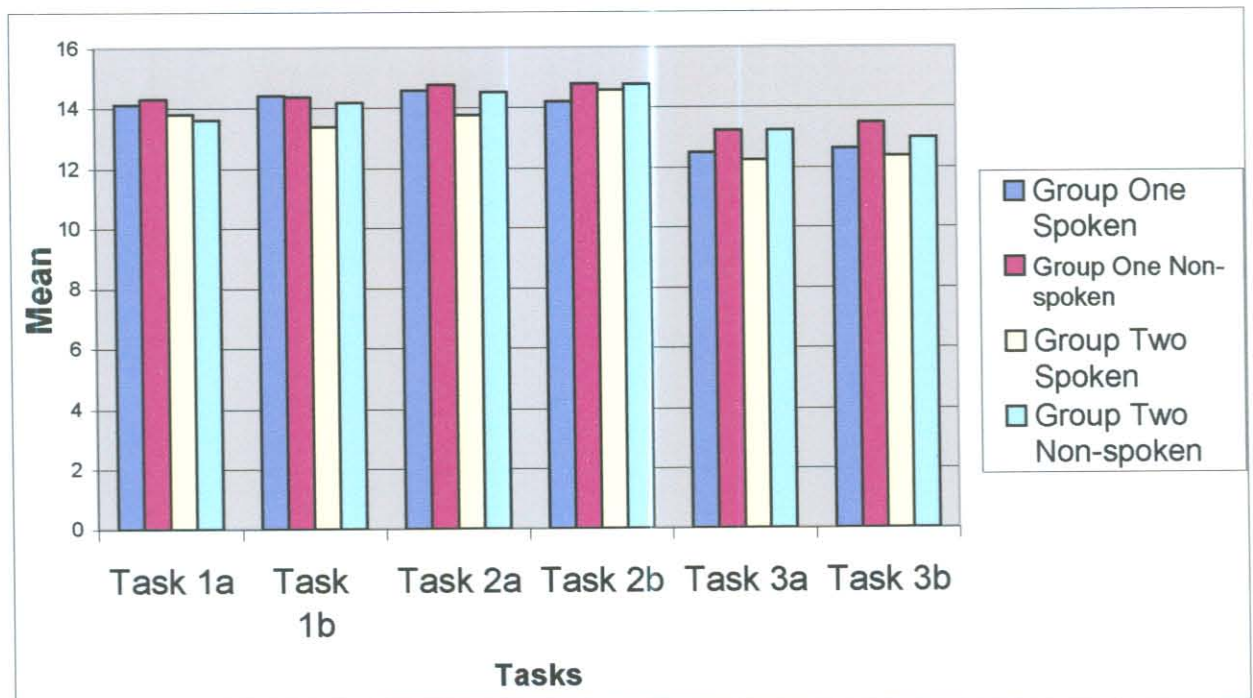


Figure 4.3 Analyses of Spoken and Non-Spoken Modes for Group One and Group Two per Task.

Figure 4.3 indicates that the comparison between Group One and Group Two on both the spoken and non-spoken modes are statistically insignificant at the 5% level of significance. Based on the results obtained in Figure 4.1, these results were expected. Figure 4.1 looked at the combined performance of Group One and Group Two in the spoken and non-spoken modes of response whereas in Figure 4.3 this data is taken one step further and each mode for each group on each

task was investigated. There was, however, no statistical difference at the 5% level of significance. See Table 4.6.1 in Appendix H for the Mean and Standard Deviation for both the spoken and the non-spoken modes of response for Group One and Group Two. Group One fared better on the non-spoken response modes for all tasks except for Task 1b. Group Two obtained higher scores for all the non-spoken tasks except for Task 1a. The order in which the items were presented within each task was randomized and therefore the slight inconsistency of results for Group One on Task 1b and Group Two on Task 1a is inexplicable. Fatigue, levels of motivation, novelty aspects as well as learnability of the task have all been ruled out as the study controlled for task order, and the order in which items were presented.

4.2.2 Analysis of the Order of Tasks Presented for Each Group.

Figure 4.4 shows the overall performance of the mean for the two groups combined for each of the task orders for all 6 tasks. For the full data on the Mean, Standard Deviation and p-Values refer Tables 4.7.1 to 4.7.6 in Appendix I.

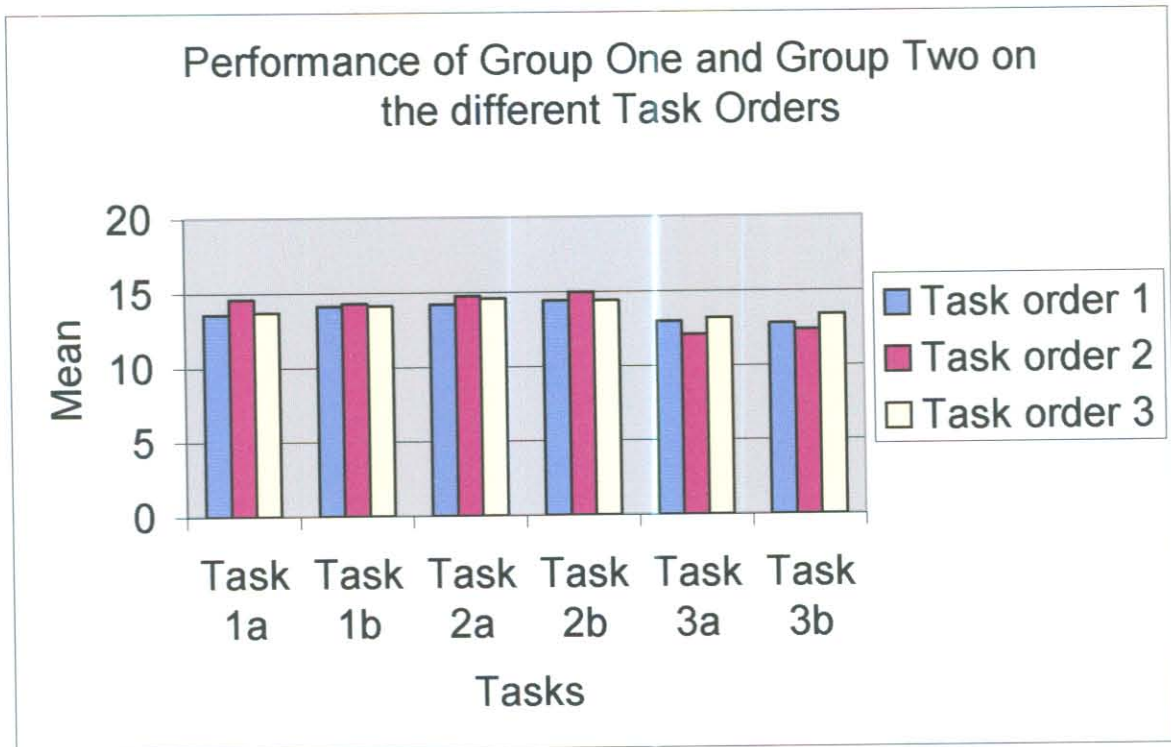


Figure 4.4 The Performance of the Mean for Task Order 1, 2 and 3 for Group One and Group Two.

From the above figure, as well as Appendix I, it is apparent that there was no significant difference at the 5% level of significance for Group One and Group Two on the different task orders.

The children who received the assessment in Task Order 1 belonged to the above-average reading cohort. They received the test in the order of Tasks 1, 2 and 3. It would have been expected that their ability in phonological awareness should have been better than their peers in the average or below-average reading cohorts, yet this is not reflected in the scores obtained for the combined groups. This may be due to the fact that they processed the reading tasks via the direct route, rather than the indirect route as described by Bishop and Robson (1987). The reading scheme used in the participating school is Breakthrough to Literacy, which in the early stages of Grade One focuses on recognition of the whole word within a meaningful sentence as constructed by the children themselves. It may be suggested that the children who are better readers in this school access their reading material primarily via the visual route along with semantic cues.

The average reading cohort on the other hand fared the best in Tasks 1a, 1b, 2a and 2b. This does not follow the suggestion of Adams (1990) that skills in phonological awareness are one of the best predictors of the acquisition of literacy. This is further supported by the fact that the below-average reading cohort fared better than the above-average reading cohort all tasks, even on Tasks 3a and 3b, the most difficult component of the test.

4.3 SUMMARY

The findings of the research were presented in this chapter. The following observations were made:

- i. There was no statistically significant difference in the combined performance between the two groups in both the spoken and non-spoken modes of response.
- ii. There was no statistically significant difference between Group One and Group Two in both the spoken and non-spoken modes of response.

- iii. There was no statistically significant difference between the performance of Group One and Group Two respectively on each task.
- iv. There was no statistically significant difference between the orders in which the tasks were presented.
- v. There was no statistically significant difference between the orders in which the items in each task were presented.

CHAPTER FIVE
SUMMARY, CONCLUSION
AND
RESEARCH IMPLICATIONS

5.1 INTRODUCTION

This chapter provides a brief summary of the results obtained in this study and also an integrated discussion of the results. This is followed by a critical evaluation of the study. Finally, recommendations for future research are made.

5.2 SUMMARY OF RESULTS AND INTEGRATION OF RESULTS

The purpose of this study was to investigate whether the children's performance on a phonological awareness assessment battery using both a non-spoken and a spoken mode of response was comparable, and therefore a valid accommodation in determining "Yes/No" responses. The non-spoken mode of response required the children to answer the questions using eye-gaze only. This was achieved by looking at the top left hand corner of the E-tran to indicate "Yes", or by looking at the bottom right hand corner of the E-tran to indicate "No". The spoken mode merely involved the children responding with a verbal "Yes" or "No". The Constitution of South Africa (Republic of South Africa, 1996) mandates that all South African learners, including those with disabilities, be granted access to basic education. Children who do not have sufficient physical abilities to respond via a spoken "Yes" or "No" to questions which assess their knowledge require accommodations so that they may participate in the assessment and accountability systems of the schools in which they are educated.

The Draft Guidelines for the Implementation of Inclusive Education (National Department of Education, 2002) in its summary of recommended assessment accommodations for children who have LNFS suggest that the following accommodations be permitted: time, amanuensis, reader, learning programme credits, oral to examiner and AAC strategies.

Eye-gaze is one of the strategies used by individuals who use AAC and is therefore an accepted strategy for the assessment of children with LNFS in South African schools.

Because of the emphasis of the social model of education, which views barriers to learning as being primarily within the environment and not within the individual, the emphasis has moved from viewing the child as the problem, to creating an environment in which that child can succeed (National Department of Education, 2002). To achieve this objective, amongst others, adaptations in the manner in which these individuals are assessed are necessary. The accommodations, which are afforded to individuals with LNFS, therefore provide the teachers with information on the effectiveness of their teaching strategies, information about the learning needs and strengths of the children, as well as identifying the barriers that the children may be experiencing.

Although this study was conducted on typically developing children, the equivalence of the spoken and non-spoken modes of response is a positive result, as it indicates that in typically developing children the test accommodations provided (as in the study comparing scanning versus direct selection of Arvidson, 2000) acted neither as an advantage nor as a disadvantage in the test of phonological awareness. This was a positive finding because in South Africa, as in other developing regions in the world, the issues of affordability and accessibility are pivotal when implementing specialized services, both in specialized and mainstream schools (Dada, 1999). This is a low cost method that can be explored further with children with varying degrees of disabilities.

5.3 CRITICAL EVALUATION

This is an initial study of its kind, as it investigates test accommodations for children who have LNFS. The need for evidence-based practice to determine the equivalence or non-equivalence of assessment accommodations is necessary as the barriers to assessment are being removed internationally (Thurlow et al. 2003). This study compares two response modes, namely spoken and non-spoken, in typically developing Grade One children. These children belonged to both English First Language and English Second Language groups. It highlights that there is no

significant difference between responding in a spoken format or a non-spoken format. The findings suggest that, in typically developing children, those who receive accommodations in their assessment will be neither advantaged nor disadvantaged in their response via eye-gaze.

Although Higginbotham (1992) feels that typically developing children may provide a viable alternative to AAC users as research participants, these results may not, however, be generalized to the population of children who have little or no functional speech, as a methodological constraint of the study is that it was conducted on typically developing children. These children were able to make use of well-developed articulatory skills to assist in the memorization of questions while simultaneously working out the answers to the questions posed. Children who have disabilities, and in particular those with LNFS, do not have the advantage of articulating the phonemes within the words and therefore may have difficulties when participating in the test. For this cohort, reliance on the oral motor feedback is reduced and they are required to identify sameness of words primarily through the acoustics of the word. In order to justify the generalization of research findings from typically developing individuals to the population of individuals who have LNFS, a sufficient number of comparable studies need to be conducted (Bedrosian, 1992). As a first step, it should be field-tested on children with disabilities who are able to provide a consistent verbal “Yes/No” as well as to utilize eye-gaze to indicate “Yes/No”. If, in a replication of this study, equivalence of this population cohort is found, then it may be generalized to a group of children who are unable to indicate “Yes/No” in a spoken mode of response.

The strengths of the study are as follows:

- i. This is one of the very few studies that investigate accommodations of response modes for the assessment of children. Other than the Arvidson (2000) and Wagner (1994) studies no other studies, have investigated the validity of accommodations in response modes.
- ii. The assessment procedure provides the tester with reliable information on the skills of the testee. In contrast to the Wagner (1994) study, where any consistent response was recorded in the affirmative and an absence of

response was recorded in the negative, this test required a definite “Yes” or “No” to all questions posed.

- iii. It compares favourably with the accommodation studies on various response modes. As with the Wagner (1994) and Arvidson (2001) studies, it found that accommodations in the response modes neither advantaged nor disadvantaged the cohorts participating in their studies.
- iv. There was methodological equivalence between the two groups with respect to the two modes of response.

There were a number of limitations present in this study. They are as follows:

- i. The findings were limited to a group of six and seven year old children. Children younger or older may not produce the same results. Should the same age children be assessed on more complex aspects of phonological awareness, those results may also differ from those found in this study.
- ii. Eye-gaze as a response mode can be applied in tests using binary communication but it is limited, as in binary communication there is a 50/50 chance of providing the tester with the correct response. Using binary communication to test phonological awareness results in the test only assessing the skill at a receptive level and not at an expressive level. By not being able to generate words or pseudo words, it means that the whole range of phonological awareness (rhyme oddity, rhyme production, oral production of phonemes, articulating individual segments in words, phoneme deletion and synthesis) would therefore not be assessed (Blischak, 1994).
- iii. The phonological assessment battery used for this study was not a standardized test, but rather a screening test, which used benchmarks to indicate whether further investigation and intervention for the children to achieve satisfactory levels of phonological awareness was necessary.
- iv. A further limitation of this study is that it can be only used in a one-to-one test situation and not in a group or class situation.

5.4 RECOMMENDATIONS FOR FUTURE RESEARCH

Recommendations for future research are:

- i. Further development of phonological awareness tests which require “Yes” or “No” responses at a more complex developmental level.
- ii. Testing response modes using eye-gaze to indicate from an array of more than two items, without providing cues for the participants.
- iii. Testing response modes using a switch to indicate “Yes” or “No”, which can be used for children with cortical visual impairment or children with blindness and who have LNFS.
- iv. Testing response modes using a Speech Generating Device.
- v. A replication of this study to investigate on a more comprehensive scale in order to facilitate the generalization of results. Replication of the use of the two response modes on individuals with severe disabilities and who are unable to communicate orally.

5.5 SUMMARY

This chapter summarized the results and discussion of the study. This was followed by a critical evaluation of the study and its clinical implications. Finally recommendations for future research were provided.

REFERENCES

- Arvidson, H. (2000). *Comparative study of two modes of response: direct selection and scanning*. Unpublished doctoral thesis (PhD). West Lafayette, IN: Purdue University.
- Adams, M. J. (1990). *Beginning to read: Thinking and learning about print*. Cambridge, MA: MIT Press.
- Alant, E., & Emmett, T. (1995). *Breaking the silence: Communication and education of children with severe handicaps*. Human Sciences Research Council Publishers. Pretoria, South Africa.
- Ball, E. W. (1997). Phonological awareness: Implications for whole language and emergent literacy programs. *Topics in Language Disorders, 17*(3), 14-26.
- Bedrosian, J. L. (1992). Use of non-disabled subjects in AAC research: Are we really saving a dime? *Methodological Issues in Research in Augmentative and Alternative Communication*. Proceedings of the Second ISAAC Research Symposium in Augmentative and Alternative Communication. Philadelphia, Pennsylvania.
- Beringer, V. W., & Gans, B. M. (1986a). Language profiles in nonspeaking individuals of normal intelligence with severe cerebral palsy. *Augmentative and Alternative Communication, 2*, 45-50.
- Beringer, V. W., & Gans, B. M. (1986b). Assessing word processing capabilities of the nonvocal, nonwriting. *Augmentative and Alternative Communication, 2*, 56-63
- Beukelman, D. R. (1991). Magic and cost of communication competence. *Augmentative and Alternative Communication, 7*(2), 2-9.

Beukelman, D. R., & Mirenda, P. (1998). *Augmentative and alternative communication. Management of severe communication disorders in children and adults* (2nd ed). Paul Brookes H. Brookes, Baltimore, Maryland.

Bishop, D. V. M., & Robson, J. (1989). Accurate non-word spelling despite congenital inability to speak: Phoneme-grapheme conversion does not require subvocal articulation. *British Journal of Psychology*, *80*, 1-13.

Bishop, K., Rankin, J., & Mirenda, P. (1994). Impact of graphic symbol use on reading acquisition. *Augmentative and Alternative Communication*, *10*, 113-125.

Blachman, B. A. (1991). Phonological awareness and word recognition: Assessment and Intervention. In A. G. Kamhi & H. W. Catts (Eds.), *Reading disabilities: A developmental language perspective* (pp 133-158). Boston: College Hill Press.

Blischak, D. M. (1994). Phonological awareness: Implications for individuals with little or no functional speech. *Augmentative and Alternative Communication*, *10*, 245-254.

Booth, J. R., Perfetti, C. A., & MacWhinney, B. (1999). Quick automatic, and general activation of orthographic and phonological representations in young readers. *Developmental Psychology*, *35*(1), 3-19.

Burd, L., Hammes, K., Bornhoeft, D., & Fisher, W (1988). A North Dakota prevalence study of nonverbal school-age children. *Language, Speech, and Hearing Services in Schools*, *19*(4), 371-383.

Catts, H. W. (1989). Phonological processing deficits and reading disabilities. In A. Kamhi & H Catts (Eds.), *Reading disabilities: A developmental language perspective* (pp101-132). Boston: College-Hill Press.

Conrad, R. (1964). Acoustic confusion in immediate memory. *British Journal of Psychology*, 55, 75-84.

Dada, S. (1999). *Teachers' attitudes towards children with little or no functional speech using two Augmentative and Alternative Communication devices*. Unpublished Masters thesis (MA). Pretoria, South Africa: Pretoria University.

Dahlgren Sandberg, A., & Hjelmquist, E. (1996a). Phonological awareness and literacy in nonspeaking pre-school children with cerebral palsy. *Augmentative and Alternative Communication*, 12, 138-153.

Dalton, B., Tivnan, T., Riley, M. K., Rawson, P., & Dias, D. (1995). Revealing Competences: fourth-grade students with and without learning disabilities show what they know on paper and pencil and hands-on performance assessments. *Learning Disabilities Research and Practice*, 10(4), 198-214.

Dunn, L.M., & Dunn, L.M. (1981). *Peabody Picture Vocabulary Test-Revised*. Circle Pines, MN: American Guidance Service.

Elliott, S. N., Kratochwill, T. R., & Schulte, A., G. (1998). The assessment accommodations checklist: who, what, where, when, why and how? *Teaching Exceptional Children*, 31, 10-14.

Elliott S. N., McKivitt, B. C., & Kettler, R. J. (2002). Testing accommodations research and decision-making: The case of "good" scores being highly valued but difficult to achieve for all students. *Measurement and Evaluation in Counselling and Development*, 35, 153-166.

Ellis, N., & Large, B. (1987). The development of reading: As you seek so shall you find. *British Journal of Psychology*, 78, 1-28.

- Felton, R. H., & Wood, F.B. (1989). Cognitive deficits in reading disability and attention deficit disorder. *Journal of Learning Disabilities*, 22, 3-12.
- Foley, B. E., & Pollatsek, A. (1999). Phonological and reading abilities in adolescents and adults with severe congenital speech impairments. *Augmentative and Alternative Communication*, 15, 156-171.
- Gilberton, M., & Bramlett R. K. (1989). Phonological awareness screening to identify at-risk readers: Implications for practitioners. *Language, Speech, and Hearing Services in Schools*, 29, 109-116
- Gillam, R. B., & van Kleeck, A. (1996). Phonological awareness training and short-term working memory: Clinical implications. *Topics of Language Disorders*, 17(1), 72-81.
- Goossens', C. A. (1989). Aided communication intervention before assessment: A case study of a child with cerebral palsy. *Augmentative and Alternative Communication*, 5(2), 14-26.
- Goossens', C. A., & Crain, S. S. (1987). Overview of nonelectronic eye-gaze communication techniques. *Augmentative and Alternative Communication*, 3(2), 77-89.
- Grise, P., Beatie, S., & Algozzine, B. (1982). Assessment of minimum competency tests in Fourth Grade learning disabled students: test modifications make a difference. *Journal of Educational Research*, 76(1), 35-40.
- Hanley, J. R., Reynolds, C. J., & Thornton, A. (1987). Orthographic analogies and developmental dyslexia. *British Journal of Psychology*, 88, 423-440.
- Higginbotham, D. J., & Bedrosian, J. L. (1995). Subject selection in AAC research: Decision points. *Augmentative and Alternative Communication*, 11, 11-13.

Hodson, B. W. (1994). Helping individuals become intelligible, literate, and articulate: The role of phonology. *Topics in Language Disorders, 14*(2), 1-16.

Jenkins, R., & Bowen, L. (1994). Facilitating development of preliterate children's phonological abilities. *Topics In Language Disorders, 14*(2), 26-39.

Jones, B., & Kenward, M. G. (1989). Design and analysis of cross-over trials. London: Chapman and Hall.

Koppenhaver, D. A. (2000). Literacy in AAC. What should be written on the envelope that we push? *Augmentative and Alternative Communication, 16*(4), 270-279.

Koppenhaver, D. A., Coleman, P. P., Steelman, J., & Yoder D. E. (1992). The emergence of literacy research in AAC: Methodological issues and research priorities. *Proceedings of the Second ISAAC Research Symposium in Augmentative and Alternative Communication*. Philadelphia, Pennsylvania.

Koppenhaver, D. A., & Yoder, D. E. (1992). Literacy issues in persons with severe speech and physical impairments. In R. Gaylord-Ross (Ed.), *Issues and research in special education, Vol. 2*. (p156-201). New York: Teachers College Press.

Integrated National Disability Strategy (INDS) (1997). *White Paper*. Office of the Deputy President, T. M. Mbeki. Ndabeni, South Africa: Rustica Press.

Invernizzi, M., Meier, J. D., Swank, L., & Juel, C. (1999-2000). Phonological Awareness Literacy Screening (PALS). Student Booklet.

Leedy, P.D., & Ormrod, J.E. (2001). *Practical Research Planning and Design (7th ed.)*. New Jersey: Merrill Prentice Hall.

Light, J. (1988). Interaction involving individuals using augmentative and alternative communication systems: State of the art and future directions. *Augmentative and Alternative Communication*, 4(2), 66-82.

Light, J., & Kelford-Smith, A. (1993). Home literacy experiences of preschoolers who use AAC systems and of their nondisabled peers. *Augmentative and Alternative Communication*, 9, 10-25.

Lloyd, L. L., Arvidson, H., Bennett, D. E., & McLaughlin, T. R. (2002). Accommodations taxonomy for improved assessment of AAC users. ISAAC Miniseminar, Odense, Denmark. Purdue Research Foundation.

Lloyd, L. L., Fuller, D. R., & Arvidson H. H. (1997). Introduction and overview. In L.L. Lloyd, D. R. Fuller & H. H. Arvidson (Eds.). *Augmentative and alternative communication. A handbook of principles and practices* (pp.1-17). New York: Paul H. Brookes.

McMillan, J. H., & Schumacher, S. (2001). *Research in Education. A Conceptual Introduction* (5th ed.). New York: Longman.

McNaughton, S., & Lindsay, P. (1995). Approaching literacy with AAC graphics. *Augmentative and Alternative Communication*, 11, 212-228.

National Department of Education. (2001). *Education White Paper 6. Special education needs. Building an inclusive education and training system*. Pretoria: Department of Education.

National Department of Education. (2002). *The draft guidelines for the implementation of inclusive education*. Pretoria: Department of Education.

- Phillips, S. E. (1994). High-stakes testing accommodations: validity versus disability rights. *Applied Measurement in Education*, 7(2), 93-120.
- Rankin, J. L., Harwood, K., & Mirenda, P. (1994). Influence of graphic symbol use on reading comprehension. *Augmentative and Alternative Communication*, 10, 269-281.
- Rivers, K. O., & Lombardino, L. J. (1998). Generalization of early metalinguistic skills in a phonological decoding study with first graders at risk for reading failure. *International Journal of Language & Communication Disorders*, 33(4), 369-391.
- Salend, S. M., & Salend, S. J. (1985). Adapting teacher-made tests for mainstreamed students. *Journal of Learning Disabilities*, 18, 373-375.
- Siegelman, C. K., Budd, E. C., Spanhel, C. L., & Schoenrock, C. J. (1981). When in doubt say yes: Acquiescence in interviews with mentally retarded persons. *Mental Retardation*, 19, 53-58.
- Smith, M. M. (1996). In *Augmentative and alternative communication: European perspectives*, von Tetzchner, S, & Jensen, M. H. (Eds.). London: Whurr Publishers.
- Smith, M. M., & Blischak, D. M. (1997). Literacy. In L. L. Lloyd, D. R. Fuller, & H. H. Arvidson (Eds.). *Augmentative and alternative communication. A handbook of principles and practices* (pp.414-443). New York: Paul H. Brookes.
- Snow, C. E. Scarborough, H. S., & Burns, M. S. (1999). What speech-language pathologists need to know about early reading. *Topics in Language Disorders*, 4, 48-58.
- South Africa (Republic). (1996). Constitution of the Republic of South Africa, Act No 108 of 1996. Pretoria: Government Printers.

Stanovich, K. E., Cunningham, A. E., & Cramer, B. B. (1984). Assessing Phonological awareness in kindergarten children: Issues of task complexity. *Journal of Experimental Child Psychology*, 38, 175-190.

Swank, L. K. (1994). Phonological coding abilities: Identification of impairments related to phonology-based reading problems. *Topics in Language Disorders*, 14(2), 56-71.

Thorstad, G. (1991). The effect of orthography on the acquisition of literacy skills. *British Journal of Psychology*, 82, 527-537.

Thurlow, M. L., Elliott, J. L., & Ysseldyke, J. E. (2003). *Testing Students with Disabilities. Practical Strategies for Complying with District and State Requirements (2nd ed.)*. Thousand Oaks: Corwin Press.

Thurlow, M. L., Ysseldyke, J., & Silverstein, B (1995). Testing accommodations for students with disabilities. *Remedial and Special Education: RASE*, 16, 260-270.

Torgesen, J. K., & Bryant, B. R. (1994). *Test of Phonological Awareness. Examiners Manual*.

UNESCO Open File on Inclusive Education (2001). *Support Material for Managers and Educators. Inclusive Education. Section for Exclusion through Education. Division of Basic Education. Paris, France.*

Vandervelden, M. C., & Siegel, L. S. (1999). Phonological processing and literacy in AAC users and students with motor speech impairments. *Augmentative and Alternative Communication, 15*, 191-211.

Von Tetzchner, S., Grove, N., Loncke, F., Barnett, S., Woll B., & Clibbens, J. (1996). Preliminaries to a comprehensive model of augmentative and alternative communication. In S. von Tetzchner & M. H. Jensen (Eds.). *Augmentative and Alternative Communications European Perspectives*. (pp. 19-37) Whurr Publishers: London.

Wagner, P. A. (1994). Adaptations for administering the Peabody to individuals with severe communication and motor dysfunctions. *Mental Retardation, 32*(3), 107-112.

Wagner, R. K., & Torgesen, J. K. (1987) The nature of phonological processes and its causal role in the acquisition of reading skills. *Psychological Bulletin 101*, 192-212.

Wagner, R. K., Torgesen, J. K., Rashotte, C. A., Hecht, S. A., Barker, T. A., Burgess, S. R., Donahue, J., & Garon, T. (1997). Changing relations between phonological processing abilities and word level reading as children develop from beginning to skilled readers: A 5-year longitudinal study. *Developmental Psychology, 33*(3), 468-479.

Wagner, R. K., Torgesen J. K., Rashotte, C. A. (1994). Development of reading-related phonological processing abilities: New evidence of bi-directional causality from a latent variable longitudinal study. *Developmental Psychology, 30*(1), 73-87.

Wood, F.B., & Felton, R.H. (1994). Separate linguistic and attentional factors in the development of reading. *Topics in Language Disorders, 14*3, 442-457.

APPENDIX A

TOPA AND PALS

Procedures

For all tasks, three practice trials were provided. Here, when necessary, corrective feedback was given to the child. The practice trials were repeated once if necessary. Thereafter the test proceeded with no feedback. It was explained to the children that the researcher would no longer be able to assist them and that they must try their best to give the correct answer. The subjects were told that if they did not know the correct answer they should have a guess.

The subjects' score for each of the phonological awareness tasks were the total number of correct responses, and the maximum score for each task was 30. All tasks provided the subjects with three options, and the correct words were placed randomly and occurred approximately with equal frequency in all positions.

1. Rhyme Recognition (PALS)

In this task the subjects were provided with the target word and asked to respond via a "yes", or "no" signal, which of three successive words rhymes with it. 3 practice items were given before the test began.

At the commencement of each test, the child was read the following scripted instructions:

"Today you are going to answer some questions. For some of them you will say Yes, if you think the answer is Yes and No if you think the answer is No. For others you will look at the Yes word written on the green paper - the one with a tick on it - if you think the answer is Yes. If you think the answer is No you will look at the No word written on the red piece of paper - the one with a cross on it. Come lets practice."

- a. *The tester then said, "Listen to this word – **bag**. One of these words that I am going to say will rhyme with bag. Listen carefully. – **nine, tag, cake**.*

Do bag & nine rhyme? Spoken

Do bag & tag rhyme? Spoken

Do bag & cake rhyme? Spoken

- b. The tester then said, "Listen to this word – **rock**. One of these words that I am going to say will rhyme with rock.
Listen carefully. – **clock, game, fruit**

*Do rock & clock rhyme? Non-Spoken
Do rock & game rhyme? Non-Spoken
Do rock & fruit rhyme? Non-Spoken*

- c. The tester then said, "Listen to this word – **tire**. One of these words that I am going to say will rhyme with tire.
Listen carefully. – **book, pot, fire**.

*Do tire & book rhyme? Non-Spoken
Do tire & pot rhyme? Non-Spoken
Do tire & fire rhyme? Non-Spoken*

Tests for which marks were allocated.

- i. The tester then said, "Listen to this word – **man**. One of these words that I am going to say will rhyme with man.
Listen carefully. – **five, bed, can**.

*Do man & five rhyme?
Do man & bed rhyme?
Do man & can rhyme?*

- ii. The tester then said, "Listen to this word – **sail**. One of these words that I am going to say will rhyme with sail.
Listen carefully. – **whale, tree, cow**.

*Do sail & whale rhyme?
Do sail & tree rhyme?
Do sail & cow rhyme?*

- iii. The tester then said, "Listen to this word – **coat**. One of these words that I am going to say will rhyme with coat.
Listen carefully. – **duck, hand, goat**

*Do coat & duck rhyme?
Do coat & hand rhyme?
Do coat & goat rhyme?*

- iv. The tester then said, "Listen to this word – **bug**. One of these words that I am going to say will rhyme with bug.
Listen carefully. – **hat, rug, tape**.

Do bug & hat rhyme?
Do bug & rug rhyme?
Do bug & tape rhyme?

- v. The tester then said, "Listen to this word – **dog**. One of these words that I am going to say will rhyme with dog.
Listen carefully. – **nail, frog, boy**.

Do dog & nail rhyme?
Do dog & frog rhyme?
Do dog & boy rhyme?

- vi. The tester then said, "Listen to this word – **ball**. One of these words that I am going to say will rhyme with ball.
Listen carefully. – **tent, pig wall**.

Do ball & tent rhyme?
Do ball & pig rhyme?
Do ball & wall rhyme?

- vii. The tester then said, "Listen to this word – **cat**. One of these words that I am going to say will rhyme with cat.
Listen carefully. – **bat, horse, saw**.

Do cat & bat rhyme?
Do cat & horse rhyme?
Do cat & saw rhyme?

- viii. The tester then said, "Listen to this word – **lock**. One of these words that I am going to say will rhyme with lock.
Listen carefully. – **boat, sock, pie**.

Do lock & boat rhyme?
Do lock & sock rhyme?
Do lock & pie rhyme?

- ix. The tester then said, “Listen to this word – **house**. One of these words that I am going to say will rhyme with house.
Listen carefully. – **mouse, bike, fan**.

Do house & mouse rhyme?
Do house & bike rhyme?
Do house & fan rhyme?

- x. The tester then said, “Listen to this word – **box**. One of these words that I am going to say will rhyme with box.
Listen carefully. – **leaf, gas, fox**.

Do box & leaf rhyme?
Do box & gas rhyme?
Do box & fox rhyme?

2. Beginning Sound Awareness (PALS).

In this task the subjects were provided with the target word and asked to respond via a “yes”, or “no” signal which of three words begins with the same sound as the target word. 3 practice items were given before the tests began.

- a. *The tester then said, “Listen to this word – **milk**. One of these words that I am going to say will begin with the “m” sound just like the “m” sound you hear in **milk**.*

*Listen carefully. – **moon, toes, soap**.*

*Do milk & moon begin with the same sound? Non-Spoken
Do milk & toes begin with the same sound? Non-Spoken
Do milk & soap begin with the same sound? Non-Spoken*

- b. *The tester then said, “Listen to this word – **fish**. One of these words that I am going to say will begin with the “f” sound just like the “f” sound you hear in **fish**.*

*Listen carefully. – **leg, bell, fence**.*

*Do fish & leg begin with the same sound? Spoken
Do fish & bell begin with the same sound? Spoken
Do fish & fence with the same sound? Spoken*

- c. The tester will say, "Listen to this word – **tail**. One of these words that I am going to say will begin with the "t" sound just like the "t" sound you hear in **tail**.

Listen carefully. – **flag, two, web**.

Do tail & flag begin with the same sound? Non-Spoken

Do tail & two begin with the same sound? Non-Spoken

Do tail & web begin with the same sound? Non-Spoken

Tests for which marks were allocated

- i. The tester then said, "Listen to this word – **bat**. One of these words that I am going to say will begin with the "b" sound just like the "b" sound you hear in **bat**.

Listen carefully. – **bird, lips, ring**.

Do bat & bird begin with the same sound?

Do bat & lips begin with the same sound?

Do bat & ring begin with the same sound?

- ii. The tester then said, "Ready for the next one? Listen to this word – **rain**. One of these words that I am going to say will begin with the "r" sound just like the "r" sound you hear in **rain**.

Listen carefully – **bus, foot, rake**.

Do rain & bus begin with the same sound?

Do rain & foot begin with the same sound?

Do rain & rake begin with the same sound?

- iii. The tester then said, "Ready for the next one? Listen to this word – **sun**. One of these words that I am going to say will begin with the "s" sound just like the "s" sound you hear in **sun**.

Listen carefully - **door, seal, car**.

Do sun & door begin with the same sound?

Do sun & seal begin with the same sound?

Do sun & car begin with the same sound?

- vi. The tester then said, "Ready for the next one? ? Listen to this word – **cup**. One of these words that I am going to say will begin with the "c" sound just like the "c" sound you hear in cup.

Listen carefully - **cone, six, belt**.

Do cup & cone begin with the same sound?

Do cup & six begin with the same sound?

Do cup & belt begin with the same sound?

- iv. The tester then said, "Ready for the next one? Listen to this word – **heart**. One of these words that I am going to say will begin with the "h" sound just like the "h" sound you hear in heart.

Listen carefully - **mop, hose, tie**.

Do heart & mop begin with the same sound?

Do heart & hose begin with the same sound?

Do heart & tie begin with the same sound?

- v. The tester then said, "Ready for the next one? Listen to this word – **van**. One of these words that I am going to say will begin with the "v" sound just like the "v" sound you hear in van.

Listen carefully - **hay, vine comb**.

Do van & hay begin with the same sound?

Do van & vine begin with the same sound?

Do van & comb begin with the same sound?

- vii. The tester then said, "Ready for the next one? Listen to this word – **deer**. One of these words that I am going to say will begin with the "d" sound just like the "d" sound you hear in deer.

Listen carefully - **sink, lamp, doll**.

Do deer & sink begin with the same sound?

Do deer & lamp begin with the same sound?

Do deer & doll begin with the same sound?

- viii. The tester then said, "Ready for the next one? Listen to this word – **sheep**. One of these words that I am going to say will begin with the "sh" sound just like the "sh" sound you hear in sheep.

Listen carefully - **shoe, train, wheel**.

Do sheep & shoe begin with the same sound?

Do sheep & train begin with the same sound?

Do sheep & wheel begin with the same sound?

- ix. The tester then said, “Ready for the next one? Listen to this word – **rain**. One of these words that I am going to say will begin with the “**r**” sound just like the “**r**” sound you hear in rain.

Listen carefully - **bus, foot, rake**.

Do rain & bus begin with the same sound?

Do rain & foot begin with the same sound?

Do rain & rake begin with the same sound?

- x. The tester then said, “Ready for the next one? Listen to this word – **paint**. One of these words that I am going to say will begin with the “**p**” sound just like the “**p**” sound you hear in paint.

Listen carefully - **gum, pen, key**.

Do paint & gum begin with the same sound?

Do paint & pen begin with the same sound?

Do paint & key begin with the same sound?

3. Ending sound the same (TOPA)

In this task the subjects were provided with the target word and asked to respond via a “yes”, or “no” signal which of three words ends with the same sound as the target word. 3 practice items will be given before the tests began.

- a. *The tester then said, “Listen to this word – **coat**. One of these words that I am going to say will have the same last sound as **coat**, it must end with the “**t**” sound just like the “**t**” sound you hear at the end of **coat**.
Listen carefully – **van, seat, man**.*

Do coat & van end with the same sound? Non-Spoken

Do coat & seat end with the same sound? Non-Spoken

Do coat & man end with the same sound? Non-Spoken

- b. *The tester then said, “Listen to this word – **dog**. One of these words that I am going to say will have the same last sound as **dog**, it must end with the “**g**” sound just like the “**g**” sound you hear at the end of **dog**.*

*Listen carefully – **bead, dot, pig**.*

Do dog & bead end with the same sound? Spoken

Do dog & dot end with the same sound? Spoken

Do dog & pig end with the same sound? Spoken

- c. The tester then said, "Listen to this word – **chair**. One of these words that I am going to say will have the same last sound as chair, it must end with the "r" sound just like the "r" sound you hear at the end of **chair**.
Listen carefully – **sheep, can, jar**.

Do chair & sheep end with the same sound? Spoken

Do chair & can end with the same sound? Spoken

Do chair & jar end with the same sound? Spoken

Tests for which marks were allocated

- i. The tester then said, "Listen to this word – **ball**. One of these words that I am going to say will end with the "l" sound just like the "l" sound you hear at the end of ball.
Listen carefully – **smile, horn duck**.

Do ball & smile end with the same sound?

Do ball & horn end with the same sound?

Do ball & duck end with the same sound?

- ii. The tester then said, "Ready for the next one? Listen to this word – **house**. One of these words that I am going to say will end with the "s" sound just like the "s" sound you hear in **house**.
Listen carefully – **boat, dress, store**.

Do house & boat end with the same sound?

Do house & dress end with the same sound?

Do house & store end with the same sound?

- iii. The tester then said, "Ready for the next one? Listen to this word – **plane**. One of these words that I am going to say will end with the "n" sound just like the "n" sound you hear in **plane**.
Listen carefully – **hook, sun, pail**.

Do plane & hook end with the same sound?

Do plane & sun end with the same sound?

Do plane & pail end with the same sound?

- iv. The tester then said, "Ready for the next one? Listen to this word – **gum**. One of these words that I am going to say will end with the "m" sound just like the "m" sound you hear in **gum**.

Listen carefully – **nail, farm, rug**.

Do gum & nail end with the same sound?
Do gum & farm end with the same sound?
Do gum & rug end with the same sound?

- v. The tester then said, "Ready for the next one? Listen to this word – **web**. One of these words that I am going to say will end with the "b" sound just like the "b" sound you hear in **web**.

Listen carefully – **tub, bowl, pet**.

Do web & tub end with the same sound?
Do web & bowl end with the same sound?
Do web & pet end with the same sound?

- vi. The tester then said, "Ready for the next one? Listen to this word – **cake**. One of these words that I am going to say will end with the "k" sound just like the "k" sound you hear in **cake**.

Listen carefully – **book, knife, ice**.

Do cake & book end with the same sound?
Do cake & knife end with the same sound?
Do cake & ice end with the same sound?

- vii. The tester then said, "Ready for the next one? Listen to this word – **tape**. One of these words that I am going to say will end with the "p" sound just like the "p" sound you hear in **tape**.

Listen carefully – **rake, rope, tail**.

Do tape & rake end with the same sound?
Do tape & rope end with the same sound?
Do tape & tail end with the same sound?

- viii. The tester then said, "Ready for the next one? Listen to this word – **man**. One of these words that I am going to say will end with the "n" sound just like the "n" sound you hear in **man**.

Listen carefully – **lock, lion, ant**.

Do man & lock end with the same sound?
Do man & lion end with the same sound?
Do man & ant end with the same sound?

- ix. The tester will say, "Ready for the next one? Listen to this word – **bulb**. One of these words that I am going to say will end with the "b" sound just like the "b" sound you hear in **bulb**.

Listen carefully – **loud, bus, rub**.

Do bulb & loud end with the same sound?

Do bulb & bus end with the same sound?

Do bulb & rub end with the same sound?

- x. The tester will say, "Ready for the next one? Listen to this word – **boat**. One of these words that I am going to say will end with the "t" sound just like the "t" sound you hear in **boat**.

Listen carefully – **nail, boot, house**.

Do boat & nail end with the same sound?

Do boat & boot end with the same sound?

Do boat & house end with the same sound?

APPENDIX B DATA CAPTURE SHEET

Child No:					1-2
Age:					3-5
Race:					6
Gender:					7
Class:					8
Home Language:					9
Reading Group:					10
Time:					11-14
Task 1					
Test Order:					15
Spoken/ Non Spoken:					16
Order of Items:					17
Results	a				18-20
	b				21-23
	c				24-26
	1				27-29
	2				30-32
	3				33-35
	4				36-38
	5				39-41
Test Order:					42
Spoken/ Non Spoken:					43
Order of Items:					44
	6				45-47
	7				48-50
	8				51-53
	9				54-56
	10				57-59
					60-62
Task 2					
Test Order:					63
Spoken/ Non Spoken:					64
Order of Items:					65
Results	a				66-68
	b				69-71
	c				72-74
	1				75-77
	2				78-80
	3				81-83
	4				84-86
	5				87-89
Test Order:					90
Spoken/ Non Spoken:					91
Order of Items:					92
	6				93-95
	7				96-98
	8				99-101
	9				102-104
	10				105-107
Task 3					
Test Order:					108
Spoken/ Non Spoken:					109
Order of Items:					110
Results	a				111-113
	b				114-116
	c				117-119
	1				120-122
	2				123-125
	3				126-128
	4				129-131
	5				132-134
Test Order:					135
Spoken/ Non Spoken:					136
Order of Items:					137
	6				138-140
	7				141-143
	8				144-146
	9				147-149
	10				150-152

APPENDIX C CODE FOR DATA CAPTURE SHEET

Codes:

Race:

1. = White
2. = Indian
3. = Coloured
4. = Black
5. = Asian
6. = Other

Reading Cohort

1. = Top
2. = Middle
3. = Bottom

Mode of response

1. = Spoken
2. = Non-Spoken

Gender

1. = Male
2. = Female

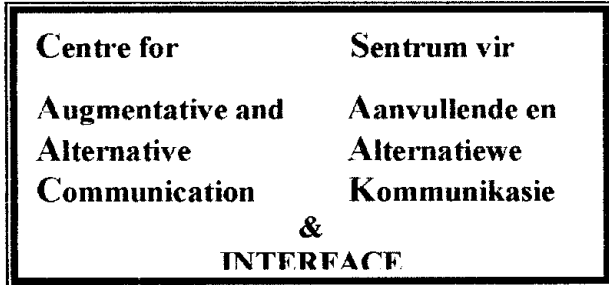
Order of items presented

1. = Questions 1 – 5
2. = Questions 6 – 10

Language group

1. = English
2. = Afrikaans
3. = Arabic
4. = Hindi
5. = Urdu
6. = Chinese
7. = Israeli
8. = Portuguese
9. = Taiwanese

APPENDIX D



1995: Education Africa Presidential Award for Special Needs
1998: Rolex Award for Enterprise: Associate Laureate

Fax/Faks: (012) 420 – 4389
Tel: (012) 420 – 2001

Centre for Augmentative and Alternative Communication
Sentrum vir Aanvullende en Alternatiewe Kommunikasie
University of Pretoria
PRETORIA, 0002
SOUTH AFRICA

The Principal
Crawford Preparatory School
Groenkloof
Pretoria
0002

Dear Mr. McLeod

Re: Request for permission to conduct a research study at your school

I am presently reading for a Masters Degree in Augmentative and Alternative Communication (AAC) at the University of Pretoria. Part of the course requirements is that I need to conduct a research study. The research will be a comparative study of two modes of response in a test of phonological awareness in typically developing Grade 1 children.

Phonological awareness is the metalinguistic skill whereby a person has acute awareness of, and can manipulate the individual sounds of a spoken language. The literature indicates that sound phonological awareness is a very good predictor of developing mature reading skills. Children who are unable to speak are able to develop phonological awareness although with more difficulty than their speaking peers. The aim of the study will be to establish whether non-spoken response modes would render the same results as spoken response modes. The results of this study would then be of assistance to educators of learners who have special educational needs to assess their abilities with a greater degree of accuracy.

The children will be assessed individually and the information will be treated with the strictest confidence. The test for each child should be completed in 15 minutes.

Apart from obtaining class-lists and the reading group into which each child is placed, I will not need to take up any of your teachers' teaching time. I would however, like to meet with them beforehand as a courtesy and explain the nature of the test as well the value it would provide to the field of AAC.

I would like to assess the children on the school premises at a time that will be optimal for both the child and the teacher. I would like to conduct the pilot study on the 28th and 30th of May. I would appreciate it if I could conduct the main study on the 16th, 17th 18th, 19th , and 23rd of July.

In appreciation

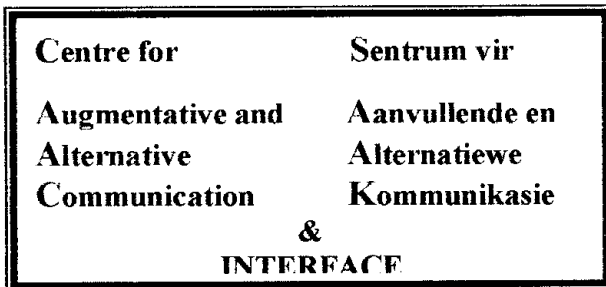
Maureen Casey

BA (Hons) DSE DE

Dr Juan Bommman

MA (AAC) Co-ordinator

APPENDIX E



1995: Education Africa Presidential Award for Special Needs
1998: Rolex Award for Enterprise: Associate Laureate

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Centre for Augmentative and Alternative Communication
Sentrum vir Aanvullende en Alternatiewe Kommunikasie
University of Pretoria
PRETORIA, 0002
SOUTH AFRICA

July 4, 2002

Dear Parent/s

Re: Request for permission for your child participate in a research study

I am presently reading for a Masters Degree in Augmentative and Alternative Communication (AAC) at the University of Pretoria. Part of the course requirements is that I need to conduct a research study.

I am wanting to investigate whether a spoken response or a non spoken response would deliver the same results in a screening test of phonological awareness in Grade 1 children.

Phonological awareness skills are those skills whereby a child is aware of and is able to use the individual sounds of his/her language. This skill is of vital importance for the

development of good literacy skills. In fact, good phonological awareness skills are very good predictors of reading ability. It is therefore important for educators to be able to establish whether different response modes would render the same results under the same condition in typically developing children. This would then assist educators of children who have little or no functional speech to be able to assess these children with a greater degree of accuracy.

What I would require of your child is for him/her to be out of the class for about ten to fifteen minutes during one class day. Your child will be asked questions on rhymes and sounds within words. For one half of the test he/ she will be required to answer using spoken language and for the other half he will be required to answer by using eye-gaze.

Your child's name will not be reflected on the answer sheets for purpose of the test and all information will be treated in the strictest confidence in line with the ethical requirements of the University of Pretoria.

I would appreciate it if you would grant permission for your child to participate in this study. It will be of great assistance to future children who have severe communication difficulties, as well as to the educators who are entrusted with their education.

Yours truly,

Maureen Casey

BA (Hons) DSE DE

Reply form

**I.....parent/guardian of
grant permission for my child to participate in the research study on phonological
awareness conducted under the auspices of the University of Pretoria.**

Signed.....

Date.....

APPENDIX F

Table 4.4.1 PERMANACE OF GROUP 1 AND GROUP 2 ON TASK 1A

The Mean, Standard Deviation and P- value for task 1a of this study			
	Mean Group One and Group Two	Standard Deviation	P- Value
Task Order 1	13.6	1.6	0.1117
Task Order 2	14.6	0.7	
Task order 3	13.7	1.4	
Spoken	13.9	1.2	0.9949
Non-spoken	14.1	1.5	
Order of Items 1-5	13.9	1.6	0.3035
Order of Items 6 - 10	14.2	1.0	

Table 4.4.2 PERFORMANACE OF GROUP 1 AND GROUP 2 ON TASK 1B

The Mean, Standard Deviation and P- value for task 1b of this study			
	Mean Group one and Group Two	Standard Deviation	P- Value
Task Order 1	14.1	1.5	0.6963
Task Order 2	14.3	1.1	
Task order 3	14.1	1.8	
Spoken	14.1	1.7	0.5073
Non-spoken	14.3	1.2	
Order of Items 1-5	14.3	1.3	0.7239
Order of Items 6 - 10	14.0	1.6	

Table 4.4.3 THE PERFORMANACE OF GROUP 1 AND GROUP 2 ON TASK 2A

The Mean, Standard Deviation and P- value for task 2a of this study			
	Mean Group one and group Two	Standard Deviation	P- Value
Task Order 1	14.2	1.1	0.1676
Task Order 2	14.8	0.4	
Task order 3	14.6	1.4	
Spoken	14.3	1.2	0.1985
Non-spoken	14.6	0.9	
Order of Items 1-5	14.2	1.4	0.2933
Order of Items 6 - 10	14.7	0.6	

Table 4.4.4 THE PERFORMANACE OF GROUP 1 AND GROUP 2 ON TASK 2B

The Mean, Standard Deviation and P- value for task 2b of this study			
	Mean Group one and Group Two	Standard Deviation	P- Value
Task Order 1	14.4	1.1	0.1050
Task Order 2	15.0	0.0	
Task order 3	14.4	1.0	
Spoken	14.5	1.1	0.2022
Non-spoken	14.8	0.5	
Order of Items 1-5	14.7	0.6	0.7965
Order of Items 6 - 10	14.5	1.0	

Table 4.4.5 THE PERFORMANACE OF GROUP 1 AND GROUP 2 ON TASK 3A

The Mean, Standard Deviation and P- value for task 3a of this study			
	Mean Group One and Group Two	Standard Deviation	P- Value
Task Order 1	13.0	1.8	0.4110
Task Order 2	12.1	2.2	
Task order 3	13.2	2.0	
Spoken	12.4	2.2	0.2947
Non-spoken	13.2	1.7	
Order of Items 1-5	12.8	1.8	0.7566
Order of Items 6 - 10	12.9	2.2	

Table 4.4.6 THE PERFORMANACE OF GROUP 1 AND GROUP 2 ON TASK 3B

The Mean, Standard Deviation and P- value for task 3b of this study			
	Mean Group One and Group Two	Standard Deviation	P- Value
Task Order 1	12.8	1.6	0.3433
Task Order 2	12.4	2.4	
Task order 3	13.4	1.4	
Spoken	12.5	1.8	0.0756
Non-spoken	13.3	1.8	
Order of Items 1-5	13.4	1.4	0.1874
Order of Items 6 - 10	12.4	2.1	

APPENDIX G

Table 4.5.1 PERFORMANCE OF GROUP ONE AND GROUP TWO IN THE SPOKEN AND NON – SPOKEN MODE ON ALL TASKS

The Mean and Standard Deviation for Task 1a, 1b, 2a, 2b, 3a and 3b					
Group One	Mean	SD	Group Two	Mean	SD
Task 1a	14.25	1.26	Task 1a	13.75	1.45
Task 1b	14.42	1.25	Task 1b	13.92	1.56
Task 2a	14.67	0.70	Task 2a	14.25	1.33
Task 2b	14.58	0.88	Task 2b	14.67	0.82
Task 3a	12.75	1.65	Task 3a	12.92	2.34
Task 3b	13.21	1.56	Task 3b	12.58	2.06

APPENDIX I

Table 4.5.1 Investigation of the interactions between the two groups for Task 1a are as follows:

Analysis of the mean, standard deviation and P-value for Group One and Group Two on Task 1a					
TASK 1A: Item 1-5	Group One	SD	Group Two	SD	P- Value
Task Order 1 (Sequenced 1,2,3)					
Spoken	13.83	1.60	13.67	1.53	
Non-spoken	13.00	0.00	13.67	2.34	
Task Order 2 (Sequenced 3,1,2)					
Spoken	15.00	-	14.14	00.90	
Non-spoken	15.00	0.00	14.00	-	
Task Order 3 (Sequenced 2, 3,1)					
Spoken	15.00	-	13.50	1.38	
Non-spoken	14.17	1.60	13.00	-	
Order of Items					
1-5; 6-10 Spoken	15.00	0.00	13.44	1.33	
1-5; 6-10 Non-Spoken	14.22	1.39	12.67	3.22	0.0919
6-10; 1-5 Spoken	13.60	1.67	14.29	0.76	
6-10; 1-5 Non Spoken	14.43	0.98	14.20	0.84	

Table 4.5.2 Investigation of the interactions between the two groups for Task 1b are as follows:

Analysis of the mean standard deviation and P-value for Group One and Group Two on Task 1b					
TASK 1B: Item 6 -10	Group One	SD	Group Two	SD	P- Value
Task Order 1 (Sequenced 1,2,3)					
Spoken	14.67	0.58	13.83	1.94	
Non-spoken	14.17	1.33	14.00	1.73	
Task Order 2 (Sequenced 3,1,2)					
Spoken	14.57	0.78	14.00	-	
Non-spoken	15.00	-	14.00	1.41	
Task Order 3 (Sequenced 2, 3,1)					
Spoken	14.17	2.04	10.00	-	
Non-spoken	15.00	-	14.50	0.55	
Order of Items					
1-5; 6-10 Spoken	14.71	0.49	13.60	2.07	
1-5; 6-10 Non-Spoken	14.40	1.34	14.29	1.11	0.6958
6-10; 1-5 Spoken	14.22	1.72	13.00	2.65	
6-10; 1-5 Non Spoken	14.33	1.155	14.11	1.27	

Table 4.5.3 Investigation of the interactions between the two groups for Task 2a are as follows:

Analysis of the mean standard deviation and P-value for Group One and Group Two on Task 2a					
TASK 2A:Item 1 - 5	Group One	SD	Group Two	SD	P- Value
Task Order 1 (Sequenced 1,2,3)					
Spoken	14.60	0.55	14.50	0.71	
Non-spoken	14.50	0.71	13.60	1.67	
Task Order 2 (Sequenced 3,1,2)					
Spoken	14.83	0.41	14.33	0.58	
Non-spoken	15.00	0.00	15.00	0.00	0.2436
Task Order 3 (Sequenced 2, 3,1)					
Spoken	14.25	1.50	13.00	2.16	
Non-spoken	14.75	0.50	15.00	0.00	
Order of Items					
1-5: 6-10 Spoken	14.29	1.11	13.60	2.07	
1-5: 6-10 Non-Spoken	14.60	0.55	14.29	1.49	0.6550
6-10: 1-5 Spoken	14.88	0.35	14.00	0.82	
6-10: 1-5 Non Spoken	15.00	0.00	14.75	0.71	

Table 4.5.4 Investigation of the interactions between the two groups for Task 2b are as follows:

Analysis of the mean, standard deviation and P-value for Group One and Group Two on Task 2b					
TASK 2B: Item 6-10	Group One	SD	Group Two	SD	P- Value
Task Order 1 (Sequenced 1,2,3)					
Spoken	13.50	2.12	14.20	1.30	
Non-spoken	14.80	0.45	15.00	0.00	
Task Order 2 (Sequenced 3,1,2)					
Spoken	15.00	0.00	15.00	0.00	
Non-spoken	15.00	0.00	15.00	0.00	0.7432
Task Order 3 (Sequenced 2, 3,1)					
Spoken	14.00	1.41	14.50	1.00	
Non-spoken	14.50	0.58	14.50	1.00	
Order of Items					
1-5: 6-10 Spoken	14.75	0.50	14.63	0.74	
1-5: 6-10 Non-Spoken	14.86	0.35	14.50	1.00	0.2982
6-10: 1-5 Spoken	13.80	1.64	14.57	1.13	
6-10: 1-5 Non Spoken	14.71	0.49	15.00	0.00	

Table 4.5.5 Investigation of the interactions between the two groups for Task 3a are as follows:

Analysis of the mean, standard deviation and P-value for Group One and Group Two on Task 3a					
TASK 3A: Item 1 - 5	Group One	SD	Group Two	SD	P- Value
Task Order 1 (Sequenced 1,2,3)					
Spoken	12.14	1.57	15.00	-	
Non-spoken	13.00	-	13.57	1.81	
Task Order 2 (Sequenced 3,1,2)					
Spoken	12.17	2.23	9.00	-	
Non-spoken	14.00	-	12.33	2.34	
Task Order 3 (Sequenced 2, 3,1)					
Spoken	14.00	1.00	12.33	2.94	
Non-spoken	13.17	1.33	14.33	1.15	
Order of Items					
1-5; 6-10 Spoken	12.00	1.66	13.67	2.31	
1-5; 6-10 Non-Spoken	12.33	1.15	14.44	1.88	0.3281
6-10; 1-5 Spoken	13.14	1.95	11.40	3.21	
6-10; 1-5 Non Spoken	13.80	0.84	13.00	2.24	

Table 4.5.6 Investigation of the interactions between the two groups for Task 3b are as follows:

Analysis of the mean, standard deviation and P-value for Group One and Group Two on Task 3b					
TASK 3B: Item 6 - 10	Group One	SD	Group Two	SD	P- Value
Task Order 1 (Sequenced 1,2,3)					
Spoken	12.00	-	12.71	1.50	
Non-spoken	13.29	1.50	10.00	-	
Task Order 2 (Sequenced 3,1,2)					
Spoken	11.00	-	11.50	2.88	
Non-spoken	13.50	2.07	12.00	-	
Task Order 3 (Sequenced 2, 3,1)					
Spoken	13.00	1.41	13.33	0.57	
Non-spoken	14.00	1.00	13.67	1.97	
Order of Items					
1-5; 6-10 Spoken	12.80	1.48	12.57	1.27	
1-5; 6-10 Non-Spoken	14.43	0.79	13.80	1.30	0.4187
6-10; 1-5 Spoken	12.33	1.53	12.22	2.59	
6-10; 1-5 Non Spoken	12.78	1.72	11.67	2.89	