A STUDY OF THE EFFECTIVENESS OF LOW VISION AND BLIND BRAILLING ON THE ACADEMIC PERFORMANCE OF SOME VISUALLY HANDICAPPED CHILDREN

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THIS DISSERTATION SUBMITTED BY

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BY

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Department of Guidance and Counselling
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DEDICATION

This thesis is dedicated to my mother Mrs Beatrice NwanyiSunday Abosi for her continued love.

CERTIFICATION

I certify that this work was carried out by Mr. C. O. Abosi in the Department of Guidance and Counselling, University of Ibadan.

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ABSTRACT

This study sought to know whether Braille reading is more productive in low vision students than Bold print.

The low vision subjects are persons who could ri rightly be said to be blind but possess residual vision. This group of visually handicapped have been made to adopt braille reading as a means of communication. Since there is no empirical evidence to support either the braille or bold print reading as a better means of communication, it is necessary that the area is empirically studied.

English and Mathematics Achievement Tests designed by professionals were used. The internal consistency of the tests were determined by the use of the Split Half Raliability. ('r' for English I = 0.86; English II = 0.83; 'r' for Mathematics I and II = 0.87 and 0.88 respectively).

26 Low Vision Children representing a natural cluster sample from Pacelli school for the blind Lagos were involved in this study. The 2 x 2 factorial design was adopted using Analysis of Covariance for the analysis of data.

The hypotheses tested during this study were:

1. There is no significant difference in the English achievement of low vision subjects who used braille and those who used bold print.
2. There is no significant difference in the English achievement of low vision high academic ability subjects and low vision low academic ability subjects when they use braille and when they use bold print.
3. There is no significant difference in the Mathematics achievement of low vision subjects who used braille and those who used bold print.
4. There is no significant difference in the Mathematics achievement of low vision high academic ability subjects when they use braille and when they use bold print.

Hypotheses 1, 2, 3 and 4 were tested using Analysis of Covariance (ANCOVA), while the data collected was further analysed using 't'-test. Hypothesis 1 was rejected. ($F = 55.40$, $df = \frac{1}{22}$, P 0.01).

The low vision high academic ability bold print readers were found to be superior to low vision high

academic braille readers in English.. (t = 12.51, df = 12, P 0.001).

The low vision low academic ability bold print readers were found to be superior to the low vision low academic ability braille readers in English (t = 13.6, df = 10, P 0.001).

Hypothesis 2 was rejected. (F = 16.18, df = $\frac{1}{22}$, P 0.01).

The low vision high academic ability braille users were found to be superior to low vision low academic ability braille users in English. (t = 7.67, df = 11, P 0.001).

The low vision high academic ability bold print users were found to be superior to the low vision low academic ability bold print users in English. (t = 7.19, df = 11, P 0.001).

Hypothesis 3 was rejected. (F = 35.9, df = $\frac{1}{22}$, P 0.01).

The low vision high academic ability bold print readers were found to be superior to the low vision high academic ability braille readers in Mathematics. (t =17.8, df = 12, P 0.001).

The low vision low academic ability bold print readers were found to be superior to the low vision low academic ability braille readers in Mathematics. ($t = 5.7$, $df = 10$, P 0.001).

Hypothesis 4 was rejected. ($F = 52.7$, $df = \frac{1}{22}$, P 0.01).

The low vision high academic ability braille readers were found to be superior to low vision low academic ability braille readers in Mathematics. ($t = 16.5$, $df = 11$, P 0.001).

The low vision high academic ability bold print readers were found to be superior to low vision low academic ability bold print readers in Mathematics. ($t = 21.16$, $df = 11$, P 0.001).

Slow maturity in braille reading is among the reasons put forward to explain the trends of the findings. Suggestions are made for further research.

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During the process of the study, a number of persons rendered immense help to me. I would therefore like to express my appreciation for the help given to me by the following individuals listed below:

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CHAPTER ONE

INTRODUCTION

PROBLEM AND ITS BACKGROUND

The visually handicapped children need the best education that one can provide to enable them minimize the effect of disability and develop adequate powers and potentialities.

Visual perception is one of the main sources through which the human organism understand the world around him. It is through the visual senses that the larger proportion of human information processing takes place. Yet a number of people have this visual modality either profoundly or mildly impaired. When an individual is visually impaired, therefore, his learning, social interaction, locomotion and general operation and adjustment are bound to be adversely affected. This is why it is very crucial that more intensive studies be conducted in the area of visual impairment.

Among the visually handicapped individuals are those who might have totally lost their visual capability.

There are also those who have not lost all their visual capability. Such individuals may be described as low vision individuals. The present study primarily assessed the degree to which low vision individuals used their residual visual ability. One is also interested in assessing the role of the use of the braille as an aid to visual problem.

Low vision subjects are those who have limitations in distance vision but are sometimes able to see objects and materials when they are within a few inches. Their mode of communication had been mainly braille.

The effect of low vision on a child is enormous. Braille reading itself has also been proved to be slow. The fact that braille reading is slow, expensive and brings unnecessary stress to bear on the user makes its use questionable to most low vision children, special educators and other professionals.

However, it was in 1967 that Barraga (1976)[1] discovered that 80 percent of the certified blind children in special schools for the blind in America had residual vision. This group, she tagged, "low vision" children.

1. Barraga, N.C. Visually Handicapped and Learning. University of Texas, Austin, 1976.

Barraga's (1964)[1] discovery stimulated reaction in Britain; the British College of Teachers of the blind[2] in 1973 carried out a follow-up survey in Britain and confirmed Barraga's findings in the United States of America. This later findings led to the classification of the visually handicapped into the blind, the low vision and the partially sighted.

This separation undoubtedly benefitted all the categories, but especially the low vision pupils whose teachers for the first time could concentrate on visual approach in teaching method and make use of their new situation to investigate the specific educational, psychological and social needs of their pupils. This area is widely open for experiment, equipment, furniture and illumination.

Here in Nigeria, no specific research has been done in the area of education of the low vision persons. But it has been observed that quite a number of low vision persons have abandoned their studies and retired to

1. Barraga, N.C. "Increased visual behaviour in low vision children". Research series No. 13 American Foundation for the Blind, N. York, New York, 1964.

2. Tobin, M.J. and Chapman, E.K. Look and Think. A handbook for teachers. RNIB 1981.

begging because they could not cope with the braille system. Some low vision extremists have taken their life because they were unable to adjust and come to terms with the new mode of communication. The problems created by the braille system calls for immediate search for an alternative means to braille reading for the low vision children without sacrificing academic performance.

The recent increase in the number of visually handicapped persons studying at various levels in secondary schools and institutions of higher learning has motivated professionals to give serious thought to finding a better way of helping them study with less difficulty.

Provisions have been made for braille readers in some institution in Nigeria without consideration to students who can effectively use their residual vision. The low vision subjects are not encouraged to use their vision because of the idea that they could damage their sight. Professionals have come to regard the ideas of "sight-saving" as old ophthalmic idea. It is also speculative that the low vision will do better using their residual vision.

The low vision students themselves have argued that they would do better using their vision in reading large

print, some others are known to have protested strongly when their question papers were prepared in braille form. They felt that they would have done better had they used their residual vision. They went on to attribute their poor performance to braille reading.

The outcome of this study will no doubt have some instructional and social implications. Learning and personal adjustment are likely to be enhanced. Vocational decisions could be more easily taken. The cost of Braille equipment and brailling which is usually expensive may be drastically reduced. Visual handicap is enough problem and carries with it some serious psychological problems for those affected. The family and society at large will regard any effort towards improving their well-being as a worth-while venture. Nevertheless, since the outcome of the study affects the general family life of the low vision individual, it has a great social value.

There are eight visually handicapped students in the University of Ibadan alone pursuing courses at various levels - ranging from sub-degrees certificate to Ph.D. More than five visually handicapped students have also passed out of this University in the last 5 years. It has not been an easy task to cope with their special

educational needs. Despite the fact that those of them with low vision could read braille, some of them have argued that they would do better if their learning materials were presented in bold print form.

Considering the financial involvement of having to purchase special type-writer with bold print characters, the University authorities felt that there was no basis for what they called "financial waste" if the students could do well in braille which is available.

The students on their part have always felt that no one including the University authorities have their interest at heart for not making available adequate and relevant learning materials.

Naturally, since there is no empirical evidence to support the arguement that using either braille or bold print would not make any difference, some of the visually handicapped students have persisted in their demand for bold print reading materials to be made available for them. No doubt the University authorities or the government would not want to plunge money into a project without getting the value for their money.

The purpose of the present study was therefore to investigate the relative effectiveness of Brailling

versus Bold print on the academic achievement of low vision children.

Visual Handicap·

The phrase "visually handicapped" is now generally used instead of 'blindness', 'low vision' and 'partial sight' because it gives a clearer indication of the person's difficulties. Visually handicapped children may have been born with visual impairments or lost their sight partially or completely at some time during their lives. Barraga (1974)[1] acknowledges this when she notes that "the term visually handicapped is used at present to denote the total group of children who have impairments in the structure or functioning of the eye irrespective of the nature and extent of the impairment".

Chapman (1978)[2] puts it clearer when she observed that it is necessary to use the two medico-legal terms blind and partially sighted when describing educational provisions and in tracing its development

1. Barraga, N.C. The visually handicapped in school Constable and Co. London, 1974.

2. Chapman, E.K. Visually handicapped Children and young people. Routledge and Keegan Paul, London, 1978.

but the broader term of visually handicapped more realistically describes the condition of many children who are normally in either category.

Blindness:

Children whose vision is severely impaired that they cannot read print but use braille as a medium of reading and writing (Abosi (1979)[1]. Technically speaking, they are said to have visual acuity of $\frac{20}{200}$ (Lowenfeld (1971))[2].

The official definition of a blind person in Great Britain is a person so blind as to be unable to perform any work for which eye sight is essential; Visual acuity of $\frac{3}{60}$ or less in the better eye usually constitute blindness (Gulliford (1971))[3]. However, where an individual's field of vision is markedly contracted, then a visual acuity of more than $\frac{3}{60}$ can constitute blindness. For educational purposes the British educational Act (1944)[4] defined the blind as pupils who have no sight or

1. Abosi, C.O. "Introduction to education of the visually handicapped". Journal of Special Education, vol. I No. I, 1979.
2. Lowenfeld, B. Our Blind Children. Thomas Springfield, Illinois, 1971.
3. Gulliford, R. Special Educational Need. Routledge and Keegan Paul, London, 1971.
4. British Educational Act. Her Majesty Service, 1944.

whose sight is or likely to become so defective that they may require education by methods not involving the use of sight. A comprehensive survey of blind conducted by the World Health Organisation (WHO) in 1966 listed 65 different definitions of visual impairment throughout the world.

There is no universally accepted definition of blindness and because of this, one cannot satisfactorily compare epidemiological studies of visual impairment from one country to the other. Some countries rely on functioning description in defining blindness and mention the individuals inability to perform certain tasks in daily task such as harvesting etc. Others use ophthalmic measurements pertaining to visual acuity of field of vision. The latter originated out of concern for the welfare of visually impaired adults during the 1930's when unemployment was high in United States of America. At the request of the Department of Public Welfare of the State of Illinois, a committee of tyemsection of ophthalmology of American Medical Association was appointed to

develop a scientific definition of blindness suitable for development status. The following year, one of the definitions - that of economic blindness was modified and the following definition emerged. Blindness is visual acuity in the better eye with correction of not more than $\frac{20}{200}$ or a defect in the visual field so that the widest diameter of vision subtends to an angle not greater than 20°. This definition is not created for children but for adults.

Braille:

Braille is a form of writing usually used by blind persons. It consists of three cells each bearing two dots arranged serially. A combination of one or more of the dots will represent a letter, a word or a phrase. The Royal National Institute for the Blind (1969)[1] defines braille as a system of embossed "signs" which are formed by using combination of six dots arranged and numbered 1 to 6. The signs are embossed on special paper, either by

1. Braille Primer Standard English Braille Royal National Institute for the Blind (1969).

hand with a 'stylet' which is pressed into the paper through holes in a perforated "frame", or by styles which are attached to typewriter keys of a brailling machine such as a stainsby writing machines. A simple sign, e.g. a sign denoting a letter, occupies one space or cell and there are 36 cells in a line of braille on a Stainsby Machine. A blank space is left between words and between the end of one sentence and the beginning of the next.

Low vision:

Children who are legally certified blind but have residual vision which could be managed for reading large print. These children are normally at advantage in schools for the blind and at disadvantage in schools for the partially sighted. Various authors have used different terms, words like partially sighted and partially blind to indicate what these people are not. They are not quite sighted and not quite blind. They reside between blindness and normal vision. The two words "low vision" are most appropriate to indicate that the word vision differentiates them from those who are

blind. The word low identifies their vision as less than normal. Lumping children with low vision with normally sighted leads to ignoring their problem and lumping them with blind is to ignore their visual potential. Barraga (1976)[1] stated that a child has low vision if he has limitations in distance vision but he is able to see objects and materials in the near environment with a few inches or at most cases use his low vision for learning activities including print reading but are likely to need specialized help and encouragement to do so. Attempts have been made to describe low vision according to distance visual acuity. Thus an artificial range of $\frac{20}{70}$ to $\frac{20}{200}$ was created. This really was an incorrect concept because one cannot define the functioning ability of a child with a simple physiological measurement.

Many youngsters are considered to have low vision because they read print especially large print even though their distance visual acuity is below $\frac{20}{200}$. Educators tend to base their definitions on

1. Barraga, N.C. Visually Handicapped and Learning. University of Texas, Austin, 1976.

functions such as partial, low or residual. This seems to be superior to those based on physiological measurements as they are more flexible and less artificial.

Low Vision Aid:

Any optical appliance that does more than correct a refraction error. There are two main types in current use. Those which are hand-held or hand-manipulated and those worn (as in a spectacle frame).

Refraction Error:

Defects or irregularities in the eye producing distorted images on the retina.

Bold Print: 14 point Plantin medium type.

Shellen test:

A distance test of central vision, i.e. A child can read at 6 metres what he ought to be able to read at 6 metres = $\frac{6}{6}$.

Theoretical Background

Frampton and Gall (1955)[1] recognise three stages in the development of attitudes towards the handicapped child. Firstly, during the pre-christian era, the handi-

1. Frampton, M.E. and Gall. Special Education for the Exceptional. Porter Sargent. Boston, 1955.

capped were neglected. Secondly, during the spread of Christianity, they were protected, thirdly in the recent years, there has been a movement towards accepting the handicapped and integrating them into the society.

The three stages in the development of attitudes towards the handicapped can be seen in the education history of our own country. Here in Nigeria, education of handicapped could be said to have emerged in 1957.

Lily (1979)[1] observes that since the inception of special education, provision have consistently been made for handicapped children of varying degrees. Lily (1979)[1] stresses that the need for provision for the low vision children has recently been recognised.

Provisions for the education of the visually handicapped are relatively universal. It has also moved from segregation to integration. Children are now considered on their specific problem and a programme designed to meet the need.

Education of children with low vision is of the 20th century origin. The relative small number of research into the education and psychological needs of the low

1. Lily, M.S. Children with Exceptional Needs: A Survey of Special Education. Holt, Reinhart and Winston, 1979.

vision children is probably a side-product of the developed countrie . Britain and Russia seem to be the champion of a tradition of special education (Wlassova[1]). This does not mean that other developed countries ignored the needs of this particular group of children.

In Scandinavian countries for example, the small number of low vision pupils have been accommodated by special classes in schools for the blind. In the United States of America, much emphasis is, as with the blind on integration with the sighted. Bateman (1963)[2] reports that in 1964 in United States of America, there were about 10,000 children enrolled in special education programmes. She goes on to estimate on the basis on an incidence of one 'low vision' per 500 school children and concludes that only one-tenth of such children are receiving appropriate attention. It must be stressed at this point that it is difficult to arrive at an estimate of the total number of children throughout the world who

1. Wlassova, T.A. Die Bildung and Erzie Hung Anomalar Kinder in der Sowjetunion Und Die. Rotwicklung den. Sowjetischen Defek totogie. Die Sonderschule 15 Jahrgang 1970.

2. Bateman, B.D. "Sighted children's perception of Blind Children's Abilities". Exceptional Children 29, 1963.

would benefit from special provision, but it would seem safe to say that most of them are not being given even the minimal help that they need.

Technicialy speaking, blind people are said to have visual acuity of $\frac{22}{200}$ (Lowenfeld, 1974)[1]. The official definition of a blind person in Great Britain is a person so blind as to be unable to perform any work for which eye-sight is essential; a visual acuity of $\frac{3}{60}$ or less in the better eye usually constitute blindness. However, where an individual's field of vision is markedly contracted, then a visual acuity of more than $\frac{3}{60}$ can constitute blindness. For educational purposes, the British education Act of 1944 defined the blind as pupils who have no sight or whose sight is or likely to become so defective that they may require education by methods not involving the use of sight.

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1. Lowenfeld, B. The visually handicapped child in school. Constable and Co. London. 1974.

Finding the accurate number of children with low vision is not necessarily the main issue. The main issue is finding a way of helping the children who have this problem to achieve their potentials. Bateman (1967)[1] had earlier asked the question "Is special education beyond the provision of large text books etc. necessary or beneficial to the "low vision child?" Research should be directed, she believes, to answering this question by comparing the academic achievement, social status, post school adjustment of "low vision" children who have received varying amounts and types of special education ranging from non to continual placement in a segregated special class.

Barrage (1974)[2] stated that the child with low vision needs to learn to use his sight however impaired it may be, before he is provided with low vision aid, so

1. Bateman, B.D. Visually handicapped children Methods in Special Education. McGraw-Hill, New York, 1967.
2. Barraga, N.C. The visually handicapped in school. Constable and Co., London, 1974.

that he has paid some attention to visual stimuli through using his own natural visual equipment before trying to use low vision aid. In her study in 1964, she set out to determine whether the visual behaviour of legally blind children with low vision could be improved by an intensive period of instruction based on a progression of enlarged and adapted educational materials. She chose children whose levels of residual vision were extremely low and who have received specific instruction in the visual discrimination and recognition beyond the expectations of the researcher, and to a degree of statistical significance well beyond that of a control group of children in another school for the blind who did not work the programme. The results appeared to fulfil the aim of improving the children's capacity to interprete what they saw.

Today, researchers are prooccupied with finding which method enhance the academic performance of the visually handicapped (Low vision) Braille or "large print" reading. This is the main interest of this study.

Barraga's work stimulated reactions and renewal of interest in the education of low vision children in

England. In 1973, a survey was carried out by English teachers of the College of Teachers of the blind. This survey included the Sunshine homes for nursery school children and centres for further education and training Out of the 1,256 children and young persons registered blind in these establishments, only 503 had no perception of light (Chapman, 1978)[1].

In 1974, therefore, the British School Council launched a 3-year project under the direction of Chapman and Tobin in order to develop and evaluate materials for training children in effective use of residual vision. This scheme titled "Look and Think" programme may be described as a curriculum development project on the training of residual vision in the case of educationally blind and partially sighted children. The rationale underlying this, is to encourage children within these categories to use any residual vision that they may possess as effectively as possible, as against the now historic approach of seeking to protect any remaining

1. Chapman, E.K. Visually handicapped children and young people. Routledge and Keegan Paul, London, 1978.

vision by limiting procedures and materials to those demanding a minimum level of visual acuity. The training set out in the programme is systematic and through seeking to strengthen the development of visual skills should result in an increase both in the amount and quality of experience in areas of visual perception resulting from lack of stimulation as measured by Hebb (1937)[1] whilst Gibson (1969)[2] was able to demonstrate an improvement in acuity discrimination and also in the recognition of patterns. Barraga (1964)[3] directed the implications of these conclusions towards the training of visually handicapped children, especially those who may be described as possessing "low vision".

For learning to take place, the situation to be learnt must be perceived through one or more of the sensory modalities. Herbart (1891)[4] however identified

1. Hebb, D.O. "Innate organisation of visual activity". J. Genet Psychology, 51, 1937.
2. Gibson, E.J. Principles of Perception Learning and Development. Appleton-Century Croft. New York, 1969.
3. Barraga, N.C. "Increased visual behaviour in low vision children". Research series No. 13. American Foundation for the Blind. New York, 1964.
4. Herbart, J.F. A text-book in Psychology. Appleton Century, New York, 1891.

three stages of learning - the sense activity stage; the memory stage which reproduces impressions previously acquired through the sense activity stage above; and then comes the highest stage of learning - the conceptual thinkin or understanding which according to Bigge (1971)[1] occurs when the common or shared attributes of a series of ideas make themselves felt and seen.

Bigge (1971)[1] maintains that if a teacher builds up the right sequence of ideas, the right conduct follows. This emphasizes the need for sequential and orderly presentation of materials to the learner. Stressing the importance of sensory presentation of learning material in the learning process. Williams (1971)[2] argues that without sensory information neither life nor adjustment can be maintained.

Supporting the view that senses and learning are inter-related, Geldard (1965)[3] argued that all behaviour triggered by stimuli must have sense-organs on which to operate. Stephen (1956)[4] points out that some people

1. Bigge, M.L. Learning theories for teachers. Harper and Row. New York, 1971.
2. Williams, G.W. Psychology. Harcourt, Brace and World Inc. New York, 1960.
3. Geldard, F.A. The human senses. Willey, New York, 1965.
4. Stephen, J.M. Educational Psychology. Constable, London, 1956.

believe that they can learn better if they listen to the material that is to be learned. Other people feel uncomfortable while listening to oral presentations, and feel the need for seeing the material.

Okoye (1981)[1] stresses that although experimental studies have shown no great superiority of one sensory modality over the other in the process of learning since the difference observed are quite insignificant and inconsistent, yet the fact that some people prefer one sensory avenue to the other in the process of learning should make a careful teacher put such preferences into consideration in presenting learning materials.

It is such consideration that has made Stephen (1956)[2] suggest rules for sensory presentation of learning materials.

Visual learning is more efficient than simple sensory modality; that whether combined visual and auditory presentation are better than when a learner recites the material aloud, there will be better learning results than if the learner simply merely reads and listens

1. Okoye, N.N. The Psychology of effective learning. University of Ibadan, Department of Guidance and Counselling, 1981.
2. Stephen, J.M. Educational Psychology. Constable, London, 1956.

to it without any recitation. He suggests either visual or combined visual cum auditory presentation of learning material where many people are studying in the same room and studying alone to the inconveniences of others.

Around the beginning of this century, people believe that learning could be improved if the material is presented through the sense modality in which the learner can show deminance. Stroud (1940)[1] referring to this assumption doubted its validity.

Barraga in her study in 1964, had set out to determine whether the visual behaviour of legally blind children with low vision could be improved by an intensive period of instruction based on a progression of enlarged and adapted educational materials. She chose children whose levels of residual vision were extremely low and who have received specific instruction in the visual discrimination and recognition beyond the expectations of the researcher, and to a degree of statistical significance well beyond that of a control group of

1. Stroud, J.B. "Sex differences in Achievement in elementary secondary schools. Journal of Educational Psychology, 1940.

children in another school for the blind who did not work the programme. The results appeared to fulfil the aim of improving the children's capacity to interpret what they saw.

Abbot (1909)[1] observed that subjects easily transferred from one modality to the other, when the material is presented through a different sense modality. Although Henmou's (1921)[2] studies find no relationship over the effectiveness of transference of one modality to the other, yet Stroud (1940)[3] maintained that we should anticipate that some subjects in a given instance will earn their best scores by one mode of presentation and others by another.

Empirical Studies:

During the past years, so much research effort has been directed towards improving the reading efficiency

1. Abbot, E.E. "On the analysis of the factor of recall in learning". Psychological Monograph 11. 1909.
2. Henmou, V.A.C. "The relation between mode of presentation and retention". Psychological Review 19, 1912.
3. Stroud, J.B. "Sex differences in Achievement in elementary secondary schools. Journal of Educational Psychology, 1940.

of the visually handicapped children and college student print readers. The success achieved naturally led to speculation as to whether the techniques taught to print readers would also be effective for readers of braille, a medium which places even the best readers at a considerable disadvantage compared with print readers of the same general ability.

Braille reading poses a great difficulty which affects reading rate. William's (1971)[1] study had given rise to concern with regard to the attainment of braille reading among pupils. Lorimer (1962)[2] using Neale Analysis of Reading confirms earlier findings. It was in the rate of reading that braille readers were at considerable disadvantage compared with those using print. Although there was some retardation in comprehension with braille readers, the gap between the blind and sighted narrowed in the upper age group.

While there is ample evidence to show that eye defects are not necessarily the main causes of reading

1. William, M. "Braille Reading". Teacher of the Blind vol. 59, 1971.
2. Lorimer, J. The Lorimer Braille Recognition Test. Royal National Institute for Blind, 1962.

retardation, Lawson (1968)[1] concludes that eye defects can aggravate a learning disorder or inhibit the success of remedial measures. One implication of these conclusions is that at the very least, the size and type of print should be so chosen that they do not add further difficulties. However, the flexibility and power of visual accommodation possessed by the child is such that effective reading can be achieved despite large deviations from the normal in terms of acuity of field. Sykes (1972)[2] in reporting similar findings concluded that stardard print is as effective as large print in facilitating the reading skills of comprehension and reading speed. His investigation did show that the use of large print resulted in less visual fatigue.

Lorimer (1975)[3] on the other hand confirms the fact that the size of the fingertip as a conductor of information limits speed in reading. He found that even the better touch readers were achieving about 55 percent of average sighted readers.

1. Lawson, L.J. "Ophthalmological factors in Learning Disabilities in Myklebust". Progress in learning disabilities vol. 1. Grune and Stratton. New York, 1968.

2. Sykes, K.C. "A comparison of the effectiveness of standard print and large print in facilitating the reading skills of visually impaired children. Education of the visually handicapped 4: 1972.

3. Lorimer, J. "The measurement of Braille Reading Skills in Blind Children". Southern Regional Association for the Blind Report 1975.

This revelation sounds alarming and accounts for the inability of braille readers to complete the assignments when timed. It also supports their demands for extra time during examination.

Apart from slow rate of reading observed with braille readers, Ashcroft (1961)[1] found through his analysis of oral reading errors in the recognition of short form words represented by on a few significant letters. Nolan and Kederis (1969)[2] hypothesized that the braille reading process matures more slowly than print reading process. They maintained that in the upper primary grades, pupils are still refining skills in character recognition. This to a great extent looks unproveable: What both researchers failed to appreciate in their paper, is that braille readers feel and concentrate on one word or even a character of a word at a time. This is unlike the print readers. As braille readers mature and learn to use both hands in braille reading for improvement, the print reader sees the whole line at a glance.

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1. Ashcroft, S.C. "Blindness and Partially seeing Children". Exceptional Children in Schools. Holt, 1961.

2. Nolan, C.Y. and Kederis, J.C. "Perceptual factors in Braille word recognition". A.F.B. Research series No. 20, 1969.

Symbolic materials such as mathematical formulae diagrams and charts, of certain kinds require perception and understanding at a higher level. Vernon[1] (1964) finds that only 8.4 percent children aged 10 to 14 years made perfect scores in experimental work involving the matching of cross section of a doll and a stand to three dimensional drawings of these articles. 38 percent scored little or nothing though the older children did better than the younger ones. After only ten minutes of instruction, the scores improved considerably. It cannot be assumed that quick visual perception will authomatically develop into quick understanding.

McBride (1974)[2] was interested in the explorations in the rapid reading in braille. He gave rapid reading instruction to a group of 35 adults. 17 of whom were totally blind. The group attended the workshop for two weeks, teaching and testing were informal throughout and there was no control group. Dramatic gains in speed were made and were accompanied by only slight loss of comprehension.

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1. Vernon, K.D. The Psychology of Perception.. Penguin, 1964.
2. McBride, V.G. "Exploration in Rapid Reading in Braille". New Outlook for the Blind, vol. 68, 1974.

Crandell and Wallace (1975)[1] have also researched on the speed of reading in braille. The experiment unlike McBride's (1974)[2] was carried out under controlled conditions. The purpose was to investigate the effects on reading and code recognition for one group and of rapid reading instruction only for another group. 22 adult braille readers participated and were randomly assigned to form two experimental groups and a control group. McBride's teaching approach was used.

The rate gains, though modest compared with those reported by McBride (1974)[2] were nonetheless a very slight improvement, the 'Mean' for the experimental groups increased by approximately 39 percent. It was found that training in rapid reading alone produced large gains than rapid reading combined with code recognition training. All subjects improved regardless of their initial speeds. The level of comprehension did not significantly drop with increase of speed. The improvement of reading rates, with no loss of comprehension, in

1. Crandell and Wallace "Speed Reading in Braille". New outlook for the Blind, vol. 69, 1975.
2. McBride, V.G. "Exploration in Rapid Reading in Braille". New Outlook for the Blind, vol. 68, 1974.

a relatively few training sessions offer promise of increased utilization of tactile media for a large number of visually handicapped children.

Not surprising, McBride's claims aroused a great deal of interest and even shocked many teachers of reading. Olson, Harlow and Williams (1975)[1] were interested in Rapid Reading in Braille and large print and so re-examined McBride's (1975)[2] procedure. They sought to determine the effects of McBride's rapid reading techniques on rate and comprehension when both formal and informal measures of attainment were used. Three groups were used, the first and second groups comprised of 15 and 12 adult braille readers respectively, the third comprised of 10 readers of large print readers. All the three groups achieved significant rate gains. Comprehension levels showed no significant change for either of the braille readers. Those using large print made the greatest of the three group gains. The authors concluded that braille readers irrespective of their initial speeds, can benefit from training in rapid reading, but they noted that the

1. Olson, M., Harlow, S.D. and Williams, J. "Rapid Reading in Braille and large print". An Examination of McBride's Procedure, 1975.

2. McBride, V.G. "Exploration in Rapid Reading in Braille". New Outlook for the Blind, vol. 68, 1975.

substantially greater rates on the informal post-test tended to be achieved at some sacrifice of comprehension. It was found that the faster readers before training were also the faster readers after it, and that rate was significantly related to years of experience with braille.

Apart from studies that have to do with the amount of residual vision, the legally blind have and its effective use, a number of other studies have been carried out in the direction of emotional adjustment in low vision children and factors that influence their academic performance and general development of perceptual and cognitive processes.

Bauman (1964)[1] has investigated emotional adjustment among visually handicapped students compared with those without useful vision; the low vision were less well adjusted to their handicap, showing insecurity, suspicion, and over-compensation. She also found a greater sense of social loneliness among the visually handicapped in "integrated" or open education settings. A different picture emerges in an investigation by Miller (1970)[2]

1. Bauman, M.K. "Group Differences Disclosed by inventory items. Journal for the education of Blind, 4, 1964.
2. Miller, W.H. "Manifest Anxiety in visually handicapped Adolescent" 1970.

who found no differences between blind and low vision pupils in terms of "manifest anxiety". Examination of specific items reveals that the majority of anxiety responses centred around the areas of social competence, personal appearance and adjustment to handicap. However, since other investigations have drawn attention to the advantages of integrating the visually handicapped into educational programmes for the sighted, these particular results need to be borne in mind. Another aspect of this integration arguement has been examined by Tobin[1] who found that teachers of sighted were relatively unwilling to accept the visually handicapped into an integrated group, feeling themselves to be lacking in knowledge about this group of handicapped children.

Studies of the effect of "low vision" upon the course of development of perceptual and cognitive processes have been very few and rather in-conclusive: one of the main inferences being that the intelligence of "low vision" children is not significantly different from that of their normally sighted peers. Miller (1969)[1] however reports that in tests of conservation of substance,

1. Miller, C.K. "Conservation in Blind Children". Education of the visually handicapped 1/4.1969

weight, and volume, his group of low vision children in range of six to ten did significantly better than the more severely impaired group. His suggestion that visual efficiency is an important determinant in the development of reasoning is supported, at least in a very wide sense as regards the differences between the sighted and the visually handicapped by Tobin. Tobin (1972)[1] found that conservation of substances was attained by 70 percent of visually handicapped in the 9th and 10th years: whereas researchers using normally sighted children located the 70 percent criterion in the 7th and 8th years. The implications of these findings, if they are validated by further replications, are obvious and extensive. Not only is the timing of the introduction of certain concepts in mathematics and sciences affected; the very content of formal lessons and structured activities in the infant school must be determined by the child's current developmental level which can be tapped by tests such as those used in the typical piagetian investigation.

1. Tobin, M.J. "A study in the improvement i of visual efficiency in children registered blind". New Beacon 56 (659), 1972.

Myer (1930)[1] utilized two approaches to the question of whether the intelligence of children with defective vision is similar to that of normal children. He asked the teachers to record psychological tests data and also to rate the children. On teachers judgement, the children were average or above while on intelligence tests score, they were average or below.

Myer (1930)[1] again administered the Standford-Binet test to 60, eight and nine year old children in classes for the partially seeing and found their average IQ to be 98.6. Enlarging the test print did not help them to score any higher than they did on the regular size. He concluded that although the visually handicapped were below normal on visually presented tests, they performed like the normal children on reasoning, language development and abstract generalization.

Moffka (1935)[2], Kohler (1951)[3] and Tolman (1938)[4]

1. Myer, G.F. "Responsibility of the School for the vocational Guidance and Placement". Proceedings of American Ass. of Instr. of Blind, 1930.
2. Koffka, K. Principles of Gestalt Psychology. Harcourt Brace, New York, 1935.
3. Kohler, W. The Mentality of the Apes. Humanities Press, New York, 1951.
4. Tolman, E.C. "The determiner of behaviour at a choice point". Psychological Review 45. 1938.

as a result of their studies of configurational and non-configurational presentation of stimuli to learners found that for children as well as animals, the perceptual frame work in which stimuli are presented is very crucial in determining the quality of learning of that organism.

Stephen (1956)[1] carried out studies on sensory presentation of learning materials and found that different people have different sensory modality choices in the process of learning.

Bateman (1963)[2] studied the effects of visual handicap on the reading and psycholinguistics abilities of 131 children enrolled in classes for the partially sighted in the public schools in Illinois, U.S.A. She found out the following:

(a) Children with mild visual defects were slightly lower in IQ and also lower on subtests of IPTA than those with moderate defect.

1. Stephen, J.M. Educational Psychology. Constable, London, 1956.

2. Bateman, B.D. "Sighted children's perception Blind Children's Abilities". Exceptional Children 29. 1963.

(b) The visual motor channel deficits were most marked in the severely defective group.

Tilman (1967)[1] compared 100 sighted with 100 blind children on Wechsler Intelligence Scale for children. An item comparison showed that the blind scored the same as the sighted in Mathematics, Information, and Vocabulary. The blind were inferior in items of comparisons, comprehension and similarities.

Bateman (1967)[2] in her research on educational achievement, finds that the partially seeing children scored lowest on Gray Oral Reading Examination and high on the Silent reading test.

Birch (1966)[3] and others survey the school achievement of 903 fifth and sixth grade partially seeing children to determine their level of educational achievement. They found that although these children were of average intelligence, they were two and half years retarded in academic achievement.

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1. Tilman, M.H. "The Performance of the Blind and Sighted Children on the Wechsler intelligence scale for children". Study 2. International Journal for the Education of the Blind, 1967.
2. Bateman, B.D. Visually handicapped Children: Methods in Special Education. McGraw-Hill. New York, 1967.
3. Birch, J.W. et.al. School Achievement and effect of type size on Reading in visually handicapped children. Pittsburgh University, 1966.

Generally, the intelligence of the visually handicapped is neither rasied nor lowered by the visual handicap. The mental level of the visually handicapped as measured by existing intelligence test do not differ markedly from that of children with normal vision Bateman (1967)[1]. Binet intelligence test was revised by Hayes (1941)[2] specifically for the blind. He used the revised version in 1941 in testing children in seventeen residential schools for the blind and obtained an average IQ of 99. The only significant deviation from the normal was that a large percentage of blind children scored both high and low (10 percent were above 120 and 9 percent were below 70) and that a correspondingly smaller percentage was in the middle range.

Nolan (1969)[3] found the average reading speed of 264 partially seeing children grades four to twelve to be about 100 words per minute which is less than half the speed of seeing children.

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1. Bateman, B.D. Visually handicapped children: Methods in Speicla Education. McGraw-Hill. New York 1967.
2. Hayes, S.P. "Contributions to Psychology of Blindness". American foundations of the Blind, New York, 1941.
3. Nolan, C.Y. Reading of large types. Journal of Education of the Blind, 1969.

There is als research evidence indicating that the blind persons do not but think more on a concrete level (Nolan (1969)[1]. However, it has been shown that with intensive training, blind children are able to improve their abilities sufficiently to catch up with their sighted peers.

In one study, 81 blind children, six to twelve years old attending regular classes were found to be more verbally fluent, flexible and original as measured by Torrence Test of Creative Thinking than were comparable sighted children, Torrance (1973)[2]. In the study, the author postulates that the blind is more fluent because he relies heavily on verbal output to compensate for the limitations imposed by blindness. The blind may also have to be more flexible and adaptable to cope with the demands of living in a world designed for the sighted. The blind may have to rely on imagination more than do the sighted, and what they imagine may be more unusual, unique and original than reality.

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1. Nolan, C.Y. Reading of large types. Journal of Education of the Blind, 1969.
2. Torrance, E.P. "Factors affecting creative thinking in children". (unpublished paper) APA Convention. Minnersota Univ. 1973.

When seeing and blind children were compared grade by grade, the two groups are about equal except in Mathematics in which the scores of the blind children are on the average about two years older than the seeing children of the same grade. Consequently, comparison by either chronological or mental age indicate considerable educational retardation (Hayes (1941))[1], (Lowenfeld (1973))[2].

Saunder (1970)[3] reported observation of pre and post-operative behaviour of congenitally blind subjects who were able to see after the removal of cataracts. He concluded that a totally blind person was unable to acquire awareness of space merely by tactual perception but that this was solely dependent on visual perception.

Lowenfeld (1974)[4] argued that blindness limits perception and cognition. This restriction is expected to influence intellectual development and attainment.

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1. Hayes, S.P. "Contributions to Psychology of Blindness". American Foundation of the Blind, New York, 1941.
2. Lowenfeld, B. Blind children learn to read. Springfield, Illinois, 1973.
3. Saunders, W.B. Caring for the visually Impaired older person. Minneopolis Society for the Blind, 1970.
4. Lowenfeld, B. The visually handicapped child in school. Constable, London, 1974.

Miller (1969)[1] found that on three piagetian tests of conservation, the partially seeing did better than those with more limited vision and concluded that visual intactness may be an important determinant in the development of reasoning abilities.

Lowenfeld, Abel and Hathen (1969)[2] also found age grade difference between braille readers and normally seeing children in a braille reading study involving 200 subjects from fourth and eighth grades. The fourth grade braille readers 0.6 years older in local schools and 1.2 years older in residential schools than normally seeing children. There were only small differences between braille readers and seeing students on the eighth grade level. The results of these studies indicate varying degrees of academic retardation for both partially seeing and educationally blind children.

Among the blind also, there has been a growing interest in the use of rapid and compressed speech for increasing both the effectiveness and efficiency of teaching procedures.

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1. Miller, C.K. "Conservation in Blind Children" Education of the visually handicapped, 1969.
2. Lowenfeld, B. et.al. The Blind Adolescent in a sighted world. Constable 1969.

Many of these studies are relevant to the needs of the low vision, and in one of them, Bischoff (1967)[1] specifically selected "low vision" subjects numbering 63 to evaluate training in listening comprehension. Significant increases in comprehension scores were made by the experimental group as compared with a "no training" control. The implications for educational practice are clear. Retardation among the low-vision may not be, as Birch (1966)[2] puts it, "related in any substantial way to types of visual disability or degree of visual acuity". But where achievement is in any way affected by perceptual impairment, the best possible procedures need to be sought out and adopted, particularly when that means of increasing the variety of interest may be maintained and fatigue alleviated.

So far, little research has been conducted on problems of the low vision children. With growing awareness of their needs, it may be that something will be done to balance the scale. In Nigeria, little or nothing has

1. Bischoff, R.W. Improvement of listening Comprehension in partially sighted students. Doctoral Thesis, Uni. of Oregan, 1967.
2. Birch, J.W. et.al. School Achievement and effect of type size on Reading in visually handicapped children. Pittsburgh University, 1966.

been done in this direction and if so, the work of Karnes and Wollers' ..n (1963)[1] may serve as a useful model underlying as it does the value of a more "Clinical" approach in the particular area. Basically, their method was to use scores of psychological and educational tests with the objective of identifying the fectors that contribute to successful learning by the low vision child.

Armed with as complete a picture as possible of child's strength and weakness, the psychologists and teachers might then be able to draw up a prescription more in keeping with his true capacity and potential.

As earlier mentioned, no positive attempt has been made in Nigeria towards finding the incidence of low vision in ordinary schools. However, it is estimated that over 160,000 of Nigeria school-age children would require special education sight-saving class (Abang (1980))[2].

Nonetheless, Abosi (1981)[3] in a pilot study discovered that 54.20 percent of 203 registered blind children

1. Karnes, M.B. An intensive differential diagnosis of partial seeing children to determine the implications of education. Exceptional children, 1963.
2. Abang, T.B. Teaching visually handicapped children in Nigeria. Claverian Press, Ibadan, 1980.
3. Abosi, C.O. A survey to determine the percentage of legally blind children who have low vision and can be trained to read print. M.Ed. Dissertation, Univ. of Ibadan, 1981.

... special schools for the blind have residual vision. 203 visually handicapped children drawn from three special schools for the blind in Nigeria were involved in the study.

Abosi's study produced an encouraging result that calls for more research into the problems and needs of the low vision children in Nigeria. The present study is part of an answer to the previous work. It throws more light to their existence and capabilities. It also poses a great challenge to workers and researchers interested in the welfare of the visually handicapped children in Nigeria.

Hypotheses:

The hypotheses are stated in Null form.

1. There is no significant difference in the English achievement of low vision subjects who use braille and those who use bold print.
2. There is no significant difference in the English achievement of low vision high academic ability subjects and low vision low academic subjects when they use braille and when they use bold print.

3. There is no significant difference in the Mathematics achievement of low vision subjects who use braille and those who use bold print.

4. There is no significant difference in the Mathematics achievement of low vision high academic ability subjects and low vision low academic ability subjects when they use braille and when they use bold print.

CHAPTER TWO

METHODOLOGY

Design:

A 2-way 2 x 2 factorial design was used to execute the study. The design has four cells including Cell 1.1 - high academic ability low vision braille users, Cell 1.2 - low academic ability low vision braille users; Cell 2.1 - high academic ability low vision bold print users. Cell 2.2 - low academic ability low vision bold print users.

The Two-way Factorial

	Academic Ability level	
Methods used	High Achievers	Low Achievers
Braille	1.1	1.2
Bold Print	2.1	2.2

See Figure 1: The Design of the study.

Subjects:

26 low vision subjects all males were selected for the study. The subjects were studied in their school as natural clusters. In short, the sampling procedure was a cluster type.

Natural clusters of the low vision children were drawn from primary four. The subjects have a Mean age of 12.5 years and an age range of 10-15 years. The number of low vision children of this age in schools for the blind in the country is limited. This has been shown in Abosi's 1981 study. All the low vision children were used.

Instruments:

The instruments used were mainly tests of English and Mathematics achievement. The tests were constructed through the assistance of teachers in Ogbomosho school for the blind and Pacelli School for the Blind, Lagos. The teachers from Ogbomosho were involved in the construction of test in order to make it more reliable. The teachers from both schools supplied test items that were supposed to have been covered by their pupils. The items which were found common to both sides were selected from the numerous ones constructed based on primary school syllabus operating in Nigeria for the normal pupils which have also been adopted by special schools.

Block and Burns (1976)[1] have expressed concern about research's ecological validity. They maintained that research has to be performed in the actual school setting

1. Block, J.N. and Burn, R.B. "Mastery learning in Lee, S. shulman, Review of Research in Education, @. AERA Publications, 1976.

employing school-like learning tasks. Such tasks they said have to be subject-matter centred; coming for the most part from a text book or other existing curricular material. Hence the need to construct the test based on the syllabus in operation.

All the tests had a "construct validity" hence they were constructed by experienced professionals.

Separation of Subjects into high and low Achievers:

Two achievement tests were used to separate the low vision subjects into high and low achievers. The first test was an English achievement test consisting of 25 items. The second test was a Mathematics achievement test consisting of 25 items. To ascertain the discriminatory ability of the tests, they were administered to the high and low academic achievers as established by class records of different classes of children of the same grade. The index validity of the English was 0.75 and 0.85 for Mathematics. The tests were presented to the pupils in Bold print form.

To determine the internal consistency of the tests, the Split Half Reliability was computed based on the correlation of the scores of the odd-even components. After adjusting for full length using the Spearman Brown

Prophecy Formulae, 'r' was found to be 0.91 for English and 0.94 for Mathematics. The tests exhibited a co-efficient of stability of 0.92 English and 0.96 for Mathematics respectively after correlating the scores on two administration with two weeks interval with different set of pupils.

The maximum mark that could be scored by a subject in one test was 25. A cut off point was established at 15. For a subject to be classified as a high academic ability, he or she must have scored at least 15 in one of the tests. Additionally, the sum total of his or her scores in English and Mathematics must not have been less than 25.

Apart from the two tests used in separating the subjects into high and low academic abilities, four other instruments were used for gathering data for the study; thus English I, English II; Mathematics I and Mathematics II.

English I and II:

The English I and II consist of 25 items each. To determine the internal consistency of the tests, the Split Half Reliability was computed based on the correlation of the scores of the odd-even components. After adjusting

for full length using the Spearman Brown Prophecy formular,[1] 'r' was found to be 0.86 for English I and 0.83 for English II. The tests exhibited a co-efficient of stability[2] of 0.82 for English I and 0.83 for English II after correlating the scores on two administration with two weeks interval with the same set of pupils.

Mathematics I and II:

Mathematics I and II also consist of 25 items each. The internal consistency was also determined using the Split Half Reliability. After adjusting for full length using the Spearman Brown Prophecy Formular 'r' was found to be 0.87 for Mathematics I and 0.80 for Mathematics II. The tests exhibited a coefficient of stability of 0.84 for Mathematics I and 0.82 for Mathematics II after correlating the scores on two administration with two weeks interval with the same set of pupils. The tests also had "construct validity" since they were constructed by professionals.

Procedure:

Two weeks before the commencement of the study, the

1. Nunnally, J.C. Educational Measurement and Evaluation, McGraw-Hill Book Co., 1964.
2. Akinboye, J.O. Simple Research Methods. University of Ibadan, 1982.

researcher had gone to the school to ascertain the pupils' standard in Braille and Bold print reading. Apart from the assurances from the school authorities that the pupils were proficient in the two methods (Braille and Bold print), the researcher had also transcribed a passage from the pupils' work into braille and another passage was also printed in bold print form. The pupils showed high degree of mastery of the two methods. Furthermore, the two methods are concurrently being used in the school.

A few days to the commencement of the study, the pupils were presented with the initial tests which helped in separating the subjects into high and low achievers. The services of the classroom teachers were employed to avoid unnecessary nervousness which could affect some pupils performance.

Children who scored above 15 in each of the tests or whose scores in the two tests sum totalled 25 were classified as high academic ability pupils.

The high and low ability subjects were again randomly split into two groups to form (a) high academic ability braille user; (b) low academic ability braille user; (c) high academic ability bold print user; (d) low academic ability bold print user.

English I and Mathematics I were all brailled. All the 26 low vision subjects involved in the study took the tests and were scored. These all brailled tests were used as a pre-test.

English II and Mathematics II were brailled for the low vision subjects who have been assigned to do the tests in braille, while the same tests were produced in bold print for the low vision subjects assigned to do the tests in bold print form. The tests were taken by all the subjects using the relevant methods and were scored. (see Appendix).

Extraneous Variable and Control:

An experiment may be easily contaminated if proper precaution is not taken (Akinboye[1]). A number of extraneous variables were likely to influence the performance of the subjects. These extraneous variables include intelligence, environment, emotional adjustment, exposure, the use of unvalidated materials etc. A number of researchers have also argued on the same line (Bauman[2],

1. Akinboye, J.O. Simple Research Methods. University of Ibadan. 1982.

2. Bauman, M.K. "Group Differences Disclosed by Inventory items". Journal for the Education of Blind XIII 4, 1964.

Tilman[1], Lowenfeld[2], Miller[3]).

In the light of the above research findings, this study adopted the analysis of covariance in computing the data collected. The analysis of covariance combines the advantage of regression analysis and analysis of variance. The analysis of covariance was therefore used to eliminate other extraneous variable that could not be eliminated through randomization and clustering. The analysis of covariance equated all the scores of the low vision subjects on the braille scores which served as the covariate. This, the Analysis did by regression and computation of the adjusted 'Y' - Means.

The tests used in the study were all carefully validated. The study was carried out in the school setting applying Block and Burn (1976)[4] mastery learning approach.

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1. Tilman, M.H. "The performance of the blind and sighted children on the Wechster Intelligence scale for children". J. for the Edu. of Blind, 1967.
2. Lowenfeld, B. The visually handicapped child in school. Constable, London, 1974.
3. Miller, C.K. "Conservation in Blind Children" J. Edu. of the Blind 1.4. 1969.
4. Block, J.H. and Burn, R.B. Mastery learning in Lee S. Shulman; Review of Research in Education 4, AERA Publications, 1976.

Analysis of Data:

The data collected were analysed by the use of analysis of covariance and 't' tests. The braille scores were used as the covariate. The covariate was obtained for all subjects and used to compute regression coefficients and hence the adjusted 'Y'-means. These were techniques used to equate the subjects statistically and to eliminate possible confounding variables.

CHAPTER THREE

RESULTS

The results are reported by describing the findings on the tables included in this section.

In testing the hypothesis that there is no significant difference in the English achievement of low vision subjects who use braille and those who use bold print, tables 1, 2 and 3 indicate that there was a significant difference between the groups ($F = 55.40$; $df = 1/22$; P 0.01). The low vision subjects that used bold print achieved significantly higher than the low vision subjects that used braille. The t-tests described below (table 3) show the details of the differences.

Table 1: Adjusted 'Y' Means of Subjects academic achievement in English Language.

Rows*	Columns**					
	unadjusted	adjusted		unadjusted	adjusted	
	$Y-\bar{X}$	$Y-\bar{Y}$	N	$\bar{Y}y-\bar{X}$	$Y-\bar{Y}$	N
1	13.71	11.45	7	9.83	8.16	6
2.	12.71	17.27	7	6.00	14.17	6

* Rows: Method
1 = low vision subjects using braille method.
2 = Low vision subjects using hold print method.

**Columns: Academic ability level
1 = High academic ability subjects
2 = Low academic ability subjects.

Table 2: Analysis of covariance of subjects English language achievement

Variable	Source	SS	DF	MS	F	P
[illegible]	Rows	34.94	1	34.94	55.40	0.01*
[illegible]	Columns	10.20	1	10.20	16.18	0.01*
[illegible]	Interaction	0.01	1	0.01	0.02	(NS)
[illegible]	Within	89.67	22	0.63		

Figure 2: indicates the cells and various means being compared with the 't' test.

Rows	Columns	
	a (1.1)	b (1.2)
	c (2.1)	d (2.2)

Table 3 (a vs c) Low vision high academic ability subjects who used braille were compared with the low vision high academic ability subjects who used bold print in English achievement test. It was found that the low vision high academic ability bold print users were found to be superior. ($t = 13.51$, $df = 12$, P 0.001).

(b vs d): Low vision low academic ability subjects who used braille method in English were compared with those who used bold print. There was a significant

difference between them, (t = 13.6, df = 10, P 0.001) in favour of the bold print users.

Table 3: Inter-treatment group 't'-test Comparison of Adjusted 'Y' Means of Subjects English Language Achievement Scores using the Standard error Means

CELLS	N	LMS	Pooled S.E	't' values	P
a vs b	13	0.01	0.043	7.67	0.001*
a vs c	14	0.01	0.040	13.51	0.001*
a vs d	13	0.01	0.043	6.32	0.001*
b vs c	13	0.01	0.043	21.16	0.001*
b vs d	12	0.01	0.044	13.6	0.001*
c vs d	13	0.01	0.043	7.19	0.001*

Cell a(N) = 7; Cell b(N) = 6, Cell c(N) = 7, Cell d(N) = 6

a or 1.1 = high academic ability braille users

b or 1.2 = low academic ability braille users

c or 2.1 = high academic ability bold print users

d or 2.2 = low academic ability bold print users.

In testing hypothesis 2 that there is no significant difference in the English achievement of low vision high academic ability subjects and low vision low academic ability subjects when they use braille and when they use

bold print, tables 1, 2 and 3 indicate that there was a significant difference between the groups (F = 16.18, df = 1/22, P 0.01). The high academic ability subjects were found to be superior. The t-tests described above show the details of the differences. Table 3 (a vs b) Low vision high academic ability braille users were compared with the low vision low academic ability braille users in English achievement test; there was significant difference between them (t = 7.67, df = 11, P 0.001) in favour of the high academic ability subjects.

(c vs d): The low vision high academic ability bold print users were compared with the low vision low academic ability bold print users. There was significant difference between them (t = 7.19, df = 11, P 0.001) in favour of the high academic ability subjects.

In testing hypothesis 3 that there is no significant difference in the Mathematics achievement of low vision subjects that used braille and those that used bold print; tables 4, 5 and 6 show that there was a significant difference between the groups. (F = 35.9, df = 1/22, P 0.01). The low vision subjects that used bold print performed better than the braille users. The t-tests described below show the details of the differences.

Table 4: Adjusted 'Y' Means of subjects academic achievement in Mathematics

Rows*	Columns**					
	unadjusted	adjusted		unadjusted	adjusted	
	$Y - \bar{X}$	$Y - \bar{Y}$	N	$Y - \bar{X}$	$Y - \bar{Y}$	N
1	10.14	13.47	7	7.33	7.18	6
2	11.85	19.58	7	9.50	11.96	6

Table 5: Analysis of covariance of subjects Mathematics achievement

Source	SS	Df	MS	F	P
Rows	31.45	1	31.45	35.9	0.01*
Columns	46.20	1	46.20	52.7	0.01*
Interaction	0.69	1	0.69	0.79	(NS)
Within	124.41	22	0.87		

Table 6 (a vs c) Low vision high academic ability subjects who used braille were compared with low vision high academic subjects who used bold print in Mathematics achievement test. The low vision high academic bold print users were better performers ($t=17.8$, $df=12$, P 0.001).

(b vs d): Low vision low academic ability subjects who used braille method in Mathematics were compared with those who used bold print. There was a significant difference between them (t = 5.7, df = 10, P o 0.001) in favour of the bold print users.

Table 6: Inter-treatment group 't'-test comparison of adjusted 'Y' Means of subjects Mathematics Achievement scores using the standard error means

Cells	N	LMS	Pooled S.E.	't' values	P
a vs b	13	0.69	0.36	16.5	0.001*
a vs c	14	0.69	0.33	17.8	0.001*
a vs d	13	0.69	0.36	3.2	0.005*
b vs c	13	0.69	0.36	34.4	0.001*
b vs d	12	0.69	0.83	5.7	0.001*
c vs d	13	0.69	0.36	21.16	0.001*

Cell: a(N) = 7, Cell b(N) = 6, Cell c(N) = 7, Cell d(N) = 6.

Cell a or 1.1 = high academic ability braille users

b or 1.2 = low academic ability braille users

c or 2.1 = high academic ability bold print users

d or 2.2 = low academic ability bold print users.

In testing Hypothesis 4 that there is no significant difference in the Mathematics achievement of low vision high academic ability subjects and low vision low academic

ability subjects when they use braille and when they use bold print; tables 4, 5 and 6 indicate that there was a significant difference between the groups (F = 52.7, df = 1/22, P 0.01). The high academic ability subjects were superior. The t-tests described above show the details of the differences. Table 6 (a vs b) Low vision high academic ability braille users were compared with the low vision low academic ability braille users in Mathematics achievement test, the (t = 16.5, df = 11, P 0.001) in favour of the high academic ability subjects.

(c vs d): The low vision high academic ability bold print users were compared with the low vision low academic ability bold print users in Mathematics. There was significant difference between the groups (t = 21.16, df = 11, P 0.001) in favour of the high academic ability subjects.

Discussion on the findings

The study sought to test four hypotheses. An attempt was made to discuss the findings as they relate to the stated hypotheses in subsequent sections of this Chapter.

Peculiarities of this study:

A number of studies have been done in Europe and America in line with the present study, but none of these studies has African background in terms of home and environmental influences.

The present study is conscious of the influence of Nigerian culture, including Nigerian attitude towards the visually handicapped. The fact Nigerian environmental peculiarities could have positive or negative effect on the performance of low vision children were taken into account while analysing the data collected during this study.

In discussing hypothesis I, that there is no significant difference in English achievement of low vision subjects that used braille and those that used bold print: the result of analysis of covariance (Rows) indicates that there was significant difference between the groups The low vision subjects who used bold print were found to be superior.

The data was further analysed using 't'-tests. Low vision high academic ability subjects who used braille in English were compared with the low vision high academic

ability subjects who used bold print. The bold print users were found to be superior. Further comparison was done between the low vision low academic ability subjects who used braille method in English and those who used bold print, a significant difference was found in favour of the bold print users.

The results of this study corroborates Lorimer's (1975)[1] assertions. He had stressed that the size of the fingertip as a conductor of information limits speed in reading. Lorimer observed that even the better braille readers are achieving about 55 percent of reading speed of average sighted reader.

A number of assertions by different professionals agree with the findings of this study. Williams (1951)[2] lays a great deal of emphasis on sensory presentation of learning material in the learning process. Kohler (1951)[3] Geldard (1965)[4] and Tolman (1938)[5] observed that the

1. Lorimer, J. "The measurement of Braille Reading Skills in Blind Children" Southern Regional Ass. for the Blind Report, 1975.
2. Williams, G.W. Psychology, Harcourt, Brace and World Inc. New York, 1960.
3. Kohler, W. The mentality of the apes Humanities Press, New York, 1951.
4. Geldard, F.A. The Human senses. Wiley, New York, 1965.
5. Tolman, E.C. "The determiner of behaviour at a choice point". Psychological Review, 1938.

perceptual frame work in which stimuli are presented is very crucial in determining the quality of learning of that organism. Grandell and Wallace (1975)[1], and Olson et.al. (1975)[2] have given support to the use of bold print by the low vision.

Braille reading poses a great difficulty which affects reading. William (1971)[3] study had given rise to concern with regard to the attainment of braille reading among pupils. Lorimer (1962)[4] using Neal Analysis of Reading confirms earlier findings - It was in the rate of reading that braille readers were at considerable disadvantage compared to those using bold print.

A number of reasons could be given to explain the outcome of these results. Braille readers feel and concentrate on one word or even a character of a word at a time. This is unlike the bold print readers. As braille readers mature and learn to use both hands in braille reading for improvement, the print reader

1. Grandell and Wallace "Speed Reading in Braille" New Outlook for the blind vol. 69, 1975.
2. Olson et.al. (1975) "Rapid Reading in Braille and large print", An Examination of McBride's procedure, 1975.
3. William, M. "Braille Reading". Teacher of the Blind vol. 59, 1971.
4. Lorimer, J. Lorimer Braille Recognition Test, RNIB, 1962.

sees the whole line at a glance.

It was possible that the low vision subjects associated Braille with blindness. Low vision persons would therefore prefer to use bold print since they would not want to be seen as blind persons. Some other personal cognitive, attributional, personality, social and emotional reasons are possible.

Hypothesis 2: That there is no significant difference in the English achievement of low vision high academic ability subjects and low vision low academic ability subjects when they use braille and when they use bold print: the result of analysis of covariance (column results) indicate that there was significant difference between the groups. The low vision high academic ability subjects were found to be superior. Analysing the data further, using a t-test, the low vision high academic ability braille users were compared with the low vision low academic ability braille users in English achievement test. The high academic ability subjects were found to be superior. The low vision high academic ability bold print users were also compared with the low vision low academic ability bold print readers in English test.

There was a significant difference in favour of the high academic ability subjects.

The result of this study is in agreement with a number of observations and suggestion made by different professionals regarding the cognitive abilities of the visually handicapped in general and the low vision persons in particular. Bateman (1963)[1] stresses that the intelligence of the visually handicapped is neither raised nor lowered by the visual handicap.

Myer (1930)[2] utilized two approaches to the question of whether the intelligence of children with defective vision is similar to that of normal children. He asked teachers to record psychological test data and also to rate the children. On teachers judgement, the children were average or above, while on intelligence tests score, they were average. Bateman (1963)[1] had used the existing intelligence test measure the mental level of the visually handicapped children in seventeen residential

1. Bateman, B.D. "Sighted Children Perception of Blind Children's Ability". Exceptional Children, 29, 1963.
2. Myer, G.F. "Responsibility of the school vocational guidance and placement" Proceedings of American Ass. of Instr. of the Blind, 1930.

schools. He obtained an average 1Q of 99. The significant deviation from normal was that a large percentage of the visually handicapped children scored both high and low. The present study utilized Bateman's findings in grouping subjects according to academic ability level.

The result of hypothesis 2 might be so considering the the fact that visual acuity is only an aspect of cognitive components that determine performances either in Mathematics or English. Thus deprivation of vision may not significantly affect performance. There are many more cognitive factors that could determine performance other than vision. In other words, the other cognitive components making for overall academic response less vision form such a larger majority of cognitive components that these other factors are likely to be more dorminant in affecting individual academic response than vision.

Another possibility could be that intellectual capacity plays a very vital role in determining the quality and quantity of academic response given environmental interaction hence it is likely that the possible differential 1Q levels of subjects used in the study could have interacted effectively and positively too

with the other cognitive components less vision that determine performance.

This result strongly suggests that intellectual ability is a major factor in determining a person's academic performance. The bold print used by the high academic ability subjects was an added advantage. It could not have made the low academic ability subjects to perform better than the high academic ability subjects.

In discussing hypothesis 3 that there is no significant difference in Mathematics of low vision subjects that used braille and those that used bold print: the results of analysis of covariance (ANCOVA: Rows) shows that there was significant difference between the groups. (see table 5). The low vision subjects that used bold print were found to be superior.

Analysing the data further using 't'-test, Low vision high academic ability subjects who used braille in Mathematics were compared with low vision high academic ability subjects who used bold print. The bold print users performed better. When the low vision low academic ability subjects who used braille method in Mathematics were compared with those who used bold print, a significant difference was found in favour of the bold print users.

The arguement put forward in hypothesis 1 still holds for hypothesis 3.

The present study is relevant to Nolan and Kederis (1969)[1] hypothesis. They had maintained that the braille reading process matures more slowly than print reading process. This could account for the [illegible].

Miller (1969)[2] had reported a finding similar to findings made in the present study. In a test of conservation of substance, weight and volume, his group of low vision children in age range six to ten years did significantly better than the braille users.

While there is ample evidence to show that eye defects are not necessarily the main causes of learning retardation, Lawson (1968)[3] says in his findings that eye defects can aggravate a learning disorder. Sykes (1972)[4] reporting a similar finding concluded that the

1. Nolan, C.Y. and Kederis, J.C. "Perceptual factors in Braille word recognition", A.F.B. Research series No. 20, 1969.
2. Miller, C.K. "Conservation in Blind Children" Education Education of the visually handicapped, 1.4. 1969.
3. Lawson, L.J. "Ophthalmological factors in Learning Disabilities in Myklebürst, H.R. (ED). Progress in learning Disabilities, vol. 1, Grune and Stratton, New York, 1968.
4. Sykes, K.C. "A comparison of the effectiveness of standard print and large print in facilitating the Reading Skills of visually impaired students. Education of the visually handicapped, 4, 1972.

use of large print resulted in less visual fatique.

The reason for the poor performance of braille users could be psychological, cultural, and sociological. Bauman (1964)[1] had established that the low vision subjects were less well adjusted to their handicap. This could account for their poor performance in the use of braille.

Hypothesis 4: that there is no significant difference in Mathematics achievement of low vision high academic ability subjects and low vision low academic ability subjects when they used braille and when they used bold print: The result of analysis of covariance (columns) indicates that there was singificant difference between the group. The low vision high academic ability subjects were found to be superior. Using 't'-test in making further analysis of the data, the low vision high academic ability braille users were compared with the low vision low academic ability braille users in Mathematics achievement test. The high academic ability subjects were found to have performed better. The low vision high academic ability bold print readers were compared with low vision

1. Bauman, M.K. "Group Differences Disclosed by inventory items". International Journal for the Education of the Blind XIII, 4, 1964.

low academic ability bold print readers in Mathematics test. There was a significant difference in favour of the high academic ability subjects.

The arguement put forward in hypothesis 2 still holds for hypothesis 4.

Relating to this study are observations made by Koffka (1935)[1], Kohler (1951)[2] and Tolman (1949)[3] on configurational and non-configurational presentation of stimuli to learners. They stress that the perceptual frame work in which stimuli are presented is very crucial in determining the quality of learning of that organism. Stephen (1956)[4] had earlier pointed out that visual learning is more efficient than simple sensory modality. Since Bateman (1963)[5] maintains that the intelligence of the visually handicapped is not lowered by the defects, this therefore means that the level of cognition of the learner will determine the quality and level of performance when materials are presented to a group of low vision subjects.

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1. Koffka, K. Principles of Gestalt Psychology. Harcourt Brace. New York, 1935.

2. Kohler, W. The Mentality of the Apes. Humanities Press, New York, 1951.

3. Tolman, E.C. "The determiner of behaviour at a Choice Point". Psychological Review, 1938.

4. Stephen, J.M. Educational Psychology Constable, London, 1956.

6. Bateman, B.D. "Sighted Children's Perception of Blind Children's Abilities" Exceptional Children 29, 1963.

However, for Mathematics alone vision forms only one of the cognitive components than the rest of cognitive components associated with academic responses. Besides, nature has a way of compensating for sensory disabilities. For examples, one who does not see may have more active senses of hearing and touch which may compensate for visual impairment. In other words, sight is not the only factor that is considered for academic response..

This study carefully grouped the subjects according to their achievement in English and Mathematics. The analysis of covariance was used in the data analysis. The design is known to be able to combine the advantages of regression analysis and analysis of variance. The reliability and validity of the findings of this study are therefore guaranteed.

The present study stands unique because it has shown that despite the different cultural background of the subjects used in this study and of other foreign studies, the results seem to be showing the same thing. Nonetheless, this study has clearly differred from previous studies by indicating that:

(1) Academic ability is determinant factor of learning.

(2) Residual vision is definitely an added advantage when two groups of visually handicapped children of equal academic ability are given learning task.

(3) Past researchers seem to be over-flogging the residual vision issue without given the necessary consideration to cognition or academic ability which has turned out to be a major factor in this study.

This has not only gone a long way in consolidating results obtained in previous researches but has opened another dimension in the planning and making of provisions for all low vision persons studying in various institutions.

Implications of this study:

The implications of this study for special educators and psychologists is that they must always bear in mind that the low vision child is a seeing child and the aim throughout his education must be directed towards encouraging him to make full use of his residual vision.

This therefore necessitates some knowledge of visual processes and optimum conditions for their smooth functioning.

Some of these conditions are:

(1) Adequate illumination for the observer to be able to perceive clearly, rapidly and accurately;

(2) Familiarity with as great a range of objects as possible, for the young child to be able to classify a variety of things and forms his own simple concepts from first hand experience;

(3) Planning of activities so that they are meaningful to the child;

(4) Careful analysis of early reading material;

(5) Judicious use of films and other visual aids;

(6) Presentation of graphs and diagrams, clear and precise at appropriate cognitive level; and

(7) Most important, it should be noted that inherent in these conditions are the known principles of learning.

Pupils can no longer be given print reading on the basis that they possess low vision. Intelligence test would have to be given and children grouped into "High"

and "Low". This study indicates that the high group low vision children will definitely benefit more from the use of their residual vision in reading bold print than in braille reading. The other group of low vision low academic ability pupils should be encouraged to use both methods - braille and bold print reading when convenient.

Recommendation:

All the children in special schools for the blind throughout Nigeria and elsewhere should be screened for residual vision.

All the low vision children in special schools for the blind should adopt the print reading method.

Schools, colleges and universities should produce reading materials in large print form for the low vision students.

Low vision pupils should be able to cope with instruction in normal schools.

Publishers should be able to help in the education of the low vision children by producing books with large print character.

The low vision children are a special group. No specific provision has been made for them in Nigeria to enable them pursue their education without much difficulty. The Nigeria Educational Research Council and the Federal Ministry of Education should sponsor researches in this direction.

Electronic reading devices are now available and the low vision can benefit from it. A further development not yet being offered to the public is the machine that actually speaks the word out. These devices hold great promise. Student should be supplied with up to date information on them and be given the opportunity to become proficient in the use of one of their choices.

The weakness of these devices especially the electronic ones include the fact that it is usually expensive, scarce, difficult to maintain and service and in some cases damaged parts are not available. All these make the use of such devices almost unacceptable in developing country like Nigeria.

However, a good reading environment stimulates purposeful reading. Such an environment includes a

wholesome learning atmosphere, objects and activities that arouse curiousity and raise problem to be solved, and adequate equipment for comfortable reading. But most importantly, is an environment where parents and others accept the low vision child and treat him like any other child, his handicap notwithstanding.

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APPENDIX I

English I and Mathematics I tests in Braille

High Academic Ability subjects		Low Academic Ability subjects	
English	Mathematics	English	Mathematics
13	13	15	5
13	11	10	12
15	8	10	8
14	7	7	9
12	10	8	8
17	10	9	2
12	12	8	14
7	12	6	8
9	10	6	8
10	10	5	6
14	13	8	9
18	13	3	12
15	14		
16	11		

APPENDIX 2

Low Vision:- Subjects using Braille for English and Mathematics.

High Academic Ability subjects			Low Academic Ability subjects		
English		Mathematics	English		Mathematics
12		10	10		4
14		15	9		10
16		13	9		10
12	1.1	12	5	1.2	6
13		12	6		4
15		14	7		3
9		17			

Low Vision:- Subjects using Bold Print for English and Mathematics.

High Academic Ability subjects			Low Academic Ability subjects		
English		Mathematics	English		Mathematics
13		20	12		17
16		21	11		11
19	2.1	21	15	2.2	10
20		24	14		14
20		19	8		10
22		20	10		9
18		18			

APPENDIX 3

Department of Special Education,
University of Ibadan.

English I: Achievement Test

Primary Four. Time: 1Hr. 30 mins.

SECTION A

Read this passage and answer the questions.

Mr. Giwa is a trader. He has a store in David's town. His store is full of things to sell. He sells knives, nails and books. He also sells cloth, tea, sugar and soap. One day, David's sister, Mary went to Mr. Giwa's store.

Questions:-

1. Who is Mr. Giwa? (a) Teacher? (b) Trader? (c) sailor?.
2. Where is Mr. Giwa's store? (a) In David's town?
   (b) At Moniya? (c) In Ibadan?
3. Does Mr. Giwa sell knives and books?
   (a) Yes (b) No.
4. Who sells tea and sugar? (a) Mary? (b) David?
   (c) Giwa?
5. Where did Mary go? (a) To David's house?
   (b) To Mr. Giwa's house? (c) To Mr Giwa's store?.

6. Who is Mary? (a) Giwa's mother (b) David's sister? David's mother?

7. Who has a store in David's town? (a) Mr. Giwa's brother (b) Mr. David (c) Mr. Giwa.

8. Who went to Mr. Giwa's store? (a) Mary? (b) David? (c) Mary's brother?

9. Mr. Giwa does not sell (a) soap (b) radio (c) sugar.

10. This is a story (a) Mr. Giwa, John and Mary? (b) Mr. Giwa, Mary and Rebecca? (c) Mr. Giwa, Mary and David?.

SECTION B

Complete these sentences: Example, I run fast but she runs faster.

11. They get high marks but I get ..... more

12. My ball is big but hers is .....

13. The oranges are good but mine is .....

14. I have a beautiful sister but his is .....

15. My pencil is small but hers is .....

SECTION C

Complete these sentences. Example:- Mother said, "Drink it" so we drank it.

16. I said, "Jump up" so they ..... up.

17. Father said, "stop it" so we ..... it.

18. They said, "sit down" so he .....down.

19. You said, "make it" so we ..... it.

20. She said, "Run home" so they ..... home.

SECTION D

Write the correct word from the bracket.

Example:- I (go, went) to farm yesterday.

Answer: - went.

21. He (kills, killed) a rat yesterday.

22. The rain (fell, felt) last week.

23. He will enjoy next (wick, week).

24. Bose is (taking, taken) tea now.

25. He (told, thold) us a story.

APPENDIX 4

Department of Special Education,

University of Ibadan.

English II: Achievement Test.

Primary Four. Time: 1hr. 30 mins.

SECTION A

Read this passage and answer the questions.

A long time ago, there was a man named Ali. He was clever but had no money. Although he wanted to get rich quickly, he was very lazy.

One day, he left the city to a lonely place, there he built a small hut of wood and stone. His friends came and watched and one of them said, "You have got a house in the city". Why are you building another one here?

Write out the correct answers.

(1) Who was Ali? (a) A very rich man? (b) a very short man? (c) a very clever and lazy man?

2. Was Ali rich or poor?

3. What did Ali do one day? (a) he cried (b) he was singing (c) he left the city?

4. What did his friends do? (a) They came and watched him? (b) They were selling in the market? (c) They all travelled?

5. Where did Ali go after leaving the city? (a) to a lonely place, (b) to the river, (c) to the school?

6. Who was clever and had no money. (a) Ali (b) His friends (c) David.

7. What did Ali build? (a) a house (b) a hut (c) a palace?

8. Who had got a house in the city? (a) Ali's friend, (b) Ali (c) Nobody?

9. What is the hut built for? (a) stone (b) wood (c) wood and stone?

10. Why did Ali leave the city? (a) stone (b) to dance (c) to build a hut?

SECTION B

Fill in the blank spaces with the words in bracket (was, he, is, were, they). Example: Where is ..... going? Ans. he.

11. Ade ..... going to the market.

12. John ..... a tall boy.

13. What ..... he doing yesterday?

14. They ..... climbing a tree.

15. Who ..... they looking for last week?

SECTION C

Give the plural of the words in bracket.

Example: He has (book) in his locker. books.

16. There are many (chair) in our class.

17. He needs more than two (table).

18. They have many (box) of soap.

19. She catches many (fly).

20. He has many (child).

SECTION D

Choose the correct from the bracket.

Example: Tell us (who, whose) ball is that - whose.

21. Some clothes are made (of, up) cotton.

22. We looked everywhere (for, of) water.

23. Raji's room is (in, on) this block.

24. Be present (at, on) our table.

25. They all came back (from, on) time.

APPENDIX 5

Department of Special Education, University of Ibadan.

Mathematics I: Achievement Test.

Primary Four. Time: 1hr. 45 mins.

SECTION A

Answer all questions.

1. Write in words 234.
2. Write in figures Two hundred and sixteen.
3. 28 + 73
4. 143 + 325
5. 53 - 27

SECTION B

Answer all questions.

6. 26 + 14
7. ₦5.00 - ₦2.70
8. Divide 24 by 3
9. Write in words 140
10. 144 + 12 + 20
11. 369 ÷ 9
12. Find the H.C.F. of 24 and 30
13. Change $3\frac{3}{4}$ to improper fraction
14. Write in Roman figure 33.
15. Change 770k to Naira and kobo.

SECTION C

Answer all questions.

16. ₦3.80 + ₦4.12 + ₦2.60

17. 17 + 23 + 35. Divide your answer by 3.

18. 50k x 4 + 20k x 5 + ₦1.00 x 3

19. 4 men can do a piece of work in 8 days. How many days will it take 8 men to do the same work?

20. A garden is 200 metre long and 70 metre wide. Find the area of the garden.

21. 3.21 + 7.89

22. $1\frac{2}{3} - \frac{3}{4}$

23. Find the L.C.M. of 8 and 16.

24. Find the H.C.F. of 12 and 18.

25. Multiply 3 hours 10 minutes by 6.

APPENDIX 6

Department of Special Education, University of Ibadan.

Mathematics II: Achievement Test.

Primary Four. Time: 1 hr. 45 mins.

SECTION A

Answer all questions.

1. 37 x 3
2. $3\frac{1}{2}k + 10\frac{1}{2}$
3. $\frac{1}{4}$ of 16
4. $\frac{1}{2}$ of 24
5. 50k + 50k

SECTION B

Answer all questions.

6. Write in words (a) 307 (b) 104.
7. Write in numbers (a) Two thousand, one hundred and forteen (b) Three thousand and nine.
8. What is two scores plus ten.
9. Write in Roman numerals (a) 73 (b) 46.
10. Write in ordinary number (a) XL (b) CL
11. Add up 1 to 9
12. 6 + 5 + 3 + 4
13. Substract 49 from 94
14. $\frac{1}{4} + \frac{2}{3}$
15. Find the H.C.F. of 8 and 12.

SECTION C

Answer all questions.

16. 49 + 108 + 7

17. Subtract 98 from 187

18. Multiply 23 by 7 and divide your answer by 2.

19. Find the L.C.M. of 30 and 20.

20. Find the H.C.F. of 15 and 20.

21. (a) $1\frac{2}{3} + \frac{2}{3} + \frac{1}{4}$ (b) $3\frac{3}{4} - 1\frac{3}{4}$

22. If I pay ₦1.50 for a journey of 60 km, what will I pay for 600 km?

23. 8 bags of rice cost ₦464.00. How much will one bag cost.

24. A football field is 120 metre long and 100 metre wide. Find the perimeter.

25. One pail of water weighs 3.25kg. How many kg will 7 pails of water weigh?

APPENDIX 7

Department of Special Education,
University of Ibadan.

Achievement test used in obtaining scores for separating the subjects into high and low achievers.

English: Primary Four: Time: 1 hr. 30 mins.

Read this passage and answer the questions.

Fatima is a school in Ikire. The two sons of Mr. and Mrs. Babajide and two daughters of Mr. and Mrs. Bayo who are friends of Mr. and Mrs. Babajide also attend the school.

Last year July, the parents wanted the children to come home immediately the holiday began. They trecked to their village along the bush paths.

Underline the correct answers:

1. In what area is the school? (a) Oyo (b) Ikire (c) Ede?
2. Who were the parents of the two girls?
   (a) Mr. and Mrs Bayo (b) Mr. and Mrs Jide
   (c) Mr. and Mrs. John.
3. Mr. Bayo was a friend to Mr. Babajide (a) Yes (b) No.
4. When did the parents want their children back home?
   (a) immediately the holiday began (b) after the holiday
   (c) before the holiday.

5. How did they travel? (a) On a bicycle (b) In a car (c) They trecked?

6. How many people were mentioned in the passage? (a) 2 (b) 4 (c) 8?

7. How many people trecked along the push paths? (a) 3 (b) 8 (c) 4.

8. When in the year did the holiday begin? (a) December (b) April (c) July?

9. What is the name of the school? (a) Abadina (b) Loyola (c) Fatima?

10. This passage is based on two families only. (a) Yes (b) No.

SECTION B

Write the correct word from the bracket.

Example: I (sang, sung, sing, song) sang.

11. You (travel, travelled, travels) often.

12. Rose (comes, came, coming) yesterday.

13. He (had, have, has) done it before I arrived.

14. He (speak, spoke, spoken) well.

15. They (will, was, would) come tomorrow.

SECTION C

Choose the correct word from the bracket.

16. My mother's daughter is my (brother, sister, uncle).

17. My brother is a (girl, boy, woman).

18. His father's brother is his (cousin, uncle).

19. Paul's Headmistress is a (man, lady).

20. Tunde bought an ear-ring for his (mother, father).

SECTION D

Fill in the blank spaces with words in the bracket (whose, whom, who).

21. ..... was in the room?

22. ..... were you taking with.

23. The man ..... cat died.

24. I do not know ..... took the pen.

25. ..... did you see in the school?

APPENDIX 8

Department of Special Education,
University of Ibadan

Achievement test used in obtaining scores for separating the subjects into high and low achievers:

Mathematics: Primary Four: Time: 1 hr. 45 mins.

SECTION A.

1. 16 + 17 =
2. 11 + 14 =
3. 15 x 5 =
4. 60 x 3 =
5. 80 - 45 =
6. 28 - 14 =
7. $\frac{3}{4}$ of 12 =
8. 7k + 5k + 15k =
9. 25k - 10k =
10. 65 ÷ 5 =
11. 95 ÷ 6 =

SECTION B

12. Write in words 130.
13. Write in words 1250.
14. Write in figures: Five hundred and sixty-two
15. Write in figures: Seventy-nine.

16. 99 + 66 + 33 =

17. 57 + 2 + 10 =

18. $\frac{1}{2}$ + $\frac{1}{4}$ + $\frac{1}{3}$ =

19. $\frac{1}{5}$ $\frac{1}{10}$ =

20. $\frac{1}{4}$ + $\frac{3}{4}$ =

SECTION C

21. Find the H.C.F. of 12 and 8

22. Find the H.C.F. of 16 and 36

23. Change six Naira into kobo.

24. Change 150k to Naira and kobo.

25. 505 ÷ 5.

APPENDIX 9

Scores obtained from English and Mathematics used in separating subjects into Ehigh and low achievers

High Academic Ability Subjects		Low Academic Ability Subjects	
English	Mathematics	English	Mathematics
16	15	11	10
20	13	9	11
22	11	9	6
17	10	5	4
20	13	0	5
20	10	17	0
16	20	8	0
16	12	15	6
15	20	7	4
20	20	7	17
20	10	0	7
16	10	0	2
20	11		
20	18		