

A Survey of the Differences between the Mathematics and English Language Achievement of Children with Visual Impairments during Mainstreaming and Inclusive Education

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Abstract

This study was set out to investigate the difference between the academic achievement of children with visual impairments in mainstreaming and inclusive education. Two research questions and two hypotheses guided the study. Twenty five students who attended mainstreaming and inclusive education were selected for the study out of which sixteen were selected as sample for the study. Data for the study was collected using a content analysis rubric (proforma). The mean and standard deviation was used to analyse the data collected and the results were presented in tabular form. Findings of the study showed that no significant difference existed between the Mathematics and English Language achievement of male and female students with visual impairment. The study also showed that gender had no effect on the Mathematics and English Language performance of students with visual impairment in Waec during the period of mainstreaming and inclusive education. Some recommendations were made that will help in the teaching of Mathematics and English Language to children with visual impairments.

Keywords: *Inclusive education, Mainstreaming, Mathematics and English Language achievement, Visual impairment*

Introduction

Inclusive education is an educational approach that involves a systematic reform and altering teaching methods to ensure that all students are able to engage with learning materials rather than removing them from general classrooms (Basin, 2023). Inclusive Education (IE) is a new educational philosophy and a worldwide reform strategy intended to include students with different abilities in mainstream regular schools (Ahmed, Sharma and Deppeler, 2012). In this new arrangement, school curriculums, teaching methods, organisation and resources are expected to be adapted to ensure that all learners, irrespective of their ability can successfully participate in the regular classroom activities without any serious discomfort. This new agenda was informed by World Conference on Special Needs Education held in Salamanca, Spain in 1994 which basically provided the standard rules on the equalisation of opportunities for persons with disabilities. The concept of inclusive education is based on the principles that all children regardless of ability or disability have a basic right to be educated alongside their peers in their local schools (UNESCO, 1994). The new trend is aimed at removing social prejudice and alienation that have been hitherto meted on children with special needs within and outside the classroom. According to Mitchell (2009), inclusive education policies enable everyone to be accorded equal status regardless of the level of functioning or other personal characteristics that are associated with human beings, such as disabilities or in other cases, those children who are gifted and talented. Inclusive education is a global trend that involves the idea of making education accessible to all children (Bryant, Smith and Bryant, 2008). The main difference between the two approaches is that mainstreaming focuses on integrating students with disabilities into the regular classroom while inclusive education focuses on providing supports so that all students can participate in the same activities and learn together (differencebetweenz.com, 2022). Mainstreaming does not always require significant changes to the curriculum or classroom environment, inclusion, on the other hand, may require more accommodations and supports in order to be successful. Ultimately, both mainstreaming and inclusion have the same goal and that is to promote equal access to education for all students.

Definition of Visual Impairment

Visual impairment refers to impairment in vision that even with correction, adversely affects a child's educational performance. Hemrick (2007) states that visual impairment refers to individuals having at least some difficulties with near and far vision. It is estimated that world-wide, one person loses their vision every five seconds (Leske, Yuh, Nemesure and Hennis, 2010). Learners with visual impairment can be categorised mainly into two groups according to their educational needs. There are those children who need print as their educational medium and those who need to use Braille (Verneyen, 2004). The World Health Organisation (2023) classifies vision impairment into two groups, distant vision impairment and near vision impairment.

Distance Vision Impairment

- i. Mild – visual acuity worse than 6/12 to 6/18
- ii. Moderate – visual acuity worse than 6/18 to 6/60
- iii. Severe – visual acuity worse than 6/60 to 3/60
- iv. Blindness – visual acuity worse than 3/60

Near Vision Impairment

- i. Near vision acuity worse than N6 or M.08 at 40cm

The low vision project group categorises students with visual impairment into five categories. The first category consists of totally blind students. The second group consists of children with vision which is not enough to read print and hence should be educated using Braille. Kiarie (2004) says that the detection of visual problems in children is done by either parents or doctors. However, severe eye problems can be detected in hospitals by the eye units. Vision problems can also be detected by teachers in general educational classrooms using behavioural characteristics that may indicate visual function problems. For instance, students with visual problems may: usually turn their heads or eye, hold reading materials extremely close to the face or fail to make eye contact when talking to people.

Background

The difference in academic achievement between boys and girls especially mathematics and English language has been and will continue to be an area of debate for a long time to come. While some believe that boys perform better than girls in these subjects, some disagree to that. In a research conducted by Oakhill and Petrides (2007) on the difference between the reading comprehension of 10 and 11 year old boys and girls, they reported that boys performed significantly better on texts they were interested in reading while girls' performance was the same regardless of their interest in the text. The Organization For Economic Cooperation and Development (OECD) through the programme for international student assessment (PISA) released mathematics, science and reading test results of 15- year olds. The findings indicated that no gender differences in average mathematics and science performance were observed in any Canadian school (Lauzon, 2001). Similarly, Danquah (2000) conducted a research to determine the academic difference between male and female students in mathematics and English Language in Cape Coast. The researcher used the result of the final examination conducted by the West African Examination Council (WAEC) between the period of 1994 – 1997. The result showed that boys performed better than girls within the period in English Language and Mathematics but girls out-performed the boys in English language within the same period. In the same way, Randhawa (1991) quoted in Dorleku and Kwashie (2019) reported the result of a research conducted in Saskatchewan high school for Sophomores, the result showed that male students consistently perform better than girls in mathematics concept computation and problem solving. Eshun (1999) also conducted a research to determine the difference between the performance of male and female secondary school students in 1993 and the result indicated that boys achieved higher

than girls.

The story was however different when it came to English language performance. Dorleku and Kwashie (2019) conducted a research to find out the difference between the performance of visually impaired boys and girls and discovered that girls performed better than boys in English Language. They also discovered that girls with visual impairment performed better than the boys after being placed in the IEP mathematics. They therefore concluded that the girls performed better than the boys in Mathematics and English Language. The *National Policy on Education* (2004) made Mathematics and English language compulsory subjects in both junior and secondary schools in Nigeria. This is because mathematics is a subject that affects all facets of human life in many ways (Malik, Ngban and Ibu, 2009). The teaching of mathematics for students with visual impairments was pioneered by the Worcester School for the Blind in the United Kingdom in 1866. It was championed by Rev. W. Taylor who invented the Taylor frame for mathematics and the Taylor code for Mathematics transcribing (Jurmang and Hill, 1996). The first student with visual impairment to study Mathematics successfully in Plateau State was Bitrus Gani in Boys' Secondary School Gindiri. After him, children with visual impairments refused to study Mathematics until Miss Hill took it upon herself to teach Emmanuel Karami who was able to pass Mathematics at credit level and eventually read Mathematics in the University of Jos where he graduated with a second class upper division. This shows that blind students can study and pass Mathematics. This made the implementation of the policy easier to schools. Mr Derek Joy the then principal of United Faith Tabernacle College, Jarawan-Kogi also introduced his students to mathematics with many failing and some passing. All these took place during the mainstreaming education. English language has been a compulsory subject for all students in the school before the policy and many have also been passing and some also failing.

The introduction of inclusive education came with a lot of promises of success for the children with visual impairments. The language of instruction in Nigeria is English. It is expected that by the time every student should acquire and also develop spoken and written skills of the language to enable them cope with the demands of higher education. The role played by language is very crucial and any one that is handicapped in the language of instruction will most probably mean that no learning is taking place (Global Journal, 2021). However, despite the importance of English language in education, researches have consistently shown that children with visual impairment in secondary schools have not been performing well (Mosha, 2014). Olanipekun, Garuba, Mohammed and Ohiemi (2014) discovered that competency in English considerably determines the students' academic performance therefore, the importance of English as a medium of communication cannot be overemphasised. Students' success in school to a large extent relies on their proficiency in the language of instruction (Fekeye and Ogunsiji, 2009).

Studies by Ekeh and Oladayo (2013) and Ibrahim and Okopi (2014) found that significant difference existed in the academic achievement of regular and special needs students in inclusive classroom setting, in favour of those in inclusive classrooms. The West African Examination Council chief examiner report for 2011/2012 indicated that pupils with visual impairments performed academically poor in Mathematics and English Language (WAEC, 2012). Hence, the need for this study.

Research Questions

The following research questions have been formulated to guide the study.

1. What is the performance of students with visual impairment in WAEC during mainstreaming based on gender?
2. What is the performance of students with visual impairment in WAEC during inclusive education based on gender?

Hypotheses

The following hypotheses will be tested at 0.05 level of significance.

1. There is no significant difference between the performance mean score of male and female students with visual impairment in WAEC during the period of inclusive education
2. There is no significant difference between the performance mean score of male and female students with visual impairment in WAEC during the period of main streaming

Methodology

The Cross-sectional survey design was used in carrying out this study. The population of the study was made up of 25 mainstreamed and inclusive education students with visual impairment from United Faith Tabernacle College Jarawan-kogi, Jos East Local Government Area of Plateau state. The researcher randomly selected 16 students as sample for the study. The sample includes those who started JSS1 to SSS3 mainstreaming programme and those who started JSS1 to SSS3 during the inclusive education programme. The sample was selected from the years 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019 and 2020 academic years. The researcher made use of the Mathematics and English Language results for the comparison. Two research questions and two hypotheses guided the study.

The instrument that was used for data collection was a content analysis rubric (proforma). The content analysis rubric was developed by the researcher and it contained five (5) items namely: name of school, year of examination, type of examination and grades obtained by students, and percentage performance of candidates. The content analysis rubric was developed with consideration to the research objectives. The items drafted were adapted from similar research conducted by Bulus and Chukwuma (2021). The face and content validity of the instrument was established by submitting the instrument to experts in Special Education Measurement and Evaluation for editing and more input. The suggestions, comments, criticisms and remarks raised by these experts were used to improve the content of the instrument. This was to ensure the validity of the instrument

The reliability of the instrument was determined by the inter-rater reliability, The reliability coefficient of .70 was obtained. To generate the needed information, a content analysis rubric was created which specified the various data sorted for in the WASSCE result spread sheets. The components of data sorted for included performances from 2010 to 2020, the grades obtained (credit level, pass level and fail).

The data collected for the study was analysed through the use of Statistical Package for Social Sciences (SPSS) version 25. The information generated through the content analysis rubric used to retrieve information from the WASSCE result spread sheets were fed into the computer and the computer was instructed to analyze them in simple percentage tables and frequency tables, mean and standard deviation. This was aimed at revealing differences or otherwise of students' performances in these examinations based on the type of education whether mainstreaming or inclusive.

Results

Research Question One

What is the performance of students with visual impairment in WAEC during mainstreaming based on gender?

Table 1: Mathematics performance mean score of students in waec during mainstreaming based on gender

Gender	N	Mean	Std	Mean difference
Male	5	26.80	16.05	3.87
Female	3	30.67	18.47	

Table 1 shows the Mathematics performance mean score of students in WAEC during mainstreaming from 2010-2015. The result recorded a mean score of 26.80 and a standard deviation of 16.05 for male students, while the female recorded a mean score of 30.67 and a standard deviation of 18.47. The result indicates a mean difference of 3.87; this implies that male students performed slightly better than the female students although they both performed poorly

Table 2: English Language performance mean score of students in WAEC during mainstreaming based on gender

Gender	N	Mean	Std	Mean difference
Male	5	53.80	3.70	0.87
Female	3	54.67	2.08	

Table 2 shows the English Language performance mean score of students in WAEC during mainstreaming from 2010-2015. The result recorded a mean score of 53.80 and a standard deviation of 3.70 for male students, while the female recorded a mean score of 54.67 and a

standard deviation of 2.08. The result indicates a mean difference of 0.87, indicating that male performed at the same level with their female counterparts.

Research Question Two

What is the performance of students with visual impairment in WAEC during inclusive education based on gender?

Table 3: Mathematics performance mean score of students in WAEC during inclusive education based on gender

Gender	N	Mean	Std	Mean difference
Male	6	54.50	3.02	
				0.50
Female	10	55.00	2.98	

Table 3 shows the Mathematics performance mean score of students in WAEC during inclusive education from 2017-2020. The result recorded a mean score of 54.50 and a standard deviation of 3.02 for male students, while the female recorded a mean score of 55.00 and a standard deviation of 2.98. The result indicates a mean difference of 0.50, indicating that male performed at the same level with their female counterparts.

Table 4: English Language performance mean score of students in WAEC during inclusive education based on gender

Gender	N	Mean	Std	Mean difference
Male	6	55.83	2.86	
				0.23
Female	10	55.60	3.17	

Table 4 shows the English Language performance mean score of students in WAEC during inclusive education from 2017-2020. The result recorded a mean score of 55.83 and a standard deviation of 2.86 for male students, while the female recorded a mean score of 55.60 and a standard deviation of 3.17. The result indicates a mean difference of 0.23, indicating that male performed at the same level with their female counterparts.

Hypothesis One

There is no significant difference between the performance mean score of male and female students with visual impairment in WAEC during the period of inclusive education.

Table 5: Summary of t-test Result on Mathematics performance mean score of students during inclusive education based on gender

Gender	N	Mean	Std	Df	T	P-value	Decision
Male	6	54.50	3.02				
				14	-.323	.751	Insignificant
Female	10	55.00	2.98				

Table 5 shows the result on difference between the Mathematics performance mean score of male and female students with visual impairment in WAEC during the period of inclusive education. The result recorded a mean score of 54.50 and a standard deviation of 3.02 for male students, while the female recorded a mean score of 55.00 and a standard deviation of 2.98. The result also yielded $t(14) = -.323$, $P > 0.05$. Since the P-value of 0.751 is greater than the 0.05 level of significance, the null hypothesis was retained. It was concluded therefore, that there is no significant difference between the Mathematics performance mean score of male and female students with visual impairment in WAEC during the period of inclusive education.

Table 6: Summary of t-test result on English Language performance mean score of students during inclusive education based on gender

Gender	N	Mean	Std	Df	T	P-value	Decision
Male	6	55.83	2.86				
				14	.148	.885	Insignificant
Female	10	55.60	3.17				

Table 6 shows the result on difference between the English Language performance mean score of male and female students with visual impairment in WAEC during the period of inclusive education. The result recorded a mean score of 55.83 and a standard deviation of 2.86 for male students, while the female recorded a mean score of 55.60 and a standard deviation of 3.17. The result also yielded $t(14) = .148$, $P > 0.05$. Since the P-value of 0.885 is greater than the 0.05 level of significance, the null hypothesis was retained. It was concluded therefore, that there is no significant difference between the English Language performance mean score of male and female students with visual impairment in WAEC during the period of inclusive education.

Hypothesis Two

There is no significant difference between the performance mean score of male and female students with visual impairment in WAEC during the period of mainstreaming.

Table 7: Summary of t-test result on Mathematics performance mean score of students during mainstreaming based on gender

Gender	N	Mean	Std	Df	T	P-value	Decision
Male	5	26.80	16.05				
				6	-.313	.765	Insignificant
Female	3	30.67	18.47				

Table 7 shows the result on difference between the Mathematics performance mean score of male and female students with visual impairment in WAEC during the period of mainstreaming. The result recorded a mean score of 26.80 and a standard deviation of 16.05 for male students, while the female recorded a mean score of 30.67 and a standard deviation of 18.47. The result also yielded $t(6) = -.313$, $P > 0.05$. Since the P-value of 0.765 is greater than the 0.05 level of significance, the null hypothesis was retained. It was concluded therefore, that there is no significant difference between the Mathematics performance mean score of male and female students with visual impairment in WAEC during the period of main streaming.

Table 8: Summary of t-test result on English Language performance mean score of students during mainstreaming based on gender

Gender	N	Mean	Std	Df	T	P-value	Decision
Male	5	53.80	3.70				
				6	-.365	.728	Insignificant
Female	3	54.67	2.08				

Table 8 shows the result on difference between the English Language performance mean score of male and female students with visual impairment in WAEC during the period of main streaming. The result recorded a mean score of 53.80 and a standard deviation of 3.70 for male students, while the female recorded a mean score of 54.67 and a standard deviation of 2.08. The result also yielded $t(6) = -.365$, $P > 0.05$. Since the P-value of 0.728 is greater than the 0.05 level of significance, the null hypothesis was retained. It was concluded therefore, that there is no significant difference between the English Language performance mean score of male and female students with visual impairment in WAEC during the period of mainstreaming.

Discussion

The study examined and compared the performance of students with visual impairment in WAEC during the periods of mainstreaming and inclusive education in Jos, Plateau State. The findings of the study revealed that male students performed slightly better than female

students in Mathematics WAEC during mainstreaming but they performed at the same level during inclusive education. This finding is in line with the finding of Danqua (2000) who discovered that boys performed better than girls in mathematics and English language. However, the finding does not agree with Dorleku (2019) who discovered that girls performed better than boys in mathematics after exposure to Individualised Education Plan (IEP). The study also discovered that boys and girls performed at the same level in Mathematics and English language during inclusive education. This finding does not agree with Dorleku (2019) who discovered that girls performed better than boys in English language.

The study also discovered that students with visual impairment performed at the same level in Mathematics and English language during inclusive education. The study also discovered that no significant difference existed between the Mathematics and English language achievement during mainstreaming and inclusive education. This finding is in disagreement with the finding of Ekeh and Oladayo (2013) and Okopi (2014) who discovered that significant difference existed in the academic achievement between inclusive education and mainstreaming in favour of inclusive education

Summary of the Findings

The summary of the findings is that:

1. Male students performed slightly better than the female students in Mathematics, although they both performed poorly during the period of mainstreaming.
2. Male students with visual impairment performed at the same level with their female counterparts in English Language during mainstreaming.
3. English Language performance mean score of students with visual impairment in WAEC during the periods of mainstreaming and inclusive education revealed that the performance was almost the same with mean difference of 1.56.
4. There was no significant difference between the Mathematics and English Language performance mean score of male and female students with visual impairment in WAEC during the period of inclusive education.
5. There was no significant difference between the Mathematics and English Language performance mean score of male and female students with visual impairment in WAEC during the period of main streaming.

Conclusion

The findings of this study shows that no significant difference exists between the Mathematics and English language achievement of male and female students in mainstreaming and inclusive education. The implication of this is that both mainstreaming and inclusive education are good educational programmes as far as Mathematics and English language achievement is concerned. The result further showed that gender has no effect on the Mathematics and English Language performance of students with visual

impairment in WAEC during the period of mainstreaming and inclusive education.

Recommendations

Based upon the findings of the study, the following recommendations were made:

1. More teachers especially with vast knowledge in the education of children with visual impairments should be employed.
2. Teachers should employ different teaching methods and strategies to accommodate the various categories of students in their class when teaching Mathematics and English Language.
3. Workshops and trainings should be organised by school administrators and for Mathematics and English teachers in inclusive schools.
4. Classroom teacher should have a strong moderator role in terms of classroom climate and behaviours in any classroom condition, especially in the class-rooms where the children with special needs and normally developing children are trained together.
5. The government should ensure that schools receive adequate and sustainable financial support so that all activities and services are fully inclusive.

References

Ahmmmed, M., Sharma, U. and Depeler, J. (2012). Variables affecting teachers' attitudes towards inclusive education in Bangladesh. *Journal of Research in Special Education Needs*, 12(3), 132-140.

Altman, J. R., Thurlow, M. and Vang, M. (2010). Annual performance report. 2007 – 2008 state assessment data. Minneapolis, MN: University of Minnesota, National Centre on Educational Outcomes. *American Medical Association*, 291(16) 207 - 2012

Bryant, D. P., Smith, D. D. and Bryant, B. R. (2008). *Teaching students with special needs in inclusive classroom*. Boston, MA: Pearson Education, Inc.

Danquah, M. (2000). Gender differences in academic achievement of senior secondary school students in Cape Coast municipality. Unpublished M. Phil. Thesis UCC. Ghana.

Differencebetweenz.com (2022). Difference between mainstreaming and inclusion. Retrieved from <https://differencebetweenz.com/difference-between-mainstreaming-and-inclusion>.

Dorleku, J. E. A. and Kwashie, R. K. (2019). Academic achievement of pupils with Visual impairments placed on the integrated education programme in the Hohoe municipality. Retrieved from <https://zenedo.org/record/3564333/files/mad%20Dorleku%20>

Ekeh, P. U. and Oladayo, O. T. (2013). Academic achievement of regular and special needs

students in inclusive and non-inclusive classroom settings. *European Scientific Journal*, 9(8), 141-159.

Eshun, B. A. (1999). The pattern of Mathematical achievement of students in Ghana. *Journal of Science and Mathematics Education*, 2(1) 22 - 23

Fakeye, D. and Ogunsi (2009). English Language Proficiency as a predictor of academic achievement among EFL students in Nigeria. *European Journal of Scientific Research*, 37(4) 79 - 93

Federal Republic of Nigeria (2004). *National Policy on Education*, 4th ed. Lagos. NERDC

Hemrick, H. (2007). Visual impairment and eye care among North Carolina adults: results from the new vision module questions in the 2006 BRFSS survey. *North Carolina Public Health*, 155, 1 – 6

Hill, K. E. and Jurmang, I. J. (1993). Production and adaptation of local Materials for Teach Science and Mathematics for the Visually Impaired. In Ozoji, E.D. and Nwazuoke, I. K. (Eds). *Education of the visually impaired in the 21st century*. NCE Jos: Ehindero Press.

Ibrahim, A. K. and Okopi F. O. (2014). Effect of Mainstreaming Education on The Academic Achievement of Mildly Impaired Lower Basic Three Pupils in Northwest Nigeria. *IOSR Journal of Research and Method in Education*, 4(4), 9-15.

Lauson, D. (2001). How do gender difference in science and mathematics achievement? Unpublished working paper, centre for education statistics, Canada, Ottawa.

Leske, M. C., Sub – Yuh wu., Nemesure, B and Hennis, A. (2010). Causes of visual lost and their risk factors: An incidence summary from the Barbados eye studies. *Revista Panamericana De Salud Publica*, 27(4) 259 - 267

Maliki, A., Ngbam, A. and Ibu, J. (2009). Analysis of students performance in J u n i o r Secondary Mathematics in Bayelsa state of Nigeria. *Student communication science* 3(2) 173 – 188

Mitchell, D. and Desai, I. (2005). Diverse socio-cultural contexts for inclusive education in Asia. In D. Mitchell (Ed.), *Contextualizing inclusive education: Evaluating old and new international perspectives*. Routledge, Oxford shire.

Mosha, M. (2014). Factors affecting students' performance in Zanzibar Rural and Urban Secondary Schools. Retrieved from <https://pdfs.semanticscholar.org/12>

Oakhill, J.V. and Petrides, A. (2007). Sex differences in the effect of interest on boys' and girls' reading comprehension. *British Journal of Psychology*. 98(2) 223 - 235

Olanipekun, S., Garuba, I., Mohammed, Y. and Ohiemi, A. (2014). Students' English

Language Proficiency and academic performance in Vocational Educational.

UNESCO (1994). The Salamanca Statement and Frame Work for Action on Special Needs Education. Paris: UNESCO.

UTpermian Basin (2023). Mainstreaming special education students. Retrieved from <https://online.utpb.edu/aboutus/articles/education/mainstreaming-special-education-students>

Verneyen, H. (2004). The impact of low vision project- Kenya in the education of visually impaired children. Retrieved on August 10th, 2009 from <http://ww.lea.test.sgis.fi/en/assesmnet/kenya.html>.

West African Examination Council (WAEC), (2012). Chief examiner's report on performance in Mathematics and English language. Accra. WAEC

World Health Organisation (2023). Blindness and vision impairment. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/blindness-vision-impairment>.