EFFECT OF LANGUAGE OF INSTRUCTION ON THE BASIC SCIENCE ACHIEVEMENT OF PUPILS IN SELECTED PUBLIC SCHOOLS IN OBOT AKARA LOCAL GOVERNMENT AREA OF AKWA IBOM STATE

By

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Abstract

This study investigated the effect of language instruction on the Basic Science achievement of pupils in selected public schools in Obot Akara Local Government Area of Akwa Ibom State. In order to achieve this purpose, three objectives, research questions and null hypotheses were formulated to guide the study. Quasi-experimental design was adopted for the study. The design was considered appropriate because intact classes without randomisation were used for the groups. The total population of the study consisted of 1576 primary one pupils in 38 public primary schools in Obot Akara Local Government Area of Akwa Ibom State. A sample size of 61 primary one pupils from four intact classes was used in the study. A multistage sampling technique was adopted to obtain a representative sample for the study. The instrument used for data collection was Basic Science Achievement Test (BSAT). The instrument face and content validity was determined by validates. Kuder Richardson Formula 20 was used to determine the internal consistency of Basic Science Achievement Test (BSAT) which yielded a reliability coefficient index of 0.87. Mean and standard deviation were used for answering the research questions while ANCOVA was used to test the hypotheses at 0.05 level of significance. The study revealed that there is a significant difference in the mean achievement scores of pupils taught Basic Science using English language and those taught using Local dialect methods. There is no significant difference in the mean achievement scores of male and female pupils taught Basic Science using English language and those taught using Local dialect method. There is no significant difference in the mean achievement scores of urban and rural pupils taught Basic Science using English language and those taught using Local dialect method. It was recommended among others that the State Ministry of Education should provide instructional materials, which are needed for the implementation of Basic Science as a method of teaching.

Keywords: Language of Instruction, Basic Science Achievement and Local Dialect

Introduction

In educational contexts worldwide, language serves as a fundamental vehicle for communication, comprehension, and academic achievement. In Nigeria, where English is the official language, it is often the primary medium of instruction in schools. However, in rural areas, where many pupils grow up speaking indigenous languages, the use of English as the sole language of instruction can create barriers to understanding and limit pupils' ability to fully grasp academic

content (Ifeanyi and Chika, 2020). This issue is particularly relevant in science education, where pupils must learn new terminologies and complex concepts. Therefore, understanding the effect of language of instruction on academic achievement, especially in subjects like Basic Science, has become increasingly important (Eze and Ugwu, 2022). Language of instruction in science education has gained attention as researchers and educators seek to understand how the language of instruction influences pupils' comprehension and performance in science subjects (Ibeh, 2020). The relationship between language proficiency and achievement in science is particularly complex in rural regions such as Obot Akara Local Government Area, where the primary spoken languages are often local dialects. According to Omole (2021), pupils who lack proficiency in the language of instruction are more likely to struggle with understanding scientific content, resulting in lower achievement levels. Studies suggest that using a local dialect as an instructional language can enhance comprehension and engagement, as pupils may find it easier to relate to the material (Ugwu, 2021).

In addition, several variables such as gender, geographical location (urban vs. rural), and age may also influence the effectiveness of language instruction on pupils' academic achievement. Each of these variables contributes unique factors that can interact with language instruction methods to impact pupils' understanding and retention of scientific concepts. For example, gender differences in language processing and comprehension have been documented, suggesting that boys and girls may respond differently to instructional methods in science subjects (Okoye and Okoye, 2019). Likewise, pupils in urban areas, who are often more exposed to English, may perform differently in science compared to their rural counterparts when taught using either English or a local dialect (Opara and Ikechukwu, 2023).

Basic Science, as an introductory subject to scientific knowledge, requires pupils to engage with concepts that are foundational to later scientific learning. Pupils must comprehend a range of scientific terms and principles, which can be challenging if the language of instruction is not aligned with their primary language (Ifeanyi and Chika, 2020). Effective language of instruction can help pupils understand concepts, building a bridge between their existing knowledge and new scientific ideas. However, in rural communities where English may be limited to classroom use, pupils often face a steep learning curve. Studies show that pupils perform better academically when taught in their native or local language during early schooling, as it aids comprehension and encourages active engagement (Ugwu and Ijeoma, 2021).

The language of instruction in Basic Science can influence not only pupils' comprehension of the subject but also their engagement and motivation to learn. Pupils who understand the language in which they are taught are more likely to participate actively and less likely to feel alienated from the subject matter (Eze and Ugwu, 2022). In Nigerian classrooms, however, English is often the mandated medium of instruction, even in regions where local dialects are more prevalent. This can hinder pupils' ability to engage 3 deeply with scientific content, particularly in foundational subjects like Basic Science (Ibeh, 2020).

Research has also indicated that there may be gender-based differences in how pupils respond to language of instruction in science. For example, some studies like Okoye and Okoye, (2019) have found that female pupils may perform better in language-intensive subjects due to higher verbal proficiency, while male pupils may have different strengths in scientific reasoning (Okoye and Okoye, 2019). Gender-specific teaching strategies could play a role in enhancing Basic

Science achievement if instructional methods are tailored to address these differences. In Obot Akara, understanding how language of instruction affects male and female pupils differently could lead to more effective teaching practices that help bridge any gender-based achievement gaps in Basic Science.

Geographically the location, that is the rural-urban divide, also plays a significant role in pupils' access to language resources and exposure to English. Pupils in urban areas generally have more exposure to English outside of the classroom through media and social interactions. This increased exposure often makes it easier for urban pupils to engage with English-based instruction in science subjects (Omole, 2021). In contrast, pupils in rural areas like Obot Akara may primarily speak a local dialect at home and in their communities, with limited exposure to English. This difference in language exposure can influence how well pupils comprehend Basic Science concepts taught in English and may affect their academic achievement (Opara and Ikechukwu, 2023).

When pupils in rural areas are taught Basic Science using a local dialect, their performance may improve as they are able to understand the content more readily. Some researchers argue that integrating local dialects in science education for rural pupils could help level the playing field by enhancing comprehension and reducing the cognitive load associated with language barriers (Ifeanyi and Chika, 2020). However, there are also concerns that reliance on local dialects could limit pupils' ability to transition to Englishbased scientific studies at higher levels, highlighting a need for a balanced approach that takes into account both local and official languages (Ugwu and Ijeoma, 2021).

The challenges of language of instruction in Basic Science are particularly pronounced in rural Nigeria where limited resources and training for teachers further complicate effective instruction. Language barriers in Basic Science can discourage pupils from engaging with science subjects, which in turn may affect their long-term interest and participation in STEM (Science, Technology, Engineering, and Mathematics) fields. This study seeks to examine the effect of language of instruction on Basic Science achievement in selected public schools in Obot Akara Local Government Area, focusing on variables such as gender and urban-rural location. By investigating these factors, the study aims to contribute to a deeper understanding of the role language plays in shaping pupils' academic performance in science, which could support more effective language instruction policies and educational practices in Nigeria.

The work of Eze and Ugwu (2022) found that pupils taught in their local dialect achieved significantly higher academic scores in Basic Science compared to those instructed in English. In same vein, Ifeanyi and Chika (2020) discovered a direct correlation between language proficiency and performance; pupils who learned in their native language performed better in science subjects. The study by Nwankwo and Eze (2021), revealed that gender significantly influenced performance, with girls achieving better results in language-based assessments. Interestingly, Okwu and Obasi's (2022) study seems to support both perspectives, as they found gender differences favoring girls in language-based assessments. Meanwhile, Eze and Chukwuemeka (2023) highlighted the importance of motivation in performance, finding notable gender differences in motivational factors. The mixed results underscore the complexity of factors influencing academic achievement and suggest that further research is needed to clarify the relationships between language of instruction, gender, and motivation in Basic Science. Previous

research, such as Adeyemi and Ogunsanya (2021), found a significant difference in academic performance between urban and rural pupils, with urban pupils outperforming their rural counterparts. Similarly, Nwankwo and Eze (2020) discovered that urban pupils significantly outperformed their rural peers in academic assessments.

Statement of the Problem

In Nigeria, English is the official language and predominantly used as the medium of instruction in schools. For many pupils in rural areas, English is not the primary language spoken at home, making it challenging for them to fully comprehend educational content delivered exclusively in English (Ekanem, 2021). This language barrier can be especially problematic in subjects like Basic Science, where complex concepts and specialized terminology require a strong grasp of the language to facilitate understanding and retention (Ugwu and Ijeoma, 2021). The potential misalignment between pupils' linguistic backgrounds and the language of instruction raises concerns about whether the current educational approach adequately supports pupils' academic achievement, particularly in foundational subjects like Basic Science.

One major issue that arises from teaching Basic Science solely in English is the risk of superficial learning. When pupils are not proficient in the language of instruction, they may struggle to understand fundamental concepts and resort to rote memorization without a deep comprehension of the subject matter. This problem is exacerbated in rural areas, where pupils may have minimal exposure to English outside the classroom. For example, in Obot Akara Local Government Area, many pupils primarily communicate in local dialects at home and within their communities. Consequently, these pupils may find it difficult to engage with scientific content when taught exclusively in English, resulting in lower achievement levels compared to their urban counterparts who may have greater English language exposure.

The problem, therefore, lies in the potential mismatch between the language of instruction and pupils' linguistic backgrounds, particularly in rural areas where exposure to English may be limited. If pupils are unable to comprehend scientific content due to language barriers, their achievement in Basic Science is likely to be negatively impacted. This issue has significant implications for their future educational and career opportunities, particularly in fields that require a solid foundation in science. It also highlights the need for educational policies that consider the linguistic diversity of pupils and the role that language plays in academic achievement. This study seeks to address these gaps by examining the effect of language instruction—using both English and local dialects on the Basic Science achievement of pupils in selected public schools in Obot Akara Local Government Area. Specifically, it aims to investigate whether there are differences in achievement scores based on the language of instruction and demographic factors such as gender, urban-rural location, and age. By exploring these issues, this study seeks to provide evidence-based insights into how language instruction policies can be optimized to support science learning for all pupils, regardless of their linguistic background.

Purpose of the Study

The main purpose of this study is to examine the effect of language of instruction on the Basic Science achievement of pupils in selected public schools in Obot Akara Local Government Area of Akwa Ibom State. Specifically, the study sought to:

1. Examine the difference in the mean achievement scores of pupils taught Basic Science using Local dialect methods and those taught using English.

2. Determine the difference in the mean achievement scores of male and female pupils taught Basic Science taught using Local dialect method.
3. Determine the difference in the mean achievement scores of urban and rural pupils taught Basic Science taught using Local dialect method.

Research Questions

The study addressed the following research questions:
1. What is the difference in the mean achievement scores of pupils taught Basic Science using Local dialect methods and those taught using English?
2. What is the difference in the mean achievement scores of male and female pupils differ taught Basic Science using Local dialect methods?
3. What is the difference in achievement scores between urban and rural pupils taught Basic Science using Local dialect methods?

Research Hypotheses

The following hypotheses guided this study and tested at .05 level of significance:
1. There is no significant difference in the mean achievement scores of pupils taught Basic Science using Local dialect methods and those taught using English.
2. There is no significant difference in the mean achievement scores of male and female pupils taught Basic Science using Local dialect method.
3. There is no significant difference in the mean achievement scores of urban and rural pupils taught Basic Science using Local dialect method.

Research Method

This study adopted a quasi-experimental research design, specifically a pretest-post-test non-equivalent control group design. The design was chosen because random assignment of subjects to treatment and control groups was not possible. Instead, intact classes were used as experimental and control groups. The study was conducted in Obot Akara Local Government Area in Akwa Ibom State, Nigeria. The population of the study consisted of 1576 primary one pupils in 38 public primary schools. A sample size of 61 primary one pupils from four intact classes was used in the study. The researcher used a multi-stage sampling procedure, clustering the entire primary one pupils and randomly selecting four primary schools. The study used a researcher-made instrument, Basic Science Achievement Test (BSAT), which was validated and found reliable. The study used mean and standard deviation to answer research questions and analysis of covariance (ANCOVA) to test hypotheses at a 0.05 level of significance. The researcher controlled for extraneous variables and used various statistical and methodological controls to ensure the integrity of the study. The decision rule was based on mean difference and p-values, where a higher mean difference indicated better achievement, and null hypotheses were rejected or retained based on p-values.

Research Question One

What is the difference in mean achievement scores of pupils taught Basic Science using English language and those taught using Local dialect method in Obot Akara Local Government Area?

Table 1: Mean and Standard Deviation and mean difference in the mean achievement scores of pupils taught Basic Science using English language and those taught using Local dialect method

Group	n	Pretest $\bar{X}$	SD	Posttest $\bar{X}$	SD	Mean Difference
Experimental group (Local Dialect Method)	30	30.80	10.13	44.00	5.45	13.2
Control group (English Language)	31	30.70	4.60	32.32	6.49	1.62

The result in Table 1 revealed the pretest and posttest means of experimental group (those taught using Local dialect method) of 30.80 and 44.00 with their respective standard deviations of 10.13 and respectively 5.45. The result further shows the pretest and post-test means of control group (those taught using English Language)) of 30.70 and 32.32 with a respective standard deviations of 4.60 and 6.49. Comparing mean differences of those in the experimental group with those in the control group implies that there is difference in the mean achievement scores of pupils taught Basic Science using English language and those taught using Local dialect method in Obot Akara Local Government Area. The result also implies that pupils taught using Local dialect method had a higher mean difference (13.2) compared to the using English Language (1.62).

Research Question Two

What is the difference in the mean achievement scores of male and female pupils taught Basic Science using Local dialect method in Obot Akara Local Government Area?

Table 2: Mean and Standard Deviation on mean difference in the mean achievement scores of male and female pupils taught Basic Science using Local dialect method

Gender	n	Pretest $\bar{X}$	SD	Posttest $\bar{X}$	SD	Mean Difference
Male	14	30.57	10.59	44.42	3.25	14.05
Female	16	31.00	10.06	42.87	6.77	11.87

The result in Table 2 revealed the pretest and posttest means of male pupils taught using Local dialect method) of 30.57 and 44.42 with their respective standard deviations of 10.59 and respectively 3.25. The difference between the pretest and posttest mean was 14.05.The result further shows the pretest and post-test means of female pupils taught using Local dialect method of 31.00 and 42.87 with respective standard deviations of 10.06 and 6.77. The difference between the pretest and posttest mean was 11.87. For both urban and rural pupils, the posttest means were greater than the pretest mean with male pupils having slight higher mean in achievement in Basic Science concepts than their female counterparts.

Research Question Three

What is the difference in the mean achievement scores of urban and rural pupils taught Basic Science using Local dialect method in Obot Akara Local Government Area?

Table 3: Mean and Standard Deviation on mean difference in the mean achievement scores of urban and rural pupils taught Basic Science using Local dialect method

Location	n	Pretest $\overline{X}$	SD	Posttest $\overline{X}$	SD	Mean Difference
Urban	17	29.52	12.15	40.76	9.31	11.24
Rural	13	32.46	6.78	44.30	2.68	11.84

The result in Table 3 revealed the pretest and posttest means of urban pupils taught using Local dialect method) of 29.52 and 40.76 with their respective standard deviations of 12.15 and respectively 9.31. The difference between the pretest and posttest mean was 11.24.The result further shows the pretest and post-test means of rural pupils taught using Local dialect method of 40.76 and 44.30 with respective standard deviations of 6.78 and 2.68. The difference between the pretest and posttest mean was 11.84. For both urban and rural pupils, the posttest means were greater than the pretest mean with rural pupils having slight higher mean in achievement in Basic Science concepts than their urban counterparts.

Hypothesis One

There is no significant difference in the mean achievement scores of pupils taught Basic Science using English language and those taught using Local dialect method in Obot Akara Local Government Area.

Table 4: Result of Analysis of Covariance (ANCOVA) of the significant difference in the mean achievement scores of pupils taught Basic Science using English language and those taught using Local dialect method

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2353.712[a]	2	1176.856	36.816	.000
Intercept	3171.098	1	3171.098	99.202	.000
Pretest	274.748	1	274.748	8.595	.005
Method of Teaching	2070.038	1	2070.038	64.758	.000
Error	1854.026	58	31.966		
Total	92596.000	61			
Corrected Total	4207.738	60			

a. R Squared = .559 (Adjusted R Squared = .544)

The result in Table 4 shows that an F-ratio of 64.758 with an associated probability value of 0.000 was obtained with regards to the difference in mean achievement scores of pupils taught Basic Science using English language and those taught using Local dialect method. Since the associated probability of 0.000 was less than .05, the null hypothesis one is therefore rejected. This implies that there is a significant difference in mean achievement scores of pupils taught Basic

Science using English language and those taught using Local dialect method in Obot Akara Local Government Area.

Hypothesis Two

There is no significant difference in the mean achievement scores of male and female pupils taught Basic Science using Local dialect method in Obot Akara Local Government Area.

Table 5: Result of Analysis of Covariance (ANCOVA) of the significant difference in mean achievement scores of male and female pupils taught Basic Science using Local dialect method

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	20.310[a]	2	10.155	.333	.720
Intercept	5209.914	1	5209.914	170.943	.000
Pretest	2.288	1	2.288	.075	.786
Gender	18.290	1	18.290	.600	.445
Error	822.890	27	30.477		
Total	57872.000	30			
Corrected Total	843.200	29			

a. R Squared = .024 (Adjusted R Squared = -.048)

The result in Table 6 shows that an F-ratio of 0.600 with an associated probability value of 0.445 was obtained with regards to the difference in mean achievement scores of male and female pupils taught Basic Science using Local dialect method. Since the associated probability of 0.445 was greater than .05, the null hypothesis two is therefore retained. This implies that there is no significant difference in mean achievement scores of male and female pupils taught Basic Science using Local dialect method in Obot Akara Local Government Area.

Hypothesis Three

There is no significant difference in the mean achievement scores of urban and rural pupils taught Basic Science using Local dialect method in Obot Akara Local Government Area.

Table 6: Result of Analysis of Covariance (ANCOVA) of the significant difference in the mean achievement scores of urban and rural pupils taught Basic Science using Local dialect method

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	239.199[a]	2	119.599	2.433	.107
Intercept	3486.171	1	3486.171	70.927	.000
Pretest	146.727	1	146.727	2.985	.095
Location	60.029	1	60.029	1.221	.279
Error	1327.101	27	49.152		
Total	55245.000	30			
Corrected Total	1566.300	29			

a. R Squared = .153 (Adjusted R Squared = .090)

The result in Table 6 shows that an F-ratio of 1.221 with an associated probability value of 0.279 was obtained with regards to the difference in the mean achievement scores of urban and rural pupils taught Basic Science using Local dialect method. Since the associated probability of 0.000 was greater than .05, the null hypothesis three is therefore retained. This implies that there is a significant difference in the mean achievement scores of urban and rural pupils taught Basic Science using Local dialect method in Obot Akara Local Government Area.

Discussion of Findings

The findings obtained in research question one revealed that pupils' taught with Local dialect methods (experimental group) had higher mean difference than those taught with English Language. This is possible because there existed mean difference between the experimental and control groups in favour of the experimental group. In testing hypothesis one, the finding revealed that there is a significant difference in the mean achievement scores of pupils taught Basic Science using English language and those taught using Local dialect method. The findings of this study is in line with the work of Eze and Ugwu (2022) who found that pupils taught in their local dialect achieved significantly higher academic scores in Basic Science compared to those instructed in English. In same vein, the finding with agrees Ifeanyi and Chika (2020) who discovered a direct correlation between language proficiency and performance; pupils who learned in their native language performed better in science subjects.

The data analysis for research question and hypothesis two revealed a notable finding: there was no significant difference in the mean achievement scores of male and female pupils taught Basic Science using English language versus those taught using local dialect method. This suggests that the language of instruction does not have a differential impact on the academic achievement of male and female pupils in Basic Science. Furthermore, the finding implies that both male and female pupils perform similarly regardless of the language used to teach them.

However, this finding contradicts the study by Nwankwo and Eze (2021), which found that gender significantly influenced performance, with girls achieving better results in language-based assessments. Interestingly, Okwu and Obasi's (2022) study seems to support both perspectives, as they found gender differences favoring girls in language-based assessments. Meanwhile, Eze and Chukwuemeka (2023) highlighted the importance of motivation in performance, finding notable gender differences in motivational factors. The mixed results underscore the complexity of factors influencing academic achievement and suggest that further research is needed to clarify the relationships between language of instruction, gender, and motivation in Basic Science.

The analysis revealed a notable finding: rural pupils had a slightly higher mean achievement in Basic Science concepts compared to their urban counterparts. This suggests that rural pupils performed marginally better in Basic Science, although the difference is not substantial. Furthermore, the study found no significant difference in the mean achievement scores of urban and rural pupils taught Basic Science using English language versus those taught using local dialect method. This implies that the language of instruction does not have a significant impact on pupils' achievement in Basic Science, regardless of their geographical location.

These findings contradict previous research, such as Adeyemi and Ogunsanya (2021), which found a significant difference in academic performance between urban and rural pupils, with urban pupils outperforming their rural counterparts. Similarly, Nwankwo and Eze (2020) discovered that urban pupils significantly outperformed their rural peers in academic assessments. The disparity in findings could be attributed to various factors, including differences in study design, population, or context. Some studies suggest that rural pupils can perform as well as or even better than urban pupils due to factors like fewer distractions and a more focused learning environment. For instance, research has shown that rural schools can have higher achievement levels than urban schools, possibly due to the absence of urban-related distractions and the presence of a more homogenous student population.

Conclusion

Based on the findings of this study, the conclusion reached that the language of instruction plays a significant role in pupils' achievement in Basic Science, with a notable difference in mean achievement scores between those taught using English language and those taught using Local dialect methods. However, the study also indicates that gender and geographical location do not influence pupils' achievement in Basic Science, as evidenced by the lack of significant differences in mean achievement scores between male and female pupils, as well as between urban and rural pupils.

Recommendations

Based on the conclusion of the study the following recommendations were made:

i. The study found the use of Local Dialect Method effective in enhancing meaningful learning in Basic Science, thus teachers should be encouraged to use Local Dialect method in teaching pupils Basic Science concepts.

ii. The State Ministry of Education should provide instructional materials, which are needed for the implementation of Basic Science as a method of teaching

iii. Both the State and the Federal Government should organize workshops, seminars and talk shows for preschool teachers on how to use Local Dialect Method in the teaching and learning process.

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