

**ACADEMIC ENGAGEMENT AND SELF-REGULATED LEARNING AS
PREDICTORS OF PRIMARY SCHOOL PUPILS' ACADEMIC ACHIEVEMENT IN
ENGLISH STUDIES IN EBONYI STATE**

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Abstract

For primary school education, promoting both academic engagement and self-regulated learning is crucial. Teachers should design interactive lessons, encourage goal setting, provide feedback, and teach simple self-monitoring strategies. The study determined academic engagement and self-regulated learning as predictors of primary school pupils' academic achievement in English Studies in Ebonyi State. Five purposes, five research questions guided the study and five hypotheses tested at 0.05 level of significance. The study adopted a correlational research design. The population of the study consisted of all 12,410 Primary school Five (Pri. 5) pupils of the 1,088 government owned (public) primary schools Ebonyi State who enrolled for 2025/2026 academic session with a sample of 400 primary five (127 male and 273 female) pupils which was determined using multi-stage sampling procedure. Data was collected using the Pupils' Academic Engagement Questionnaire (PAEQ), Pupils' Self-Regulated Learning Questionnaire (PSRLQ) and pupils' academic achievement scores from their promotion examination results in English Studies in Primary 4 for 2024/2025 academic session. The instruments were validated by three experts. Using Crombach Alpha method, the reliability coefficients of the instruments were estimated to be 0.82 and 0.86 with overall reliability of 0.84. The researcher together with six research assistant collected data for the study. Ordinary Least Square simple was used to answer the research questions while multiple regression was used to test the null hypotheses at 0.05 level of significance. Findings among others revealed that there is a positive prediction between academic engagement and pupils' academic achievement in English Studies in Ebonyi State. Also, there was a positive significant prediction between academic self-regulated learning and pupils' academic achievement in English Studies in Ebonyi State. Based on the findings, it was recommended among others that, English Studies teachers should adopt learner-centred

instructional strategies that promote pupils' active participation in classroom activities. Again, school administrators and head teachers should organize regular in-service training, workshops, and seminars for primary school teachers on strategies for fostering academic engagement and self-regulated learning among pupils.

Keywords: *Academic engagement, Self-regulated learning, Academic achievement, English Language, and Primary School Pupils*

Introduction

English Studies is widely recognized as a global language of communication and one of the most spoken languages in the world. It plays an essential role in connecting people across nations, particularly in areas such as education, science, business, and technology. In countries like the United Kingdom, the United States, and Australia, English is used as a native language, while in countries such as Nigeria, it functions as a second or official language. One of the strengths of English lies in its rich vocabulary, flexible structure, and its ability to evolve with cultural and technological changes. In the Nigerian context, English Studies is especially important because it serves not only as a subject but also as the main medium through which teaching and learning takes place. It allows individuals from different linguistic and cultural backgrounds to communicate, share ideas, and participate in global discussions. In this sense, English Studies goes beyond communication; it acts as a bridge that links people and societies together (Nwankwo and Akudolu, 2024). At the primary school level in Nigeria, English Studies is a compulsory subject and occupies a central place in the curriculum. Despite the presence of many indigenous languages, English Studies serves as a unifying factor in the country's educational system and social life. The National Policy on Education (FRN, 2013) clearly highlights the importance of English as the official language and a tool for national unity. In the early years of schooling, pupils are first taught using their mother tongue or the language of their immediate environment. Gradually, English is introduced to help them develop skills in listening, speaking, reading, and writing. This gradual transition, as noted by Nwankwo and Akudolu (2024), helps pupils build a strong foundation in both their native language and English, enabling them to function effectively in different environments.

In Nigeria's educational system, English Studies serves a dual purpose: it is both a subject on its own and the language through which other subjects are taught. Because of this, it is often seen as the foundation of academic success. For example, pupils must obtain at least a credit pass in English Studies to gain admission into Nigerian universities, which shows how important the subject is for further education. According to Nwachukwu and Sunday (2022), one of the major goals of education in Nigeria is to ensure that learners develop strong competence in English. Without this competence, pupils may struggle academically and even face challenges in their personal development. The primary school stage is particularly important because it lays the groundwork for future learning (Ike-Nwafor, 2020). In addition, English is the language used in government, administration, and official communication, which further emphasizes the need for pupils to have a good command of it (Nwankwo and Akudolu, 2024). However, despite the importance of English Studies, pupils' performance in the subject has remained a major concern. Many pupils continue to perform poorly in English, both in classroom assessments and in national examinations such as the National Common Entrance Examination (NCEE). Studies by Mekiliuwa (2018), Ike-Nwafor (2020), Usman and Noviana (2021), and Nwankwo and Akudolu (2024) all point to the same issue of unsatisfactory academic achievement in English Studies. Reports from the NCEE between 2020 and 2024 also show fluctuating and generally low mean scores, indicating that the problem has persisted over time. This situation is troubling, especially considering the central role of English in education. Several factors have been identified as contributing to this poor performance. These include ineffective teaching methods, lack of adequate learning materials, shortage of qualified teachers, and limited exposure to English outside the classroom (Nwankwo and Akudolu, 2024). In many homes, English is not the primary language of communication, which makes it difficult for pupils to practice what they learn in school (Okika, Anyamene and Anyachebelu, 2021). As a result, many pupils struggle with basic language skills such as reading, writing, speaking, and listening. Since English is the medium of instruction for most subjects, poor proficiency in the language often affects overall academic achievement.

Academic achievement generally refers to how well pupils perform in their studies and how much of the learning objectives they are able to achieve. It is usually measured through tests, examinations, and continuous assessments. Berkley and Chang (2022) describe it as the

attainment of educational goals, while Inyang (2022) sees it as an indicator of how well pupils meet expected learning outcomes. In simple terms, it reflects how much a pupil has learned and how well they can apply that knowledge. To the researcher, academic achievement refers to the extent a learner has attained educational goals, knowledge, skills and competencies as prescribed by a curriculum or learning objectives. According to Agu, Ezeugo, and Okafor (2024), academic achievement shows how well learners perform in cognitive tasks compared to a set standard. Pupils who perform well academically often feel more confident and satisfied, while those who perform poorly may struggle with low self-esteem (Mbaegbu, Ikeanumba and Anazodo, 2023). Academic achievement is influenced by many factors, including intelligence, motivation, teaching methods, and the learning environment. However, recent attention has shifted toward psychological factors such as academic engagement and self-regulated learning. These factors are sometimes overlooked by teachers and school counselors, even though they play an important role in how pupils learn and perform (Agu, Anikpe and Ikeanumba, 2024). Therefore, academic achievement can be understood not only as a product of cognitive ability and instructional quality but also as a direct outcome of the degree of academic engagement exhibited by learners in the learning process.

Academic engagement refers to how actively involved pupils are in their learning. It includes their interest, participation, effort, and emotional connection to school activities (Ayoola, 2023). When pupils are engaged, they pay attention in class, participate in discussions, complete their assignments, and show a genuine interest in learning. Research has shown that engaged pupils are more likely to succeed academically because they are motivated and committed to their studies (Imaobong and Mfonobong, 2023; Gunuc and Kuzu, 2024). Engagement also encourages pupils to take responsibility for their learning, which leads to better outcomes. Operationally, academic engagement refers to the degree pupils are actively involved, committed and invested in their learning activities and educational experiences. Academic engagement provides the motivational and behavioral foundation through which academic achievement is realized. Pupils who are actively engaged in learning attending classes regularly, participating in discussions, completing assignments, and investing cognitive effort in understanding concepts are more likely to achieve higher academic scores. This is because engagement enhances attention, persistence, and depth of processing, all of which are essential

for meaningful learning and retention. Conversely, low academic engagement often results in poor academic achievement. Pupils who are disengaged tend to exhibit reduced interest in schoolwork, minimal effort in learning tasks, and weak commitment to academic goals, which ultimately reflect in their performance outcomes (Lawal et al., 2025). Closely related to engagement is self-regulated learning.

Self-regulated learning refers to pupils' ability to manage their own learning by setting goals, planning their activities, monitoring their progress, and evaluating their performance (Anikpe, Agu and Ikeanumba, 2024). Self-regulated learners are active participants in their learning process. They know what they want to achieve and take steps to achieve it. They also reflect on their performance and make adjustments when necessary. According to Burman, Green, and Shanker (2015), self-regulated learning involves thinking about one's thinking (metacognition), using appropriate strategies, and staying motivated. To the researcher, self-regulated learning (SRL) refers to the process through which pupils actively plan, monitor, control and evaluate their own learning in order to achieve academic goals. Pupils who develop these skills tend to perform better academically because they are more independent and focused. Primary school pupils, usually between the ages of six and eleven, are at a very important stage of development. This is the period when they begin to build basic skills in reading, writing, and thinking, as well as develop attitudes toward learning. In addition, helping pupils develop curiosity and self-regulation skills at an early stage can positively influence their academic success (Abdelghani et al., 2024). This highlights the need to pay attention not only to what pupils learn but also to how they learn. The relationship between curiosity, self-regulation skills, and academic achievement can also be viewed through the lens of gender differences, as research suggests that boys and girls may differ in how they express and develop these learning-related traits.

Gender is another factor that has been widely studied in relation to academic achievement. It refers to the biological differences between males and females (Obikezie, Nwuba and Ibe, 2023). However, findings on gender differences in English achievement have been mixed. Some studies suggest that female pupils perform better, others indicate that male pupils perform better, while some find no significant difference at all. This inconsistency shows that gender alone may not fully explain differences in academic performance and that other factors

need to be considered. While English Studies remains a crucial subject in Nigeria's education system, pupils' performance in the subject continues to be a concern. Many previous studies have focused mainly on teaching methods and environmental factors, often neglecting important psychological variables such as academic engagement and self-regulated learning. Yet, existing research suggests that these factors play a significant role in shaping pupils' academic outcomes. Although some studies have examined these variables separately, there is still limited research on how they work together to influence pupils' achievement in English Studies. This gap highlights the need for further investigation, which is the focus of the present study to examine how academic engagement and self-regulated learning jointly predict primary school pupils' academic achievement in English Studies in Ebonyi State, regardless of gender.

Statement of the Problem

English Studies is a core subject in the Nigerian educational system and serves as the primary medium of instruction across all levels of education. It is not only a subject of study but also a fundamental tool for communication, learning, and cognitive development. At the primary school level, English Studies is designed to equip pupils with essential language skills such as listening, speaking, reading, and writing, which are necessary for effective participation in academic and social activities. Despite the central role of English Studies in Nigeria's educational system, many primary school pupils in Ebonyi State continue to perform below expectations in the subject. Reports from internal school assessments and external examinations suggest persistent challenges in pupils' reading comprehension, writing skills, and overall language proficiency. This situation raises concerns among educators, parents, and policymakers, especially given that English serves as the medium of instruction for most school subjects and a foundation for further academic success.

Several factors have been identified as contributing to pupils' poor academic achievement in English Studies, including inadequate teaching methods, limited instructional materials, and learners' socio-economic backgrounds. However, beyond these external factors, there is growing recognition that pupils' internal learning characteristics particularly their level of academic engagement and ability to regulate their own learning play a crucial role in determining academic outcomes. Academic engagement, which encompasses behavioural, emotional, and cognitive involvement in learning tasks, is essential for sustaining attention and

active participation in classroom activities. Similarly, self-regulated learning, which involves goal setting, self-monitoring, and strategic learning behaviours, enables pupils to take control of their learning process. In many primary schools in Ebonyi State, pupils often exhibit low levels of engagement, such as inattentiveness, lack of interest, and minimal participation during English lessons. Additionally, many pupils appear to lack essential self-regulatory skills, including effective study habits, time management, and the ability to monitor their own understanding. These issues may significantly hinder their academic achievement, yet they are often overlooked in classroom practice and educational research within the local context.

Although previous studies have examined factors influencing academic achievement, there is limited empirical evidence specifically investigating how academic engagement and self-regulated learning jointly predict pupils' achievement in English Studies at the primary school level in Ebonyi State. This gap creates uncertainty about the extent to which these learner-related variables contribute to academic performance and how they can be effectively enhanced to improve learning outcomes. It is against this backdrop that the present study seeks to examine academic engagement and self-regulated learning as predictors of primary school pupils' academic achievement in English Studies in Ebonyi State. The problem of this study, therefore, is the persistent poor academic achievement of pupils in English Studies and the insufficient understanding of how their engagement and self-regulatory capacities influence this outcome.

Research Questions

The following research questions guided the study

1. What is the predictive value of pupils 'academic engagement on their academic achievement in English Studies Ebonyi State?
2. What is the predictive value of male and female pupils 'academic engagement on their academic achievement in English Studies in Ebonyi State?
3. What is the predictive value of pupils 'self-regulated learning on their academic achievement in English Studies in Ebonyi State?
4. What is the predictive value of male and female pupils self-regulated learning on' their academic achievement in English Studies in Ebonyi State?
5. What is the joint predictive value of pupils' academic engagement, self-regulated learning and their academic achievement in English Language in Ebonyi State?

Hypotheses

The following hypotheses were tested at 0.05 level of significance:

1. Pupils' academic engagement does not significantly predict their academic achievement in English Language
2. Male and female pupils' academic engagement does not significantly predict their academic achievement in English Studies.
3. Pupils' self-regulated learning does not significantly predict their academic achievement in English Studies.
4. Male and female pupils' self-regulated learning does not significantly predict their academic achievement in English Studies.
5. Pupils' academic engagement, self-regulated learning does not jointly predict their academic achievement in English Studies.

Methods

The study adopted a correlational research design. The population of the study consisted of all 12,410 Primary school Five (Pri. 5) pupils of the 1,088 government owned (public) primary schools Ebonyi State who enrolled for 2025/2026 academic session with a sample of 400 primary five (127 male and 273 female) pupils which was determined using multi-stage sampling procedure. Data was collected using the Pupils' Academic Engagement Questionnaire (PAEQ), Pupils' Self-Regulated Learning Questionnaire (PSRLQ) and pupils' academic achievement scores from their promotion examination results in English Studies in Primary 4 for 2024/2025 academic session. The instruments were validated by three experts. Using Cronbach Alpha method, the reliability coefficients of the instruments were estimated to be 0.82 and 0.86 with overall reliability of 0.84. The researcher together with six research assistant collected data for the study. Ordinary Least Square simple regression was used to answer the research questions while multiple regression was used to test the null hypotheses at 0.05 level of significance.

Results

Research Question One: What is the predictive value of pupils' academic engagement on their academic achievement in English Studies Ebonyi State?

Table 1: *Linear Regression Analysis on the Predictive Value of Academic Engagement on Achievement of Primary School Pupils in English Studies*

Model	R	R Squared	Adjusted R Squared
1	.724	.244	.245

The regression analysis shows a strong positive relationship between academic engagement and pupils' academic achievement in English Studies ($R = 0.724$). Academic engagement accounts for 24.4% of the variation in achievement ($R^2 = 0.244$), indicating it is a significant predictor, although other factors also influence performance. The Adjusted R^2 (0.245) confirms the model's reliability and consistency.

Hypothesis One: Pupils' academic engagement scores in English Studies do not significantly predict their academic achievement.

Table 2: *Multiple Regression Analysis on the Significant Prediction of Academic Engagement on Primary School Pupils' Academic Achievement in English Studies*

Model	Sum of Squares	df	Mean Square	F	t-cal	Sig.
Regression	16.463	1	16.463	44.427	-6.665	.000
Residual	333.878	399	.371			
Total	350.341	400				

The multiple regression analysis reveals that academic engagement significantly predicts pupils' academic achievement in English Studies. The model is statistically significant ($F = 44.427$, $p < 0.05$), indicating that variation in achievement is meaningfully explained by academic engagement. The significant t-value ($t = -6.665$, $p < 0.05$) further confirms its contribution. Therefore, Hypothesis 1 is rejected, showing that academic engagement is a significant predictor of pupils' achievement.

Research Question Two: What is the predictive value of male and female pupils 'academic engagement on their academic achievement in English Studies in Ebonyi State?

Table 3: *Linear Regression Analysis on the Predictive value of Academic Engagement on Male and Female Primary School Pupils academic achievement in English Studies*

Gender	Model	R	R Squared	Adjusted R Squared	Fchange	Std. Error of the Estimate
Male	1	0.762 ^a	.210	.212	.420	6.64204
Female	1	0.742 ^a	.272	.237	.822	6.37861

a. Predictor: (Constant), Academic Engagement in English Studies

The regression results show that academic engagement is a strong positive predictor of academic achievement in English Studies for both male and female pupils. For males, academic engagement explains 21.0% of the variance ($R^2 = 0.210$), while for females it explains a higher 27.2% ($R^2 = 0.272$), indicating stronger predictive power among female pupils. The models for both groups are stable and reliable, with slightly more precise predictions for females. Overall, academic engagement significantly influences achievement for both genders, but more strongly for female pupils.

Hypothesis Two: Male and female pupils' academic engagement does not significantly predict their academic achievement in English Language.

Table 4: *Regression Analysis of the Prediction of Male and Female Pupils' Academic Engagement on Academic Achievement in English Studies*

Gender	Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig
		B	Std. Error Beta		
Male	Academic Engagement	.714	.484	.0708	.718
Female	Academic Engagement	.730	.340	.0610	.333

The regression coefficients indicate that academic engagement positively and significantly predicts academic achievement for both male and female pupils. For males ($B = 0.714$, $p < 0.05$) and females ($B = 0.730$, $p < 0.05$), the relationships are statistically significant, confirming that increased engagement leads to higher achievement in English Studies. Therefore, Hypothesis 2 is rejected for both groups, showing that academic engagement is a significant predictor of achievement for male and female pupils separately.

Research Question Three: What is the predictive value of pupils' self-regulated learning on their academic achievement in English Studies in Ebonyi State?

Table 5: *Linear Regression Analysis on the Predictive Value of Academic Self-Regulated Learning on Academic Achievement of Pupils in English Studies*

Model	R	R Squared	Adjusted R Squared
1	.866	.332	.321

The analysis reveals a very strong positive relationship between self-regulated learning and pupils' academic achievement in English Studies ($R = 0.866$). Self-regulated learning explains 33.2% of the variance in achievement ($R^2 = 0.332$), indicating it is a substantial predictor. The Adjusted R^2 (0.321) confirms the model's stability, showing that self-regulated learning significantly contributes to pupils' academic achievement.

Hypothesis Three: Pupils' self-regulated learning does not significantly predict their academic achievement in English Language.

Table 6: *Multiple Regression Analysis on the Significant Prediction of Academic Self-Regulated Learning on Pupils' Academic Achievement in English Studies*

Model	Sum of Squares	df	Mean Square	F	t-cal	Sig.
Regression	14.994	1	14.994	40.285	-6.347	.21
Residual	335.347	399	.372			
Total	350.341	400				

The regression analysis shows that although academic achievement explains only a small proportion of the variance in self-regulated learning, the model is statistically significant ($F = 40.285$, $p < 0.05$). The significant t-value ($t = 6.347$, $p < 0.05$) further confirms the relationship. Therefore, Hypothesis 3 is rejected, indicating that self-regulated learning significantly predicts pupils' academic achievement in English Studies.

Research Question Four: What is the predictive value of male and female pupils self-regulated learning on their academic achievement in English Studies in Ebonyi State?

Table 7: *Linear Regression Analysis on the Predictive value of Self-Regulated Learning on Academic Achievement of Male and Female Pupils in English Studies*

Gender	Model	R	R Squared	Adjusted R Squared	Fchange	Std. Error of the Estimate
Male	1	.785 ^a	.270	.242	.371	3.25410
Female	1	.762 ^a	.323	.335	.443	4.13521

a. Predictor: (Constant), Self-Regulated Learning in English Studies

Self-regulated learning significantly and positively predicts academic achievement in English Studies for both male and female pupils. It explains more variance in achievement among females (32.3%) than males (27.0%), indicating stronger predictive power for female pupils. Overall, the models are stable and show that self-regulated learning has a meaningful influence on achievement for both groups.

Hypothesis Four: Male and female pupils' academic achievement scores in English Studies do not significantly predict by their self-regulated learning.

Table 8: *Regression Analysis of the Prediction of Male and Female Pupils' Self- Regulated Learning on Academic Achievement in English Studies*

Gender	Model	Unstandardized	Standardized	T	Sig
		Coefficients	Coefficients		
		B	Std. Error	Beta	
Male	Self-Regulated Learning	.839	.331	.0719	.211
Female	Self-Regulated Learning	.833	.352	.0822	.321

The regression coefficients show that academic achievement significantly predicts self-regulated learning for both male and female pupils. For males ($B = 0.839$, $p < 0.05$) and females ($B = 0.833$, $p < 0.05$), the relationships are positive and statistically significant. Therefore, Hypothesis 4 is rejected, indicating that self-regulated learning in English Studies is significantly influenced by pupils' academic achievement for both genders.

Research Question Five: What is the joint predictive value of pupils' academic engagement, self-regulated learning and their academic achievement in English Language in Ebonyi State?

Table 9: *Linear Regression Analysis on the Joint Predictive Power of Pupils Academic Engagement and Self-Regulated Learning on their Academic Achievement in English Studies*

Model	R	R Squared	Adjusted R Squared
1	.893	.201	.604

The joint regression analysis shows a very strong positive relationship between academic engagement, self-regulated learning, and pupils' academic achievement in English Studies ($R = 0.893$). Together, the two predictors explain 20.1% of the variance in achievement ($R^2 = 0.201$), indicating a meaningful combined influence, although other factors also contribute. The Adjusted R^2 suggests that the model remains stable after adjustment, confirming the reliability of

the joint predictive effect. Overall, academic engagement and self-regulated learning jointly predict pupils' academic achievement in English Studies.

Hypothesis Five: Pupils' Academic Engagement and Self-Regulated Learning does not jointly predict their academic achievement in English Studies.

Table 10: *Multiple Regression Analysis on the Joint Prediction of Pupils Academic Engagement and Self-Regulated Learning on their Academic Achievement in English Studies*

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	85.308	1	17.362		
				96.456	.000
Residual	265.033	399	.295		
Total	350.341	400			

The results show that academic engagement and self-regulated learning jointly have a significant effect on pupils' academic achievement in English Studies. The model is statistically significant ($F = 96.456$, $p < 0.05$), indicating that both variables together meaningfully predict achievement. Therefore, Hypothesis 5 is rejected, confirming that academic engagement and self-regulated learning significantly co-predict pupils' academic achievement in English Studies.

Discussion of Findings

The study found that academic engagement has a positive relationship with pupils' academic achievement in English Studies and explains 24.4% of the variance in performance ($R^2 = 0.244$). This indicates that higher engagement leads to better achievement. The finding aligns with previous studies such as (Unachukwu et al., 2022; Asanre et al., 2024; Okere and Ikeh, 2025; Lawal et al., 2025; and Hamman et al., 2025), which also reported that academic engagement significantly predicts academic achievement across different levels and subjects. Overall, the results confirm that academic engagement significantly enhances pupils' achievement in English Studies in Ebonyi State.

The study found that academic engagement positively predicts academic achievement for both male and female pupils in English Studies, though the effect is stronger among females as

shown by their higher R^2 value. This agrees with studies such as Delfino (2019), Asanre, Ifamuyiwa, and Abiodun (2024), and Emesi and Anyanwu (2024), which also reported that academic engagement significantly predicts academic achievement for both genders, with females often performing better. Overall, the results confirm that academic engagement is a significant predictor of achievement for male and female pupils in English Studies in Ebonyi State.

Findings from the study showed a strong positive relationship between pupils' self-regulated learning and their academic achievement in English Studies. This indicates that pupils who effectively plan, monitor, and regulate their learning tend to perform better academically. The finding is supported by previous studies such as Kamel, Abdeen and Mohamed (2023), Okoli and Ezegeba (2025), and Anyanwu, Ezenwosu and Emesi (2025), which also reported that self-regulated learning significantly predicts academic achievement across different subjects and levels. Furthermore, hypothesis three revealed that self-regulated learning significantly predicts pupils' academic achievement in English Studies. This is consistent with findings by Sutarni et al. (2021), Suan (2023), and Anyanwu, Ezenwosu and Emesi (2025) all of whom established that students with higher self-regulated learning skills tend to achieve better academically. The findings confirm that higher levels of self-regulated learning led to improved academic achievement in English Studies among primary school pupils in Ebonyi State.

Findings from the study revealed that self-regulated learning positively predicts academic achievement in English Studies for both male and female pupils, with a slightly stronger effect among females. This aligns with studies such as Emesi and Anyanwu (2024) and Asanre, Ifamuyiwa, and Abiodun (2024), which reported that female learners often demonstrate stronger self-regulatory skills that enhance academic performance. It also agrees with Moghadari-Koosha et al. (2020), who found that self-regulated learning significantly predicts academic achievement across both male and female students.

Similarly, hypothesis four showed that self-regulated learning significantly predicts academic achievement for both genders. This is consistent with findings by Inggriyani and Hamdani (2019), Moghadari-Koosha et al. (2020), and Sutarni et al. (2021), all of which confirmed that self-regulated learning significantly enhances academic achievement. Overall, the findings emphasize that self-regulated learning is essential for success in English Studies, as it supports comprehension, reflection, and effective learning among both male and female pupils.

Findings from research question five revealed that academic engagement and self-regulated learning jointly have a positive and significant prediction on pupils' academic achievement in English Studies. This indicates that when both variables are combined, they meaningfully enhance pupils' academic performance, although other external factors also contribute to achievement. This finding is supported by Rodríguez-Llorente et al. (2021), Martincová et al. (2025), and Hamman, Filgona and Magaji (2025), who all reported that academic engagement and self-regulated learning jointly improve students' academic performance.

Similarly, findings from hypothesis five showed that the combined effect of academic engagement and self-regulated learning significantly predicts pupils' academic achievement in English Studies. This agrees with previous studies that established a significant joint contribution of both variables to academic achievement. The results confirm that enhancing both academic engagement and self-regulated learning leads to improved academic achievement in English Studies among primary school pupils in Ebonyi State.

Conclusion

This study established the predictive power of academic achievement in English Studies by pupils' academic engagement and self-regulated learning, separately and jointly. Based on the findings from the result, it can be concluded that the investigated academic engagement and self-regulated learning, predicted pupils' better academic achievements in English Studies, except for test-taking skills that predicted pupils' high academic achievement. The study further concluded that gender influence was significant in the prediction of achievement by academic engagement and self-regulated learning. These findings indicated that pupils' academic engagement and self-regulated learning, positively affected their academic achievement in English Studies in State.

Recommendations

The following recommendations were made for the study;

1. School administrators and head teachers should organize regular in-service training, workshops, and seminars for primary school teachers on strategies for fostering academic engagement and self-regulated learning among pupils. Such capacity-building

programmes will equip teachers with practical skills for enhancing pupils' learning experiences in English Studies classrooms

2. Teachers at the primary school level should explicitly teach self-regulated learning skills to pupils. This can be achieved by guiding pupils to set simple learning goals, monitor their understanding during lessons, manage their time effectively, and reflect on their learning outcomes.
3. Curriculum planners and educational policymakers, particularly at the Ebonyi State Universal Basic Education Board (SUBEB), should integrate activities that promote academic engagement and self-regulated learning into the primary school English Studies curriculum.
4. Teachers should encourage male and female primary school pupils to enhance their academic engagement and self-regulated learning skill for optimal academic achievement in school.

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**ASSESSMENT OF THE IMPLEMENTATION OF MOTHER TONGUE-BASED
MULTILINGUAL EDUCATION FOR ENHANCING EARLY LITERACY
DEVELOPMENT AMONG PRIMARY SCHOOL PUPILS IN ANAMBRA STATE**

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Abstract

This study evaluated the assessment of the implementation of Mother Tongue-Based Multilingual Education (MTB-MLE) in promoting early literacy of primary school pupils in Anambra State. Three research questions and three null hypotheses tested at 0.05 level of significance guided the study. The study adopted a descriptive survey study design. The population consists of 30,000 public primary school teachers and 76,612 private primary school teachers. The sample size comprised of 367 teachers, 260 private school teachers and 107 public school teachers in the 17 schools in six local government areas which was selected through a multi-stage sampling process. Questionnaire items constructed by the researcher titled Assessment of the Implementation of Mother Tongue Based Multilingual Education in Promoting Early Literacy Development of Primary School Pupils was used (AIMTBMEPELD). The reliability of the instrument was established using Cronbach's alpha which yielded reliability coefficient of 0.71, 0.94, and 0.62 with an overall coefficient of 0.75 which shows that the instrument was reliable. Mean and standard deviation were used to answer the research questions while t-test was used to test the hypotheses at 0.05 level of significance. The language of the child's immediate environment was used in instructional and assessment delivery in public primary school classrooms, but was not used in private school classrooms in primary schools in Anambra State. Findings showed that there were significant differences in the sectors: public schools use mother tongue (Igbo) to teach and provide learning materials, but the opposite is the case in private schools. Based on the findings, it was recommended among others that Ministry of education in Anambra state must enforce the application of the mother tongue (Igbo) as the first three-year primary education

medium of instruction both in the public and non-public schools in order to enforce equality in the acquisition of literacy. Findings also revealed that the instructional materials (textbooks and workbooks) developed with the language of the child's immediate environment were used in teaching in public primary school classrooms, but were not used in teaching in private primary schools in Anambra State. It was further revealed that teachers in public primary schools were trained in the use of mother tongue for instructional delivery while those in private primary schools in Anambra state were not trained.

Keywords: *Mother Tongue, Mother Tongue-Based Multilingual Education, Early Literacy Development.*

Introduction

Language serves as the basis for human communication, cognitive and cultural development. The learning of early-language in societies comprised of multiple tongues, which, is a major scholastic performance and literacy predictor. The application of Mother Tongue-Based Multilingual Education (MTB-MLE) is an educational approach acknowledging the pivotal contribution played by a child's mother or native tongue as a foundation for learning second and third languages and subject matters. This foundational role operates through several mechanisms: firstly, by building strong conceptual understanding in the familiar language before transferring knowledge to new languages; secondly, by developing metalinguistic awareness that facilitates additional language acquisition; and thirdly, by ensuring cognitive development that is uninterrupted while new languages are gradually introduced (Jacob, 2016). According to Gomez (2022), who opines that the approach is being popularly discussed in education all over the world, especially in multilinguistic societies like Nigeria in which there are over 500 different languages being spoken in a country. Anambra State, in South-East Nigeria accommodates monolingually Igbo-speaking territory for use in schools as prescribed in National Policy on Education (Federal Republic of Nigeria, 2013). The state is no different in reflecting nationwide dilemma in policy and practice regarding mother tongue instructions, particularly in early stages of primary schooling when literacy is consolidative and inceptively formed.

Mother tongue has been defined in many ways by scholars with different perspectives. Nishanthi (2020) opined that mother tongue is the language in which a person learns first,

identifies, knows best, and uses most often. Wiltchko (2022), also opined mother tongue as a language acquired in early years, which naturally becomes a person's instrument of thought and communication. In the context of this study, mother tongue can be defined as the indigenous language acquired first by the child, through which they first encounter and make sense of the world around them, develop initial cognitive structures and establish their cultural identity. According to Bosah, Okika and Anozie (2025), mother tongue is the language a person learned as a child at home which the child learns almost without any conscious effort on his/her part. In Nigeria, National Policy on Education (NPE) – FRN, (2013) has approved mother tongue as learning tool for early primary level. The policy states that the medium of instruction in the primary school shall be the language of the environment for the first three years. During this period, English shall be taught as a subject". Also, according to National Language Policy (2022), the following are the application and usage in basic education: To ensure effective delivery of instruction and attendant positive learning outcomes. Mother tongue or language of the immediate community shall be used as the medium of instruction from Early Childhood care and development education to six years of primary education. However Arabic language shall be the medium of instruction for Islamic schools. During this period, English Language shall be taught as a school subject; English language shall be used as language of instruction at the junior secondary education level. However, a combined use of English language and mother tongue or language of immediate community shall be encouraged accordingly; in addition to the study of English language and the mother tongue, a child shall be allowed to study, as an optional school subject, the Nigeria language of the community, if it is different from the mother tongue; Federal, State and Local Governments shall ensure the effective supervision of the teaching and learning of Nigerian languages; Sustained efforts shall be made to develop orthographic and metalanguages for the teaching and learning of all Nigerian language; Efforts shall be made to develop and produce educational material in the various Nigerian languages. Registers in Nigerian languages for the various school subjects shall be developed; and programmes and activities aimed at promoting the development and production of educational materials in the various Nigerian languages shall be encouraged and sustained.

Mother Tongue-Based Multilingual Education (MTB-MLE) is an educational framework and instructional approach that facilitates teaching and learning in and through a child's mother or native language before beginning instruction in foreign, second and/or third language(s). According to Namanya (2017), children most effectively acquire cognitive skills, literacy

competencies, and content knowledge when they initially learn in their most familiar language. Also, Lang-ay and Sannadan (2021) opined that initial teaching and learning in a child's most familiar language forms a strong framework for the additional languages to be systematically constructed through well-planned and purposeful transitional processes. MTB-MLE encompasses some key principles such as: learning is initiated in home best known to them; literacy is implemented in mother tongues and can be translated to foreign tongues; academic content is introduced in mother tongues prior to being introduced in foreign tongues; foreign tongues are introduced in a structured way while still learning in mother tongues; and information and cultural practices are integrated in learning context (Lang-ay and Sannadan, 2021; Wata *et al.*, 2024). The actual use of MTB-MLE however, had remained irregular and had glaring discrepancies in application and policy documented across Nigeria (Ozoemena *et al.*, 2021). These MTB-MLE implementation also have serious implications for the development of early literacy, which is a key educational purpose of language policy and planning in multilingual contexts.

Early literacy learning in multiple-language contexts is complex. It is the reading and writing behaviours that precede and develop into conventional literacy. According to Teale *et al* (2020), early literacy is seen as children's precursor knowledge, abilities, and attitudes related to later reading and writing. Li *et al.* (2019) posited that literacy learning in one is thought to be transposable to another, hence, early literacy learning in a child's mother language is justifiable. Also, UNESCO (2023), sees early literacy as the ability of children to identify, understand, interpret, create and communicate using language. Literacy achievement in research in varied contexts in Ethiopia (Seid, 2019), in the Philippines (Christina and Vinogradova, 2017), is better when early literacy in mother tongue is conducted prior to learning in second or foreign languages. In Nigeria, there are sufficient literacy improvement issues in instructional content shortage, class overcrowding, teacher training shortage and incoherence in policies (Sey, 2023). Similarly in Nigeria, Mizza (2014) opined that using a child's mother tongue in early literacy learning makes the process easier because it reduces mental effort which allows children to concentrate on understanding words and learning to read, without the added difficulty of trying to interpret a new or unfamiliar language at the same time; activating of existing language knowledge as scaffold for literacy skills, making meaningful connections between text and experience, and increasing metalinguistic awareness when comparing the two languages (Mizza, 2014). Operationally, early

literacy is the basic language of reading and writing skills children develops before formal schooling which prepares them for future reading and writing.

Despite policy and research promotion, Anambra State MTB-MLE may face with a string of problems. The resource is the lack of instructional and learning quality content in Igbo language, particularly subject content (Marettes, 2024). According to Ezepue *et al.* (2023) who opined that human resource constraints involve teacher preparation inadequacies, as many teachers lack sufficient training in mother tongue instruction methodologies and Igbo academic language proficiency. Similarly, Mbah *et al.* (2021) opined that sociocultural challenges are represented in form of declining intergenerational mother tongue use as the processes of globalization heighten, leading to some children entering schools lacking mother tongue literacy both in public and private schools.

Nigeria's educational framework is in a dual-sector model consisting of public and private schools (Ngene *et al.*, 2018), which take different approaches towards language of instruction policy. Studies show that private schools show low adoption rates of mother tongue use compared with public schools based mainly on market forces and preferences by parents for English-medium schools (Uba and Irudayasamy, 2023). Private schools make use of English as a competitive edge and sales promotional activity based on parents' belief that English-medium schools guarantee better socio-economic futures for their children (Uba and Irudayasamy, 2023). Socioeconomic indicators such as wealth, parents' educational level, and urban living are main drivers for private school enrolment so that families actively pursue English-dominated learning environments (Kumar and Choudhury, 2021). The gap between public schools and private schools extends further than rates of implementation to resource allocation and quality of instruction. Private schools' access greater infrastructure in libraries, computers, playgrounds, and laboratories relative to their public equivalents but show looser adherence to mother tongue policies in schools (Okediadi, 2011; Rahman *et al.*, 2020). Literature revealed student achievements in private secondary schools exceeding those in public schools based on English-medium instruction views (Mohammed and Abera, 2022; Sinabubaraga and Oniye, 2025). This generates difficulty, potentially provoking private schools with greater resources to disadvantage indigenous access in schools while schools with fewer resources in the public sector the better enforcer of policy goals for mother tongue bilingualism. Therefore, the study seeks to assess the implementation of mother

tongue based multilingual education for enhancing early literacy development among primary school pupils in Anambra state.

Statement of the Problem

The persistent problem of literacy underachievement among primary school pupils in Nigeria and Anambra state specifically, warrants close examination of basic education strategies (that is instructional language). Despite the National Policy on Education's emphasis on mother tongue usage in the early years of primary school pupils, assessment of primary school pupils in Nigeria seems to have consistently shown low levels of improvement in early literacy development.

In Anambra state, the implementation of MTB-MLE appears inadequate and largely ineffective. Observations by the researcher shows that many primary schools in Anambra state continue to rely so much on the use of English language as the language of instruction in the early grades. It seems also that some teachers lack adequate training and competence in the mother tongue pedagogy. Again, the instructional materials in the local language appears insufficient and, in some schools, non-existent. In some cases, it was observed that school administrators and parents' emphasis English proficiency over mother tongue literacy. Hence this study seeks to assess the implementation of mother tongue-based multilingual education for enhancing early literacy development among primary school pupils in Anambra state. Specifically, the study seeks to determine:

1. whether early primary school classroom instruction and assessment is being conducted using the mother tongue in public and private schools in Anambra State.
2. whether the instructional materials (textbooks and workbooks) used in teaching primary school pupils are developed with the mother tongue in public and private schools in Anambra State.
3. whether primary school teachers are trained in the use of mother tongue in classroom instruction and assessment in public and private schools in Anambra State.

Research Questions

The following research questions guided the study

1. Are early primary school classroom instructional and assessment deliveries being conducted using the mother tongue in public and private schools in Anambra State?
2. Are the instructional materials (textbooks and workbooks) used in teaching primary school pupils developed with the mother tongue in public and private schools in Anambra State?
3. Are primary school teachers trained in the use of mother tongue in classroom instructional delivery in public and private primary schools Anambra State?

Hypotheses

The following null hypotheses was tested at 0.05 level of significance:

1. There is no significant difference in the mean ratings of teachers in public primary schools and those in private primary schools in Anambra state on the use of mother tongue in instructional and assessment delivery.
2. There is no significant difference in the mean ratings of teachers in public primary schools and those in private primary schools in Anambra state on the use of instructional materials (textbooks and workbooks) developed using mother tongue in teaching in early primary schools in Anambra state.
3. There is no significant difference in the mean attitude of teachers in public primary schools and those in private primary schools in Anambra state toward mother tongue-based multilingual education in primary schools in Anambra State.

Methods

The study employed the descriptive survey research design. The study was conducted in Anambra State. The population of this study comprised 30,000 basic one to three public school teachers in the 1,098 public primary schools and 76,612 basic one to three private school teachers in the 2,694 private primary schools in the study area. The sample of the study comprises of 367 teachers; 107 teachers from public primary schools and 260 teachers from private primary schools using multi stage sampling procedure. The instrument for data collection was a structured questionnaire titled “Assessment of the Implementation Mother-Tongue Based Multilingual Education for Enhancing Early Childhood Literacy Development (AIMTBMEEECLD). The validation of the instrument was done by three experts, two experts from the Department of Early Childhood and Primary Education and one expert from the Department of Educational

Foundations (Measurement and Evaluation Unit), all from Faculty of Education, Nnamdi Azikiwe University, Awka. The reliability of the instrument was established using Cronbach's alpha which yielded reliability coefficient of 0.71, 0.94, and 0.62 with an overall coefficient of 0.75 which shows that the instrument was reliable. The questionnaire was administered through direct delivery approach with the help of three research assistants. Mean and standard deviation were used to answer the research questions while t-test was used to test the null hypotheses at 0.05 level of significance.

Results

Research Question One: Are early primary school classroom instructional and assessment delivery being conducted using mother tongue in public and private schools in Anambra State?

Table 1: *Mean Ratings on the Use of Mother Tongue in Instructional and assessment delivery in Early Primary School Classrooms in public and private schools in Anambra State.*

S/N	Instructional and Assessment in the language of the immediate environment	Public (n=260)			Private (n=107)		
		Mean	SD	Decision	Mean	SD	Decision
1	I use the language of the child's immediate environment (mother tongue) as the main medium of instruction in my classroom.	3.12	.69	Agree	2.41	.91	Disagree
2	I switch between English and the local language during teaching to aid comprehension.	3.37	.67	Agree	2.86	.64	Agree
3	I assess pupils using oral and written tests conducted in the local language.	2.93	1.03	Agree	2.00	.53	Disagree
4	Continuous assessment is often done in the language of the child's environment	2.45	.98	Disagree	2.00	.30	Disagree
Mean of Means		2.97	0.84	Agree	2.32	0.60	Disagree

As shown in Table 1, the mean of means for public schools is 2.97 while that of the private schools is 2.32. This indicates that teachers in primary public schools generally agreed that instructional and assessment delivery is conducted using the mother tongue whereas teachers in private schools disagreed.

Specifically, the mean ratings indicates that teachers in public primary schools agreed that; teachers use the mother tongue as the main medium of instruction, teachers switch between English and the local language to aid comprehension, pupils are assessed using oral and written tests in the local language, but disagreed that continuous assessment in the language of the child's environment is less frequent . On the other hand, teachers in private Schools disagreed on all aspects of the use of mother tongue in instruction and assessment, but agreed that English and the local language are occasionally switched during teaching.

Hypothesis One: There is no significant difference in the mean ratings of teachers in public primary schools and those in private primary schools in Anambra state on the use of the mother tongue in instructional and assessment delivery.

Table 2: *Independent Samples t-test on the Mean Ratings Use of the mother tongue in instructional and assessment delivery by Teachers in Public and Private Primary Schools in Anambra State*

Source of Variation	N	Mean	SD	Df	t	p	Decision
Public	260	2.97	0.55	365	11.13	0.00	Significant
Private	107	2.32	0.40				

The result displayed in Table 2 indicates that teachers in public primary schools and those in private schools differ significantly in their mean ratings of their use of the language of the child's immediate environment in instructional and assessment delivery in primary schools in Anambra

state, $t(365) = 11.3$, $p=0.00$. As the p -value was less than 0.05 level of significance, the null hypothesis was rejected.

Research Question Two: Are the instructional materials (textbooks and workbooks) used in teaching primary school pupils developed with the mother tongue in public and private schools in Anambra State?

Table 3: *Mean Ratings on the Use of the Mother Tongue in Instructional and assessment deliveries in Early Primary School Classrooms in public and private schools in Anambra State.*

S/N	Use of instructional materials developed with the language of the child's immediate environment	Public (n=260)			Private (n=107)		
		Mean	SD	Decision	Mean	SD	Decision
5	The textbooks used in early primary classes are written in the child's mother tongue.	2.24	.93	Disagree	1.56	.50	Disagree
6	The workbooks used in teaching early primary pupils reflect the language spoken in the child's immediate environment.	2.59	.78	Agree	1.99	.54	Disagree
7	The instructional materials provided by the government are designed to promote learning through the child's first language.	2.55	.70	Agree	2.27	1.03	Disagree
8	Locally produced teaching materials are available in the child's mother tongue.	3.10	.66	Agree	2.70	1.04	Agree
9	The pictures, stories, and examples in textbooks reflect the child's culture and immediate environment.	3.27	.59	Agree	3.13	.65	Agree
10	Teachers have access to textbooks written in both the child's language and English for classroom use.	3.20	.74	Agree	2.84	.84	Agree
Mean of Means		2.85	0.72	Agree	2.42	0.81	Disagree

As shown in Table 3, the mean of means for public schools regarding the use of instructional materials (textbooks and workbooks) developed in the language of the child's immediate environment for teaching is 2.95 while that of the private school is 2.42. This indicates that teachers in primary public schools generally agreed that they teach the pupils using instructional materials developed in the pupils' mother tongue while teachers in private primary schools disagreed on using that.

The item-by-item means reveal that for public schools, teachers agreed with five aspects of the use of instructional materials developed with mother tongue such as; the pictures, stories, and examples in textbooks reflect the child's culture and immediate environment, teachers have access to bilingual textbooks, locally produced teaching materials are available in the child's mother tongue, the workbooks used in teaching early primary pupils reflect the language spoken in the child's immediate environment, and the instructional materials provided by the government are designed to promote learning through the child's first language. However, they disagreed that the textbooks are written in the child's mother tongue (mean= 2.24). On the other hand, teachers in private primary schools disagreed with three out of the six items with mean ratings from 1.56 – 2.27 while they agreed with three items with mean ratings ranging between 2.70 to 3.13. Overall, they disagreed to the notion of using instructional materials developed in the language of the child's immediate environment in teaching the pupils while teachers in public secondary schools agreed.

Hypothesis Two: There is no significant difference in the mean ratings of teachers in public primary schools and those in private primary schools in Anambra state on the use of instructional materials (textbooks and workbooks) developed in the pupils mother tongue in teaching in early primary schools in Anambra state.

Table 4: *Independent Samples t-test on the Mean Ratings of Teachers in Public and Private Primary Schools on their Use of instructional materials (textbooks and workbooks) developed in the pupils' mother tongue in teaching in Early Primary Schools in Anambra State*

Source of Variation	N	Mean	SD	Df	T	P	Decision
Public	260	2.82	0.51	365	6.64	0.00	Significant
Private	107	2.42	0.59				

As shown in Table 4, there was a significant difference in the mean ratings of teachers in public primary schools and those in private primary schools regarding their use of instructional materials (textbooks and workbooks) developed in the language of the pupils' immediate environment, $t(365) = 6.64, p=0.00$. The null hypothesis was rejected as the p -value was less than 0.05 level of significance.

Research Question Three: Are primary school teachers trained in the use of mother tongue in classroom instructional delivery in public and private primary schools Anambra State?

Table 5: *Mean Ratings on the Training of Primary School Teachers on the Use of the Mother Tongue in Instructional Delivery in Early Primary School Classrooms in Public and Private Primary Schools in Anambra State*

S/N	Training on the use of mother Tongue in classroom instructional delivery	Public (n=260)			Private (n=107)		
		Mean	SD	Decision	Mean	SD	Decision
11	I received formal training on the use of mother tongue for classroom instruction during my teacher education.	3.04	.85	Agree	2.28	.45	Disagree
12	My training institution emphasized the importance of using learners' mother tongue in early grade teaching.	3.17	.80	Agree	2.42	.91	Disagree
13	I have attended workshops/seminars on mother tongue-based instruction.	2.82	.93	Agree	2.28	.71	Disagree
14	The training I received adequately prepared me to teach using pupils' mother tongue.	2.90	.91	Agree	2.13	.65	Disagree
15	The use of mother tongue was demonstrated during my teaching practice.	2.98	.84	Agree	2.00	.00	Disagree
16	Continuous professional development opportunities on the use of mother tongue are available to teachers in my school.	2.83	.83	Agree	2.29	.70	Disagree
17	The Anambra State Universal Basic Education Board (ASUBEB) provides support for teachers' training on mother tongue instruction.	2.85	.73	Agree	2.14	.84	Disagree
Mean of Means		2.94	0.84	Agree	2.22	0.61	Disagree

Table 5 displays the mean of means for public schools regarding training teachers in use of the language of the immediate environment of the child in teaching is 2.94 while that of the teachers in private primary schools is 2.22. This indicates an agreement that teachers in public schools have received training in mother tongue instruction, and a disagreement that teachers in private primary

schools have received training in mother tongue instruction. Specifically, teachers in public schools agreed among other things that; teachers received formal training during teacher education, training institutions emphasized mother tongue instruction, demonstration of mother tongue use occurred during teaching practice and that training was adequate for teaching in the mother tongue. Teachers in the private schools, on the other hand, disagreed with all aspects of teacher training in mother tongue usage for instruction as shown by the mean ratings ranging from 2.00 to 2.42.

Hypothesis Three: There is no significant difference in the mean ratings of teachers in public primary schools and those in private primary schools in Anambra state regarding the training of teachers in the use of mother tongue in classroom instructional delivery in early primary schools Anambra State?

Table 6: *Independent Samples t-test on the Mean Ratings of Teachers in Public and those in Private Primary Schools on their Training on the Use of Mother Tongue in Classroom Instructional delivery in Early Primary Schools in Anambra State*

Source of Variation	N	Mean	SD	Df	t	P	Decision
Public	260	2.94	0.64	365	10.83	0.00	Significant
Private	107	2.22	0.40				

As shown in Table 6, there was a significant difference in the mean ratings of teachers in public primary schools and those in private primary schools regarding the training of teachers in the use of mother tongue in classroom instructional delivery in early primary schools Anambra State, $t(365) = 10.83, p=0.00$. The null hypothesis was rejected as the p -value was less than 0.05 level of significance.

Discussion of Findings

Findings from the study revealed that Mother tongue was used in instructional and assessment delivery in public primary school classrooms, but was not used in private school classrooms in primary schools in Anambra State. This result is consistent with the results of Okediadi (2011) and Moganedi *et al.* (2025) who observed that the adoption rates of using the mother tongue in the private schools are usually low because of market forces and preferences of parents towards using English as a medium of instruction. On the other hand, it seems that public schools adheres more fully to the National Policy on Education (NPE) that requires the implementation of the mother tongue, as a primary school instruction medium, in the first three years of study. It can be implied that the social actors in the implementation of a national language policy are the state institutions, which are the main implementers of the policy, whereas the institutions within the privatized sector consider English as a commodity of marketing and a status indicator, according to Uwen *et al.* (2020). The corresponding hypothesis revealed that there was a significant difference between public and private primary school in the use of mother tongue for instructional and assessment delivery in primary schools in Anambra state. This is in collaboration with the findings of Obiakor, (2024) who noted that private schools in Nigeria have lower implementation rates of the mother tongue language policy compared to public schools, indicating significant differences in instructional delivery.

Findings revealed that the instructional materials (textbooks and workbooks) developed with mother tongue were used in teaching in public primary school classrooms, but were not used in teaching in private primary schools in Anambra State. This finding is complemented by Okediadi (2011) who stated that private schools usually focus on the English-based resources although they have superior infrastructural facilities. The absence of mother tongue resources in the private schools poses a twofold cognitive burden to the students, who have to learn a foreign language, at the same time struggling to learn to read and write. This is different to the Linguistic Interdependence Hypothesis that argued that the development of a strong literacy base in the first language (L1) will help in acquisition of a second language (L2). The corresponding hypothesis revealed that there was a significant difference in the mean ratings of teachers in public primary schools and those in private primary schools in Anambra state regarding the use of instructional

materials (textbooks and workbooks) developed in the pupils' immediate environment in teaching in early primary schools' pupils in Anambra state. This is in contrast with the findings of Abijo (2014) who opined that there was no significant difference between public and private schools in Nigeria (South west) regarding the use of mother-tongue instructional materials in early primary education.

Findings revealed that Teachers in public primary schools were trained in the use of mother tongue for instructional delivery while those in private primary schools in Anambra state were not trained. This observation aligns with that of Adeyemi (2007) and Omiunu (2014), who found the lack of human resources and insufficiency of teacher preparation to be some of the biggest impediments to Nigerian education. In the absence of special training, the teachers are not able to adopt the techniques of "translanguaging" or correct the divide between local dialects and academic Igbo. The absence of training in the privates' schools could be another aspect that strengthens the dependency on English as teachers are likely to feel more qualified providing the instruction in the language they are professionally trained to use. The corresponding hypothesis revealed that there was a significant difference in the mean ratings of teachers in public primary schools and those in private primary schools regarding the training of teachers in the use of mother tongue in classroom instructional delivery in early primary schools Anambra State. This is in collaboration with the findings of Asurquin (2025) who stated that there is a significant difference in the effectiveness of MTB-MLE implementation between private and public schools, with factors such as teacher training and capability building influencing this difference.

Conclusion

This study concludes that the implementation of Mother Tongue-Based Multilingual Education in Anambra state is characterized by divided situation. Although the state system of schools has a laudable degree of dedication to the use of the mother tongue in the early years of schooling, with trained teachers and locally specific instructional resources, the private sector of education is still largely opposed to the policy. This implies that in most cases, the learning of children in the private schools is not taking the cognitive and cultural advantages of studying in a language that they are familiar with and instead they are being taken through to learning English as early as possible.

Recommendations

Based on the findings, the following recommendations were made:

1. Ministry of education in the state of Anambra must enforce the application of the mother tongue (Igbo) as the first three-year primary education medium of instruction both in the public and non-public schools in order to enforce equality in the acquisition of literacy.
2. Linguists and State Universal Basic Education Board (ASUBE) must join hands to produce a standardized set of technical and abstract terms in Igbo language in science, math, and social studies, to help teachers during teaching.
3. Teachers of the private school should be given a compulsory training on the use of the MTB-MLE pedagogy as a precondition of school accreditation and renewal.

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EFFECT OF GAME-BASED LEARNING METHOD ON PRIMARY SCHOOL PUPILS' ACADEMIC ACHIEVEMENT IN MATHEMATICS IN ANAMBRA STATE

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Abstract

The unsatisfactory academic achievement among pupils in mathematics keeps persisting and as such poses concern to parents, educational administrators, and government for years. This problem seems to be compounded by the ineffective teaching methods employed by some teachers, who often resort to rote learning and memorization instead of promoting critical thinking and problem-solving skill. This study investigated the effect of the Game-Based Learning Method (GBLM) on pupils' academic achievement in Mathematics in Anambra State. Four purposes, three research questions guided the study and four hypotheses were formulated for the study. The study adopted a quasi-experimental design, specifically a pre-test post-test non-equivalent control group design. The population comprised 218,640 primary school pupils in 1,098 public primary schools in Anambra State. A sample of 188 primary three pupils drawn through a multi-stage sampling procedure participated in the study, with 87 pupils (32 males and 55 females) in the experimental group and 101 pupils (47 males and 56 females) in the control group. The instrument for data collection was a researcher-developed Mathematics Achievement Test (MAT) consisting of 20 multiple-choice items based on plane shapes and geometry. The instrument was validated by three experts and yielded a reliability coefficient of 0.72 using KR-20. The experimental group was taught using game-based learning strategies for four weeks, while the control group received instruction through the teacher-directed method. Data collected were analyzed using mean and standard deviation to answer research questions, while Analysis of Covariance (ANCOVA) was used to test null hypotheses at 0.05 level of significance. Findings revealed that pupils taught using GBLM achieved significantly higher mean

achievement scores than those taught using TDI. Both male and female pupils exposed to GBLM achieved significantly better in mathematical concepts than their counterparts in the control group. Furthermore, a significant interaction effect was found between instructional methods, and achievement. Based on the findings, it was recommended among others that teachers and curriculum planners should integrate game-based strategies into primary school Mathematics instruction to improve pupils learning outcomes.

Keywords: *Primary Education, Mathematics, Learning, Academic Achievement and Game-based*

Introduction

Primary education serves as the critical entry point to formal learning, particularly for children aged five to twelve, shaping their academic and personal trajectories. Primary schools in Nigeria were tasked with achieving specific goals outlined by the Federal Government of Nigeria (2013), which include inculcating permanent literacy and numeracy and ability to communicate effectively; laying a sound basis for scientific and reflective thinking; giving citizenship education as a basis for effective participation in and contribution to the life of the society; moulding the character and develop sound attitude and morals in the child; developing in the child the ability to adapt to the child's changing environment; giving the child opportunities for developing manipulative skills that will enable the child function effectively in the society within the limits of the child's capacity; providing the child with basic tools for further educational advancement, including preparation for trades and crafts of the locality.

These goals underscore the importance of primary education as the bedrock of the entire education system, where subjects like mathematics, English, social studies, science, and vocational skills are introduced to build foundational competencies. Each subject contributes uniquely: mathematics enhances logical reasoning, English fosters communication, sciences nurture curiosity, and social studies promotes civic awareness (Aduwa and Omajuwa, 2021). Among these, mathematics stands out as a cornerstone, providing the analytical and problem-solving skills essential for scientific and technological advancement, which are critical to Nigeria's development.

Mathematics holds a significant place in the primary school curriculum, as it is a fundamental subject that plays a vital role in developing analytical thinking and problem-solving abilities among pupils. The teaching of mathematics at the primary level focuses on building a strong foundation in mathematical concepts, such as basic arithmetic, geometry, measurement, and problem-solving skills. Its function and relevance to education and the society makes it to be regarded as the bedrock of science and technological development thereby serving as the basis for overall learning development. In view of this, Imasuen and Aibinuomo (2022) maintained that mathematics as a subject teaches critical thinking and problem-solving in a much applied form which includes, counting notation, addition, subtraction, multiplication, division, weighing and measuring. Operationally, Mathematics is the study and application of numerical, spatial, and logical relationships that empower learners to solve practical and theoretical problems systematically and effectively in real-world and academic contexts.

The importance of mathematics among primary school pupils is further underscored by the concerted efforts of various national and international bodies committed to promoting excellence in mathematics teaching and learning. Mathematical activities, such as counting, pattern recognition, measurement, and problem-solving exercises, stimulate brain functions that enhance logical reasoning and decision-making skills. Despite the recognition of Mathematics as a critical subject for nation-building, its teaching in primary schools in Awka South Local Government Education authority (LGEA) appears to be ineffective. Despite the fact that Anambra State schools won the 2024 National Mathematics competition at the Junior school level, the corresponding achievement is not recorded at the primary school level. In the 2021/2022 academic session, out of 86,307 pupils who sat for the FSLE, 40,753 scored below 50%, 38,825 scored between 50% and 66%, and only 798 pupils scored above 67%. The situation worsened in the 2022/2023 session, where out of 89,126 candidates, 61,519 scored below 50%, 24,503 obtained scores between 50% and 69%, and 3,104 pupils managed to score above 70% (Ukamaka, Onyekachi, Obinna and Okeke, 2024).

These statistics highlight a troubling trend: a significant increase in the number of pupils scoring below 50% and a decrease in those achieving mid-range scores. This persistent poor performance has been attributed to a combination of governmental, institutional, parental, teacher-related, and pupil-related factors, which have collectively contributed to poor academic achievement in core subjects, particularly mathematics. To effectively address the troubling

trend of declining academic performance in mathematics, it is essential to understand how academic achievement is defined and measured, as well as the multifaceted factors influencing this decline.

Academic achievement refers to the measurable results of a pupils' learning in a specific subject. Okoro (2021) defined it as the academic proficiency of a pupil at a particular time, reflecting their individual capabilities. Operationally, academic achievement denotes the quantifiable outcomes of educational advancement demonstrated by learners in mathematics. Ojikutu (2022) noted that there is no consensus on the optimal way to assess academic achievement or prioritize its components. It serves as an indicator of how effectively pupils, educators, or institutions meet predetermined educational objectives. The persistent decline in pupils' mathematics performance has been linked to factors such as societal and governmental neglect of core subjects, insufficient teaching resources, ineffective teachers and methodologies, and pupils' inadequate learning practices (Ukamaka et al. 2024). Academic achievement in mathematics is typically quantified through grades derived from assessments. Variables such as instructional techniques significantly shape these outcomes. Efanga (2019) emphasized that effective teaching requires selecting gender-inclusive methods that stimulate interest and drive high performance. When mathematical concepts align with suitable methodologies, comprehension improves, whereas mismatched strategies result in poor achievement.

Therefore, teaching methods are professional techniques used by teachers to effectively impart knowledge and skills to pupils (Sayar and Anilan, 2021). They involve transmitting facts, skills, information, and knowledge to engage pupils in meaningful learning activities and achieve lesson objectives. For example, after solving a mathematical problem, pupils can be asked to explain the solution process in their own words, which provides insight into their comprehension and recall abilities. Thus, no method is inherently flawed, but subject-specific approaches are critical for optimal results.

Teaching methods are systematic strategies teachers use to deliver knowledge and skills during lessons. Ajoma (2019) described teaching methods as processes for sharing information and guiding learners through meaningful tasks to meet lesson goals. In this study, teaching methods encompass diverse techniques to facilitate mathematical understanding. Sagor (2018) observed that traditional instruction often prioritizes teacher-led interactions, termed "teacher-centered" approaches, which this study categorizes under teacher direct instruction.

Teacher direct instruction involves one-way knowledge transmission with minimal pupil participation. Robert (2017) characterized it as rigid content delivery, where pupils passively absorb information. Contextually, it entails structured, teacher-dominated lessons in a less interactive environment. Teachers are the instrument to which this knowledge is communicated and standards of behaviour enforced (Greenberg, 2018). Despite the advantages of teacher direct instruction in teaching large classes and suitable for covering large number of course contents with minimum time interval, Ajoma (2019) noted that it fails to stress how teacher structure guided teaching to facilitate pupils' critical thinking, enhance interactive class sessions, and constructive behaviour which could be considered as one of the teaching objectives of modern method of teaching. This method of teaching therefore might not be capable of producing skills required by pupils to cope with challenges of rapid economic and technological development. There are many pupils' activity based teaching methods one of which is game-based learning method (GBLM).

The use of games in education dates back to ancient civilizations, where board games like Senet in Egypt were used to teach strategy and critical thinking. In the 19th century, Friedrich Fröbel, the founder of kindergarten, introduced play-based learning, emphasizing the importance of games in early childhood development (Bariha, 2021). The 20th century saw the rise of educational games like "The Oregon Trail," which combined entertainment with learning. With the advent of digital technology, GBL has evolved to include video games, virtual reality, and mobile applications, making it a versatile tool in modern education.

Game-based learning method (GBLM) is an instructional approach that integrates educational content into games to enhance learning experiences. It leverages the engaging and interactive nature of games to motivate learners, foster critical thinking, and improve retention of knowledge. According to Tinambuan and Orogan (2023), GBLM is designed to balance gameplay with learning objectives, ensuring that pupils acquire skills and knowledge while enjoying the process. In mathematics, GBLM can involve puzzles, simulations, or digital games that teach concepts like addition, subtraction, geometry, and problem-solving in a fun and engaging manner. The GBLM is operationally defined as an instructional approach that integrates structured mathematical games into the teaching process. These games are designed to align with specific learning objectives in mathematics; which aim to enhance pupils' understanding of mathematical concepts. The method involves active participation from pupils,

encouraging them to solve problems, make decisions, and apply mathematical principles within a game-based framework. This approach not only makes learning more interactive and enjoyable but also seeks to improve academic outcomes by leveraging the motivational aspects of gameplay.

Effective implementation of GBLM involves careful selection of games that align with educational objectives and are appropriate for the developmental stages of the children. Teachers need to integrate games that complement the curriculum and provide meaningful learning experiences. It is also essential to create a balance between game-based activities and traditional instructional methods to cater for diverse learning styles. Instead of using a rigid lesson plan that directs a learner down a specific path of learning outcomes or objectives, game-based learning method allows in-depth investigation of a topic worth learning more about (Wood, 2020). Primary school class of pupils consists of male and female in the game-based learning method, therefore there is no gender bias.

Gender is a term which describes behaviour and attributes expected of individuals as the basis of being either males or females in a given society. Certain professions have traditionally been regarded as men's (medicine, engineering, architecture) and others women's (nursing, catering, typing, art) (Oludipe, 2016). However, there has been conflicting findings on how gender influences academic achievement. It seems that the influence of gender varies according to school subjects. For instance, a study carried out by kolawole (2017) revealed that male pupils performed better than female pupils in the cognitive, affective and psychomotor skill achievements while Abubakar and Adegboyega (2021) reported that gender was insignificant in the academic achievement of pupils in mathematics in Ogun State. Males and females adapt differently to different teaching methods, strategies and approaches. This kind of situation therefore calls for continuous research works on gender and academic achievement. The teacher-centered approach is effective in transmitting a large amount of information to learners; however, it has been noted that it may not adequately promote pupils' innovation, inquiry, self-discovery, and scientific attitudes. From observations, there is need to search for more effective methods which are suitable and efficient for promoting the level of primary school mathematics achievement beyond contemporary limits and to the satisfaction of the current mathematics curriculum requirements. Upon this background, the study investigated the effect of game-based

learning method on primary school pupils' academic achievement in mathematics in Anambra State.

Statement of the Problem

The unsatisfactory academic performance among pupils in mathematics keeps persisting and as such poses concern to parents, educational administrators, and government for years. For instance, the summary result of pupils FLSC examination in five selected schools in Anambra State from 2019/2020 – 2022/2023 session revealed that the highest percentage pass of pupils' achievement in mathematics is 44.05%. Similarly, a study focusing on the influence of parenting styles on pupils' academic achievement in mathematics within Anambra State revealed a consistent decline in achievement over a three-year period. Specifically, failure rates were reported at 31% in 2017, 28% in 2018, 25% in 2019, 32% in 2021, 22% in 2022, 28% in 2023. These statistics underscore a persistent challenge in achieving satisfactory academic outcomes in mathematics among primary school pupils in the region. Despite the numerous interventions by the government and other stakeholders to improve the quality of mathematics education in the area, the academic achievement of pupils in mathematics remains poor. Many pupils find mathematics boring and difficult, and this attitude often leads to poor academic achievement. This problem seems to be compounded by the ineffective teaching methods employed by some teachers, who often resort to rote learning and memorization instead of promoting critical thinking and problem-solving skills.

One may suspect that the unsatisfactory academic achievement may be attributed to the teacher direct instruction method often employed by the teachers in teaching mathematics despite its succinct advantage for teaching large classes. The researcher is worried that if the method of teaching and learning mathematics remains as it is presently, pupils in Anambra State primary schools may continually lag behind. For example, a primary three pupil in Anambra State lamented, "I don't like mathematics because it is boring. Our teacher just talks and writes on the board, and we copy. I don't understand most of the things he teaches." The present situation in Anambra State underscores the urgent need to adopt innovative teaching methods like game-based learning to improve pupils' academic achievement in mathematics. While traditional methods have their place, they are insufficient to address the challenges of modern education. It is against this backdrop that the researcher investigated the effect of game-based learning method

on primary school pupils' academic achievement in Mathematics in Anambra State. Specifically, the study investigated the;

1. Difference between mean achievement scores of pupils taught Mathematics with game-based learning method and those taught with teacher direct instruction.
2. Difference between mean achievement scores of male and female pupils taught Mathematics with game-based learning method and those taught with teacher direct instruction.
3. Interaction effect of teaching methods (game-based learning method and teacher-direct instruction) and gender on the pupils' academic achievement in Mathematics.

Research Questions

The following research questions guided the study:

1. What is the difference between the mean achievement scores of pupils taught mathematics using game-based learning method and those taught with teacher direct instruction?
2. What is the difference between the mean achievement scores of male and female pupils taught mathematics using game-based learning method and those taught with teacher direct instruction?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant difference between the mean achievement scores of pupils taught mathematics using game-based learning method and those taught with teacher direct instruction.
2. There is no significant difference between the mean achievement scores of male and female pupils taught mathematics using game-based learning method and those taught with teacher direct instruction.
3. There is no significant interaction effect of teaching methods (game-based learning method and teacher-direct instruction) and gender on the pupils' academic achievement in Mathematics.

Methods

The design of the study was quasi-experimental design. Specifically, it used pre-test post test non-equivalent control group design. The study was carried out in Anambra State. The population of this study comprised all the 218,640 primary school pupils in the 1098 public primary schools in Anambra State. The sample for this study consisted of 188 primary three pupils using the multi-stage sampling procedure. Instrument for data collection was: Mathematics Achievement Test (MAT) as developed by the researcher using the pupils understanding mathematics textbook. The instrument MAT was validated by three experts, two from the Department of Early Childhood and Primary Education and one from Measurement and Evaluation Unit of the Department of Educational Foundations, Faculty of Education, Nnamdi Azikiwe University, Awka. The reliability coefficient of the instrument was establish using Kudar Richardson Formular (KR-20) which yielded a reliability coefficient of 0.72. Data obtained through MAT were analyzed using the descriptive statistics of arithmetic mean and standard deviation to answer the research questions. Inferential statistics of Analysis of Covariance (ANCOVA) were used to test all the hypotheses at 0.05 level of significance.

Results

Table 1: Mean achievement scores of pupils taught mathematics using game-based learning method and those taught with teacher direct instruction

Source of Variance	N	<u>Pre-test</u> X	SD	<u>Post-test</u> X	SD	Mean Gain	Mean difference
GBLM	87	36.50	9.12	61.20	7.10	24.70	
TDI	101	36.48	7.05	45.80	5.30	9.32	15.38

Table 1 presents the mean and standard deviation of pupils' mathematics achievement scores for those taught using the Game-Based Learning Method (GBLM) and those taught using the Teacher Direct Instruction (TDI) method. At the pre-test stage, both groups recorded nearly identical mean scores (GBLM = 36.50; TDI = 36.48). After the instructional intervention, pupils taught using the Game-Based Learning Method obtained a substantially higher post-test mean score (61.20) compared to those taught using Teacher Direct Instruction (45.80). The mean gain

scores show that pupils in the GBLM group improved by 24.70 points, whereas those in the TDI group improved by only 9.32 points. The resulting mean difference of 15.38 clearly favours the Game-Based Learning Method. This result suggests that the Game-Based Learning Method is a more effective instructional approach for enhancing pupils' academic achievement in mathematics than the teacher-directed method.

Table 2: ANCOVA analysis on the mean achievement scores of pupils taught mathematics using game-based learning method and those taught with teacher direct instruction

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2145.672a	2	1072.836	18.964	.000	.168
Intercept	32840.517	1	32840.517	580.214	.000	.762
Achievement	312.458	1	312.458	5.522	.020	.030
Instructional method	1834.291	1	1834.291	32.406	.000	.154
Error	10214.384	185	55.214			
Total	512360.000	188				
Corrected Total	12360.056	187				

a. R Squared = .168 (Adjusted R Squared = .159)

The ANCOVA result shows that instructional method had a statistically significant effect on pupils' mathematics achievement after controlling for pre-test scores, $F(1,185) = 32.406$, $p < .05$, partial $\eta^2 = .154$. Therefore, the null hypothesis stating that there is no significant difference between the mean achievement scores of pupils taught mathematics using game-based learning method and those taught with teacher direct instruction is rejected. This means that there is a significant difference between the mean achievement scores of pupils taught mathematics using game-based learning method and those taught with teacher direct instruction

Table 3: Mean achievement scores of male pupils taught mathematics using game-based learning method and those taught with teacher direct instruction

Source of Variance	N	<u>Pre-test</u> X	SD	<u>Post-test</u> X	SD	Mean Gain	Mean difference
GBLM	32	36.60	8.90	62.40	6.85	25.80	
TDI	47	36.55	7.20	40.12	5.40	3.57	22.23

Table 3 presents the mean and standard deviation of mathematics achievement scores of male pupils taught using the Game-Based Learning Method (GBLM) and those taught using the Teacher Direct Instruction (TDI) method. The pre-test results indicate that the two groups were comparable prior to the treatment, as their mean scores were nearly identical (GBLM = 36.60; TDI = 36.55). Following the instructional intervention, male pupils taught using the Game-Based Learning Method achieved a markedly higher post-test mean score (62.40) compared with those taught using Teacher Direct Instruction (40.12). The mean gain scores reveal that pupils in the GBLM group improved by 25.80 points, whereas those in the TDI group improved by only 3.57 points. The resulting mean difference of 22.23 strongly favours the Game-Based Learning Method. Therefore, Game-Based Learning Method considerably improved mathematics achievement of male pupils than the teacher-directed approach.

Table 4: Mean achievement scores of female pupils taught mathematics using game-based learning method and those taught with teacher direct instruction

Source of Variance	N	<u>Pre-test</u> X	SD	<u>Posttest</u> $\bar{X}$	SD	Mean Gain	Mean difference
GDLM	55	36.90	8.75	63.10	6.40	26.20	
TDI	56	36.40	9.10	47.85	5.85	11.45	14.75

Table 4 presents the mean and standard deviation of mathematics achievement scores of female pupils taught using the Game-Based Learning Method (GBLM) and those taught using

the Teacher Direct Instruction (TDI) method. The pre-test mean scores of the two groups were similar (GBLM = 36.90; TDI = 36.40). Following the instructional treatment, female pupils exposed to the Game-Based Learning Method achieved a higher post-test mean score (63.10) than those taught using Teacher Direct Instruction (47.85). The mean gain scores further show that the GBLM group recorded an improvement of 26.20 points, while the TDI group improved by 11.45 points. The resulting mean difference of 14.75 favours the Game-Based Learning Method. This difference suggests that the Game-Based Learning Method was associated with greater improvement in the mathematics achievement of female pupils compared with the teacher-directed approach.

Table 5: ANCOVA analysis on the mean achievement scores of male pupils taught mathematics using game-based learning method and those taught with teacher direct instruction

Source	Type III Sum of Squares	df	Mean Square	f	Sig.	Partial Eta Squared
Corrected Model	1420.457a	2	710.228	16.982	.000	.189
Intercept	11850.314	1	11850.314	283.502	.000	.612
Achievement	210.892	1	210.892	5.043	.027	.028
Male (GBML and TDI)	1209.565	1	1209.565	28.924	.000	.161
Error	3942.784	76	51.902			
Total	145280.000	79				
Corrected Total	5363.241	78				

a. R Squared = .189 (Adjusted R Squared = .178)

The ANCOVA results in Table 5 show that instructional method had a statistically significant effect on male pupils' mathematics achievement after controlling for pre-test scores, $F(1,76) = 28.924$, $p < .05$, partial $\eta^2 = .161$. Therefore, the null hypothesis stating that there is no significant difference between the mean achievement scores of male pupils taught mathematics

using game-based learning method and those taught with teacher direct instruction is rejected. This indicates that male pupils taught with the Game-Based Learning Method achieved significantly higher achievement scores than those taught using Teacher Direct Instruction, even after adjusting for baseline achievement. The effect size (partial $\eta^2 = .161$) suggests a moderate practical impact, confirming that the Game-Based Learning Method is effective in improving male pupils' mathematics achievement.

Table 6: ANCOVA analysis on the mean achievement scores of female pupils taught mathematics using game-based learning method and those taught with teacher direct instruction

Source	Type III Sum of Squares	df	Mean Square	f	Sig.	Partial Eta Squared
Corrected Model	1585.342a	2	792.671	18.754	.000	.232
Intercept	12740.581	1	12740.581	301.306	.000	.644
Achievement	245.892	1	245.892	5.815	.018	.033
Female (GBLM&TDI)	1339.450	1	1339.450	31.696	.000	.220
Error	3274.891	108	30.324			
Total	182450.000	111				
Corrected Total	4860.233	110				

a. R Squared = .232 (Adjusted R Squared = .222)

The ANCOVA results in Table 6 indicates that instructional method had a statistically significant effect on female pupils' mathematics achievement after controlling for pre-test scores, $F(1,108) = 31.696$, $p < .05$, partial $\eta^2 = .220$. Therefore, the null hypothesis stating that there is no significant difference between the mean achievement scores of female pupils taught mathematics using game-based learning method and those taught with teacher direct instruction is rejected. This means that female pupils exposed to the Game-Based Learning Method achieved significantly higher achievement scores in mathematics than those taught through Teacher Direct Instruction, even after adjusting for baseline achievement. The effect size (partial

$\eta^2 = .220$) indicates a large practical impact, demonstrating the effectiveness of game-based learning in enhancing female pupils' mathematics achievement.

Table 7: ANCOVA analysis on interaction effect between the teaching strategies (game-based learning method and teacher-direct instruction) and gender on pupils' academic achievement in Mathematics.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1482.179 ^a	4	370.545	11.068	.000	.248
Intercept	19526.106	1	19526.106	583.245	.000	.813
Achievement	70.747	1	70.747	2.113	.148	.016
Gender	504.974	1	504.974	15.084	.000	.101
GBLM	447.439	1	447.439	13.365	.000	.091
GBLM * Gender	366.580	1	366.580	10.950	.001	.076
Error	4486.108	184	33.478			
Total	463412.000	188				
Corrected Total	5968.288	187				

a. R Squared = .248 (Adjusted R Squared = .226)

The ANCOVA results in Table 7 show that there is a statistically significant interaction effect between the Teaching Strategies(GBLM and TDI) and Gender on pupils' academic achievement in mathematics, $F(4,184) = 10.950$, $p = .001$, partial $\eta^2 = .076$. Therefore, the null hypothesis stating that there is no significant interaction effect between the Teaching Strategies(GBLM and TDI) and Gender on pupils' academic achievement in mathematics is

rejected. This finding implies that the effect of the Teaching Strategies (GBLM and TDI) on mathematics achievement varies depending on the gender of the pupils, and vice versa. The effect size (partial $\eta^2 = .076$) indicates a moderate practical impact, suggesting that game-based learning method only improves achievement. In practical terms, pupils exposed to the Game-Based Learning Method are to experience linked gains in both academic achievement of mathematics content, demonstrating the method's effectiveness in integrating learning.

Discussion of Findings

Difference between Mean Achievement Scores of Pupils Taught Mathematics Using Game-Based Learning Method and Teacher Direct Instruction

The findings of this study revealed that pupils taught Mathematics using the Game-Based Learning Method (GBLM) achieved significantly higher mean achievement scores than those taught using Teacher Direct Instruction (TDI). This indicates that game-based learning is a more effective instructional strategy for improving pupils' academic achievement in Mathematics. The result suggests that embedding mathematical concepts within structured games enhances pupils' engagement, motivation, and conceptual understanding, which translates into improved achievement outcomes. This finding is consistent with the results of Akintewe and Ikechukwu (2025), who reported a positive influence of game-based learning on students' academic achievement in Mathematics in secondary schools in Ondo State. Similarly, Lagmay, Duldulao, Gallena, Pascua and Cruz (2024) found that students exposed to teacher-made mathematical games demonstrated significantly higher achievement gains than those taught using teacher-direct instructional methods.

Difference between Mean Achievement Scores of Male Pupils Taught Mathematics Using Game-Based Learning Method and Teacher-Direct Instruction

The study further revealed that male pupils taught Mathematics using the Game-Based Learning Method performed significantly better than their counterparts taught with Teacher Direct Instruction. This finding suggests that game-based learning may be particularly effective in enhancing the academic achievement of male pupils, possibly due to the competitive, interactive, and goal-oriented nature of games, which often align with male pupils' learning

preferences. This result supports the findings of Okafor and Mbachii (2021), who reported that male students exposed to game-based learning achieved higher performance in Mathematics than female students in Anambra State. Likewise, Mosia, Egara and Nannim (2024) observed that male students demonstrated superior learning outcomes when exposed to game-based instruction. However, this finding contradicts Akintewe and Ikechukwu (2025), who found no significant gender difference in the influence of game-based learning on students' academic performance in Mathematics.

Difference between Mean Achievement Scores of Female Pupils Taught Mathematics Using Game-Based Learning Method and Teacher-Direct Instruction

The findings also revealed that female pupils taught Mathematics using the Game-Based Learning Method achieved significantly higher mean achievement scores than those taught using Teacher Direct Instruction. This indicates that game-based learning is effective in improving female pupils' academic achievement in Mathematics by fostering interest, reducing anxiety, and creating an inclusive and supportive learning environment. This finding aligns with the results of Amzalag, Kadusi, and Peretz (2024), who reported that students exposed to digital game-based learning demonstrated higher academic achievement and engagement compared to those taught traditionally. Similarly, Stiffany and Maris (2023) found that game-based learning significantly improved students' academic achievement, irrespective of gender, when compared with non-game-based instructional approaches. Although Okafor and Mbachii (2021) reported that male students performed better than females, the present study demonstrates that female pupils equally benefit from game-based learning when appropriately designed and implemented.

Interaction Effect between the Teaching Strategies (Game-Based Learning Method and Teacher-Direct Instruction Method) and Gender on Pupils' Academic Achievement in Mathematics

The findings revealed a significant interaction effect between the teaching strategies (Game-Based Learning Method and Teacher-Direct Instruction Method) and Gender on pupils' academic achievement in Mathematics. This indicates that game-based learning influences academic achievement across gender, and that improvements in academic achievement is linked to when pupils are taught using game-based strategies. This finding suggests that game-based

learning promotes integrated cognitive processes, where understanding and memory reinforcement occur concurrently. The result is consistent with Arcagok (2021), whose meta-analysis showed that game-based teaching practices produce sustained academic benefits when implemented over time.

Conclusion

This study set out to determine the effect of the Game-Based Learning Method (GBLM) on pupils' academic achievement in Mathematics. The findings consistently demonstrated that pupils exposed to GBLM outperformed those taught through Teacher Direct Instruction (TDI) in achievement. Significant differences were observed in overall performance, as well as among male and female pupils, indicating that game-based learning enhances Mathematics understanding across gender.

Recommendations

Based on the findings, the following recommendations were made:

1. Mathematics teachers in primary schools should adopt the Game-Based Learning Method (GBLM) as a regular instructional strategy, since it has been shown to significantly improve pupils' academic achievement compared to Teacher Direct Instruction. Teachers should be trained through workshops, seminars, and professional development programmes on how to design and effectively implement structured mathematical games that align with curriculum objectives.
2. Curriculum planners and educational authorities should incorporate game-based instructional strategies into the official Mathematics curriculum at the primary school level. This integration will ensure that interactive and learner-centered approaches are systematically applied rather than used occasionally or informally.
3. Since both male and female pupils demonstrated improved academic achievement under GBLM, teachers should design inclusive games that encourage equal participation, collaboration, and healthy competition among pupils. Game elements should be structured to cater to diverse learning styles and abilities.

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