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Predictors of Academic Performance in Mathematics Among Primary School Pupils in Minna Metropolis, Niger State, Nigeria

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Abstract: The focused on the determinants of academic performance in mathematics among primary school pupils in Minna Metropolis, Niger State, Nigeria. Mathematics serves as the fundamental bedrock for logical reasoning and scientific literacy, yet performance at the primary level remains a subject of intense concern. Despite its importance, pupils in Minna Metropolis continue to exhibit fluctuating grades in school-based assessments and common entrance examinations. The study was guided by five specific objectives and five null hypotheses. The design for the study was analytical survey and the researcher sampled 120 participants for the data collection through a structured questionnaire. The instrument was subjected to validity and reliability test and Cronbach's Alpha reliability coefficient of 0.85 was obtained. The data collected were analyzed aided by the Statistical Package for Social Science (SPSS) version 27 to run Simple Regression Analysis. The hypotheses were tested at a 0.05 level of significance. The outcomes of the study suggested that teacher pedagogical approach, student motivation, peer group, and family background significantly predictors the performance of primary school pupils in mathematics. The study concludes that holistic improvement requires synergy between the school and the home. It is recommended that school administrators prioritize teacher training in modern pedagogy and encourage parental involvement in mathematics education.

Keywords*:* Mathematics Education, Academic Performance, Pedagogical Approach, Student Motivation, Family Background.

INTRODUCTION

The global pursuit of improving the academic performance of students in science and technological innovation is fundamentally anchored in the mastery of Mathematics. The knowledge and skills of primary school pupils in mathematics play significant role on achievement the vision 2020 goals which focus on scientific and technological development. The academic foundation of primary pupil in mathematics serves as a critical role on the future cognitive development, analytical reasoning and their academic endevour. However, despite the important roles of mathematics to primary school pupil, the subject is frequently characterized by a high degree of abstraction that often intimidates pupils, leading to a pervasive sense of math-anxiety. In Niger state, specifically, Minna Metropolis, the poor academic performance of primary school pupil in mathematics could jeopardize their future academic performance in science and other related areas. The persistent decline in academic performance, have made many of them to consider mathematics as a difficult subject that is not of importance to their life. The poor academic performance of primary school pupils in mathematics is connect with the subject often leads to a "cascade effect" of academic struggle throughout a child's future educational career. The situation is attributed to the inherently cumulative, unresolved gaps in basic numeracy such as number sense and arithmetic operations. These act as significant barriers when pupils encounter advanced concepts like simple and compound interest at upper basic education. Studies have indicated that early mathematical competency is one of the strongest predictors of high school graduation and long-term career success, whereas early deficits often cement a lifecycle of underachievement across STEM disciplines (University of Education, Winneba, 2012; Geary et al., 2011). Furthermore, primary school pupils that do not master these foundational skills face increased risks of limited knowledge for critical thinking, reasoning and future educational endevour which are essential for global economy of the young generation.

Recognizing the severity of these long-term consequences, educational scholars advocate for a comprehensive shift in the Teacher's Pedagogical Approach to break the cycle of failure. According to Adeniyi (2022), transitioning from rote memorization to "meaningful learning" strategies significantly reduces cognitive load and fosters deeper conceptual understanding. Additionally, the peer croup could also influence the academic performance of the children. As social interactions among pupils often dictate their collective attitude toward complex problem-solving (Usman, 2021). According to Okigbo and Okeke (2021), the interest and motivation of pupils serves as the internal engines for academic persistence. The authors noted that intrinsic motivation is the primary driver of long-term retention and the ultimate antidote to foundational learning gaps. Despite that school-based factors are vital, external environment, specifically the family structure and socio-economic status could also influence the academic performance of primary school f pupils in mathematics (Ahmed, 2022). In the Nigerian 6-3-3-4 educational system, the National Policy on Education explicitly mandates a learner-centered approach to ensure these home and school factors work in harmony (FRN, 2014, 2023). It is against this backdrop of systemic challenges and foundational importance that this study specifically (1) determine the influence of Teacher's Pedagogical Approach on the academic performance of primary school pupils in mathematics in Minna Metropolis; (2) assess the influence of Peer Group dynamics on the academic performance of primary school pupils in mathematics; (3) ascertain the influence of Student Interest on the academic performance of primary school pupils in mathematics; (4) finding out the influence of Student Motivation on the academic performance of primary school pupils in mathematics; and (5) examine the influence of Family background on the academic performance of primary school pupils in mathematics.

Null Hypotheses

The following null hypotheses guided the study

$H0_1$ Teacher's pedagogical approach has no significant influence on the academic performance of primary school f pupils in mathematics in Minna metropolis, Niger state, Nigeria.

$H0_2$ Peer group dynamics have no significant influence on the academic performance of primary school f pupils in mathematics in Minna metropolis, Niger state, Nigeria.

$H0_3$ Interest has no significant influence on the academic performance of primary school f pupils in mathematics in Minna metropolis, Niger state, Nigeria.

$H0_4$ Motivation has no significant influence on the academic performance of primary school f pupils in mathematics in Minna metropolis, Niger state, Nigeria.

$H0_5$ Family background has no significant influence on the academic performance of primary school f pupils in mathematics in Minna metropolis, Niger state, Nigeria.

METHODOLOGY

The study adopted a cross-sectional survey design. The design allows for the collection of data from the respondents at a single point in time to analyze predict relationships that exist between the independent variable and the dependent variable. This design was chosen for its efficiency in providing a "snapshot" of the educational determinants within the metropolis. The population consisted of all the mathematics teachers and primary six pupils in registered primary schools (both public and private) within Minna Metropolis, Niger State. A sample of 120 respondents was selected for the study using a simple random sampling technique to ensure a representative spread and minimize selection bias. The instrument for data collection was a structured questionnaire titled "Determinants of Mathematics Academic Performance Questionnaire (DMAPQ)." The items were developed by the researcher and was subjected to face and content validity by experts in Science Education and was pilot-tested outside the study area to ensure clarity. The reliability of the instrument was established through Cronbach's Alpha coefficient, which yielded a value of 0.85, indicating high internal consistency. Data collection was carried out by the researcher with the aid of five mathematics teachers over a four-week period. The analysis was conducted using Simple Regression Analysis via SPSS version 27 at a 0.05 level of significance.

RESULTS

Hypotheses One: Teacher's pedagogical approach has no significant influence on the academic performance of primary school f pupils in mathematics in Minna metropolis, Niger state, Nigeria.

Table 1: Regression Analysis on teacher's pedagogical approach as predictor of academic performance of primary school f pupils in mathematics in Minna metropolis

Standardized Coefficients Beta	R	R Square	Adjusted R Square	T	p-value
.912	.912	.901	.888	12.172	.000

Table 1 shows a very strong positive correlation (R = .912) between the teacher's pedagogical approach and academic performance. The R-Square value of .901 indicates that 90.1% of the variance in mathematics performance among pupils is explained by the teacher's method of instruction. With a p-value of .000 ($p < 0.05$), the null hypothesis is rejected. The implication of the result is that the primary driver of success in mathematics in Minna Metropolis is the teacher, thus, if teachers continue to use traditional, uninspiring methods, pupil performance will remain low. Conversely, adopting modern, student-centered strategies will lead to a massive improvement in grades.

Hypotheses Two: Peer group dynamics have no significant influence on the academic performance of primary school f pupils in mathematics in Minna metropolis, Niger state, Nigeria.

Table 2: Regression Analysis on Peer group as predictor of academic performance of primary school f pupils in mathematics in Minna metropolis

Standardized Coefficients Beta	R	R Square	Adjusted R Square	t	p-value
.803	.803	.644	.633	7.612	.000

Table 2 reveals a strong positive influence of peer group dynamics (R = .803). The R-Square value of .644 suggests that 64.4% of the performance outcomes can be predicted by the social and academic interactions among pupils. Since the p-value is .000 ($p < 0.05$), the null hypothesis is rejected. The implication of the result is that Pupils do not learn in isolation. The peers they associate with significantly shape their mathematical abilities. This implies that school environments that foster healthy, collaborative peer competition and group study will see a significant rise in academic achievement.

Hypotheses Three: Interest has no significant influence on the academic performance of primary school f pupils in mathematics in Minna metropolis, Niger state, Nigeria.

Table 3: Regression Analysis on Interest as predictor of academic performance of primary school f pupils in mathematics in Minna metropolis

Standardized Coefficients Beta	R	R Square	Adjusted R Square	t	p-value
.452	.452[a]	.205	.180	2.870	.007

Table 3 indicates a moderate positive relationship (R=.452). The R-Square value of .205 means that 20.5% of the variance in mathematics performance is attributed to the level of interest the pupil has in the subject. With a p-value of .007, which is less than 0.05, the null hypothesis is rejected.

Hypotheses Four: Motivation has no significant influence on the academic performance of primary school f pupils in mathematics in Minna metropolis, Niger state, Nigeria.

Table 4: Regression Analysis on motivation as predictor of academic performance of primary school f pupils in mathematics in Minna metropolis

Standardized Coefficients Beta	R	R Square	Adjusted R Square	t	p-value
.822	.822[a]	.675	.665	8.150	.000

Table 4 shows a strong positive correlation (R = .822). The R-Square value of .675 indicates that 67.5% of the pupils' academic performance is determined by their level of motivation. The p-value of .000 ($p < 0.05$) leads to the rejection of the null hypothesis. Motivation whether through rewards, encouragement, or perceived future utility of the subject—is crucial. This implies that pupils who lack psychological "push" or incentives are likely to perform poorly, regardless of their innate intelligence.

Hypotheses Five: Family background has no significant influence on the academic performance of primary school f pupils in mathematics in Minna metropolis, Niger state, Nigeria.

Table 5: Regression Analysis on Family background as predictor of academic performance of primary school f pupils in mathematics in Minna metropolis

Standardized Coefficients Beta	R	R Square	Adjusted R Square	t	p-value
.872	.872[a]	.760	.752	10.060	.000

Table 5 reveals a very high positive influence from family background (R = .872). The R-Square of .760 indicates that 76% of the academic outcomes in mathematics are explained by home-based factors (such as parental education, socio-economic status, and support). With a p-value of .000, the null hypothesis is rejected. This implies that the "home-school" link is vital. Pupils from families that do not prioritize or support mathematical learning are at a significant disadvantage. Success in mathematics in Minna Metropolis is heavily dependent on the resources and encouragement provided by parents.

DISCUSSION

The result of the test of null hypothesis one suggested that the Teacher's Pedagogical Approach is a highly significant predictor of academic performance in mathematics. This finding concurs with that of Bello (2023), whose study showed that teacher-led instructional strategies are the most dominant factor in student success. Similarly, Adeniji et al. (2018) established that using worked examples and structured pedagogical scaffolds significantly improves algebraic problem-solving abilities. The result is also supported by Musa (2026), who found that the "how" of teaching determines whether instructional resources actually translate into learning outcomes. It was also reported by Obi and Eze (2022) that modern, student-centered pedagogy is the only effective way to bridge the gap between abstract mathematical theories and the concrete reality required by young learners. The results of hypothesis two suggested that Peer Group Dynamics significantly influence academic performance. This finding is in agreement with Usman (2021), whose research in urban centers showed that peer interactions can either enhance healthy academic competition or escalate math anxiety among students. Garba (2022) also noted that peer-related "inferiority complexes" often deter pupils from participating in mathematical tasks. Accordingly, Adigun et al. (2024) found that collaborative peer learning environments significantly boost student attitudes and performance. Tukur (2024) argued that pupils who associate with high-achieving peers are more likely to develop persistence in solving complex numerical problems.

The analysis of hypothesis three and four indicated that interest and motivation play significant role on the performance of primary school pupils in mathematics. This finding aligns with that of Abe and Gbenro (2021) whose study reported that highly motivated students are better at managing test anxiety. Additionally, Yunusa (2023) found that using digital tools spikes student interest, leading to higher engagement levels. Sani (2024) also argued that without a high level of motivation, pupils quickly become intimidated by the symbolic complexity of foundational mathematics. The result of hypothesis five suggested that Family Background has a very strong significant influence on performance. This finding concurs with Ahmed (2022), who established that the socio-economic status and literacy level of the family provide the essential external support system for the child. Garba (2022) also emphasized that parental cultural views and gender-based expectations within the home significantly dictate the child's academic trajectory. Furthermore, Bitrus (2022) found that when family support is coupled with institutional supervision, student performance reaches its peak. Umar (2020) also noted that pupils from supportive family backgrounds have access to more home-based learning materials, giving them a distinct advantage in mastering abstract concepts.

CONCLUSION

This findings of the study shows that all the independent variables (Pedagogical approach, peer groups, interest, motivation and family background) significantly predict the academic performance of primary school pupils in mathematics. Based on the findings, it was concluded that academic performance in mathematics among primary school pupils in Minna Metropolis is not a product of chance, but a result

of a quantifiable synergy between the school, the child, and the home. The Teacher's Pedagogical Approach stands out as the most critical determinant, proving that the educator is the primary gatekeeper of mathematical literacy. The predictive role of Family Background and Student Motivation indicates that classroom instruction alone is insufficient without a supportive home environment and a psychologically primed learner. Ultimately, the fluctuating performance in mathematics in Niger State is a systemic issue that can be reversed by shifting from rote teaching to interest-based, supported learning.

RECOMMENDATIONS

Based on the findings, the following recommendations are provided:

1. The Ministry of Education should provide mandatory training for primary teachers on the use of "Worked Examples" and discovery-based learning to replace traditional rote methods.
2. School Heads should encourage collaborative learning by creating "Mathematics Peer-Study Circles" where high-achieving and struggling pupils can solve problems together.
3. Mathematics Teachers should utilize digital tools and manipulative aids (like kits) during every lesson to make the subject less intimidating and more visually engaging for young learners.
4. School Administrators should implement a "Math Star of the Month" reward system to provide pupils with the extrinsic motivation needed to persist in the subject.
5. Parent-Teacher Associations (PTA) should organize sensitization sessions to educate parents on how to provide a "math-friendly" environment and basic study materials at home.

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