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# HOME ENVIRONMENT, LEARNING STYLE AND ACADEMIC ACHIEVEMENT OF SECONDARY SCHOOL STUDENTS IN MATHEMATICS IN OYO TOWN, OYO STATE, NIGERIA

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**Abstract:** This study examined the impact of home environment and learning style on the students' academic achievement in secondary schools in mathematics in Oyo town, Oyo state, Nigeria. The population of the study consisted of all secondary school students in Oyo Town, Oyo State, Nigeria. Ten (10) public secondary schools were randomly selected for the study with 20 respondents chosen from each school, resulting in a total sample of 200 students. SS2 students were used for the study. Three instruments were used for the study i.e. Questionnaire on the Home Environment, Questionnaire on Learning Styles and Mathematics Achievement Test (MAT) with reliability coefficients 0.91, 0.89 and 0.88 respectively. The instrument were given both face and content validity by experts in the field of mathematics education and evaluation. Four research questions guided the study. The collected data were analyzed using descriptive and inferential statistics. The finding revealed that there is no significant linear relationship between home environment and students' academic achievement in mathematics; that the learning styles do not significantly affect students' academic achievement in mathematics; that there is a statistically significant positive relationship between the parental participation and home environment; and that students' learning style and their degree of mathematical achievement are substantially related. Based on the findings, it was recommended among others that Schools should organize workshops and seminars to educate parents on the importance of their active involvement in supporting their children's language learning, particularly in Mathematics.
**Keywords:** Home environment, Learning style and Academic achievement, Mathematics

## 1 INTRODUCTION

Since the 19th century, the discourse surrounding mathematics education in the Western world has been extensive and has engaged prominent mathematicians. This debate encompasses all age groups of learners, from primary school to university-level mathematics education. Many pupils in primary and secondary education encounter challenges in mastering some components of the mathematics curriculum. Like pupils encountering challenges in learning mathematics, teachers also face issues in delivering effective instruction within the Nigerian educational system. This has posed problems for parents, students, educators, and education professionals. Educators are currently confronted with the challenge of delivering effective instruction that leads to improved student performance in both internal and external assessments [1].

Throughout the history of didactics, educational methodologies, and science education, no discipline has been as extensively examined as mathematics. There is no doubt: that mathematics is difficult and for most students the learning of maths is a problematic question. Furthermore, mathematics is directly associated with the development of sciences such as physics and engineering which have a significant influence on daily life, so mathematics education needs also, at least in part, to be connected with the changing necessities of society [2].

Mathematics encompasses human activities and, broadly speaking, is a discipline that cultivates an individual's scientific reasoning skills. The primary objectives of mathematics in secondary schools which are the capacity to recognise numbers and perform basic Functions, Data Collection and Interpretation, Critical Thinking and Problem Solving among others nowadays are no longer realised. One of the causes for this may be due to the poor basis on which mathematics finds itself right from the secondary school level of the pupils which leads to the students' low performance in it as a subject.

One significant aspect impacting academic progress in mathematics is the home environment. The family plays a vital influence in moulding pupils' attitudes towards learning and can considerably impact their academic success [3]. Students from parents that appreciate and encourage education are more likely to develop favourable attitudes toward learning. Conversely, students with less supportive home contexts may struggle to engage with their studies, resulting in lower competence levels.

The family environment greatly impacts a student's educational journey, especially in mathematics education considering it crucial to national development. Parental involvement, such as assisting with schoolwork or engaging in joint problem solving, and reading, provides a healthy learning climate. Castro, Sims, Dearing and Spielvogel [4] demonstrated that parental participation is substantially connected with better reading and numeracy.

Learning styles refer to the varied ways individuals choose to learn and absorb information. In educational settings, knowing different types is vital for developing effective teaching tactics, particularly in language acquisition. One of the key learning styles is visual learning, where pupils prefer to utilize images, diagrams, and other visual aids to understand concepts. This strategy can dramatically affect language acquisition mathematics, by boosting vocabulary retention and comprehension through visual context [5]. Visual learners can benefit from flashcards, films, and pictorial representations of mathematical topics.

The inclusion of learning styles into mathematics training can assist address individual disparities among students. Tailoring teaching methods to meet varied learning styles can lead to more effective and individualized mathematics training, enabling improved engagement and motivation. This approach supports the assumption that a one-size-fits-all method is less effective than a differentiated strategy that considers students' preferred learning styles [6]. Research also suggests that mixing multiple learning styles in a multimodal strategy can boost mathematics learning outcomes and accomplishment [7]. Despite the benefits, it is crucial to understand that learning styles are simply one component of mathematical proficiency. Other elements, like as motivation, and exposure to mathematical materials, also play essential roles. Therefore, tailoring teaching approaches to learning styles can boost academic accomplishment in mathematics [8].

The combination of family environment and learning style generates a complicated foundation for accomplishment in mathematics. Research indicates that matching these parameters favourably can lead to higher proficiency levels [9]. A supportive home setting can foster good language attitudes, while an appropriate learning style can boost instructional efficacy. Misalignment among these components can result in problems and lower proficiency outcomes. This study analyzes the impacts the home environment and learning style have on students' academic progress in secondary schools in Oyo town, Oyo state, Nigeria.

### 1.1 Statement of the Problem

Despite the critical role of mathematics education in Nigeria, especially in Oyo Town, students' performance remains markedly below expectations. This situation highlights issues with current teaching methods and underscores the need to explore factors affecting achievement in mathematics. Although mathematics is a mandatory part of the secondary school curriculum, inconsistencies in implementation, along with insufficient resources, training, and support for teachers, contribute to the problem. Additionally, Key predictors such as the home environment and their learning styles significantly influence achievement levels. Parental involvement and socioeconomic status impact students' attitudes and motivation, while mismatched learning styles and inadequate teaching strategies further hinder proficiency. This study aims to investigate these factors and their interactions to develop effective strategies for improving mathematics achievement among secondary school students in Oyo Town, Oyo State, Nigeria.

### 1.2 Purpose of the Study

The main purpose of this study is to investigate the impact of home environment and learning style on the academic achievement of secondary school students in mathematics in Oyo Town, Oyo State, Nigeria. Specifically, it sought to:

1. Examine the relationship between home environment and students' academic achievement in mathematics.
2. Explore how different learning styles affect students' academic achievement in mathematics.
3. Assess the extent to which parental involvement in the home environment contributes to students' academic achievement in mathematics.
4. Determine the effectiveness of current teaching strategies in accommodating different learning styles for students' academic achievement in mathematics.

### 1.3 Research Questions

The following research questions are raised and answered to guide the conduct of this study:

1. What is the relationship between the home environment and students' academic achievement in mathematics?
2. In what ways do different learning styles affect students' academic achievement in mathematics?
3. To what extent does parental involvement in the home environment contribute to students' academic achievement in mathematics?
4. How effective are current teaching strategies in accommodating different learning styles for students' academic achievement in mathematics?

## 2 METHODOLOGY

The study adopted a descriptive survey research design to examine how the home environment and learning style predicted the academic achievement in mathematics of secondary school students in Oyo Town, Nigeria. The population of the study consisted of all secondary school students in Oyo Town, Nigeria. Ten (10) public secondary schools were randomly selected schools were selected for the study, with 20 respondents chosen from each school, resulting in a total sample of 200

students. SS2 students were used for the study because they are considered to have covered most items on the syllabus and not preparing for any external examination at the period of the study. A simple random sampling technique was employed to ensure that every student in the population had an equal chance of being selected.

The study utilized self-structured questionnaires and Mathematics Achievement Test (MAT) as the research instruments. The questionnaires are tagged "Questionnaire on the Home Environment" and "Questionnaire on Learning Styles" Each section contained structured items on a Likert scale, ranging from strongly agree to strongly disagree. The instrument also included a section for demographic data, such as age, gender, and parental education levels. The research instrument underwent content and face validation by experts in mathematics and measurement and evaluation. A trial test was conducted to determine the reliability of the instruments using Cronbach's Alpha. For this trial testing, the instruments were administered to respondents outside the scope of the study to ensure that the measurements generated by the questionnaire for the students were consistent. Four schools were sampled with forty (40) respondents for the instruments. The selected sampled schools and respondents had the same characteristics as the intended sampled population. The coefficients obtained were as follows: home environment (0.91), learning styles (0.89) and mathematics achievement test (0.88). Data collection was conducted over four weeks. The researchers obtained permission from the selected schools to administer the instruments to students during school hours. The instruments were distributed to the students in their classrooms, and they were given ample time to complete them. The researchers provided clear instructions and were available to answer any questions from the students during this process. The completed instruments were collected immediately after completion to ensure a high response rate. The collected data were analyzed using descriptive and inferential statistics. Descriptive statistics, such as mean and standard deviation, Pearson correlation, t-test, ANOVA and Regression analysis were conducted at a 0.05 level of significance.

## 3 RESULTS

The results were stated according to the stated research questions as follows;

**Research Questions 1:** What is the relationship between home environment and students' academic achievement in mathematics?

**Table 1** Descriptive Analysis of Home Environment and Students' Academic Achievement in Mathematics

Correlations

| | | Home Environment | MAT Scores |
|---|---|---|---|
| Home Environment | Pearson Correlation | 1 | .131 |
| | Sig. (2-tailed) | | .064 |
| | N | 200 | 200 |
| MAT Scores | Pearson Correlation | .131 | 1 |
| | Sig. (2-tailed) | .064 | |
| | N | 200 | 200 |

P > 0.05

The correlation coefficient (r) between home environment and students' academic achievement in mathematics is .13 with a p-value of .064. Since the p-value is greater than .05, the correlation is not statistically significant. This indicates that there is no significant linear relationship between home environment and students' academic achievement in mathematics.

**Research Questions 2:** In what ways do different learning styles affect students' academic achievement in mathematics?

**Table 2** Analysis of Variance Test of learning styles and Students' Academic Achievement in Mathematics

**ANOVA**

Learning Style

| | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 469.505 | 5 | 93.901 | 1.001 | .418 |
| Within Groups | 18194.475 | 194 | 93.786 | | |
| Total | 18663.980 | 199 | | | |

P > 0.05

The analysis of variance (ANOVA) test was conducted to examine the impact of different learning styles on students' academic achievement in mathematics. The results indicate that there was no significant difference in mathematics test scores among students with different learning styles ($F(5,194) = 1.001$, $p > .05$). Hence, the learning styles do not significantly affect students' academic achievement in mathematics.

**Research Questions 3:** To what extent does parental involvement in the home environment contribute to students' academic achievement in mathematics?

**Table 3** ANOVA Table for Regression Analysis of Parental Involvement in the Home Environment and Students' Academic Achievement in Mathematics.

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .137[a] | .019 | .014 | .733 |

a. Predictors: (Constant), Test Scores

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 2.030 | 1 | 2.030 | 3.779 | .053[b] |
| | Residual | 106.325 | 198 | .537 | | |
| | Total | 108.355 | 199 | | | |

a. Dependent Variable: Parental Involvement
b. Predictors: (Constant), Test Scores
P > 0.05

The results in Table 3 provide an ANOVA summary and model statistics for the regression analysis assessing the extent to which parental involvement in the home environment contributes to students' achievement in mathematics. The results indicate a statistically significant positive relationship between the two variables ($F(1,198) = 3.78$, $p = .053$). However, the effect size, as indicated by the R-squared value of .019, is relatively small, suggesting that parental involvement accounts for only 1.9% of the variance in students' academic achievement in mathematics.

**Research Questions 4:** How effective are current teaching strategies in accommodating different learning styles for students' academic achievement in mathematics?

**Table 4** Paired Sample t-Test on the Current Teaching Strategies in Accommodating Different Learning Styles for Students' Academic Achievement in Mathematics

**Paired Samples Statistics**

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | LearningStyle | 40.01 | 200 | 9.684 | .685 |
| | TestScores | 7.18 | 200 | 1.305 | .092 |

**Paired Samples Test**

| | | Paired Differences | | | | | T | Df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | LearningStyle - Test Scores | 32.835 | 9.929 | .702 | 31.451 | 34.219 | 46.769 | 199 | .000 |

P < 0.05

The paired sample t-test was conducted to compare the mean scores of learning styles and students' academic achievement in mathematics. The results indicate a significant difference between the two variables ($t(199) = 46.77$, $p < .05$). The positive t-value suggests that the mean score for learning styles is significantly higher than the mean score for students' academic achievement in mathematics. This finding implies that while students may have diverse learning styles, the current teaching strategies may not be effectively accommodating these differences, leading to a lower level of mathematics achievement among the students. The results show that students' learning preferences and their level of mathematics achievement are significantly correlated.

Table 1 shows that there is no significant linear relationship between home environment and students' academic achievement in mathematics. This outcome fits with the findings of Taylor and Gebre [10], who argued that while the home environment influences some academic outcomes, its effect on mathematics is frequently indirect, mediated by other factors such as motivation and instructional quality. Xue and Meisels [11] likewise opined that academic progress in mathematics is frequently more strongly connected with exposure to excellent pedagogical tactics and consistent practice than with the overall home setting. Furthermore, the findings underline the significance of focused interventions in schools to boost academic progress in mathematics, independent of the students' home backgrounds. This perspective is consistent with Dörnyei and Ryan's [12] view that successful mathematics achievement hinges on a combination of intrinsic and extrinsic factors, where classroom dynamics and individual learner differences often overshadow the broader home context in determining students' academic achievement in mathematics.

Furthermore, the data demonstrated that the learning styles do not significantly affect students' academic achievement in mathematics. The result agrees with the work of Desforges and Abouchaar [13], who suggested that while learning styles provide insights into students' preferences, they are not direct predictors of academic performance. This means that elements

beyond individual learning styles, such as instructional approaches, teacher efficacy, and students' motivation, may play a more essential role in mathematical accomplishment. Furthermore, the findings confirm Timmons, Pelletier and Corter [14], who found that instructional designs that focus on material delivery and alignment with learning objectives had a better impact than those that rely purely on learning style preferences. As a result, this research encourages educators to adopt a variety of teaching tactics that completely engage students, regardless of their chosen learning style, to increase students' academic progress in mathematics.

The results in Table 3 demonstrated a statistically significant positive relationship between the two factors that is, parental participation and home environment. This accord with the discoveries of Wilder [15], who stressed that while parental participation favourably benefits educational results, its influence is typically intertwined with other environmental and individual factors. Similarly, Armstrong [16] argued that the home environment provides foundational support for academic success, particularly when parents actively engage in their children's learning activities. Despite the limited contribution of parental participation in this setting, its significance cannot be underestimated. Effective parental engagement offers pupils motivation and support that boosts their confidence and enthusiasm in studying. This finding is corroborated by Hornby and Lafaele [17], who stated that parental participation is vital for cultivating academic motivation and cognitive development; even if it's direct contribution to quantifiable outcomes may be restricted. Consequently, while parental participation is a vital component of student's academic achievement, it is imperative to study and incorporate additional pedagogical and environmental measures to optimize language proficiency. This illustrates that even while students have varied learning styles, many classrooms' teaching techniques might not be sufficient to accommodate these variances. As a result, this misalignment between teaching approaches and students' learning preferences may make it more difficult for them to become more adept in mathematics. According to Fleming and Baume [18], academic performance is better when teaching tactics are changed to meet students' learning preferences. These findings are consistent with their studies. According to Bautista [19], taking into account each student's unique learning preferences also increases involvement and promotes deeper understanding, both of which are crucial for mastering challenging talents like language acquisition.

Table 4 demonstrates that students' learning style and their degree of mathematical achievement are substantially associated. Teachers must utilize more inclusive and differentiated teaching techniques because of the glaring inequalities in learning styles and competency. Regardless of their preferred learning styles, these strategies would guarantee that every student may get the highest possible results when learning mathematics. According to Mayo and Siraj [20], mathematics teachers need to be aware of the variety of students' learning styles to construct courses that successfully bridge these gaps. The usefulness of experiential learning frameworks, which accommodate varied learning styles and boost performance in applied disciplines like languages, is ultimately validated by a study by Adeniyi and Funmilayo [21]. To address the identified problems in teaching mathematics, these academic findings suggest the urgent demand for a pedagogical shift.

## 4 CONCLUSION

This study studied the links between family environment, and learning styles in predicting the secondary school students' academic achievement in mathematics in Oyo Town, Oyo State, Nigeria. The results demonstrated no significant linear links between pupils' academic achievement and their home environment suggesting that exposure, practice, and quality of instruction have a bigger impact on mathematical learning. In a similar vein, learning styles did not significantly predict proficiency in mathematics, showing that captivating instructional designs and successful teaching approaches may have a higher influence than tailoring lessons to suit individual learning preferences. Nonetheless, there was a minor but noticeable positive link between students' achievement in mathematics and parental involvement, underscoring the importance of active parental involvement. These results underscore the requirement for a holistic strategy for boosting mathematical achievement, integrating strong teaching methods, caring home settings, and expanding educational possibilities to improve academic results.

## 5 RECOMMENDATIONS

Based on the findings of the study, the following recommendations are made:

- Schools should organize workshops and seminars to educate parents on the importance of their active involvement in supporting their children's language learning, particularly in Mathematics.
- Teachers should adopt innovative and engaging teaching methods that cater to diverse learning preferences, such as incorporating multimedia tools, interactive mathematics games, and role-playing activities to make Mathematics lessons more interesting and effective.
- Schools should ensure the availability of adequate mathematics learning resources, such as textbooks, audio-visual materials, and digital tools, to create an enriched mathematical learning environment.
- Educational authorities should formulate policies that support the teaching and learning of mathematics, including subsidies for mathematics learning materials, scholarships for students studying mathematics, and incentives for mathematics teachers.

• Regular monitoring and evaluation of mathematics programmes should be conducted to assess their effectiveness and identify areas for improvement, ensuring that teaching practices and learning outcomes align with national educational goals.

## COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

## REFERENCES

[1] Azuka B F. Teach yourself senior secondary school mathematics. Onisha, 2015.
[2] Briggs E E. Mathematics laboratories and teacher centres. London; Pan Books, 2022.
[3] Babatunde L L, Olaoluwa T W. Parenting and children's educational outcomes: A meta-analysis of effects. Journal of Family Psychology, 2020, 35(4): 463-473.
[4] Castro R L, Sims J, Dearing E, et al. The development of behaviour Problems in children of low-income mothers: A cumulative risk perspective. Journal of Child Psychology and Psychiatry, 2017, 60(3): 345-354.
[5] Mayer E C. The impact of the home learning environment on child cognitive development: The mediating role of parental educational expectations. European Journal of Psychology of Education, 2017, 33(2): 333-348.
[6] Reinders B, White EY. The Cultural Nature of Human Development. Oxford University Press.
[7] Tuzun P. Scaffolding Second Language Output: The Role of Task Design in Complexity, Accuracy, and Fluency. The Modern Language Journal, 2019, 102(3): 520-541.
[8] Dornyei A. Minority Language Parenting in Europe and Children's Language Use. Journal of Multilingual and Multicultural Development, 2019, 38(3): 245-260.
[9] Adebisi T, The influence of parental educational background on students' language proficiency. Journal of Language and Education, 2019, 5(2): 56-72.
[10] Taylor S, Gebre B. Home learning resources and language proficiency in a multilingual context: A longitudinal study. Journal of Multilingual Education, 2019, 29(1): 89-104.
[11] Xue Y, Meisels S J. Home and school influence on children's bilingual proficiency: An integrative review. Journal of Applied Linguistics, 2021, 45(2): 203-218.
[12] Dörnyei A, Ryan E. The long reach of early childhood poverty. Pathways, 2017, 19(2): 22-27.
[13] Desforges C, Abouchaar A. The impact of parental involvement, parental support, and family education on pupil achievements and adjustment: A literature review. Journal of Research on Educational Effectiveness, 2018, 11(3): 413-436.
[14] Timmons K, Pelletier J, Corter, C. The impact of learning resources on academic achievement in early childhood. Early Childhood Research Quarterly, 2020, 53(4): 1-10.
[15] Wilder S. Effects of parental involvement on academic achievement: A meta-synthesis. Educational Review, 2020,72(3): 372-396.
[16] Armstrong F. Peer influence and language attitude in learning Mathematics: A mixed-methods study. Journal of Educational Psychology, 2017, 34(2): 202-219.
[17] Hornby K, Lafaele Y. Second Language Writing (2nd ed.). Cambridge University Press, 2021.
[18] Fleming N D, Baume D. Learning Styles Again: VARKing up the right tree! Educational Developments, 2017, 18(4): 4-7.
[19] Bautista C. A. The role of auditory learning in language acquisition: A study of verbal learners. Language Learning Journal, 2019, 47(1): 72-88.
[20] Mayo A, Siraj I. Home learning environment and its impact on learning. Educational Research Review, 2017, 20(2): 55-64.
[21] Adeniyi A, Funmilayo K. Family socioeconomic status and academic achievement in language subjects: A study in Oyo State. African Journal of Educational Research, 2018, 27(3): 101-118.