

Investigating the Impact of Parental Factors on Students' Academic Performance in Mathematics: A Comparative Analysis of Motivation, Provision of Instructional Materials.

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ABSTRACT

This study sought to investigate the impact of parental factors on students' academic performance in mathematics: a comparative analysis of motivation, provision of instructional materials in Oredo Local Government Area of Edo State. To guide the study, three hypotheses were formulated and were tested at 0.05 alpha level of significance. The descriptive survey was used as the design for the study and the population consisted of 2, 516 SSII students in the six selected schools out of the 14 public senior secondary schools in Oredo Local Government Area of Edo State. The sample of the study consisted of 250 SSII students which represented about 10% of the population. The instrument used for the study was a constructed questionnaire titled "Parental Mentoring Strategies and Students Academic Performance in Mathematics" (PMSAPMQ). The instrument was of four sections. Section A comprised 10 items on parental mentoring strategies; Section B consisted of another 10 items requesting responses on parental motivation; section C comprised 10 items on parents' provision of instructional resources and finally Section D requests for students' academic score in Mathematics in their last term. Three experts, one in the field of Measurement and Evaluation, one in Educational Planning and Administration while the other expert in Counselling Psychology validated the instrument. The test-re-test reliability method was used and the data collected was analysed using the Pearson Product Moment Correlation. The instrument yielded correlations coefficients of 0.89 for parental mentoring strategies; 0.77 for parental motivation and 0.85 for parental provisions of instructional materials. The instrument was administered to the selected sample and data collected was analysed and results showed that there was a significant influence of parental motivation, parents' provision of instructional materials and parental mentoring strategies on students' academic performance in Mathematics in Oredo Local Government Area of Edo State. Based on the findings of the study, it was therefore recommended that parents and teachers should make use of motivation, provision of instructional materials mentoring strategies to enhance students' academic performance in mathematics in secondary schools in Oredo Local Government Area of Edo State.

Keywords: Strategies, motivation, instructional materials, mathematics, academic performance

BACKGROUND TO THE STUDY

Introduction

Mathematics refers to the study of quality, structure, space, and change. It involves using logical reasoning and critical thinking to solve problems and make predictions about the natural world. Mathematics has many applications in science, engineering, finance, and other fields and is essential for developing new technologies and advancing human knowledge. Some key areas of mathematics include algebra, geometry, calculus, probability theory, and statistics. Mathematics is a significant part of human logic and thoughts. It gives an effective way to create mental discipline and increases logical reasoning. Moreover, mathematical knowledge plays an essential role in understanding the concept of other subjects like science, social studies, and even music and art. Math is used in several fields and disciplines (Benjamin, 2022). The concepts and

procedures of mathematics are used to solve engineering, science, and economics problems.

Moreover, many other topics, such as chemistry, physics, and statistics, are built on the basis of math. These fields would not be possible without mathematical formulas and notions. Automobile manufacturers must understand the demand to build the right number of vehicles. In addition, businesses aim to maximize their earnings. They can compute the optimum price for their autos using mathematical techniques. A business cannot be profitable and grow in the long run if it does not use math. Even after graduating from high school, many students choose to pursue a career in interior design. However, most individuals are unaware that the profession lists out a significant amount of arithmetic. Finances are determined, and the rooms' interiors need to be designed depending on their size and volume. Different mathematical principles are required to compute the layout. In computer science, the subjects of mathematics and computers interact. Without arithmetic, studying computer applications is nearly difficult. Computation, algorithms, and other principles create the basis for various computer applications such as PowerPoint, Word, Excel are impossible. No wonder, the Federal Government of Nigeria made it a core subject without which no course of study can be admitted into in the higher level of education (Rupam, 2022).

However, it is atrocious and appalling that secondary students are failing this all-important subject (WAEC, 2020). Educational stakeholders are wondering what would be possibly responsible for this academic anomaly in the secondary arm of education. There are some possible factors that could be influencing this poor academic performance in the subject. One of them could be parental mentoring strategies. Parents' role is of crucial importance in every child's life and in the attainment of life's goals (WAEC, 2020).

Studies have shown a strong relationship between parents and student performance (Ralph, 2014). One such variable is the level of parents' involvement in students' education. Researchers have shown that parents who are involved in their children's education contribute not only to higher academic achievement, but also to positive behaviour and emotional development (Shradha, Palati, Brundha & Priyadharshini, 2022; Sandal, 2019). Although the importance of parental involvement in students' education does not seem debatable, the kinds of parental roles that are most effective is still an open question (Thornton, 2015) Previous research on parental involvement has investigated mainly general kinds of involvement, however, less research has been done to examine specific kinds of parental involvement aimed at facilitating students' learning of mathematics in home settings.

In researching on this, Avelina, Cecilia, Florinda and Nerinissa (2019) covered 237 students of Angat National High School in Taboc, Angat, Bulacan – Philippines. Descriptive correlational method of research was utilized in this study with questionnaire as the main instrument for gathering data. The results of analysis of variance revealed and F-ratio of .990 with associated probability of $p=.422$ which indicates that the parental involvement strategies like mentoring, parental involvement initiatives, awarding scheme and achievement recognition affect the academic performance of the students in Mathematics but not to a significant extent. Since the associated probabilities of the coefficients were found to be higher than the significance level set at .05, it was found to be non-significant. The null hypothesis is sustained.

In the same vein, Benjamin (2022) aimed at investigating the relationship between parental involvement and learners' perceived attitude to their academic performance in Mathematics. To achieve this aim, the researcher used a sample of 134 parents and learners from grades 4-6 at Bungahan Elementary School. The researcher used the descriptive-correlational method of research, which utilized standardized questionnaires from published research. The study clearly revealed that learners' attitudes toward Mathematics do not affect their academic performance in Mathematics. The result of the correlational analysis is that learners' perceived attitudes in Mathematics such as (a) Motivation and Support, (b) Anxiety in Learning, (c) Self-Efficacy in Learning Mathematics do not significantly affect their academic performance in Mathematics as these perceived attitudes got a significant level of greater than 0.05, therefore, the null hypothesis was accepted. However, among the different ways of parental involvement stated in the study, only the

mentoring strategies provided by the parents during the indicated school year have been effective in increasing their performance in Mathematics. There is a significant relationship between the mentoring strategies of parents and learners' academic performance; $p = 0.016$ (< 0.05), which means a p-value smaller than 0.05 suggests that the correlation is statistically significant.

Another possible factor that could be responsible for mass failure in Mathematics is lack of parental motivation. Motivation has to do with the driving force which prompts people to act the way they do towards a specific goal. According to McGregor theory of motivation, he makes a theory of "X" and "Y" which implies that every person has two sides of good and bad. Theory "X" states that man will not be motivated if not punished or reinforced while theory "Y" implies that man is good and he needs to be disturbed. A motivated child always carries out his assignment and does not get discouraged but works harder towards the achievement of his goals. Motivation leads to good performance and high productivity, hence students' attitude towards Mathematics has proven to be influenced by parental roles including motivation, resource material provision and monitoring (Cai, Moyer, & Wang, 1999). Significant positive correlations exist between effort, self-efficacy, worry, and overall motivation with students' average mathematics performance, with motivation accounting for higher Mathematics achievement (Suraya, Yunus, Zah & Ali, 2009). Motivation factors have proven to influence academic achievements of students in Mathematics and Sciences in combination with academic time devoted to home assignment (Singh, Granville, & Dika, 2002).

In the work of Martinez (2015) who studied to determine whether differences existed in English language arts (ELA) and mathematics achievement between fourth grade students whose family members were involved in school and fourth grade students whose family members were not involved in school. The sample consisted of 30 fourth grade students whose family members were highly involved in school and 30 fourth grade students whose family members were not involved. Independent t-tests were conducted to compare the ELA and mathematics district benchmark mean scores between the two groups. The results suggested that students of highly involved family members significantly outperformed those with family members who were not involved based on scores of the cumulative end-of-year district benchmark tests for ELA and mathematics for grade 4. The mean difference for ELA was 32.33 $p = .001$ and 52.73 ($p = .001$) for mathematics.

Also, Werunga and Maragia (2022) investigated parental motivation as a predictor of academic performance of primary school pupils in Migori County, Kenya. The objective of the study was to determine the extent to which parental motivation predicts academic performance. The study was anchored on achievement motivation theory, social learning theory and a conceptual framework showing the relationship of the variables. Explanatory sequential mixed research design was adopted. Population of the study comprised 570 teachers, 30,600 standard eight pupils, 30600 parents and one director of education. Sample size was 481 of which 60 were teachers, 380 standard eight pupils, 40 parents and one county director of education. Purposive sampling was used to select pupils and the director of education. Stratified random sampling and simple random sampling techniques were used to select 190 boys and 190 girls; 30 male and 30 female teachers. Cluster sampling was used to classify sub-counties. Questionnaire, interview schedules, focus group discussion and document analysis guide were employed to collect data. A pilot study was conducted among 10 teachers, 40 pupils and one director of education. Split-half method was used to determine the reliability of research instruments and their index was 0.823 for teachers and 0.786 for pupils. Content and construct validity were ascertained by the supervisors. Quantitative data was analysed using Pearson's product moment correlation coefficient and regression. The data was also presented using descriptive statistics such as frequency counts, percentages and means. Qualitative data was reported as themes and subthemes. The results showed that parental motivation predictor variable, related linearly to academic performance response variable. This relationship was found to be statistically significant at p -value = 0.002, < 0.05 . The study concluded that parental motivation based on provisions to support the pupils in their

education, encouragement through praise and appreciation when pupils perform better in examinations and rewards such as material gifts improves academic performance.

Yet another important factor that influences learning of Mathematics is resource materials which are visible materials used in teaching and learning. Resource provision by parents influences the ability of the student to follow up instructional procedures by the teacher during class room sessions. It will also to a large extent determine whether the student will be able to follow up at home while the teacher is away. Unavailability and non-use of resource materials in teaching and learning of mathematics should be checked by education stakeholders including parents and government (Bassey, Ndiyo, & Joshua, 2010). That is to emphasize that instructional materials constitute a potent factor influencing secondary school Mathematics achievement of students. Parents and government financial supports to the schools go a long way in providing learning and teaching materials needed for good performance of students in mathematics (Yara., & Otieno, 2010). This goes to confirm that resource provision by parents if done could significantly and positively influence students Mathematics achievements. One of the factors that negatively influence students' performance in Mathematics is inadequate resource material (Enu & Nkum, 2015).

This is also confirmed by Anegu and Chukwu (2021) who focused on the influence of parental motivation, monitoring and resource provision on performance of students in Mathematics at senior secondary school level. Materials and Methods: A structured student and parent survey questionnaire covering motivation, monitoring and resource provision was administered to a sample of 245 senior secondary school students in Unwana Comprehensive Secondary School. Results: Motivation by parents; 75% of parents either strongly disagreed or disagreed with encouraging their children to study Mathematics against only 16.6% that encouraged their children to study Mathematics. Resource provision by parents; 63.3% of parents do not provide necessary resource materials at home to enhance the study of Mathematics by their children, only 30% of parents provided necessary resource materials for their children. Monitoring by parents; only 33.4% of parents checked their children's Mathematics assignment regularly against the vast majority of 55% that do not care about that. Students' performance; only 11.25% of sampled students scored between A and B grades in Mathematics against the vast majority of 88.75% scoring below A and B grades. Conclusion: Considering the low level of motivation, lack of resource provision and inadequate monitoring by parents as evident in the frequency/percentage response in this study, one cannot totally disassociate students' poor performance in Mathematics from parental roles. Therefore, the parental roles of motivation, resource provision and monitoring are influential factors on the performance of students in Mathematics at senior secondary school level.

If mathematics is an all-important subject that is relevant to all human endeavours and it has been confirmed that secondary school students are failing the subject and studies have shown some factors could be responsible for this mass failure, but no one had been carried out in Oredo Local Government Area of Edo State, then, the statement of the problem is: could parental mentoring strategies, motivation and instructional materials be responsible for the mass failure in Mathematics in the Local Government Area?

To guide this study, three hypotheses were formulated. These include:

Hypotheses

1. There is no significant influence of parental motivation on students' academic performance in Mathematics
2. There is no significant influence of parent's provision of instructional materials on students' academic performance in Mathematics
3. There is no significant influence of parental mentoring strategies on students' academic performance in Mathematics

METHODOLOGY

The study used the descriptive survey as the design for this study and the population consisted of 2, 516 SSII students in the six selected schools out of the 14 public senior secondary schools in Oredo Local Government Area of Edo State. The sample of the study consisted of 250 SSII students which represented about 10% of the population. Both the schools and students were selected using the simple random sampling technique by balloting. This was done to give every member an equal chance of being selected.

The instrument used for the study was a constructed questionnaire titled “Parental Mentoring Strategies and Students Academic Performance in Mathematics” (PMSAPMQ). The instrument was of four sections. Section A comprised 10 items on parental mentoring strategies; Section B consisted of another 10 items requesting responses on parental motivation; section C comprised 10 items on parents’ provision of instructional resources and finally Section D requests for students’ academic score in Mathematics in their last term. Three experts, one in the field of Measurement and Evaluation, one in Educational Planning and Administration while the other expert in Counselling Psychology validated the instrument. The test-re-test reliability method was used. In doing this, 30 copies of the questionnaire were administered on twenty SSII students outside the sample used for the study twice at three weeks interval using the same instrument on the same students. Data collected was analysed using the Pearson Product Moment Correlation. The instrument yielded correlations coefficients of 0.89 for parental mentoring strategies; 0.77 for parental motivation and 0.85 for parental provisions of instructional materials, which showed the dependability of the instrument.

The instrument was administered to the sample for the study after the principals had given the permission. With the help of two research assistants employed for the study, every completed questionnaire was collected and was collated for analysis. In analyzing the data collected, all the formulated hypotheses were tested using the Pearson Product Moment Correlation Statistics at 0.05 alpha level of significance.

ANALYSIS AND FINDINGS

Testing of Hypotheses

The following two hypotheses were tested at 0.05 alpha level of significance as shown in Tables 1-3.

Hypothesis 1: There is no significant influence of parental motivation on students’ academic performance in Mathematics

The summary of the test of hypothesis one was presented in Table 1.

Table 1: Pearson Product Moment Correlation showing the influence of parental motivation on students’ academic performance in Mathematics in Oredo Local Government Area of Edo State

N= 250

Variables	r	r ²	p-value	Decision
Parental Motivation	0.81	0.65	0	Reject H ₀
Students’ Academic Performance in Math				

r²= coefficient of determination

Table 1 showed that there was a high positive relationship (0.81) between parental motivation and the students’ Academic Performance in math. The coefficient of determination (r²) associated with the

correlation coefficient of 0.81 was 0.65. The coefficient of determination (r^2) indicated that, parental motivation had 65% influence on students' academic performance in mathematics and the relationship was statistically significant at 0.00. Since this p-value was less than 0.05 the alpha level of significance, the hypothesis which stated, therefore, that there is no significant influence of parental motivation on students' academic performance in Mathematics is rejected. It is concluded, therefore, that there was a significant influence of parental motivation on students' academic performance in Mathematics in Oredo Local Government Area of Edo State.

Hypothesis 2: There is no significant influence of parents' provisions of instructional materials on students' academic performance in Mathematics

The summary of the test of hypothesis two was presented in Table 2.

Table 2: Pearson Product Moment Correlation showing the influence of parents' provisions of instructional materials on students' academic performance in Mathematics in Oredo Local Government Area of Edo State

N= 250

Variables	r	r ²	p-value	Decision
Provision of Instructional Materials	0.56	0.31	0	Reject H ₀
Students' Academic Performance in Math				

r^2 = coefficient of determination

Table 2 showed that there was a moderate positive relationship (0.56) between parents' provision of instructional materials and the students' Academic Performance in math. The coefficient of determination (r^2) associated with the correlation coefficient of 0.56 was 0.31. The coefficient of determination (r^2) indicated that, parents' provision of instructional materials had 31% influence on students' academic performance in mathematics and the relationship was statistically significant at 0.00. Since this p-value was less than 0.05 the alpha level of significance, the hypothesis which stated, therefore, that there is no significant influence of parents' provision of instructional materials on students' academic performance in Mathematics is rejected. It is concluded, therefore, that there was a significant influence of parents' provision of instructional materials on students' academic performance in Mathematics in Oredo Local Government Area of Edo State.

Hypothesis 3: There is no significant influence of parental mentoring strategies on students' academic performance in Mathematics

The summary of the test of hypothesis three was presented in Table 3.

Table 3: Pearson Product Moment Correlation showing the influence of parental mentoring strategies on students' academic performance in Mathematics in Oredo Local Government Area of Edo State

N= 250

Variables	r	r ²	p-value	Decision
Parental Mentoring Strategies	0.69	0.47	0	Reject H ₀
Students' Academic Performance in Math				

r^2 = coefficient of determination

Table 3 showed that there was a high positive correlation (0.69) between parental mentoring strategies and students' academic performance in Mathematics. The coefficient of determination (r^2) associated with the correlation coefficient of 0.69 was 0.47. The coefficient of determination (r^2) indicated that, parental mentoring strategies had 47% influence on students' academic performance in mathematics and the relationship was statistically significant at 0.00. Since this p-value was less than 0.05 the alpha level of significance, the hypothesis which stated, therefore, that there is no significant influence of parental mentoring strategies on students' academic performance in Mathematics is rejected. It is concluded, therefore, that there was a significant influence of parental mentoring strategies on students' academic performance in Mathematics in Oredo Local Government Area of Edo State.

DISCUSSION OF FINDINGS

The first finding of this study showed that there was a significant influence of parental motivation on students' academic performance in Mathematics in Oredo Local Government Area of Edo State. This finding agrees with Suraya, Yunus, Zah & Ali, (2009) and Singh, Granville, & Dika, (2002) whose works showed that motivation influences academic achievements of students in Mathematics and Sciences in combination with academic time devoted to home assignment. Also, the finding supports that of Martinez (2015) who studied to determine whether differences existed in English language arts (ELA) and mathematics achievement between fourth grade students whose family members were involved in school and fourth grade students whose family members were not involved in school and found that students of highly involved family members significantly outperformed those with family members who were not involved based on scores of the cumulative end-of-year district benchmark tests for ELA and mathematics for grade 4. The mean difference for ELA was 32.33 $p=0.001$ and 52.73 ($p=0.001$) for mathematics. In the same vein, the finding is in line with the finding of Werunga and Maragia (2022) who investigated parental motivation as a predictor of academic performance of primary school pupils in Migori County, Kenya and found that parental motivation predictor variable, related linearly to academic performance response variable. This relationship was found to be statistically significant at $p\text{-value} = 0.002, < 0.05$

The second finding of this study revealed that there was a significant influence of parents' provision of instructional materials on students' academic performance in Mathematics in Oredo Local Government Area of Edo State. This finding corroborates that of Anegu and Chukwu (2021) who focused on the influence of parental motivation, monitoring and resource provision on performance of students in Mathematics at senior secondary school level and found that parental roles of motivation, resource provision and monitoring are influential factors on the performance of students in Mathematics at senior secondary school level. Also, the finding supports the finding of Yara., & Otieno (2010) whose work confirmed that resource provision by parents if done could significantly and positively influence students Mathematics achievements and Enu & Nkum, (2015) that revealed that one of the factors that negatively influence students' performance in Mathematics is inadequate resource material.

The third finding of the study revealed that there was a significant influence of parental mentoring strategies on students' academic performance in Mathematics in Oredo Local Government Area of Edo State. This finding is in consonant with the finding of Avelina, Cecilia, Florinda and Nerinissa (2019) who covered 237 students of Angat National High School in Taboc, Angat, Bulacan – Philippines particularly the students of Junior High School department for the 2nd Grading Period of the Academic Year 2017-2018 and found that parental involvement strategies like mentoring, parental involvement initiatives, awarding scheme and achievement recognition affect the academic performance of the students in Mathematics. In the same vein, the finding supports that of Benjamin (2022) who investigated the relationship between parental involvement and learners' perceived attitude to their academic performance in Mathematics and found a

significant relationship between the mentoring strategies of parents and learners' academic performance; $p=0.016$ (<0.05), which means a p-value smaller than 0.05 suggests that the correlation is statistically significant.

CONCLUSION

Based on the findings of the study, it can be concluded that parents' motivation, provision of instructional materials and their mentoring strategies are all having significant influence on students' academic performance in mathematics in secondary schools in Oredo Local Government Area of Edo State

RECOMMENDATIONS

- Since the findings of the study have confirmed the significant influence of motivation, mentoring and provision of instructional materials on the academic performance of students, it is therefore recommended that parents and teachers should motivate students in the learning of mathematics
- Also, teachers should encourage adequate mentoring to help the students develop interest in the learning of mathematics.
- And finally parents should provide required instructional materials for their children to help them in the learning of mathematics especially in the secondary schools.

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