

PARENTS' FACTORS AS DETERMINANTS OF SECONDARY SCHOOL STUDENTS' INTEREST AND ACHIEVEMENT IN MATHEMATICS IN IBADAN METROPOLIS, OYO STATE

By

¹Olasesaan, Olayinka O., ²Lawal, Christianah A.,
³Awobode, Gbolagade O. and ⁴Kumuyi, Gbemisola J

¹Department of General Studies in Education, (Mathematics Unit)
School of General Studies in Education, Federal College of Education, Abeokuta

²Departement of Science and Technology Education,
Faculty of Education, University of Ibadan

³Department of Statistics, Oyo State College of
Agriculture and Technology, Igboora

⁴Science Education Department, Faculty of Education,
Adekunle Ajasin University, Akungba Akoko,

Abstract

Poor mathematics achievement and interest of students in secondary school is alarming and has reduced their chance of securing admissions into reputable higher institutions in Nigeria and globally. Thus, this study investigates the parents' factors as determinants of secondary school students' interest and achievement in mathematics in Ibadan metropolis. The study adopted an ex-post-facto design. The study participants were 750 secondary school pupils in public schools across Ibadan. Pearson Product Moment Correlation (PPMC) and Regression analysis was the statistical tool used for the analysis at $P < .05$. It was found that students' mathematics interest had a significant relationship with parents' income, level of education, guidance, and occupation; parents' guidance and occupation had a significant relationship with students' achievement in mathematics, while parents' income and level of education did not have a significant relationship with students' mathematics achievement; parents' occupation and level of education had a significant independent influence on achievement in mathematics while parents' guidance and income did not have a significant independent influence on achievement in mathematics; parents' occupation, guidance, and level of education had a significant independent influence on interest in mathematics, while parents' income did not have a significant

independent influence on interest in mathematics; there was a significant contribution of the four parents' factors on students' achievement and interest in mathematics. Therefore, parents should provide adequate guidance to the students to facilitate their achievement in mathematics; they should do all possible to engage in occupations that would give them adequate time to attend to their children and wards' needs concerning mathematics.

Keywords: *Parents' income; parents' level of education; parents' occupation; parents' guidance; interest and achievement in mathematics.*

Introduction

The significance of mathematics in producing versatile and resourceful graduates that are needed in the teaching profession and for economic development cannot be over-emphasised. It is an important science subject that is necessary for an understanding of most other fields; no other subject has such a strong strength among the various branches of science. Mathematics is the central intellectual discipline of technology societies. However, it is discouraging that research and data obtained from national examination bodies like the West African Examinations Council (WAEC) and the Nigerian owned National Examination Council (NECO), the National Board for Technical Education (NABTEB) have shown a consistently low performance in this subject.

The increasing lack of interest of the secondary school students in the state in Mathematics occasioned by poor parental income, level of education, poor parental guidance, and low level of education of the parents are serious limiting factors among students in Ibadan. This was further buttressed by the performance in mathematics of the students in both WAEC and NECO examinations in the state which has not been notably encouraging (WAEC, 2016). The report of the West African Senior Secondary School Certificate Examination (WASSCE) between 2011 and 2016 shows that there was a generally poor performance of the candidates in mathematics. In 2017 and 2018, there was an increase in the percentage of candidates with credit pass in the subject. However, from 2019, the percentage of candidates with credit passes started to drop again (Olasesan, 2023). Students' performance in mathematics in the Senior School Certificate Examination (SSCE) has not always been good. As a result, working towards maintaining excellent performance in internal and external examination are essential.

The continuous poor performance in mathematics in Nigeria's primary and post-primary schools levels may be attributed to students' lack of interest in learning mathematics (Olasesan, 2023). Interest has to do with preparedness or mastery of a

subject matter background knowledge that can enable the learner to cope with higher level of learning of the subject matter or related learning task (Innocent, 2022; Ojo, 2022). Interest plays a significant role as a helpful factor in the independent concepts of mathematics teachers. However, the students' interests are still low because most of them have perceived that mathematics as very difficult, boring, not very concrete, and have many abstract theorems that are very hard to understand. Interest does not appear spontaneous, but it increases as a result of participation, experience, and habit when studying or working. Concerning mathematics learning, interest is something important. A student with high interest will concentrate more in mathematics class. Therefore, higher learning interest will increase students' performance academically in the subject. Students' interest in the mathematics classroom cannot be ruled out if the mathematics teacher wants to enjoy the class and this will improve the learning outcome. Students tend to engage themselves in deeper learning on a particular subject when they have an interest (Sen, Adeboye, & Alagbe, 2021).

Students' interest in mathematics can be optimized if adequate measures are put in place by the relevant stakeholders. This could be making sure that professionally trained teachers are provided, a good classroom setting with a state of the art facilities, and a well-stocked library with all the relevant books needed by the students (Karigi and Tumuti, 2015; Omotuyole, & Ibetobou, 2021). Different indicators precipitate students' low interest in mathematics in Nigeria which is the inability of teachers to apply relevant instructional materials as teachers' professional development, poor teacher-student relation, and poor classroom climate (Olaniyan and Sualman, 2015; Akintayo, 2021). Lack of adequately trained teachers, large and overcrowded classes, mathematics phobia, shortage of teaching facilities, lack of libraries and laboratories are all linked with poor students' interest in mathematics (Emeka, Margaret, Jacob, & Olatunde-Aiyedun, 2021; Aji, 2023). In another study to assess the influence of students' interest in mathematics indicated that students that viewed mathematics as a difficult course had reduced motivation to learn mathematics and a higher tendency to achieve low in the subject (Omotuyole, & Ibetobou, 2021). Further, assessing teachers' resources on mathematical literacy that has to do with cultural, economic, and social status and the general expenditure towards education; classroom climate was found to be the most potent factor contributing to education (Abdullahi, & Sirajo, 2020).

Different parental factors are responsible for the achievement and interest of students in mathematics. Parents' income, parents' level of education, size of the family, interest made available by the teachers, and students' interest in the designed curricular activities are responsible for students' academic achievement

(Daniyal, Nawaz, Aleem, and Hassan, 2011; Odikpo, & Ejide, 2021; Olasesan, Kumuyi, Awobode and Lawal, 2024). Other factors such as students' interest, perception of the students of the subject, students' habits, and peers' influence were found to also determine students' academic achievement (Adeyemi and Adeyemi, 2014). Furthermore, Shute, Hansen, Gunderwood and Razzouk, (2011) in investigating the involvement of the parents and secondary school students' academic achievement found that there was a significant relationship in communication between children and their parents concerning plans and school activities, high inspiration and expectations from parents, academic achievement and parenting methods. The background of the parents to an extent influences these factors. The income level of the parents is also very vital towards determining the level of interest and achievement of the students in mathematics in secondary school (Effiong, Ndidi, & Obogo, 2020). Parental socioeconomic status and level of education have been found to have a positive relationship with the students' interest and achievement (Odikpo, & Ejide, 2021). Therefore, students with high family incomes will perform significantly better than those in the middle class, while those in the middle class will perform better than those with low income (Pleninger, de Haan & Sturm 2022). In the light of this, students' achievement has a negative correlation with the low socio-economic status of parents because it will inhibit the individual from having access to resources that would help them in their learning (Akobi, & Okeke, 2023). Therefore, students with low income will have their studies affected negatively, as they will be dragged down to the lower level (Asif, Safdar, & Ali, 2020).

This study is built on social learning theory which asserts that learning is a cognitive process that occurs in a social context and can occur solely through direct instruction and observation, even in the absence of direct reinforcement or motor reproduction. According to the theory, learning also takes place with the observation of punishment or rewards which is called vicarious reinforcement (Bandura, 1963; Nganchi, & Charlotte, 2020). In essence, the level of achievement and interest of students in mathematics is controlled mostly by their actions and that of their parents within the social environment.

Statement of the Problem

The poor mathematics achievement and interest of students in secondary school are alarming and have reduced their chance of securing admissions into reputable higher institutions in Nigeria and globally. Mathematics is an essential requirement for admission into any higher institutions in Nigeria and globally, however, the failure rate in the subject during West African Examinations Council (WAEC) and National Examinations Council (NECO) has been proportionately high. For

instance, in 2015, only a paltry 38.6% of the students that sat for mathematics in WAEC had credit in Mathematics (Olasehinde-Williams, Yahaya and Owolabi, 2018). This is an indication of low achievement in mathematics. This unseemly outcome has dimmed the hope of major stakeholders in education and parents, as they are short of ideas on how to improve the present unsuitable state of the education system in Nigeria. Different parental factors could precipitate a poor level of achievement and interest of students in mathematics in secondary school. This study, therefore, investigated parents' income, level of education, guidance, and occupation as possible factors responsible for the poor achievement and interest of students in mathematics in secondary schools in the Ibadan metropolis.

Research hypotheses

The following research hypotheses were tested in this study:

1. There is no significant relationship between parents' factors (parents' income, level of education, guidance, and occupation) and students' interest in mathematics.
2. There is no significant relationship between parents' factors (parents' income, level of education, guidance, and occupation) and students' achievement in mathematics.
3. There is no significant independent and joint influence of parents' factors (parents' income, level of education, guidance, and occupation) on students' interest in mathematics.
4. There is no significant independent and joint influence of parents' factors (parents' income, level of education, guidance, and occupation) on students' achievement in mathematics.

Methodology

The study adopted an ex-post-facto design, whereby the researcher has no direct control over the independent variables of the study. The study participants were 1000 public secondary school students in public schools across the Ibadan metropolis. There are 11 local governments in Ibadan. Five local governments were randomly selected and these are Akinyele, Ibadan North-East, Ibadan North West, Oluyole, and South East Local Governments. A stratified random method of data collection was used by the researcher to collect data from the participants. The questionnaire was adapted by the researcher having consulted the relevant literature. The instrument has seven sections measuring the demographic characteristics of the respondents; parents' factors scale adapted from the work of Ogunsola et al (2014); it had four main dimensions of parents' income ($\alpha = 0.88$), level of education ($\alpha = 0.75$), occupation ($\alpha = 0.82$), and guidance (0.79); The face and content validity of the instrument was conducted and it was adjudged by specialists

in teacher education to be valid for measuring the assigned constructs. Students' Interest in Mathematics scale was .84 (Mitchel, 1993) and Students' Achievement in Mathematics was .78 (Tella, 2008). The questionnaire was administered to the students in different classes with the aid of some teachers in the school based on the consent of the schools' Principals. 1000 copies of the questionnaire were given out in all the schools visited, but 750 filled it appropriately. 750 copies of the questionnaire were used for the analysis and this indicates a 75% response rate. Pearson Product Moment Correlation (PPMC) and Regression analysis was the statistical tool used for the analysis.

Results

Research hypothesis 1: There is no significant relationship between parents' factors (parents' income, level of education, guidance, and occupation) and students' interest in mathematics.

Table 1: Correlational matrix of parents' factors (parents' income, level of education, guidance, and occupation) and students' interest in mathematics

	Mean	SD	Mathematics interest	Parents income	Parents level of education	Parents guidance	Parents Occup.
Mathematics interest	21.4379	4.91991	1				
Parents income	14.7934	2.79733	0.136**	1			
Parents level of education	15.0259	2.45631	0.088*	0.676**	1		
Parents guidance	14.6769	2.16942	0.266**	0.484**	0.555**	1	
Parents occupation	13.3192	2.85757	0.453**	0.308**	0.292**	0.455**	1
			733	697	733	715	733
			0.000	0.000	0.000	0.000	0.000
			680	680	680	715	716
			716	680	733	715	733

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 1 indicates that students' interest in mathematics had a significant positive relationship with parents' income $r=0.136$, $p<0.05$), parents' level of education ($r=0.088$, $p<0.05$), parents' guidance ($r=0.266$, $p<0.05$) and parents' occupation ($r=0.453$, $p<0.05$). Therefore, the result shows that all the parents' variables had significant relationship with students' interest in mathematics.

Research hypothesis 2: There is no significant relationship between parents' factors (parents' income, level of education, guidance, and occupation) and students' achievement in mathematics.

Table 2: Correlational matrix of parents' factors (parents' income, level of education, guidance, and occupation) and students' achievement in mathematics

	Mean	SD	Achievement in mathematics	Parents income	Parents level of education	Parents guidance	Parents occupation
Achievement in mathematics	13.6240	2.36575	1				
Parents income	14.7934	2.79733	0.001 0.989 697	1			
Parents' level of education	15.0259	2.45631	-0.059 0.110 733	0.676** 0.000 680	1		
Parents' guidance	14.6769	2.16942	0.136** 0.000 715	0.484** .000 680	0.555** 0.000 715	1	
Parents' occupation	13.3192	2.85757	0.599** 0.000 733	0.308** 0.000 680	0.292** 0.000 733	0.455** 0.000 715	1

** . Correlation is significant at the 0.01 level (2-tailed).

Table 2 indicates that students' achievement in mathematics did not have significant relationship with parents' income $r=0.001$, $p>0.05$) and parents' level of education ($r=-0.059$, $p>0.05$), while students' achievement in mathematics had significant positive relationship with parents' guidance ($r= 0. 136$, $p<0.05$) and parents' occupation ($r=0.599$, $p<0.05$). Therefore, the result shows that parents' guidance and occupation had a significant relationship with students' achievement in mathematics, while parents' income and level of education did not have a significant relationship with students' achievement in mathematics.

Research hypothesis 3: There is no significant independent and joint influence of parents' factors (parents' income, level of education, guidance, and occupation) on students' achievement in mathematics.

Table 3a&b: Independent and joint influence of parents' factors (parents' income, level of education, guidance, and occupation) on students' achievement in mathematics

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	10.680	0.548		19.494	0.000
	Parents' income	0.010	0.034	0.012	0.299	0.765
	Parents' education level	-0.255	0.041	-0.255	-6.290	0.000
	Parents' guidance	-0.063	0.043	-0.054	-1.455	0.146
	Parents' occupation	0.578	0.027	0.707	21.413	0.000

a. Dependent Variable: achievement in mathematics

Model Summary^b

Model	R	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
				R Square Change	F Change	df1	df2	Sig. F Change	
1	0.662 ^a	0.438	1.80244	0.438	131.470	4	675	0.000	1.757

- a. Predictors: (Constant), parents' occupation, parents' level of education, parents' guidance, and parents' income
- b. Dependent Variable: achievement in mathematics

Table 3a indicates the relative influence of parents' occupation ($\beta = 0.707$, $t = 21.413$, $P < 0.05$); parents' level of education ($\beta = -0.255$, $t = -6.290$, $P < 0.05$), parents' guidance ($\beta = -0.054$, $t = -1.455$, $p > 0.05$) and parents income ($\beta = 0.012$, $t = 0.299$, $P > 0.05$) in that order. It is thus noteworthy that parents' occupation and level of education had

significant independent influence on students' achievement in mathematics while parents' guidance and income did not have significant independent influence on students' achievement in mathematics.

Table 3b indicates the joint influence of parents' factors (parents' income, level of education, guidance, and occupation) on students' achievement in mathematics. ($R = 0.662$, $R^2 = 0.438$ and adjusted $R^2 = 0.435$). The result implies that 43.8% of the variance was due to the joint influence of parents' factors (parents' income, level of education, guidance, and occupation). The level of significance was 0.05. The analysis of variance of the regression produced (F-ratio = 131.47; $P < 0.05$). This indicates a significant contribution of the four parents' factors on students' achievement in mathematics.

Research hypothesis 4: There is no significant independent and joint influence of parents' factors (parents' income, level of education, guidance, and occupation) on students' interest in mathematics.

Table 4a&b: Independent and joint influence of parents' factors (parents' income, level of education, guidance, and occupation) on students' interest in mathematics

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	10.350	1.394		7.426	0.000
Parents' income	0.099	0.087	0.055	1.141	0.254
Parents' level of education	-0.291	0.103	-0.137	-2.831	0.005
Parents' guidance	0.323	0.109	0.130	2.965	0.003
Parents' occupation	0.705	0.068	0.405	10.292	0.000

a. Dependent Variable: mathematics interest

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	0.462 ^a	0.213	0.209	4.54538	0.213	44.621	4	658	0.000	1.283

- education, parents' guidance, and parents' income
 b. Dependent Variable: mathematics interest

Table 4a above indicates the relative influence of parents' occupation ($\beta = 0.405$, $t = 10.292$, $P < 0.05$); parents' guidance ($\beta = 0.130$, $t = 2.965$, $p < 0.05$); parents' level of education ($\beta = -0.137$, $t = -2.831$, $P < 0.05$), and parents income ($\beta = 0.056$, $t = 1.141$, $P > 0.05$) in that order. It is thus noteworthy that parents' occupation, guidance and level of education had significant independent influence on students' interest in mathematics, while parents' income did not have significant independent influence on students' interest in mathematics.

Table 4b indicates the joint influence of parents' factors (parents' income, level of education, guidance and occupation) on students' interest in mathematics ($R = 0.462$, $R^2 = 0.213$ and adjusted $R^2 = 0.209$). The result implies that 21.3% of the variance was due to the joint influence of parents' factors (parents' income, level of education, guidance, and occupation). The level of significance was 0.05. The analysis of variance of the regression produced (F-ratio = 44.621; $P < 0.05$). This indicates a significant contribution of the four parents' factors on students' interest in mathematics.

Discussion of Findings

Four research hypotheses were tested in this study. In hypothesis one it was found that parents' income, education level, guidance, and occupation had a significant relationship with students' interest in mathematics. This indicates that all the parents' factors considered in this study significantly correlated with students' mathematics interests. This was consistent with extant studies. Daniya et al. (2011); Odikpo, & Ejide, (2021) established that father and mother's level of education, income, family size, teachers' regularity, and teachers' interest are factors that significantly predict the achievement of students in their studies. Furthermore, Shute et al (2011); Olasesan, et al (2024) submit that there is a correlation in the

communication between parents and children with regards to their school activities. The implication is that parents exert a substantial role in ensuring that students perform optimally in their mathematics interests in school.

Hypothesis two found that parents' guidance and occupation had a significant relationship with students' achievement in mathematics, while parents' parents' income and level of education did not have a significant relationship with students' mathematics achievement. In essence, the level of guidance provided by the parents and the kind of job they do highly determines the level of mathematics achievement of their children and wards in the school. This shows that the role of the parent in providing requisite guidance cannot be unnoticed and must be keenly emphasized. Occupations of the parents could be in terms of parents' occupation that gives them time to focus on their children and the ones that did not allow them to have adequate time for their children goes a long way in impacting the achievement of students in mathematics. This agrees with extant studies. Odikpo, & Ejide, (2021) found that the occupation of the parents determine their socio-economic status (SES) was responsible for the achievement of the students in their studies. This is because students with high SES tend to perform better than those with low SES (Akobi, & Okeke, 2023). The finding was however refuted by earlier findings by Bozick (2007) who submits that family income had a significant relationship with students' achievement. According to the scholar financial engagement often compelled most of the students in the schools to drop out of the programs.

The finding in hypothesis three indicates that parents' occupation and level of education had a significant independent influence on achievement in mathematics while parents' guidance and income did not have a significant independent influence on achievement in mathematics. It was also found that the joint influence of parents' factors (parents' income, level of education, guidance, and occupation) on mathematics achievement was significant. The implication is that all four factors had a significant substantial contribution to students' mathematics achievement. Earlier studies have laid credence to the assertion of this study. According to Effiong, et al., (2020) who aver that the financial background of the students goes a long way in determining their level of achievement. This indicates that students that must perform optimally in mathematics must have parents with a good background, having good occupations with a reasonable income. Further, Daniya et al. (2011) opine that the level of income of the parents, education, and other factors from the parents' perspective amply determines the level of achievement of the students. In essence, for students to perform up to the level of expectation, the parent's level of income, guidance, education, and occupation must be above average.

Hypothesis four found that parents' occupation, guidance, and level of education had a significant independent influence on interest in mathematics, while parents' income did not have a significant independent influence on interest in mathematics. It was further found that the joint influence of parents' factors (parents' income, level of education, guidance, and occupation) was significant. This was consistent with some previous studies. According to Ogunshola and Adewale (2012); Olasesan, et al (2024), there was a significant difference between the students' level of performance and some parental factors such as educational qualification, health, and others. It was however found in their study that the SES of the parents occasioned by their income level did not have a significant influence on their level of performance.

Conclusion

The study tested four research hypotheses. It was found in hypothesis one that students' mathematics interest had a significant positive relationship with parents' income, parents' level of education, parents' guidance, and parents' occupation. Hypothesis two found that parents' guidance and occupation had a significant relationship with students' achievement in mathematics, while parents' parents' income and level of education did not have a significant relationship with students' mathematics achievement. Hypothesis three found that parents' occupation and level of education had a significant independent influence on achievement in mathematics while parents' guidance and income did not have a significant independent influence on achievement in mathematics. It was further found that there was a significant contribution of the four parents' factors on students' achievement in mathematics. Hypothesis four found that parents' occupation, guidance, and level of education had a significant independent influence on interest in mathematics, while parents' income did not have a significant independent influence on interest in mathematics. It was also found that there was a significant contribution of the four parents' factors on students' interest in mathematics.

Recommendations

As a result of the findings of this study, the following recommendations are made:

- i. That parents should provide adequate guidance to the students to facilitate their achievement in mathematics. This guidance could be in the areas of helping them to check their take-home assignments, monitoring their reading habits at home, and motivating them to carry out a task that would be enhancing their learning of mathematics at home.
- ii. That parents should do all possible to engage in occupations that would give them adequate time to attend to their children and wards' needs concerning mathematics.

- iii. That parents should arouse the interest of their wards and children in mathematics with the provision of easy to learn mathematics gadgets and home tutors. Students should be aided by their parents to be passionate about the learning of mathematics.
- iv. Teachers should feed the parents back about the student performance in mathematics. This is to aid prompt action being taken to address the issue and put such students on the right path towards effective mathematics learning.

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