ISSN: 2714-2965 (Print)
ISSN: 2714-3449 (Online)
The African Journal of Behavioural and Scale Development Research
AJB-SDR Vol. 3, No 2, 2021

Students Social Variables as predictors of Junior Secondary School Interest in Mathematics in Ibadan Municipal, Ibadan, Nigeria

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Abstract
The importance of mathematics in national development cannot be overemphasized. However, students' consistent poor performance in the subject has raised a lot of concern among the educational stakeholders.
This study, therefore, investigated how some student social variables (student-teacher relationship, peer pressure, age and birth order) predict their interest in mathematics in Ibadan municipal Oyo State, Nigeria. Two hundred and twenty-five students were sampled from 15 schools. The validated Student Social Variables Questionnaire (SSVQ; r=0.72) and Students' Mathematics Interest Questionnaire (SMIQ; r=0.56) were used. Data collected were analysed using percentage count and multiple regression analysis.
Findings showed that most students 121 (53.8%) have low interest in mathematics. Also, there was a linear relationship between students' social variables and students' interest in Mathematics. The four predictors jointly accounted for 6.9% observed variance in the measures of students' interest in Mathematics, [$R = 0.263$, $R^2 = 0.069$; $p < 0.05$]. The best predictor of the students' interest in mathematics was peer pressure [$\beta = 0.243, t_{(224)} = 3.227; p < 0.05$].
The study recommended that parents and teachers should educate students on the choice of friends in relation to how it influences interest in school subject, and consequently their academic performance.

Key words: Interest, Mathematics, Social, Predictors, Variables

Introduction
Mathematics predates the creation of the world. The period of the earth's creation was measured, the shape and size of the earth were all measured and determined by the Creator. Indeed, mathematics is regarded as the oldest of all sciences that have evolved over time, with a significant impact on the quality of human life on earth. According to Akinoso (2011), mathematics is the basis of science and technology, as well as a tool for accomplishing scientific and technological advancement. Despite the importance of mathematics to individuals and society as a whole, the incidence of failure in the subject among junior secondary school students (which is a foundational level for the senior secondary school level); is quite worrisome. Students' performance in Senior Secondary Certificate Examinations in major subjects (particularly mathematics) is falling, for example, between 2009 and 2014, the best result was in 2012 where 38.8% of students had five credits or more, including mathematics (Saad, Adamu & Sadiq, 2014).

Several researchers including (Karue and Amukowa, 2013; Saad, Adamu & Sadiq, 2014; Suleiman and Hammed, 2019) have given details about the causes of consistent weak performance in mathematics. Some have linked it to poor teaching of the subject (mathematics) by teachers, lack of mathematics textual materials, the school environment and atmosphere, general misconceptions about the subject that create a negative impression of the subject in students, parental influence due to their academic background, peer influence, and a variety of other factors. In order to find a long-term solution to students' low performance in mathematics, researchers explored how students' interest leads to their poor performance in mathematics (Heinze, Reiss & Franziska, 2005; Anigbo & Idigo, 2015). Unodiaku (2012) ascribed causes of failure in mathematics among secondary school students to lack of interest. Furthermore, several scholars suggested that students' failure to perform in mathematics was as a result of their lack of interest in such an

ISSN: 2714-2965 (Print)
ISSN: 2714-3449 (Online)

important subject (Idigo; 2010; Goolsby, 2013; Otoo, Iddrisu, Kessie, & Larbi, 2018).

According to Jega & Julius (2018), students' low level of interest in mathematics may be attributed to some internal and external factors. There are several factors that predict students' interest in mathematics that cannot be addressed in a single study. This study focuses solely on social variables as predictors of students' mathematics interest. One of these variables is the students' relationship with their teachers. Teachers are typically viewed as loco-parentis by the society and students see them as their role models. This viewpoint can be sustained by maintaining a positive teacher-student relationship in the classroom and even outside the classroom. Individual diversity, background, and many psychological obstacles that students face at home and at school necessitate that the mathematics teacher establishes a constructive relationship with the students in order to achieve the goal of his instruction. According to Rimm-Kaufman and Sandilos (2015), positive interactions between teachers and students help meet students' developmental, emotional and academic needs.

Students' views of how the teacher cares about them may be a crucial component of motivation to participate in classroom activities (Wentzel, 1997). Students' perceptions of teacher's care are found to be positively and significantly connected with their interest, as reflected in their receptivity, activities, and responses to teaching in the classroom, as well as relatively with their achievement. Wentzel (1997) conducted research to find out how students perceive teacher's care and how it relates to student achievement. Internal control beliefs were strongly and positively connected to students' perceptions of care, whereas other strong and hidden control beliefs, as well as student reports of discomfort, were negatively related. Rimm-Kaufman & Sandilos (2015), submitted that positive student-teacher relationships in the classroom make students feel accepted and perform better academically. Although rising student-teacher relationships does not automatically result in greater accomplishment, good teacher-student relationships can influence learners' academic and social growth (Rimm-Kaufman & Sandilos, 2015). Furthermore, a good teacher-student relationship can help students feel like they belong at school and create a welcoming environment, which can help them succeed academically by influencing motivational, emotional and behavioural aspects linked to school engagement (Vieno, Perkins, Smith & Santinello, 2005). Teachers are encouraged to create a favourable environment for students in which they may form a positive relationship with them since this will grow their interest in mathematics and, as a result, increase student investment and achievement.

The degree to which pupils acquire an interest in mathematics is also impacted by the level of peer pressure they face. The social and emotional development of an adolescent is affected by their peers. A peer is someone with the same skill in a particular subject, regardless of age difference (Topping, 2017). Pressure, on the other hand, refers to the process of influencing somebody to do something they would not normally do. According to Hartney (2011), peer pressure is the effects that peers might have on one another. According to Jones (2010), peer pressure is the ability of individuals of the same social position or age to influence people of the same age bracket. Peer pressure is generally associated with teenagers, yet it has an impact on people of all ages. Peer pressure appears to have a wide range of consequences on students' academic achievement in school. It is the manner in which their peers impact them, whether positively or negatively. Adolescents need to seek comfort from one another when they come together, however, they are oblivious of the impact their peers have on them academically (Moldes, Biton, Gonzaga, & Moneva, 2019).

Peer influence can have a variety of effects on people, but the focus here is on how it influences the interest of secondary school students in mathematics. Peer pressure influences the mathematics interest of all students, both successfully and unsuccessfully. Peer effect on students' interests can be positive or detrimental. Peer pressure is regarded as favourable when it serves to stimulate or boost one's interest in mathematics. On the other hand, when peer

ISSN: 2714-2965 (Print)
ISSN: 2714-3449 (Online)

pressure makes a student to dislike mathematics, it is considered a negative peer pressure.

A few studies have found that peer impact starts at a young age and increases during the adolescent years (Knoll, Leung, Foulkes, & Blakemore, 2017; Knoll, Magis-Weinberg, Speekenbrink, & Blakemore, 2015; Filade, Bello, Uwaoma, Anwanane, & Nwangburka, 2019). Rabenberg (2013) studied the possible factors of middle school, the confidence of girls and their interest in mathematics and science using Bronfenbrenner's Bio-ecological Model. The macro systems of age and race/ethnicity were studied, as were the microsystems of self-efficacy, teacher influences, parent encouragement and peer influences. According to the findings, mathematic/science teacher effects and peer influences both significantly predicted interest and confidence of girls mathematics and science. Also, Mosha, (2017), reported that peer influence has both positive and negative influence on the students but depends on how much and how well the students receive the climate of the peers coming from the group. When parents and teachers educate students on how their peer group influences their interest in school subjects and, as a result, their academic achievement, they will be suitably led in their peer group selection.

A student's age is another crucial student element that determines the student's interest in mathematics. Many studies have looked at how age influences mathematics performance, but few have looked at how it influences students' interest in mathematics. We define age as the amount of time a person has spent on Earth. According to Grissom (2004), older students scored better academically than their peers in the classroom, while overage students due to earlier retentions and other circumstances performed worse academically than their contemporaries. Considering the effects of relative age in secondary school, the majority of research indicated effects favouring the older. Thoren, Heinig, and Brunner (2016) reported positive effects for the relatively older in mathematics in Grades 2 and 3, which diminish in Grade 3 and reverse in Grade 8 in favour of the relatively young. This can be attributed to the fact that older students appear to behave maturely and also attend to matters maturely, which may enhance their success in mathematics, whereas younger students tend to take things lightly, get distracted easily, and may pay less attention as a result of their childish attitude, which may affect their performance in mathematics. For some of the older children in his study, Grissom (2004) found a positive correlation between age and academic success, but argued against changing entrance age policies, delaying school entry, or retaining students to enhance academic achievement based on the findings with students considered overage.

The findings of studies on age and student achievement in mathematics are conflicting, while some studies found a positive correlation, others found a negative correlation. However, some studies showed that there is relationship between age and achievement which consequently can be correlated significantly with the students' interest in mathematics (Abubakar, & Oguguo, 2011; Abubakar, 2012). Ayotola and Adedeji (2009) discovered that there was an insignificant negative correlation between age and senior secondary school two students' mathematics achievement. Furthermore, Carmichael, Callingham, Hay, and Watson (2010) investigated the relationship between important indicators of interest in statistical literacy in middle school students' and found no significant linear relationship between student ages and interest ratings. Students' interest can be attributed to achievement and just as age influences students' performance in mathematics, it also predicts students' interest indirectly. Another important variable in this study is the students' birth order. Birth order refers to a student's position in the family which can be broadly characterised as first child position, middle child position, or youngest child position. Though there haven't been many studies on how birth order influences students' interest in mathematics in the junior secondary level of education, numerous researchers have discovered that birth order does affect students' education. An individual's birth order has a significant effect on his personality development, character, intellect, and career paths, which indirectly influence interest in

ISSN: 2714-2965 (Print)
ISSN: 2714-3449 (Online)

mathematics.

Researchers (Guo, Lin, & Guo, 2018; Yang, Hou, Wei, Wang, Li, & Qiu, 2017; Szobiova, 2008) discovered mixed data that suggest a variety of birth order effects on student performance. Some researchers found that first-born and/or only-born child students outperformed any other birth order (Alsaleh, Alabbasi, Ayoub, & Hafsyan, 2021; Guo, Lin, & Guo, 2018; Yang, Hou, Wei, Wang, Li, & Qiu, 2017), others found that those who are in the middle birth positions (second- or third-born children etc.) outperformed only-born, first-born, and last-born students (Szobiova, 2008). Adding to the complication, several earlier researchers found that later-borns outperformed only-born, first-born, and middle-born students (Farley, 1978; Staffieri, 1970). In fact, some researchers discovered little or no effect on birth order (Botzet, Rohrer & Arslan, 2018; Ha & Tam, 2011; Rodgers, 2001). The reason for these discrepancies between studies is not far-fetched given the abundance of other variables (psychological, social, environmental, cultural, etc.) capable of moderating the influence of birth order on mathematics interest. Botzet, Rohrer, & Arslan (2018) stressed that the slight effects of birth order observed in other research seem to be culturally specific, with the potential of moderating birth order effect on academic achievement of students. According to Herrera, Zajonc, Wieczorkowska & Cichomski (2003), numerous personality features of first-born infants include attributes like intelligence, obedience, stability, and responsible dispositions. The family environment of a first-born kid is thought to influence personality qualities which include extroversion, maturity, and intelligence quotient. A child who is first-born frequently encounters a strong sense of overprotection and involvement from their parents, which causes them to develop the aforementioned personality traits (Collins, 2006). The growth of intelligence in the firstborn is accountable for their interest in mathematics because intelligence is highly useful in mathematical capability and also improves their success in the subject. The reason for this is that being the first child in the family thrills the family so much that they pay special attention to the firstborn child, causing the child to acquire vital characteristics that boost their interest in mathematics as a fundamental subject. On the other hand, the youngest children tend to receive a lot of love from their families, which boosts their confidence and provides them with the resources they need to succeed in school. Parents tend to relax on the middle children which causes them to pay less attention to them; as a result, they lack several characteristics that are responsible for their academic achievement and, consequently, their interest in mathematics. The only children are an exception to this tendency; they are predicted to perform the worst.

Statement of the Problem

Despite the fact that mathematics is important for individual, national, technological, and economic development, and that it is required at the primary and secondary school levels of education in Nigeria, its teaching and learning, as well as students' lack of interest in the subject, have become a source of concern for all stakeholders. Students' lack of interest in mathematics may be attributed to some student factors such as hatred for mathematics, perceived difficulty of the subject, lack of concentration in the classroom, negative attitude toward the subject, and so on. Some students who are able to attend mathematics class purposely turn off their minds from following the teacher's explanation because they do not understand and, hence, are disinterested in the subject. Many student variables are capable of predicting a certain student's interest in the subject at a given point in time. Teacher's failure to put these variables into consideration will render the subject's teaching and learning an exercise in futility.

The majority of empirical studies on student variables have been done in relation to mathematics achievement or students' performance in the subject; however, relatively few studies had studied how students' social characteristics might be used to predict their interest in mathematics. The problem of the present study is to investigate how some student's social variables (student-teacher relationship, peer pressure, age and birth order) predict their interest in mathematics in junior secondary school.

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Purpose of Study

The study's main purpose is to determine how student-teacher relationship, peer pressure, age and birth order predict students' interest in mathematics. Specifically, the study seeks to:

1. Examine the level of students' interest in mathematics
2. Investigate the variance in students' interest in mathematics in Junior Secondary School in Ibadan metropolis Oyo State explained by student social variables (student-teacher relationship, Peer pressure, age, birth order)
3. Determine the composite contribution of students' social-variables (student-teacher relationship, Peer pressure, age, birth order) to the explanation of students' interest in mathematics?

Research questions

This study intends to provide answers to the following questions:

I. What is the level of students' interest in mathematics in Junior Secondary School in Ibadan metropolis Oyo State?
II. What is the variance in students' interest in mathematics in Junior Secondary School in Ibadan metropolis Oyo State explained by student social variables (student-teacher relationship, Peer pressure, age, birth order)?
III. What is the composite contribution of students' social-variables (student-teacher relationship, Peer pressure, age, birth order) to the explanation of students' interest in mathematics in Junior Secondary School in Ibadan metropolis Oyo State?

Methodology

The study adopted the correlational design. The independent variables were correlated with the dependent measures. The design is appropriate since the study's aim is to investigate the relationship between the variables, which are the social variables of Junior Secondary School students and their interest in Mathematics.

Population, Sample and Sampling

The Junior Secondary School one (JSS1) Mathematics students in Ibadan metropolis, Oyo State, Nigeria, are the study's target population.

The study's participants were selected using a multi-stage sampling procedure. Ibadan metropolis had eleven local government areas (LGAs) divided into Ibadan city (five LGAs) and Ibadan less city (six LGAs). At the first stage, Ibadan city was randomly selected. The five LGAs were Ibadan North, Ibadan North East, Ibadan North West, Ibadan South West and Ibadan South East are the areas. There are a total of one hundred and sixty-seven Junior Secondary Schools in the local government. At the second stage of sampling, three schools were purposively selected from each LGA because some schools were preparing for examination at the time of data collection and not all schools gave access. Lastly, 15 students from each JSS1 class of the selected schools were randomly selected. This resulted in a total of two hundred and twenty-five students for the study.

Instrumentation

The instruments used for data collection were Student Mathematics Interest Questionnaire (SMIQ) and Student Social Variables Questionnaire (SSVQ). The instruments were self-designed questionnaires designed to assess students' social variables accountable for their lack of interest in mathematics learning. The Student Social Variables Questionnaire (SSVQ) was a self-designed Likert-type questionnaire constructed to assess students' social variables. It was divided into two parts. Part A contained respondents' demographic data, such as their age and birth order at ordinal scale level which was later computed to form a continuous data on SPSS before analysis. Part B contained 20 items scored from 1 to 4 on a 4-point Likert scale of strongly agree, agree, disagree, and strongly disagree respectively to measure student-teacher relationship and Peer pressure, i.e. 10 items each for the variables. The Student Mathematics Interest Questionnaire (SMIQ) consists of a dichotomous (yes or no) items used to assess students' mathematics interest. The instruments were facially validated by two experts in the Institute of Education, University of Ibadan, Ibadan. The reliability of the Student Social Variables Questionnaire (SSVQ) and Student Mathematics Interest Questionnaire

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(SMIQ) were established using Chrombach alpha to determine items which are consistent with the others and the reliability coefficient of the instruments were found to be 0.72 and 0.56 respectively.

The researchers administered the questionnaire personally and a total of two hundred and twenty-five students' questionnaires were collected for the analysis. The data collected for this study were analysed using percentage count and multiple regression analysis.

Result

Research Question 1: What is the level of students' interest in Mathematics?

Table 1
Level of students' interest in Mathematics

Level	Frequency	Percentage
Low Interest	121	53.8
High Interest	104	46.2
Total	**225**	**100**

Table 1 showed the level of students' interest in mathematics in Ibadan metropolis Oyo State, Nigeria. The result revealed that 121 (53.8%) students have low interest while 104 (46.2%) have high interest in the subject. This implies that the level of students' interest in mathematics in the selected schools was low based on the participants' rating.

Research Question 2: What is the variance in students' interest in mathematics in Junior Secondary School in Ibadan metropolis Oyo State explained by student social variables (student-teacher relationship, Peer pressure, age, birth order)?

Table 2: Regression ANOVA

R = .263
R^2 = .069
Adj. R^2 = .052
Std. Error = 1.755

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	50.460	4	12.615	4.096	.003
Residual	677.540	220	3.080		
Total	728.000	224			

Predictors: (Constant), Student-Teacher Relationship, Peer Pressure, Age and Birth Order

In Tables 2, results revealed that there is a linear relationship between students' social variables (student-teacher relationship, peer pressure, age and birth order) and students' interest in Mathematics. There is a linear relationship between these variables, and all four predictors jointly account for 6.9% observed variance in the measures of students' interest in Mathematics, [R = 0.263, R^2 = 0.069, Adj. R^2 = 0.052]. The model significantly predicts and explains students' interest in Mathematics, [$F_{(4, 224)} = 4.096, p < 0.05$].

These results mean that there is a significant composite or joint contribution of these students' social variables (student-teacher relationship, peer pressure, age and birth order) to the explanation of students' interest in Mathematics.

Research Question 3: What is the composite contribution of students' social-variables (student-teacher relationship, Peer pressure, age, birth order) to the explanation of students' interest in mathematics in Junior Secondary School in Ibadan metropolis Oyo State?

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Table 3: Regression Coefficients

Model	Unstandardised Coefficients		Standardised Coefficients		
	B	Std. Error	Beta	T	Sig.
(Constant)	18.058	.844		21.403	.000
Student-Teacher Relationship	-.004	.033	-.009	-.122	.903
Peer Pressure	.090	.028	.243	3.227	.001
Age	-.179	.162	-.074	-1.104	.271
Birth Order	.069	.156	.029	.441	.659

Dependent Variable: Students' Interest in Mathematics

Further results in Table 3 indicated that only one of the four predictors – students' peer pressure [$\beta = 0.243$, $t_{(224)} = 3.227$ $p < 0.05$] – significantly contributed to this prediction model. This means that in the model, only peer pressure allows for a reliable prediction of students' interest in Mathematics. However, other students' social variables (student-teacher relationship, age and birth order) do not make any substantial contribution to the criterion variable (students' interest in Mathematics) in this model.

Discussion of Findings

Result from the study showed that the level of students' interest in mathematics in the selected schools was low based on the participants' rating. This is attributed to the general misconceptions about the subject that create a negative impression and consequently lack of interest in the subject in students. The low level of the students' interest may also be attributed to some internal and external factors (Jega & Julius, 2018). This is in tandem with the finding of Otoo, Iddrisu, Kessie, & Larbi, (2018) who submitted that many students lack interest in mathematics which results in the students' low performance in the subject.

Also, result showed that only peer pressure allows for a reliable prediction of students' interest in Mathematics in the model. This implies that a student's peer group could have a positive or negative impact on the student's interest depending on the type of peer group. A student's peer could challenge and motivate him to develop interest in mathematics and vice versa. The positive significant relationship of peer pressure and student's interest in mathematics is in agreement with the findings of Rabenberg, (2013) which revealed that peer influences significantly predict interest and confidence mathematics and science. However, Mosha, (2017), reported that peer influence has both positive and negative influence on the students but depends on how much and how well the students receive the climate of the peers coming from the group.

Furthermore, findings from the study showed that the students variables altogether jointly predict interest in mathematics but when considered relatively only peer pressure accurately predict interest in mathematics as the other social variables could not predict interest in mathematic. A critical look at literature reveals that there have been mixed result from previous researchers on the social variables (student-teacher relationship, peer pressure, age and birth order). While some studies revealed them to have significant relationship, other results do not agree with this. On student' age for instance, some studies showed that there is relationship between age and achievement which consequently can be correlated significantly with the students' interest in mathematics (Abubakar, & Oguguo, 2011; Abubakar, 2012). Meanwhile, Carmichael, Callingham, Hay & Watson (2010), reported that age had no significant correlation with mathematics interest. Also, the result from the study of Ha & Tam (2011), corroborate with the above finding as it revealed that participants of different birth order did not differ significantly in terms of personality and academic

ISSN: 2714-2965 (Print)
ISSN: 2714-3449 (Online)

performance. The results from this study reveal that some other factors could combine together with and influence the student variables which make it difficult for proper prediction of interest.

Conclusion and Recommendation

There was a statistically significant and direct relationship between peer pressure and interest in Mathematics, whereas other students' social variables (student-teacher relationship, age and birth order) did not make any substantial contribution to the criterion variable (students' interest in Mathematics) in this model. This means that positive or negative peer pressure on students is capable of influencing their interest in Mathematics. Therefore, teachers and parents need to monitor the kind of friendship and association a student keeps in school and at home. This is important as the kind of friendship a student keeps is capable of influencing his/her interest in mathematics and academic achievement at large.

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