EMOTIONAL INTELLIGENCE AND GENDER AS PREDICTORS OF MATHEMATICS ACHIEVEMENT AMONG SECONDARY SCHOOL STUDENTS IN KATSINA METROPOLIS, KATSINA STATE

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Abstract

The study investigated the influence of emotional intelligent and gender on Mathematics achievement among senior secondary school students in Katsina metropolis, Katsina state. An ex post-facto research design was adopted. The population of three thousand four hundred and seventy-one (3471) students were obtained, the sample size of this study comprised of total number of three hundred and forty (340) senior secondary students (SSS III) at a confidence level of 95% and a Margin Error of 5.0% from seven schools were selected using purposive sampling techniques. The instrument used consists of three sections: section "A" contained personal data of respondents; section "B" Contains adapted Emotional Intelligence Scales (EIS), developed by Joiceswarnalatha (2015), Section "C" contained Mathematics Achievement Test (MAT) consists of 50 items multiple-choice with reliability coefficient of 0.82 and 0.76, for EIS and MAT respectively. Four research hypotheses were generated and tested using multiple regression, Pearson Product Moment Correlation Co-efficient and t-test at 0.05 level of significance. Result analysis of the study showed the relative importance of each of the predictor variables (emotional intelligent and gender) to the prediction of Mathematics achievement with R=.30, which is equivalent to 30%. This indicates a good level of prediction. R^2 *=.090 which is equivalent to 9%, indicating the level of shared variance between the dependent variable and the independent variables (*$F_{c=337}$*, 16.687 ;< 0.05). Based on these findings, it was recommended among others that: Students should be encouraged to memorize formulae and teacher should guide students on how to use and interprets the formulae when arise, Parents should promote the emotional intelligence of their children in order to encourage and facilitate their academic pursuit.*

Keyword: Emotional Intelligent, Mathematics Achievement, Gender, Secondary School Students

Introduction

Mathematics is one of the major subjects in National Educational System, it's taught in secondary school and it is made compulsory for all students to offer the subject. Mathematics remains the pivot on which any true science can rest and no true science can succeed without going through mathematical demonstration (Kajuru, 2008). Therefore, the learning of mathematics related discipline and mathematical sciences is the bedrock of technological and national development. Many researchers have demonstrated that the best way to improve students' performance to increase their level of thinking and intelligence through effective teaching and learning. According to Olagunju (2012) students perceived some mathematics concepts as complex and difficult, such concepts include geometric, construction, indices,

and probability etc. The predominant teaching styles used by most mathematics teachers nowadays is directly instructional strategies (Slocum, 2004), that includes lecture, demonstration, explicit and readings, which are regarded as highly teacher-cantered (Sabitu & Sani, 2016). It is necessary to change the learning style with dimension of teaching. In learning mathematics, formula and procedure are the basic steps and concept to understand by any learner, the formula approach and procedure can be broken down into small concept for student to learn easily.

There are many ways to match the student learning styles with teaching strategies that are generally categorized as active modes of teaching and learning, this, includes: (i) to keep the students actively involved, (ii) to get them to think in class, (iii) to guide them through the process of learning and constructing concepts, (iv) to retain and increase the interest of students in sciences, and thus improve enrolment in tertiary science, mathematics and technology discipline and (v) to boost the number of science, mathematics and technology (SMT) graduates in the economy with relevant skills for industry (Adetula, 2010).

Emotional intelligence (EI) is the ability to monitor one's own and other people's emotions, to discriminate between different emotions and label them appropriately, and to use emotional information to guide thinking and behaviour (Colman, 2003). Emotional intelligence (EI) to encompass four groups of specified competencies: (i) the ability to perceive, appraise, and express emotions accurately, (ii) the ability to access and evoke emotion when they facilitate cognition, (iii) the ability to comprehend emotional massages and to make use of emotional information and, (iv) the ability to regulate one's own emotions to promote growth and well-being. Emotional intelligence (EI) is a concept in psychological science, pertaining to individuals' ability to identify emotion, integrate emotions in thought, process and understand complex emotions and ultimately regulate and manage emotions in an effective manner' (Leehu & Avigail, 2017). Emotional intelligence (EI) is the ability individual to understand, use and manage its own emotions in positive ways to relieve stress, communicate effectively, empathize with others, overcome challenges and defuse conflict. Emotional intelligence helps individual to build stronger relationships, succeed at school, and achieve your academic, career and personal goals. It can also help individual to connect with his feelings, turn intention into action, and make informed and reasonable decisions about what matters most to him.

Goleman, (1995) classified Emotional intelligence (EI) into five components which are: self–awareness, self–regulation, motivation, empathy and social skills. Koleoso, Uwadiae and Nnakife, (2019), buttress that emotional intelligence can be taught, developed, and increased. Trained counsellor can be employ teach students on such skills as the ability to perceive accurately, appraise and express emotion; the ability to access and/or generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge. The variety studies showed that student academic abilities could increase the rate of individual achievement. Emotional intelligence factor plays an important role in determining individual's success and achievement at different areas such as intellectual ability, study habit and social interaction.

The role of gender in academic performance of student in the school subjects especially in mathematics cannot be overstated. Interest in the impact of gender on academic achievement has attracted mixed reports, while some proposed that males perform better than females in academics, others argue that the reverse is the case, and still others say that the difference in performance between the two is insignificant (Iroegbu, 2013). Academic achievement is a criterion for ascertaining the capabilities of a student from which his demonstrated or expressed potentials at the end of a given educational program could be inferred (Kpolovie, 2016; Oramah, 2012). Mathematics achievement operationally refers to the measured or observed aspect of an individual student's mastery of Mathematics skills in solving mathematical

problems. Etukudo, (2003); Kajuru, (2008) found that males performed much better than females in mathematics.

A study conducted by Salami and Ogundokun, (2009) examined the predictive effects of emotional intelligence and academic self-efficacy on academic performance of students. The findings indicated that emotional intelligence and academic self-efficacy were potent predictors of academic performance of students. Naderi, Shahrir, and Tengku (2010) conduct research on intelligence and academic achievement: An investigation of gender differences. The study examining relationship that exists between intelligence and academic achievement and the relationship differs between males and females. It's indicated that intelligence were not related to academic achievement for both males and females. Kpolovie, (2016) investigated the complex relationships between intelligence and academic achievement in Mathematics and English Language over a period of four years in Nigeria. Results showed statistically significant relationship between intelligence and Mathematics, English Language achievement.

Statement of the Problem

Students are expected to pass mathematics at credit level at Senior School Certificate Examination (SSCE) in order to qualify for admission into tertiary institutions. This is because Nigeria as a nation solely depends upon mathematics as one of the most important subjects that could help the nation to meet its objective for science and technological development (Kajuru, 2008). In spite of the major important place of mathematics to mankind, technological development, educational system and its central role in information technology and communication is very paramount important. Despite the fact that mathematics is very significant, students in secondary schools are still persistent performed poorly in SSCE and other external examinations and this has been of much worry to all educational stakeholders. The problem of poor academic achievement in mathematics is so much that it has led to the widely acclaimed fallen standard of mathematics education in Nigerian schools (Ambrosio, 2010; Sabitu & Sani, 2016). It has been discovered that among the factors that influence the achievement of learners in school mathematics, teacher's effectiveness as measured through the acquisition and use of good instructional skills and materials, methodologies by mathematics teachers.

Chief Examiner (WAEC, 2019 & 2020) report revealed that the major challenge for the students was as a result of their inability to translate problem into mathematical statements, students are mostly using their valuable time on social network like whatsApp, facebook, etc, and all this contributed to rate of students' failure in mathematics as a whole. Poor academic achievement can make the students' to be frustrated and later drop-out from the school, some of this drop-out students may become nuisance in the society and disturbing the peace of the society (Olutola, Olatoye & Owolabi, 2018). The problems of poor academic performance have great negative implication on the student himself, the family, the school, and the society as a whole (Bada & Muhammad 2018). Besides the socio-economic and political implication of the students' mass academic failure for the country, such failure could also compromise the integrity of the country among other African countries. Therefore, the study is designed to assess the influence of emotional intelligence and gender on mathematics achievement among senior secondary school students in Katsina metropolis.

Objectives of the Study

The objectives of the study are specifically:

1. To investigate the combined influence of emotional intelligence and gender (male and female) on mathematics achievement among senior secondary school students in Katsina metropolis.
2. To investigate the relationship between emotional intelligence among senior secondary school students and Mathematics achievement in Katsina metropolis.
3. To find out the difference in the emotional intelligence among senior secondary school students in Katsina metropolis based on gender (male and female).

4. To find out the difference in the mathematics achievement among senior secondary school students in Katsina metropolis based on gender (male and female).

Research Questions

The following research questions were formulated to guides the study:

1. What extent does emotional intelligence influence students' Mathematics achievement in Katsina metropolis?
2. What is the significant gender difference in emotional intelligence and students' Mathematics achievement in Katsina metropolis?

Research Hypotheses

The following research hypotheses were formulated for the study:

Ho_1: There is no significant combined influence of emotional intelligence and gender (male and female) on Mathematics achievement among senior secondary school students in Katsina metropolis.

Ho_2: There is no significant relationship between emotional intelligence among senior secondary school students and Mathematics achievement in Katsina metropolis.

Ho_3: There is no significant difference in the emotional intelligence among senior secondary school students in Katsina metropolis based on gender (male and female).

Ho_4: There is no significant difference in the Mathematics achievement among senior secondary school students in Katsina metropolis based on gender (male and female).

Methodology

The researchers' adopted an ex-post-facto research design study to explore the prediction of academic performance from emotional intelligence and gender among secondary school students. The population of this study comprised all twelve (12) the senior secondary school students in Katsina metropolis while the target population is made up of all the senior secondary school three (SSS III) mathematics students of 2021/2022 session in Katsina metropolis. Out of this population seven senior secondary schools were selected through purposive sampling techniques, which total number of three thousand four hundred and seventy-one (3471) students. The sample size was three hundred and forty (340) respondents estimation is in line with the recommendations offered at a confidence level of 95% and a Margin Error of 5.0% (Research Advisor, 2006). A simple random sampling technique was used to select students from three sampled schools in Katsina metropolis for the study. The sample size of each selected schools are vary due to the populations of each schools. Therefore, the sample consists of one hundred and eight-two 182 (53.5%) male and one hundred and fifty-eight 158 (46.5%) female respondents whose age ranged between 16 and 21 years with a mean age of 17.8 years and a standard deviation of 2.32.

The instrument used to collect data is questionnaire, this questionnaire was divided into three sections; Section A: contained students' information such as name of school, class, gender and age, while Section B: contained Emotional Intelligence Scales (EIS), developed and adapted version of Joiceswarnalatha (2015), items are mostly suitable for African students to investigate their intelligence. Also it has been validated and standardized for use in Nigeria. It is a 40 item, modified and structured in four point modified I.ikert Scale such as Excellent (E) = 4, Good (G) = 3, Satisfactory (S) = 2, Not satisfactory (NS) = 1. Section C: contained Mathematics Achievement Test (MAT) consists of 50 items multiple-choice objective questions with four options; the items cover many topics in the Senior Secondary School (SSS I-III) Mathematics Syllabus, which was extracted from WAEC exanimation questions. Each item was allocated with two (2) marks each which made up 100 marks for Mathematics Achievement Test (MAT) question items.

The instrument was subjected to screening by experts in the area of Educational Psychology in Faculty of Education, Federal University Dutsin-ma, Katsina state. Face, content and construct validity of the

instruments were ensured by the experts. The instrument was pilot tested using thirty (30) students from schools that is not part of the study, for the period of three weeks interval in order to prevent instrument contamination during the main research. The internal consistency was determined using Cronbach Coefficient Alpha analysis reliability index of 0.82 was obtained from Emotional Intelligence Scales (EIS). The test-retest reliability index of the (MAT) was 0.76 obtained which confirmed the suitability of the instrument.

Prior to the administration of questionnaire permission was sought form the schools' principal to have access to academic record of students with help of mathematics teacher of selected schools. The students' academic records for end of the term was collected to choice those that will participants in answering questionnaire, those that score 50 marks and above were selected to participate in the study. This was done to select high ability and intelligent students who can perform better mathematically. Data analysis was carried out using descriptive statistics (mean, standard deviation) for research questions. Multiple regression analysis was used to analyze hypothesis one, hypothesis two was analyzed using Pearson Moment Correlation (PMC) while hypotheses three and four were analyzed using t-test. All the hypotheses were tested at 0.05 alpha level of significant.

Results

Research Question 1: *What extent does emotional intelligence influence students' academic achievement in mathematics in Katsina metropolis?*

Table 1: emotional intelligence influence students' academic achievement in mathematics

Variable	Number	Mean	Std. Deviation	Std. Error
Emotional Intelligence	340	141.629	9.169	0.49729
Mathematics Achievement	340	62.776	9.054	0.49104

Table 1 revealed that emotional intelligence have a mean of 141.629 (SD = 9.169) and mathematics achievement have a mean of 62.776 (SD = 9.054). This indicates that variables are close related with one another in term of their standard deviation.

Research Question 2: *What is the significant gender difference in emotional intelligence and students' Mathematics achievement in mathematics in Katsina metropolis?*

Table 2: Gender difference in emotional intelligence and students' Mathematics achievement

Variable	Gender	Number	Mean	Std. Deviation	Std. Error
Emotional Intelligence	Male	182	141.544	9.169	0.6796
	Female	158	141.728	9.198	0.7317
	Total	340			
Mathematics Achievement	Male	182	60.0769	8.930	0.6619
	Female	158	65.886	8.179	0.6507
	Total	340			

Table 2 revealed that emotional intelligence have a mean of 141.629 (SD = 9.169) and mathematics achievement have a mean of 62.776 (SD = 9.054). This indicates that variables are close related with one another in term of their standard deviation.

Testing Hypotheses

Hypothesis 1: *There is no significant combined influence of emotional intelligence and gender (male and female) on Mathematics achievement among senior secondary school students in Katsina metropolis*

Table 3: Regression Analysis combined influence of emotional intelligence and gender (male and female) on Mathematics achievement among senior secondary school students

Model	R	R Square	Adjusted R Square	Standard Error
1	0.300[a]	0.090	0.085	8.77259

Analysis of Variance

Model	Sum of Square	Df	Mean Square	F	S
Regression	2568.369	2	1284.185	16.687	.000[b]
Residual	25934.937	337	76.958		
Total	28503.306	339			

a. Dependent Variable: EMOTIONAL INTELLIGENCE.
b. Predictors: (Constant), GENDER, MATHEMATICS ACHIEVEMENT

The analysis on table 3 shows that emotional intelligence and gender accounted for 9.0% of the total variance in student's mathematics achievement (R^2 = 0.090, P<0.05). This percentage is statistically significant. Therefore, emotional intelligence and gender have significant combined influence on mathematics achievement of secondary school students in Katsina metropolis. The results reveal that emotional intelligence and gender are important factors that significantly predict students' academic achievement in mathematics.

Hypothesis 2: *There is no significant relationship between emotional intelligence among senior secondary school students and mathematics achievement in Katsina metropolis.*

Table 4: Correlation between Emotional Intelligence and Mathematics Achievement among Senior Secondary School Students

Variable	N	Mean	S.D	Df	Calculated r-value	Critical r-value	P-value	Decision
Emotional Intelligence	340	141.63	9.17					
Mathematics Achievement	340	62.78	9.05	338	0.287**	0.042	0.000	Rejected

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

The result on table 4 shows that there are significant relationship emotional intelligence and their achievement in mathematics in Katsina metropolis, (correlation co-efficient, r = .287, P < 0.05). Therefore, hypotheses two was rejected. Hence, the emotional intelligence has great influence on their achievement in mathematics.

Hypothesis 3: *There is no significant difference in the emotional intelligence among senior secondary school students in Katsina metropolis based on gender (male and female).*

Table 5: Shown t-test Summary of Emotional Intelligence among Senior Secondary School Students Based on Gender

Gender	N	Mean	Standard Deviation	Standard Error	DF	t-value	Sig	Remark
Male	182	141.54	9.17	0.68				
Female	158	141.73	9.20	0.73	338	-.020	.986	Rejected

The result on table 5 shows that there is significant difference in mathematics achievement among senior secondary students in Katsina metropolis based on gender (t= -.020, P> 0.05). Thus, hypothesis three is hereby rejected. Therefore, female students have significantly higher emotional intelligence than their male counterparts.

Hypothesis 4: *There is no significant difference in the mathematics achievement among senior secondary school students in Katsina metropolis based on gender (male and female).*

Table 6: Shown t-test Summary of Mathematics Achievement among Senior Secondary School Students based on Gender

Gender	N	Mean	Standard Deviation	Standard Error	DF	t-value	Sig	Remark
Male	182	60.08	8.930	0.662	338	-.678	0.567	Rejected
Female	158	65.88	8.178	0.650				

The result on table 6 shows that there is significant difference in mathematics achievement among senior secondary students in Katsina metropolis based on gender (t= -.678, P< 0.05). Thus, hypothesis four is hereby rejected. Therefore, female students have significantly higher mean than their male counterparts.

Discussion of Findings

From the findings of the study, it was found that there is emotional intelligence and gender accounted for 9.0% of the total variance in students mathematics achievement (R^2 = 0.090, P<0.05). The percentage is statistically significant. Therefore, emotional intelligence and gender have significant combined influence on mathematics achievement of secondary school students in Katsina metropolis. Therefore, hypothesis rejected. This finding supported the result of Salami and Ogundokun, (2009) revealed that emotional intelligence had significant positive correlation with academic achievement.

In addition, there are significant relationship between emotional intelligence and mathematics achievement of senior secondary school students' in Katsina metropolis, (correlation co-efficient, r = .287, P < 0.05). Therefore, hypotheses two was rejected. Hence, the emotional intelligence has great influence on their achievement in mathematics. This is in agreement with finding of Kpolovie, (2016) shown statistically significant relationship between Intelligence Quotient and Mathematics achievement and indicated an overwhelming evidence of stability of intelligence.

Moreover, the study revealed that there is significant difference in mathematics achievement of senior secondary students in Katsina metropolis based on gender (t= -.020, P> 0.05). The findings in this study indicated that gender have significantly influence on the academic achievement of the students. This finding contradict the result of Naderi, et al., (2010) found that there is no significantly relation between males and females regarding which aspect of intelligence related to academic achievement, although intelligence was shown not be related to academic achievement for both genders. Olasehinde and Olatoye, (2014) found that no significantly relation between males and females students in science achievement. The findings of Koleoso, et al. (2019), showed that gender did not significantly influence emotional intelligence. This implies that there was no significant difference in emotional intelligence of the students as a result of gender. In line with this study, Bar-On and Parker (2000) found no difference between the level of emotional intelligence in girls and boys.

However, there is significant difference in the mathematics achievement of senior secondary students in Katsina metropolis based on gender (t= -.678, P< 0.05). The findings contradict with Naderi, et al., (2010) shows that correlation analysis indicated that aspects of intelligence were not related to academic achievement for both males and females. A study by Atsumbe, Owodunni, Raymond, and Uduafemhe (2018), revealed that gender made no significant difference in students' educational achievement. The result of a study investigated by Ajogbeje and Alonge (2012) also showed no gender difference in junior secondary school mathematics achievement. The results of his study also revealed that male students did not perform better than female students. Consequently, in this study too, the probable effects of gender on the students' achievement in quantitative economics were not significant.

Conclusion

Based on the findings of the study, it's concluded that emotional intelligence and gender have combined influence on mathematics achievement of senior secondary school students and have significant

relationship between emotional intelligence and achievement of senior secondary school students. In addition, there is significant difference in the emotional intelligence and mathematics achievement of senior secondary school students based on gender. This implies that both emotional intelligence and gender are strong variables that influence students' achievement in mathematics.

Recommendations

Based on the finding in this study, the following are recommendation for the study:

1. Students should be encourage to memorize formulae and teacher should guide students on how to use and interprets the formulae when arise.
2. Parents should promote the emotional intelligence of their children in order to encourage and facilitate their academic pursuit, also supervise their academic activities.
3. Government should employ qualified and dedicated mathematics teachers in order to trained the younger ones, and periodic in-service training, seminars, workshop, conferences to boost the morale of mathematics teachers.

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