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Psychological variables and emotional intelligence as predictors of students' academic achievement in mathematics in Rivers State, Nigeria

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Abstract
This study investigated psychological variables and emotional intelligence as predictors of students' academic achievement in mathematics in Rivers State Nigeria. Four research questions and four hypotheses guided the study. The study adopted a correlational design. A sample of 500 senior secondary two (SS2) students was drawn from the population of 4412 SS2 students through stratified proportionate sampling technique. The three instruments used for data collection are: Psychological Variable Questionnaire (PVQ), Emotional Intelligence Questionnaire (EIQ), and Mathematics Achievement Test (MAT). The three instrument were developed by the researchers. The instrument PVQ had three sections of self-concept, study habit and attitude while EIQ had three sections of self-awareness, self-regulation and motivation. Each section of PVQ and EIQ has ten (10) items while MAT has forty (40) items. The three instrument were validated by experts in measurement and evaluation and subject specialists. Reliability of the instruments (PVQ and EIQ) were determined through Cronbach alpha technique. The reliability coefficients of PVQ subsections were 0.68, 0.72 and 0.79 for self-concept, study habit and attitude respectively. The reliability coefficients of EIQ subsections were 0.81, 0.78 and 0.72 for self-awareness, self-regulation and motivation respectively. The reliability of MAT was determined using Kuder Richardson (KR_{20}) and the reliability coefficient was 0.89. Multiple regression analysis was used to answer the research questions while analysis of variance and (ANOVA) and t-test analysis associated with the regression were used to test the hypotheses. Based on the results, the psychological variables of self-concept, study habit and attitude jointly significantly relate to students' academic achievement in mathematics, whereas independently only self-concept and study habit significantly relate to students' mathematics achievement while attitude did not. Again emotional intelligence of self-awareness, self-regulation and motivation jointly significantly relate to students' academic achievement in mathematic whereas independently only self-regulation and motivation relate to students' academic achievement in mathematics while self-awareness did not. On the basis of these findings it was recommended among others that students' should be encouraged to have a positive attitude towards mathematics including any other subject.

Keywords: self-concept, study habit, attitude, self-awareness, self-regulation, motivation and mathematics

Introduction

In the contemporary Nigeria, greater emphasis is being placed on industrial and technological development. As a result, students are being encouraged to take up science related subjects. One subject that cut across all the sciences is mathematics. Today, mathematical methods pervade literally every field of human endeavour and play a fundamental role in economic development of a country. In our match towards scientific and technological advancement, we need nothing short of good performance in mathematics at all levels of schooling. Unfortunately performance of students in mathematics at the end of secondary education has not improved in the past decade (Umoinyang, 1999) [36]. Mathematics is seen by society as the foundation of scientific and technological knowledge that is vital in social- economic development of the nation. Because of this Mathematics is a compulsory subject at both primary and secondary levels. Mathematics is also used as a basic entry requirement into any of the prestigious courses such as medicine, architecture and engineering among other degree programmes. Despite the important role that Mathematics plays in society, there has always been poor performance in the subject at national examinations (Aduda, 2003) [2].

Mathematics is the gate and key of the Science which is an important subject in school curriculum. It is more closely related to one's daily life as compared to other subjects. Mathematics is the foundation for the economic and technological development of any nation. It has been asserted that without mathematics there cannot be any modern developed society (Ukeje, 2005) [35]. This accounts for the reason why Mathematics is made a compulsory subject at the Primary and Secondary School levels in Nigeria (Federal Republic of Nigeria, 2008). Thus, mathematics is expected to help in accelerating social, economic and technological

progress of any Society. The final analyses depend on the effective teaching and learning of mathematics in schools. Except one's mother tongue there is no other subject which is more closely related to one's daily life as mathematics. Mathematics is considered to be the father of all sciences. Napoleon remarked that- "*The progress and improvement of mathematics is linked to the prosperity of the state*" (Mahanta & Islam, 1989) [23]. Mathematics is a universal part of human culture. Mathematics is a branch of knowledge that manages estimations, numbers and amounts. For students' to move ahead in their coveted scholarly vocation, they must pass the subject legitimately with no less than a credit. Mathematics provides us with a broad range of skills in problem solving, logical reasoning and flexible thinking. Numerical ability test are designed to measure the candidate's capacity to manipulate the use of numbers to correctly solve problems (Ann, 2004; Olatoye & Adekoya, 2011) [6, 1].

Cohen (2000) [10] stated that arithmetic is science dialect; it is the pivot around which the entire embodiment of life rotates. Again mathematics is viewed as the basis for analysis thus, mathematical calculations are necessary. Mckee (2002) [26] opined that every new body of discovery is mathematical in form because time and age must be calculated mathematically because it involves symbols and is essential for any meaningful involvement in modern civilization. As a result, students who must fit positively into society, are expected to know basic concepts and principles of mathematics by constantly practicing the rudimentary concepts involving figures, especially in areas of factorization, like and unlike terms, simultaneous equation, quadratic equation and word problem in mathematics, as their usefulness is relevant in everyday dealings.

As a result, the subject must be grasped by rebuilding the self-idea, study propensity and accomplishment inspiration state of mind of young people towards how they perceive Mathematics. Gal (2000) [17] emphasized that some contributing factors to students' lack of mathematics achievement are poor study habit and attitude towards the subject which is as a result of fear and the general impression created by the society, who believe that mathematics is difficult to comprehend.

Academic achievement in mathematics seems to be one of the predictors of people's success in their career. Achievement in Mathematics is important in order to understand how society functions. Mathematics is significant in our daily life. The need for high quality professional development program in mathematics and science have become increasingly important in the current climate of educational reform (Blank, Alas, & Smith, 2007) [8]. Mathematics is an important school subject because it is associated with more academic and career opportunities (Akinsola and Tella, 2003) [5]. Burton cited in Agwagah and Usman (2003) [3] relates the importance of mathematics to the scientific, industrial, technology and social progress of a society. All these account for the reason why mathematics is made compulsory at the first and the second level of education.

Academic achievement is commonly measured by examinations or continuous assessment albeit the fact that there is no general agreement on how best it could be tested or the aspect that is considered most important, through skill or through facts (Ward, Stoker, & Murray-Ward, 1996) [38].

Academic achievement also could be measured from scores and marks awarded to a student in accordance with the student's performance (Ogudokun and Adeyemo 2010) [28]. Academic achievement is measured using different means and methods and approaches which ultimately result in high, low, or average performance. Academic achievement is broad and covers a wide range, and the indicators used in measuring it can also affect the definition. Generally academic achievement could be said to be poor, good, high, bad, low, or average. The outcome of performance of an individual or student in a given academic endeavor could determine whether same could proceed to the next higher level.

To this end, academic achievement cannot be undermined. In secondary schools, a student's academic achievement determines his progress in his studies and justifies or qualifies him to move to the next level. For instance, a nation's socio-economic wellbeing and development could be predicted via academic achievement. Previous related studies have investigated the possible predictors of academic achievement, like personality type and parenting styles and learning styles as predictors of academic achievement. This study will precisely focus on psychological variable and emotional intelligence as predictors of academic achievement in Mathematics. Students' mathematical achievements in secondary school have an influential effect on their performance in college and their future careers. Having a solid background in mathematics helps students develop sophisticated perspectives and offers more career options. The importance of mathematical learning has repeatedly been emphasized by educators and politicians (Wilkins & Ma, 2002). In the effort to improve students cognition and affective outcomes in mathematics and/or school learning, educational psychologists and mathematics educators, have continued to search for variables (personal and environmental) that could be manipulated in favour of academic gains. Of all the personal and psychological variables that have attracted researchers in this area of educational achievement, motivation seems to be gaining more popularity and leading other variables (Tella, 2003) [5]. According to Oyserman (2001) self-concept also relates to self-cognition, which means that individuals could interpret experiences such that it can affect their judgments and reactions towards academics. He stated that there are two types of self-concept which include academic self-concept which is the perception about personal academic abilities affecting particularly mathematics areas and the non-academic self-concept which includes the perception formed by individuals about his behaviour in the emotional, social and physical field.

Study habit is a behaviour style that is systematically formed by students towards learning and achievement. Fielden (2004) [26] states that good study habits help the student in critical reflection in skills outcomes such as selecting, analyzing, critiquing, and synthesizing. Nneji (2002) [27] states that study habits are learning tendencies that enable students work privately. Azikiwe (1998) [7] describes study habits as the way and manner a student plans his or her private reading outside lecture hours in order to master a particular subject or topic. Study habits help students master their areas of specialization. The study habits of students play a vital role in reflecting the

standard of education and the students' achievement in mathematics. The study habits of students vary from one student to the other and from one place to another. It is an important aspect of learning because students' achievement in schools depends greatly on their study habits. The low understanding level in mathematics has become great concern for our country, parents, educationists and government. Study habits are learning tendencies that enable students to work privately. Azikiwe (1998) [7] describes the study habit as "the adopted way and manner a student plans his private readings, after classroom learning so as to attain mastery of the subject. Study habit is important in assisting students with certain challenges in mathematics and also to help defective methods of hearing and poor motivation. Achievement according to Dahir and Stone (2003) [11] is gotten by the acquisition of skills and using these acquired skills to the best of the individual's abilities and capabilities to enhance his/her performance in life. People's personal expectations for achievement is important in enhancing their desire to succeed. For instance, if you believe that your effort at studying will result in good grade in your examination, you will be inspired to study. This belief helps to mobilize the individuals' energy in performing a lot better. This is why students, who constantly solve mathematics problems, with a mind-set to achieve success will excel

According to Mangal (1998) [24], when ones' achievement in a desired field is attained, life is fulfilling. The desire to achieve success he believes is as basic and natural as other biological needs, such as oxygen, which is essential for survival including psychosocial needs, which is needed for self-actualization. Also Darling-Hammond and Youngs (2002) [12] views, peoples' aspiration to attain success helps people to succeed, particularly in their area of interest. However Davis (2001) [13] believes that, the imbibed phobia for mathematics sometimes affects students' performance, to higher achievement levels, even if it's obvious that a good grasp of the subject would enable them gain admission into higher educational sector. Academic achievement has been described as the scholastic standing of a student at a given moment. It refers to how an individual is able to demonstrate his or her intellectual abilities (Opara & Nwaukwu, 2016) [29].

Students' opinions and beliefs regarding mathematics, how much they like and value it, and what they forecast for their own future education can all be understood as different facets of students' attitudes toward mathematics. An attitude is an internal disposition to evaluate in positive or negative terms an object, which is accompanied by affective, cognitive, and behavioral responses (Aiken, 2002). Attitude towards mathematics plays a crucial role in the teaching and learning processes of mathematics. It effects students' achievement in mathematics. The study of attitudes toward mathematics is justified from at least three stand- points. First, the development of positive attitudes is a goal for many educational systems; they are seen as a requisite for students' academic engagement and to boost learning. Second, attitudes are learned predispositions that reflect the school ethos and the wider social context in which mathematics instruction occurs. As such, attitudes can be influenced by policy interventions. Third, the literature has suggested that there is a positive relationship between attitudes toward mathematics and academic competence. The study of attitudes in the school setting has several complications. Because of the different facets of the attitude construct, what is meant by attitudes toward mathematics varies from one study to the other.

Emotional can also imitate the ability to know the interpersonal abilities. Emotional intelligence can be defined in three models – • Ability Model • Mixed Model • Trait Model. According to Ability Model the emotional intelligence can be defined as "The ability to observe emotions, integrate emotion to check your thought, understand emotions and also to regulate emotions to promote personal growth." This model says that emotional intelligence is comprising of two areas experimental and strategic. First area defines the ability to perceive, respond, and manipulate the information without understanding it, while the other are defines the ability to understand and manage the emotions without perceiving feelings well or fully experiencing them (Stys & Brown, March 2004). Mixed model introduced by Daniel Goleman emphasis on Emotional Intelligence as a group of wide range of competencies and skills that drive the performance. Trait emotional intelligence is "a collection of emotional self-perceptions located at the lower levels of personality." Here we are using the mixed model to analyse the data and interpret the result. According to mixed model it outlines five main emotional intelligence constructs (Goleman, 1998).

1. Self-awareness: It is the ability to know emotions, strengths, weaknesses, drives, values and goals and recognize their impact on others and also the decision-making ability of the individual.
2. Self-regulation: It involves controlling or redirecting individual's disruptive emotions and impulses and the capability to adapt according to the changing circumstances.
3. Social skill: It includes managing relationships to move people in the desired direction.
4. Empathy: It involves the capability of considering other people's feelings especially the time of making decisions.
5. Motivation: It involves the power of being driven to achieve for the achievement of goals.

Emotional intelligence can be explained in terms of emotional and soft skills that influence our own behavior, understanding, how we reacts in different situations and ability to adapt according to the demand of the situation. Emotional intelligence could be defined as having the ability to recognize, understand, manage one's emotions, recognize, understand and influence the emotions of others (Goleman, 2008). Emotions can be the driving force of an individual, so learning how to manage such emotions, equates to being emotionally intelligent. Going further, emotional intelligence has to do with the capacity of persons to identify their own, and other peoples' emotions, to discriminate between different feelings and label them accordingly, and to use information supplied emotionally to guide thinking and behaviour (Goleman, 2008).

The term emotional intelligence is said to have surfaced first in 1964 in a paper written by Michael Beldoch, but gained popularity by Daniel Goleman's 1995 book titled, "Emotional intelligence, why it can matter more than intelligence quotient''. There are different models of emotional

intelligence by Goleman, Peter Salovey & John Mayer. Peter Salovey and John Mayer's model was in 2004 and showcases the individual's ability to process emotional information, and then use it to find his way in the social environment (Salovey, Mayer, & Caruso, 2004).

There are domains of emotional intelligence which Goleman theorizes that there are five parts: self-awareness, self-management or regulation, social awareness (empathy), and relationship management (social skills) and motivation. The following three out of the five were used by the researchers as the area of focus for this study: self-awareness, self-regulation and motivation. Based on this background, the researchers deemed it necessary to investigate psychological variables (self-concept, study habit, attitude) and emotional intelligence (self-awareness, self-regulation and motivation) as predictors of students' academic achievement in mathematics.

Observation and report from examination bodies uncovered that high rate of students in secondary schools perform poorly in mathematics examinations. Presently, poor performance in mathematics in Rivers State has made many students drop out of school. Therefore, the required credit needed in the subject which is a compulsory prerequisite to gaining admission into any Nigerian tertiary institution is not achieved by the students. Failure in mathematics could be caused by the concept one has about himself or herself, habits in studying, attitude of students. Students' still generate great anxiety for the subject such that makes them run away from mathematics lessons. Students' negative attitude toward mathematics and their poor study habit makes them have little or no confidence in themselves. Poor performance trend in mathematics could affect student's achievement motivation and lead to students' creating an unconscious fear to the subject and this might invariably hamper students' accomplishment level in the pursuit of mathematics academic brilliance.

If the academic achievement in this subject continues to be poor, a lot of resources will be lost, which inadvertently will affect the academia, the nation's economy, and students' dream to pursue their various choices of career. The researchers consider it worthwhile to look into this problem. Therefore, this study would investigate psychological variables (self-concept, study habit, attitude) and emotional intelligence (self-awareness, self-regulation and motivation) as predictors of students' academic achievement in mathematics.

The following research questions guided the study

1. To what extent do psychological variables (self-concept, study habit and attitude) jointly predict students' academic achievement in mathematics?
2. To what extent do psychological variables (self-concept, study habit and attitude) independently predict students' academic achievement in mathematics?
3. To what extent do emotional intelligence (self-awareness, self-regulation and motivation) jointly predict students' academic achievement in mathematics?
4. To what extent do emotional intelligence (self-awareness, self-regulation and motivation) independently predict students' academic achievement in mathematics?

The following null hypotheses which were tested at 0.05 level of significance guided the study

1. Psychological variables (self-concept, study habit and attitude) jointly do not significantly predict students' academic achievement in mathematics.
2. Psychological variables (self-concept, study habit and attitude) independently do not significantly predict students' academic achievement in mathematics.
3. Emotional intelligence (self-awareness, self-regulation and motivation) jointly do not significantly predict students' academic achievement in mathematics.
4. Emotional intelligence (self-awareness, self-regulation and motivation) independently do not significantly predict students' academic achievement in mathematics.

Method

The study was conducted using correlational research design. A correlational design was defined by Kpolovie (2010) as a design which investigate the magnitude and direction or nature (positive or negative) of a relationship that exist between a dependent variables and one or more independent variables. The population of the study comprised of all senior secondary two (SSII) students in the twelve (12) secondary schools in Port Harcourt metropolis, Rivers state. At the time of this study, there are 4412 (four thousand four hundred and twelve) SS2 students in 2016/2017 academic session. (Source: Rivers State Senior Secondary Schools Board, RSSSSB 2016). The representative sample for this study was 500 senior secondary two students [SSII] students drawn from eight (8) secondary schools out of twelve (12) secondary schools in Port Harcourt metropolis through simple, stratified proportionate random sampling technique respectively. Three instruments were used for data collection, the Psychological variable Questionnaire (PVQ) and Emotional Intelligence Questionnaire (EIQ) and Mathematics Achievement Test (MAT). The instrument were developed by the researchers. PVQ and EIQ were designed using four-point Likert scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (DS).The PVQ had three sections of 10 items each which elicit information on self-concept, study habit and attitude respectively for section A, B and C. EIQ also had three sections of 10 items each which elicit information on Self-awareness, Self-regulation and motivation respectively for section A, B and C. The third instrument, MAT contained 40 items after undergoing the psychometric processes of test construction. The three instrument were validated by experts in measurement and evaluation and subject specialists. The reliability coefficients of PVQ subsections were 0.68, 0.72 and 0.79 for self-concept, study habit and attitude respectively. The reliability coefficients of EIQ subsections were 0.81, 0.78 and 0.72 for self-awareness, self-regulation and motivation respectively. All these reliability coefficients were determined through Cronbach alpha technique for internal consistency of the instruments. MAT had a reliability coefficient of 0.89 which was obtained using Kuder Richardson formula 20 (KR_{20}). Multiple regression analysis was used to answer the research questions while analysis of variance (ANOVA) and t-test analysis associated with regression analysis were used to test the null hypotheses at0.05 level of significance.

Results

Research question 1
To what extent do psychological variables (self-concept, study habit and attitude) jointly predict students' academic achievement in mathematics?

Hypothesis 1
Psychological variables (self-concept, study habit and attitude) jointly do not significantly predict students' academic achievement in mathematics.
To answer the research question, multiple regression analysis was employed. To test the hypothesis, the analysis of variance (ANOVA) associated with the regression analysis was used.

Table 1: Multiple regression analysis of the joint relationship between self-concept, study-habit, attitude and students' academic achievement in mathematics.

Model	R	R^2	Adjusted R^2	SE	
	0.255	0.065	0.059	9.18031	
	Analysis of variance (ANOVA)				
	Sum of squares	Df	Mean square	F-cal	P
Regression	2905.812	3	968.604	11.493	.000
Residual	5703.549	496	87.278		
Total	5868.737	499			

Dependent variable: Mathematics achievement
Predictor variables: Self-concept, study-habit, attitude
The result in table 1 showed multiple regression analysis of the joint relationship between psychological variable (self-concept, study-habit, and attitude) and mathematics achievement. The multiple regression coefficient obtained is 0.255 while the value for coefficient of determination (R^2) is 0.065 while the adjusted coefficient of determination (adjusted R^2) obtained as 0.059. This means that the three independent variables jointly had a low relationship with students' academic achievement in mathematics. Based on the R^2 value of 0.065, it indicates that the joint relationship of the three independent variables will only explain 6.5% of the variations on students' mathematics achievement.
To determine if the relationship is significant or not, analysis of variance (ANOVA) associated with multiple regression was employed. The calculated F-value of 11.493 was significant at 0.000 levels which is lower than the chosen level of probability of 0.05. Hence the null hypothesis is rejected. This implies that there is a joint significant relationship between self-concept, study-habit, attitude and students' academic achievement in mathematics in Port Harcourt metropolis

Research question 2
To what extent do psychological variables (self-concept, study habit and attitude) independently predict students' academic achievement in mathematics?

Hypothesis 2
Psychological variables (self-concept, study habit and attitude) independently do not significantly predict students' academic achievement in mathematics.
To answer the research question and test the hypothesis, the beta value and t-test associated with the regression analysis were employed.

Table 2: Multiple regression analysis of the relative contribution of each of the independent variables on students' academic achievement in mathematics.

	Unstandardized coefficient		Standardized Coefficients.	t	Sig.
	B	Std. Error	Beta.		
(Constant)	42.949	3.472		12.369	.000
Self-concept	.167	-.048	.170	3.502	.001
Study-habit	-.150	.057	-.134	-2.635	.009
Attitude	-.016	.037	-.019	-.424	.671

The result in table 2 revealed that the beta value for psychological variables (self-concept, study habit and attitude) are -0.170, -0.134 and -0.019 respectively. Based on their beta values, there is every indication that self-concept had the highest contribution followed by study habit and lastly attitude on students' academic achievement in mathematics.
To determine if their contributions are significant or not the t-values associated with the beta values were used. The results in the table revealed that their t-values are 3.502, -2.635 and -0.424 for self-concept, study habit and attitude respectively. Self-concept and study habit are statistically significant at 0.05 alpha level. Attitude with p-value of 0.671 was not statistically significant at 0.05 alpha level. Based on this result, self-concept and study habit independently has a significant relationship on students' academic achievement in mathematics. Whereas attitude independently has no significant prediction on students' academic achievement in mathematics.

Research question 3
To what extent emotional intelligence (self-awareness, self-regulation and motivation) jointly predict students' academic achievement in mathematics.

Hypothesis 3
Emotional intelligence (self-awareness, self-regulation and motivation) jointly do not significantly predict students' academic achievement in mathematics.
To answer the research question, multiple regression analysis was employed. To test the hypothesis, the analysis of variance

(ANOVA) associated with the regression analysis was used.

Table 3: Multiple regression analysis of emotional intelligence (self-awareness, self-regulation and motivation) and students' academic achievement in mathematics.

Model	R	R^2	Adjusted R^2	SE	
	0.342	0.117	0.112	8.92198	
	Analysis of variance (ANOVA)				
	Sum of squares	Df	Mean square	F-cal	P
Regression	5225.339	3	1741.780	21.881	.000
Residual	39482.443	496	79.602		
Total	44707.782	499			

Dependent variable: Mathematics achievement
Predictor variables: Self-awareness, self-regulation, motivation.

The result in table 3 showed multiple regression analysis of the joint relationship between emotional intelligence (self-awareness, self-regulation and motivation) and students' academic achievement in mathematics. The multiple regression coefficient obtained is 0.342 while the value for coefficient of determination (R^2) is 0.117 while the adjusted coefficient of determination (adjusted R^2) obtained as 0.112. This means that the three independent variables jointly had a low relationship with students' academic achievement in mathematics. Based on the R^2 value of 0.117, it indicates that the joint relationship of the three independent variables only explain 11.7% of the variations on students' mathematics achievement.

To determine if the relationship is significant or not, analysis of variance (ANOVA) associated with multiple regression was employed. The calculated F-value of 21.881 was significant at 0.000 levels which is lower than the chosen level of probability of 0.05. Hence the null hypothesis is rejected. This implies that there is a joint significant relationship between emotional intelligence (self-awareness, self-regulation and motivation) and students' academic achievement in mathematics in Port Harcourt metropolis.

Research question 4

To what extent do emotional intelligence (self-awareness, self-regulation and motivation) independently predict students' academic achievement in mathematics?

Hypothesis 4

Emotional intelligence (self-awareness, self-regulation and motivation) independently do not significantly predict students' academic achievement in mathematics.

To answer the research question and test the hypothesis, the beta value and t-test associated with the regression analysis were employed.

Table 4: Multiple regression analysis of the relative contribution of each of the independent variables on students' academic achievement in mathematics.

	Unstandardized coefficient		Standardized Coefficients.	t	Sig.
	B	Std. Error	Beta.		
(Constant)	64.846	4.671		13.882	.000
Self-awareness	.047	.115	.018	.410	.682
Self-regulation	-.567	.139	-.182	-4.065	.000
Motivation	-.472	.085	-.247	-5.545	.000

The result in table 4 revealed that the beta value for Emotional intelligence (self-awareness, self-regulation and motivation) are 0.18, -0.182 and -0.247 respectively. Based on their beta values, there is every indication that motivation had the highest contribution followed by self-regulation and lastly self-awareness on students' academic achievement in mathematics.

To determine if their contributions are significant or not the t-values associated with the beta values were used. The results in the table revealed that their t-values are 0.410, -4.065 and -5.545 for self-awareness, self-regulation and motivation respectively. Self-regulation and motivation are statistically significant at 0.05 alpha level. Self-awareness with p-value of 0.682 was not statistically significant at 0.05 alpha level. Based on this result, Self-regulation and motivation independently has a significant relationship on students' academic achievement in mathematics. Whereas Self-awareness independently have no significant prediction on students' academic achievement in mathematics.

Discussion of Results

The result showed that psychological variables (self-concept, study habit and attitude) jointly significantly predict students' academic achievement in mathematics. Also the result indicate that the joint relationship of self-concept, study habit and attitude only explain 6.5% of the variations on students' mathematics achievement. The present study is in consonance with the findings of Wachikwu, Oyowve, Magnus-Arewa & Nwaukwu (2017) [37] in their study psychological factors and students' academic achievement in mathematics in Ughelli-South Local Government Area of Delta State, Nigeria. Their result shows a combine relationship between self-concept, study habit, attitude, and motivation and student academic achievement in mathematics.

Also the findings of the present study showed that self-concept and study habit independently has a significant relationship on student academic achievement on mathematics. This implies that if a student feels that he is capable to handle a task he/she will work hard to maintain such feelings. Also a positive self-concept towards studies predict academic achievement in the findings of Eduwen, Umoinyang & Otu (2017) [14] in their study psychological

factors and secondary schools students' academic performance in mathematics. The results also shows a positive relationship between self-concept and students' academic performance in mathematics.

The findings also show that attitude independently has no significant prediction on students' academic achievement in mathematics. This in disagreement with the findings of Eduwen, Umoinyang & Otu (2017) [14], whom their study shows a positive relationship between attitude and academic achievement. This implies that a positive attitude to studies can predict academic achievement.

Also the findings of the present study showed that study habit independently predict students' academic achievement in mathematics. This in agreement with the study of Wachikwu, Oyovwe, Magnus-Arewa & Nwaukwu (2017) [37] and in disagreement with Harrison (2013) [21] in his study on learning style and study habits using 159 students. The result shows that there is no significant relationship between study habit and students' academic achievement.

The result showed that there is a joint significant relationship between emotional intelligence (self-awareness, self-regulation and motivation) and students' academic achievement in mathematics in Port Harcourt metropolis. This results indicates that the joint relationship of the three independent variables only explain 11.7% of the variations on students' mathematics achievement. This implies that students who possess these competencies are at an advantage, as they have the ability to identify and regulate their own emotions and manage the emotions of others. The ability to utilize and rise above emotions is crucial to task accomplishment.

Also the findings of the present study showed that self-regulation and motivation independently has a significant relationship on student academic achievement on mathematics. This implies that emotional intelligence has some elements such as ability to manage emotions or regulate ones feeling; ability to use emotion to facilitate thought i.e problem solving, intrapersonal and interpersonal skills. The present study is in consonance with the findings of Maraichelvi and Ryan (2013) [25] who found a positive connection between emotional intelligence and academic performance. And also in line with the work of Oyewuami, Osibanjo & Adeniji (2016) [30] in their study emotional intelligence and academic performance of undergraduates. Which shows a correlation between emotional intelligence and academic performance; affirming that emotional intelligence predicts academic performance and Chamundeswari (2013) [9] who found a positive significant correlation between emotional intelligence and academic achievement among students at the Higher Secondary Level.

Recommendations

Based on the findings, the researchers have made the following recommendations.

- Parents and teachers should emphasis on good study habit and organize study habit guidance programme in order to guide the students on how to develop a good study habit that will in turn reflex in their academic there by making them perform better.
- Students should be encourage to develop self-awareness which will guide them in any academic endeavor.
- It is necessary for the curriculum developers to integrate emotional intelligence into school curriculum of secondary school.
- Students should be encouraged to have positive attitude towards mathematics and any other subject.

Conclusion

From the results of the study, the following conclusions were drawn

- There is a joint significant relationship between self-concept, study-habit, attitude and students' academic achievement in mathematics in Port Harcourt metropolis.
- Self-concept and study habit independently has a significant relationship on student academic achievement in mathematics. Whereas attitude independently has no significant prediction on students' academic achievement in mathematics.
- There is a joint significant relationship between emotional intelligence (self-awareness, self-regulation and motivation) and students' academic achievement in mathematics in Port Harcourt metropolis.
- Self-regulation and motivation independently has a significant relationship on students' academic achievement on mathematics. Whereas Self-awareness independently has no significant prediction on students' academic achievement in mathematics.

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