



Socio-Psychological Variables as Correlates of Senior Secondary School Student's Performance in Mathematics in Rivers State

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ABSTRACT

The study investigated socio-psychological variables as correlates of senior secondary school students' performance in mathematics in Rivers State. A correlational research design was adopted for the study. Three research questions and three hypotheses guided the study. The population consisted of all the senior secondary school students (SS1) in public schools in Rivers State. The total population of male students was (30,095) while female student was (33636), making a total of (63,731) students in SSI. Stratified sampling technique was used to select the respondents from 18 schools in nine local government areas of Rivers State. The sample size for the study was (600) students. The instruments for data collection were self-designed titled "Performance in Mathematics Test (PMT) and Socio-Psychological Variable Questionnaire (SPVQ)". The instruments were validated by two experts in Measurement and Evaluation, Educational psychology, Guidance and Counselling, and one expert in Mathematics Department. The reliability of the instruments was established using Cronbach Alpha which yielded 0.83 and 0.80 respectively. Pearson's Product Moment Correlation was used to answer the research questions and test of the null hypotheses at 0.05 significant level. The findings showed that self-concept, correlated positively with students' academic performance in mathematics, while peer pressure, test anxiety correlated negatively with senior secondary school students' performance in mathematics. Based on these findings the following recommendations were made: Parents and teachers should help the students to build up their self-concept as it enhances academic performance. School counsellors should guide students on how to manage their anxiety level as it leads to lack of concentration and affect students' performance. Parent and School administrators should provide means of monitoring student's peer relationship, as this will help to checkmate the type of friends they keep.

Keywords: Mathematics, Socio-psychological variables, Academic Performance

Introduction

Mathematics is one of the most important subjects in educating a man; hence it is one of the core subjects in primary and secondary schools in Nigeria. It is made compulsory for all students even at school certificate level. For instance in Nigeria a credit in mathematics at the Senior School Certificate Examination (SSCE) is a precondition for admission into the university and even getting a job. It is hard to imagine any aspect of daily life that is not touched by numerical ideas such as telephone numbers, currency, time, shopping, buying and selling, etc. The importance of mathematics in everyday life cannot be over-emphasized. It is the language and tool that is used in almost all fields of science. (Usman, 2010)

Federal Republic of Nigerian (FRN, 2014) noted that the role of mathematics towards technological and industrial development is put first in special place in primary, secondary and tertiary levels of education. Prince (2019) supported that Indian laid the foundation of her technological development by giving her citizens quality science education with mathematics as its basis in the 1960s. Harbor-Peters (2010) also supported that there can be no real technological development without mathematics. In spite of the important of mathematics in our educational system, students in secondary schools still perform poorly at SSCE and other external examinations (Obodo & Umoh, 2012).

However, Bosman (2018) reported that outside the classroom, the school administrators, public and stakeholders in education express dissatisfaction over the low scores in mathematics academic performance. It is sad that student's performance in mathematics have been discouraging over the years as could be seen in most external examinations, such as West African Senior School Examination Certificate (WASSCE), Unified Tertiary Matriculation Examination (UTME) and General School Certificate Examination (GCE)

Academic performance has been an issue of concern to students, teachers, parents, school administrators, and society at large. Therefore, academic performance could be seen as the level of proficiency and knowledge demonstrated by an individual after learning has taken place. It has to do with the use of mental effort and skill acquisition. It deals with the level of success made by the students in their academic pursuits and performance recorded in the school (Elliot *et al.*, 2019). It also deals with the students' success in meeting a goal while in school. It could be high or low performance. It is high when a student is able to excel in his academic activities and perform extra-ordinarily well, scoring high marks. It is conversely low when a child performs poorly in academic activities and consistently scores very low marks in examination. Al-Zoubi and Younness (2019) asserted that student's academic

performance is the main focus in the overall educational performance. It is referred to as educational outcome. Anunaobi and Inko-Tariah (2020) acknowledged that academic performance is a yardstick used to determine how far a student has mastered a course of study within a given period of time. It is a veritable tool that can be used to determine and predict the standard of any educational system in Nigeria in terms of its efficiency and effectiveness. It portrays the quality of education offered in Nigeria.

Despite the fact that government has confirmed the importance of mathematics by making it a core subject at both senior and junior levels, students' mathematics performance in both internal and external examinations have remained a major issue in secondary schools. It is in this light that it becomes a matter of concern to look into socio-psychological variables as a correlate of senior secondary school student's mathematics performance in Rivers State. Socio-psychological is made up of sociological and psychological constructs that influence the thought, feeling and behaviours of individuals positively or negatively. Sociological variables include; peer-group, parental socio-economic status and teacher-students relationship, while psychological variables include; self-concept, anxiety, intelligence quotient. These socio-psychological variables in one way or the other influence academic performance of students and may also constitute relevant understanding or reason behind students' poor performance in Mathematics.

Self-concept is considered to encompass a variety of dimensions, areas, some of which are more related to certain personality aspects such as physical, social and emotional. It can be seen as the totality of a complex, organized, and yet dynamic system of learned attitudes, beliefs, and evaluative judgments that people hold about themselves. Self-concept is an essential part in the development of personality. The Self-concept is self-esteem, self-worth or self-acceptance that includes all beliefs and judgments about us. Hoge *et al.* (2019) noted that self-concept is a collection of beliefs about one's own nature, unique qualities and typical behaviour. It is a very important factor which determines the final outcome of the process of personality development. Cooley (2018) opined that negative self-concept may lead to under academic achievement, while positive self-concept may lead to high academic achievement. Self-concept is the sum of a number of characteristics an individual exhibits. Sayed (2019) saw self-concept as the set of perceptions or reference points that the individual has about himself; the set of characteristics, attributes, qualities and deficiencies, capacities and limits, values and relationships that the individual knows to be descriptive of himself and which he perceives as data concerning his identity. Liu (2020) also reported that self-concept and academic achievement are collaborative and mutual. He added that students with self-concept build up confidence, felt about themselves and predict extent to which tasks are accomplished successfully or unsuccessfully. Tabone (2020) recorded that self-concept deal with self-appraisal that is created through interaction with one's environment and one's self-perception in attitudes, feelings, and knowledge about one's skills, abilities, appearance, and social acceptance. He found positive relationship between self-concept and academic performance of students.

Kumari and Chamundeswaris (2020) also conducted a study and found that self-concept creates an inspiration for the change in the behaviour of the individual. Self-concept gives meaning and new ways to life and helped to create the goals as well as fulfilling them. It enhances the idea about one's view regarding the world and constructs the better vision for future. It also enables an individual to know about himself and his competency of work that he can do and what not. However, he found significant relationship between self-concept and students performance in secondary school.

Test anxiety is an undesirable reaction toward evaluation. It's the most important problem that is faced by the students in education worldwide (Walid *et al.*, 2019). Test anxiety is a psychological condition in which students experience extreme distress and worry in test situations. The psychological symptoms that build up in students before a test include restlessness, unusual body movements, difficulty in concentrating, sleeplessness, fatigue, muscle contraction, abdominal pain, and tremors. These symptoms have negative consequences on student lives and professional growth (Ferreira *et al.*, 2014).

Mukhwana *et al.* (2016) found negative significant relationship between test anxiety and academic achievement of undergraduates. He noted that students, who fail to manage their anxiety levels end up missing lessons, develop social challenges, score low grades, defer learning or repeat some course units. Khalid and Hasan (2019) found that anxiety correlates negatively with academic performance of mathematics students. He also revealed that test anxiety is a hyper-arousal condition that results in physiological, emotional and intellectual changes that prevent the effective use of the previously learned information, while taking an examination. It is composed of worry which is a cognitive anxiety related with performance and emotionality arousal of autonomic nervous system in evaluative situations.

Duraku (2016) also noted that test anxiety can cause a lot of problems with students as it leads to poor academic performance and could present in different form, such as headaches, diarrhea, extreme body temperature changes, excessive sweating, shortness of breath, light-headedness or fainting, rapid heartbeat, or dry mouth. Anxiety could also result in racing thoughts, difficulty concentrating, negative self-talk, feelings of dread and difficulty organizing thoughts. Chukwu (2017) also acknowledged that anxiety affect memory and concentration during examination. He added that students may fail examinations not because they are less capable, but because anxiety interfered with their mental functioning, hinders recall and thereby lead to poor performance. Therefore, there is significant negative relationship between test anxiety and students performance in mathematics.

Intelligence is a fundamental factor which can predict academic performance in schools, and has an important role in students' future success (Srinivas & Venkatkrishman, 2016). Intelligence plays a role on students' ability to absorb new information or new knowledge and to make it as the bases to process and solve a problem. It has a strong correlation with individuals' cognitive ability such as, thinking, remembering, reading, learning, problem solving, and language usage (Blair *et al.*, 2017). Intelligence can be measured using psychometric tools known as the test of intelligence quotient (IQ test). Intelligence quotient (IQ) is a common term used to explain the attributes of thoughts encompassing a number of abilities, such as, reasoning, planning, problem solving, abstract thinking, concept understanding, language using, and learning. IQ is the ability of the individuals enabling them to give the appropriate response towards a stimulus received. IQ provides a standardized method for measuring intellectual abilities and is widely used within education, employment and clinical practice (Deary *et al.*, 2019).

Asuru (2015) noted that the index of measuring intelligence is the intelligence quotient

$$(IQ) = \frac{MA}{CA} \times 100,$$

Where: IQ is an intelligent quotient,

CA is the chronological age and

MA is the mental age.

The mental age is the testee's level of mental development as manifested in his score on the intelligence test, while the chronological age is his natural birth age. The mental age may be higher, lower or the same as chronological age. He further explained that intelligence is not dependent on schooling and intelligence test is not based on schooling and the testee's prior knowledge plays some role in the testee's performance.

Castrogiovanni (2020) identified peer influence as one of the most influential factors in learners' mathematical performance. Learners are ridiculed by their peers for taking challenges in mathematics while others are encouraged by their peers to pursue academic excellence in mathematics. A negative peer influence could be seen as one of the militating forces why most students record poorly in academic performance, the reason for this is not farfetched: they spend enough time in extra curriculum. More often than none, academic priorities are neglected and thus academic performance grossly affected. Burk and Sass (2017) noted that peer pressure refers to the influences that peers can have on each other. Peer pressure is emotional or mental forces from people belonging to the same social group (such as age, grade or status) to act or behave in a manner similar to themselves. However, peers can also have a negative influence. They can encourage each other to skip classes, steal, cheat, use of drugs or alcohol, or become involve in other risky behaviours.

No wonder, Hartney (2020) found negative relationship between peer pressure and senior secondary school students' mathematics performance. He acknowledged that peer pressure encourages each other to skip classes, steal, cheat, use of drugs or alcohol, or become involve in other risky behaviours. Majority of adolescents with substance abuse problems began using drug or alcohol as a result of peer pressure. Peer pressure indulges youth into loitering about in the streets, attending parties during school hours, taping as alternative to stealing which may eventually graduate into armed robbery. All these result to poor academic performance of mathematics students. Kirk (2019) also contributed that peer pressure has a much greater impact on adolescent behaviour than any other factor. A teenager spends more of his/her time with peers than with family members. The interaction of peer is direct, and more powerful than the influence of teachers and other authoritative figures. A student may be compelled to do things that go against his /her belief in order to be part of a social group. Omotere (2020) also found negative relationship between peer pressure and academic performance of mathematics students.

Parental Socio-economic status includes not only income but also financial position, educational achievement and subjective perceptions of social status and social class. Parental Socio-economic status encompasses quality of life attributes as well as the opportunities and privileges afforded to people within society. Thus, parental socio-economic is relevant to all realms of behavioural and social science, including research, practice, and education. Suleman *et al.* (2019) acknowledged that children with strong parental socio-economic status show better academic performance in comparison to those with poor parental socio-economic status who show poor and unsatisfactory academic performance.

Teacher-students-interaction is an important factor although complicated, interpersonal relationship in education. The interactions between teacher and students exert a profound impact on students' physical and mental development (Hughe, 2016). Teacher-students relationship refers to the basic interpersonal relationship between teacher and students in schools, which is also one of the important social relationships in the process of children's socialization through the whole educational development (Zou *et al.*, 2017). During the process of teacher-students- interaction, teachers' response either emotional, verbal or behaviour, towards students' play an important role in the development of students' psychological variables, such as self-concept, self-confidence, motivation and self-esteem (Maulana *et al.*, 2019). They also noted that respect, mutual understanding and trust in teacher-students relationship stimulates students' motivation for independent learning, improving students' confidence in learning and reduce learning anxiety. On the contrary, a poor teacher-student relationship may make students feel lonely, withdraw from school and prone to aggressive behaviours, which may negatively impact students' academic achievements or lead to dropout and psychological disorders (Meehan *et al.*, 2018). Student-teacher-interaction patterns are strong predictors of behavioural and academic outcomes (Gregory *et al.*, 2019).

Statement of the Problem

One of the major problems facing stakeholders in education is the poor performance of students. Teachers and parents feel frustrated, worried, confused and disappointed when students fail to do well academically. In Rivers State which is the researcher's area of study, there are many qualified mathematics teachers. Also, many students can afford to buy the recommended mathematics text books, yet it is observed that many of the students are still performing poorly in mathematics which is a core subjects offered by all the students at secondary school level.

A number of strategies have also been adopted both at governmental and non-governmental levels to proffer solutions to this nagging problem of low Mathematics performance, but all to no avail. This may partly be due to the fact that stakeholders in education have not taken time to address problems related to the socio-psychological condition of the students as it affects Mathematics performance. Therefore, there is need to examine socio-psychological variables as correlates of senior secondary school student's performance in mathematics in Rivers State.

Aim and Objectives of the Study

1. Examine relationship between self-concept and senior secondary school students' performance in Mathematics in River State.
2. Ascertain the relationship between test anxiety and senior secondary school students' performance in Mathematics in Rivers State.

3. Determine the relationship between peer pressure and senior secondary students' performance in Mathematics in Rivers State.

Research Questions

1 To what extent does self-concept relates with senior secondary school students' performance in mathematics in River State?

2 To what extent does test anxiety relates with senior secondary students' performance in mathematics in Rivers State?

3 To what extent does peer pressure relates with senior secondary students' performance in Mathematics in Rivers State?

Hypotheses

H₀₁: There is no significant relationship between self-concept and senior secondary school students' performance in mathematics in River State

H₀₂: There is no significant relationship between test anxiety and senior secondary students' performance in mathematics in Rivers State

H₀₃: There is no significant relationship between peer pressure and senior secondary students' performance in mathematics in Rivers State

Method

The study adopted a correlational research design. Kpolovie (2010) noted that Correlational research design helps to determine the extent or degree of relationship existing between two or more variables and a major variable under consideration and to use such relationship in making future predictions. It seeks to find out the relationship between two variables and also the magnitude and direction of such relationship. The population of the study consisted of all the senior secondary school students (SS1) in public schools in Rivers State. The total population of male students was (30,095) while female student was (33636), making a total of (63,731) students in SSI. Stratified sampling technique was used to select the respondents from 18 schools in nine local government areas of Rivers State. The sample size for the study was (600) students. The instruments for data collection were self-designed titled "Performance in Mathematics Test (PMT) and Socio-Psychological Variable Questionnaire (SPVQ)". The instrument was segmented into two sections. Section "A" contained information on bio-data of the respondents, while sections "B" was used to elicit information on variables that were captured in the research questions. The research instrument was responded on a modified 4 point Likert scale and weighted as follows: Very High Extent (VHE) = 4, High Extent (HE) = 3, Low Extent (LE) = 2, Very Low Extent (VLE) = 1

The instruments for data collection were validated by two experts in Measurement and Evaluation, Department of Educational Psychology, Guidance and Counselling, and one expert in Mathematics Department. The reliability of the instruments was established using Cronbach Alpha which yielded reliability coefficient values of 0.83 and 0.80 for "PMT and SPVQ" respectively. The instruments were administered by researchers and also collected immediately after completion. Pearson Product Moment Correlation (PPMC) was used for the research questions and test of the null hypotheses at 0.05 level of significant.

Presentation of Results

Research Question One: To what extent does self-concept relates with senior secondary school students' performance in mathematics in Rivers State?

Hypothesis One: There is no significant relationship between self-concept and senior secondary school students' performance in mathematics in River State

Table 1.1: Pearson's Product Moment Correlation of Self-concept and Secondary School Student's performance in Mathematics

		Self-concept	Mathematics performance
Self-concept	Pearson Correlation	1	0.787**
	Sig. (2-tailed)		0.000
	N	600	600
Mathematics performance	Pearson Correlation	0.787**	1
	Sig. (2-tailed)	0.000	
	N	600	600

Table 1.1 of Pearson's Product Moment Correlation results reveal that r-value of 0.787 with its corresponding p-value of $0.000 < 0.05$ (which is less than) the chosen level of significant was gotten. This shows a strong positive relationship between self-concept and senior secondary school students' performance in mathematics. This result also indicates that self-concept relates with senior secondary school students' performance in mathematics to a very high extent. Since the p-value is less than the chosen significant level, the null hypothesis **is rejected**. It therefore indicates that there is significant relationship between self-concept and senior secondary school students' performance in mathematics in Rivers State.

Research Question Two: To what extent does test anxiety relates with senior secondary students' performance in mathematics in Rivers State?

Hypothesis Two: There is no significant relationship between anxiety and senior secondary school students' performance in mathematics in River State

Table 1.2: Pearson's Product Moment Correlation of Test Anxiety and Secondary School Student's performance in Mathematics

		Test Anxiety	Mathematics performance
Test Anxiety	Pearson Correlation	1	-0.321**
	Sig. (2-tailed)		0.028
	N	600	600
Mathematics performance	Pearson Correlation	-0.321**	1
	Sig. (2-tailed)	0.028	
	N	600	600

Table 1.2 of Pearson's Product Moment Correlation results reveal that r-value of -0.321 with its corresponding p-value of $0.028 < 0.05$ (which is less than) the chosen level of significant was gotten. This shows a weak negative relationship between test anxiety and senior secondary school students' performance in mathematics. This also indicates that to a very low extent test anxiety relates with senior secondary students' performance in mathematics in Rivers State. Again, since the p-value is less than the chosen significant level, the null hypothesis **is rejected**. It therefore implies that there is significant relationship between test anxiety and senior secondary school students' performance in mathematics in Rivers State.

Research Question Three: To what extent does peer pressure relates with senior secondary students' performance in Mathematics in Rivers State?

Hypothesis Three: There is no significant relationship between pressure and senior secondary school students' performance in mathematics in River State

Table 1.3: Pearson's Product Moment Correlation of Peer Pressure and Secondary School Student's performance in Mathematics

		Peer Pressure	Mathematics performance
Peer pressure	Pearson Correlation	1	-0.256**
	Sig. (2-tailed)		0.037
	N	600	600
Mathematics performance	Pearson Correlation	-0.256**	1
	Sig. (2-tailed)	0.037	
	N	600	600

Table 1.3 of Pearson's Product Moment Correlation results reveal that r-value of -0.256 with its corresponding p-value of $0.037 < 0.05$ (which is less than) the chosen level of significant was gotten. This shows a weak negative relationship between peer pressure and senior secondary school students' performance in mathematics. This result also indicated that, to a very low extent peer pressure relates with senior secondary school students' performance in mathematics in Rivers State. Again, since the p-value is less than the chosen significant level, the null hypothesis **is rejected**. This therefore suggests that there is significant relationship between peer pressure and senior secondary school students' performance in mathematics in Rivers State.

Discussion

Table 1.1 reveals that ($r = 0.787, P = 0.000 < 0.05$) was gotten. This shows a strong positive relationship between self-concept and senior secondary school students' mathematics performance. Therefore, the null hypothesis is rejected. This suggests that there is significant relationship between self-concept and senior secondary school students' mathematics performance in River State. This is in agreement with the studies of Liu (2020) who reported that self-concept and academic achievement are collaborative and mutual. He added that students with self-concept build up confidence, felt about themselves and predict extent to which tasks are accomplished successfully or unsuccessfully. This is probably because self-concept leads to changes in subsequent learning effectiveness as students build up self-confident and goal orientation.

Tabone (2017) also supported that self-concept deal with self-appraisal that is created through interaction with one's environment and one's self-perception in attitudes, feelings, and knowledge about one's skills, abilities, appearance, and social acceptance. He found positive relationship between self-concept and academic performance of students. This is probably because any students with positive concept will have a positive perception and interest about school, which enhances academic performance of such student. It also focused on self-awareness, assessment of qualities and characteristics made through involvements in one's situation.

Kumari and Chamundeswari (2020) also conducted a study and found that self-concept creates an inspiration for the change in the behaviour of the individual. Self-concept gives meaning and new ways to life and helped to create the goals as well as fulfilling them. It enhances the idea about one's view regarding the world and constructs the better vision for future. This is probably because it enables an individual to know about himself and his competency of work that he can do and what not. However, he found significant relationship between self-concept and students performance in secondary school.

Table 1.2 of Pearson's Product Moment Correlation results reveal that ($r = -0.321, P = 0.028 < 0.05$) was gotten. This shows a weak negative relationship between test anxiety and senior secondary school students' performance in mathematics. Therefore, the null hypothesis is rejected. It implies that there is significant relationship between test anxiety and senior secondary school students' performance in mathematics in Rivers State. This study is in

agreement with the studies of Mukhwana *et al.* (2016) who found negative significant relationship between test anxiety and academic achievement of undergraduates. He noted that students who fail to manage their anxiety levels end up missing lessons, develop social challenges, score low grades, defer learning, repeat some course units or worse get discontinued. This is probably because most students feels nervous or experiences anxiety when faced with a test or an examination.

This study is also in harmony with the studies of Khalid and Hasan (2019) who found that anxiety correlates negative with academic performance of mathematics students. He also revealed that test anxiety is hyper-arousal condition that results in physiological, emotional and intellectual changes that prevent the effective use of the previously learned information, while taking an examination. It is composed of worry which is a cognitive anxiety related with performance and emotionality arousal of autonomic nervous system in evaluative situations. This is probably because most often mathematics students learn and write examination with high level of anxiety because they perceive the subject as being too difficult to understand and not comprehended easily.

Duraku (2016) supported the study when he noted that test anxiety can cause a lot of problems with students as it leads to poor academic performance and could present in different form, such as headaches, diarrhea, extreme body temperature changes, excessive sweating, shortness of breath, light-headedness or fainting, rapid heartbeat, or dry mouth. Anxiety could also result to racing thoughts, difficulty concentrating, negative self-talk, feelings of dread and difficulty organizing thoughts. This is probably because anxiety impedes individual's mental and physical health and also has a negative effect on their personal, social and educational performance of mathematics students. Chukwu, (2017) also supported when he acknowledged that anxiety affect memory and concentration during examination. He added that students may fail examinations not because they are less capable, but because anxiety interfered with their mental functioning, hinders recall and thereby lead to poor performance. Therefore, there is significant negative relationship between test anxiety and students performance in mathematics.

Table 1.3 of Pearson's Product Moment Correlation results reveal that ($r = -0.256, P = 0.030 < 0.000$) was obtained. This shows a weak negative relationship between peer pressure and senior secondary school students' mathematics performance. Therefore, the null hypothesis is rejected. This therefore, suggests that there is significant relationship between peer pressure and senior secondary school students' performance in mathematics in River State. This study is line with the studies of Hartney (2020) who found negative relationship between peer pressure and senior secondary school students' mathematics performance. He acknowledged that peer pressure encourages each other to skip classes, steal, cheat, use of drugs or alcohol, or become involve in other risky behaviours. Majority of adolescents with substance abuse problems began using drug or alcohol as a result of peer pressure. Peer pressure indulges youth into loitering about in the streets, attending parties during school hours, tapping as alternative to stealing which may eventually graduate into armed robbery. All these result to poor academic performance of mathematics students. Kirk (2019) also contributed that peer pressure has a much greater impact on adolescent behaviour than any other factor. A teenager spends more of his/her time with peers than with family members. The interaction of peer is direct, and more powerful than the influence of teachers and other authoritative figures. A student may be compelled to do things that go against his /her belief in order to be part of a social group.

This study is also in harmony with the studies of Omotere (2020) who found negative relationship between peer pressure and academic performance of mathematics students. This is probably because adolescents always emulate their mates in whatever form of behaviour they exhibit, particularly ones which interest them most, in order to be socially acceptable.

Recommendations

1. Parents and teachers should help the students to build their self-concept as it enhances self-confidence for academic excellent.
2. Parent and School administrators should provide means of monitoring student's peer relationship, as this will help to checkmate the type of friends they keep.
3. School counsellors should guide students on how to manage their anxiety level as it leads to lack of concentration and affect level of student's achievement in school.

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