ASSESSMENT OF EMOTIONAL INTELLIGENCE AND ATTITUDE AS PREDICTORS OF SENIOR SECONDARY STUDENTS' PERFORMANCE IN MATHEMATICS IN KATSINA STATE, NIGERIA

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Abstract

This study aimed to assess the emotional intelligence and attitude as predictors of senior secondary school students' performance in Mathematics. Correlational research design was adopted. The population of the study comprises the senior secondary school students (SSS II) of Katsina metropolis. The population consists in this study was one thousand, eight hundred and sixty-two (1,862) and the sample size drawn from the total population which was two hundred (200). Data were collected using Emotional Intelligence Questionnaire (EIQ), Students Attitude Questionnaire (SAQ), and Mathematics Performance Test (MPT) with reliability indices of 0.85 for ETQ, 0.76 for SAQ and 0.87 for MPT respectively. Three research questions were designed for the study. Three hypotheses were analyzed using independent t-test at 0.05 level of significance. The results obtained showed that, there was a significant relationship between students' emotional intelligence and performance in Mathematics. It also discovered a significant relationship between students' attitude and their performance in Mathematics. The study concluded that, emotional intelligence and attitude has significant role to determine the performance of students not only in English language to every subject. Based on this finding, recommendation was made to ensure that Mathematics teachers do ensure that, an interest in learning mathematics is instilled in the students' minds.

Keywords: Assessment, attitude, emotional intelligence, mathematics, performance

Introduction:

Mathematics is one of the essential and basic areas of the college curriculum which has a wide field of subject matter. In education, mathematics plays an important role. It is the study of numbers, the relationship between these numbers and various operations performed on them that makes mathematics a very unique subject. Richard (2000), "Nature talks to us in the language of mathematics, that is numbers, mathematical rules and equation helps us to know the world around us. Mathematics is also a body of knowledge essential for the achievement of a scientific/technological nation. It has been the bedrock of several subjects in the school curriculum and it is indispensable to national educational goals and objectives (Olatoye, Olutola & Aderogba, 2020).

Performance can be describing as the quality and quantity of learning (changes) that has taken place in the learners in the school after being exposed to a course of instruction during the teaching and learning experience within a specified period which determine the skills and experiences of learners (Lamas, 2015; Bello, 2019). According to Balogun (2020), performance is a lens and a tool to analyze the world, which is defined as the capacity to generate a worthwhile outcome, and 'Performer' is a

person or group that collaborates, with performance level denoting a certain point along an academic path. To perform is to carry out a difficult chain of tasks that combines abilities and knowledge to yield a useful outcome (Maloloy-on &Arnado, 2023).

Aminat (2021) stated that, a student's attitude is their propensity to react in a particular manner to something. Naturally, the student's response can range from positive to negative or from good to awful. When a teacher criticizes a pupil for having a poor attitude, they are referring to the student's negative response to a task. According to Udonkpong (2015), has observation that perception determines the direction of attitude formation. The perception a student has about a subject influences the students‟ attitude towards that subject. Teachers thus need to make classroom instructional practices interesting in order to motivate student's interest in school subjects. As such, Meland (2022) suggested that, teachers should give more concern on the students' attitude towards their learning. Also, school learning environment is one of the important factors modifying the students' attitude to learning and determinant of the performance (Obeka, 2016). The idea was supported by Bankok et al (2019), who define attitude as developing behavior which depend on person's perception or environment.

Mathematics poor performance of secondary school students is not only on their attitude towards the subject, but there are other factors such as strategies and methods used by mathematics teachers to deliver instructions, shortage of instructional resources and teachers' inability to teach certain topics of the subject (Okoro, 2022).Eyong et al (2019) added that, attitudes give a direction to a students' behavior and actions. Because a particular positive attitude will help students to approach teaching positively and a particular negative attitude will help students' approach a particular situation negatively.

Meanwhile, giving students independence has a great influence on how they learn. Students do better academically when they are able to freely access study-related material because it increases their motivation, sense of accomplishment, and engagement (Konstantinidou, 2022). However, students' attitude is their tendency to respond in a certain way towards something positively or negatively. Whether student have positive or negative attitude, it is up to their teacher to find ways to work with them for their better performance or achievement (Michael, 2015; Educational Research Techniques, 2021). Students' negative attitude towards mathematics, inadequate qualified mathematics teachers, inadequate instructional materials and use of poor instructional method were some of causes of the students' poor performance and negative attitude towards mathematics. These indicated that, students' attitude and performance have relationship and direct effect on one another (Klinedinst, 2023).

According to Olaleye (2017), the shortage of infrastructural facilities in our secondary schools was due to overcrowdings of classrooms which negatively affected the students' performance and attitude towards learning. The numerous difficulties encountered generally fall into categories; formulae, concept; language, procedure and skills related difficulties (Dada &Olutayo, 2021). According to National Senior Secondary Education Commission (2023), which stated that "Federal Government worried about students' failure in Mathematics and English Exams" the report also stated that "Some teachers of Mathematics and English Language have the habit of skipping certain topics just because they cannot teach them" hence, leading to their poor performance.

Literature reveals that emotional intelligence skills and competencies are essential to success and that significant positive relationships exists between emotional intelligence and academic achievement among secondary education students, for instance, Tans (2003) found a positive relationship between emotional intelligence and other criteria such as contextual performance. But, emotional intelligence can work with other variables like gender, personality and personal value to predict performance, job satisfaction and effective service delivery.

Cote and Miner, (2006) argued that emotional intelligence and cognitive intelligence interact to influence efficient performance. It is a fact that it takes more than traditional cognitive intelligence to be successful at school. It also takes emotional intelligence; the ability to restrain negative feelings, such as anger, frustrations and self-doubt, rather focus on positive ones such as confidence to be successful at school.

According to theory of emotional intelligence postulated by John and Meyer (1997), an individual intelligence is far too narrow, and that individual emotions play a major role in thought, decision making and individual success. He further posits that individuals are born with a general emotional intelligence that determines their potential for learning emotional competencies in which learning mathematics is no exception. Effective learning of mathematics is in line with strong motivation. The more the tendency to focus on the set goals by individual, the stronger the motivation for an individual to learn which learning mathematics is no exception.

Bandaru's theory is a social theory of learning, and by accepting the interference of cognitive processes such as the perception of others, the imagination, the self-control, and more, his theory became socio-cognitive. Moreover, in time his theory became ever more far reaching. Concepts such as self-regulations, self-reflection, beliefs on self-sufficiency, and even moral values made Bandaru's theory on learning become full of humanism, too. This theory is applicable since this has something to do with self-regulation, self-reflection, beliefs and values as can be reflected in the emotional and social intelligence and mathematic anxiety (Soponaru, Dirtu, Ciuhodaru&lorga, 2016).

However, the theoretical model used to measure emotional intelligence in this study was Barchard (2001) Emotional Intelligence Model. She suggested that Emotional Intelligence (EI) is the ability to understand and manage one's own and other's emotions. This model was embraced by the researcher because of its comprehensive approach to measuring Emotional Intelligence which spans both Emotional Intelligence and personality traits related to emotions with seven components: positive expressivity, the tendency to express one's positive emotions nonverbally; negative expressivity, the tendency to express one's negative emotions nonverbally; attending to emotions, the tendency to attend to emotions and be aware of them; emotion-based decision-making, the tendency to make plans and decisions based on one's feelings rather than basing them on logic; responsive distress, the tendency to become distressed when in the presence of other people who are distressed, responsive joy, the tendency to become happy or cheerful when in the presence of other people who are happy or cheerful and lastly empathic concern, the tendency to feel concern or sympathy for those who suffer. The focus of this study is on three of the components namely: attending to emotions, positive expressivity and negative expressivity.

Attitude is a terminology that often invokes ambiguity; hence, it has no universally accepted definition. In fact, 30 definitions of attitude have been described over the years (Ilogu, 2004). In this study, Attitude is considered as a learned enduring system of positive and negative evolutions, emotional feelings, and pro or con action tendency with respect to a social object. Students' attitude towards examinations, on the other hand, could be described as learned enduring system of positive and negative evolutions, emotional feelings, and pro or con action tendency with respect to scholastic summative evaluation.

With the foregoing on students' attitude towards examination, a positive affect is expected since examination is an unavoidable end of institutionalized learning. So, apart from the endless round of assignments and the continuous assessment tests which undergraduate students have to cope with, they are confronted at the end of each semester in a session with a major internal examination. To this, Adegboyega, Idowu, &Mowaiye-Fagbemi, (2017) observed that the truth remains, however, that up

till now, no unexceptionable alternative means of measuring academic competence has been devised. It is worthy of note that an examination may be administered formally or informally. An example of an informal examination would be a reading test administered by a parent to a child while formal examinations often produce grades or scores. The formal examination is any test that is constructed, administered and scored in a particular fashion in order to safeguard its credibility and authenticity. A formal examination, whether internal or external, exerts its psychology on the students (Ilogu, 2015). It is worthy of note that while examination remains a consistent unavoidable design for predicting, diagnosing and promoting studentship, the predisposition of students towards examination is worrisome.

This is further exacerbated with the popular cliché that examination is not a true test of a ward's ability. This is because attitudes enable people to interpret and respond to the environment (Antonak, 1988). Based on this, the researcher investigated relationship between Emotional Intelligence and Attitude towards students' academic performance in mathematics. This enables the researcher to ascertain the extent to which variation in one variable is related to variations in the other variable.

Statement of the Problem

Students' attitude towards examination has been discussed as relevant for success in life, since examination is an unavoidable end to educational training. Unfavorable or negative attitudes are usually associated with avoidance and rejection, while positive attitudes are associated with broader acceptance and comparatively more positive or favorable reactions. In this light, it is observed that the attitude of students towards examinations may not be favorable or positive Adegboyega, Idowu, & Mowaiye-Fagbemi, 2017). This is observed with the continuous occurrence of examination dishonesty and malpractice, popularly known as cheating and lack of preparedness for examinations as well as a resulting failing performance.

Thus, poor students' attitude towards examination has been a vice that has encouraged bedeviling values in the Nigerian education system for many years. This problem does not only occur in primary schools, but also in secondary and tertiary institutions with the enormity of this challenge falling not only on the students but also on their families, the school, the society and the nation. While prior attempts in ameliorating these perceived challenges have raised more questions than answers, little or nothing is known on the linkage between emotional intelligence and students' attitude towards examination.

Objectives of the Study

In this study, the following objectives are formulated to:

1. investigate the relationship between emotional intelligence and students' academic performance in Mathematics in Katsina State.
2. determine the relationship between students' attitude and their academic performance in Mathematics in Katsina State.
3. determine the difference of emotional intelligence of senior secondary school students' performance in mathematics based on gender in Katsina State.

Research Questions

The study attempted to find answers to the following research questions:

1. What is the relationship between students' emotional intelligence and academic performance in Mathematics?
2. What is the relationship between students' attitude and academic performance in Mathematics?
3. What is the difference in emotional intelligence of senior secondary school students performance in mathematics based on gender?

Hypotheses

In this study, the following null hypotheses are formulated:

HO1 There is no significant relationship between emotional intelligence and students' academic performance in Mathematics.

HO2 There is no significant relationship between students' attitude and academic performance in Mathematics.

HO3 Male and female students' Academic Performance in Mathematics and Emotional Intelligence will not be significantly different.

Methodology

Correlational research design is adopted for this study. The population of this study are all senior secondary school students in Katsina metropolis, Katsina Quality Assurance Educational Zone. A total of two hundred (200) Students were selected randomly from the students' population. One hundred (100) male students were randomly selected from Government Pilot Senior Secondary School Katsina and One hundred (100) females' students were randomly selected from Government Girls Secondary School Katsina, which made their number to be (200) Senior Secondary School Students. Three research instruments were used for data collection such as Emotional Intelligence Questionnaire (ETQ), Students Attitude Questionnaire (SAQ), Mathematics Performance Test (MPT). The instrument consisted of two sections which are bio-data and attending skills section. Emotional Intelligence Questionnaire was subjected to five Likert Scale which the respondent is expected to tick the appropriate: SA, (Strongly Agree), A (Agree), UD (Undecided), SD (Strongly Disagree), and D (Disagree).

The instrument was adapted by modifying some items that suit this work from Sanusi, (2010) Emotional Intelligence test. Attitude Questionnaire was adapted by modifying and set ten items relevant to this work from Gardner's (2008) Attitude test Battery, it was placed on the five Scale: 5 – Strongly Agree (AS), 4- Agree (A), 3- Not Sure (NS), 2-Strongly Disagree (SD) and 1-Disagree (D) respectively.

Mathematics performance test is a teacher made test which was set by adapting some items from West African Examination Council (WAEC 2023) and National Examination Council (NECO 2023) examinations, objective test with option A-D in which the respondents were to pick the correct answer. The three (3) instruments were validated by experts in the field of psychology and mathematics. A reliability coefficient of the three instrument were determined for Emotional Intelligence questionnaire (0.85), for Student's attitude questionnaire (0.76) and for mathematics performance test (0.87).

The data obtained were subjected to statistical tool (SPSS) where null hypotheses One (1) and Two (2) were tested using Pearson moment correlation formula. The third (3) null hypotheses was tested using independent t-test.

Results

Hypothesis One: There is no significant relationship between emotional intelligence and performance in Mathematics of secondary school students.

Table 1: Relationship between Emotional Intelligence and Mathematics Performance of students. (N=200)

Variables	Mean	SD	df	r-calc.	r-critical
Emotional intelligence	28.73	2.50			
			198	0.656	0.195
Mathematics Performance	23.78	3.60			

Significant level= 0.05: df = 198; r-critical = 0.195

Table 1 shows that the calculated r of 0.656 is greater than r critical of 0.195. This is significant at 5%. This implies that there is a significance relationship between emotional intelligence and mathematic achievement. The null hypothesis which states that "There is no significant relationship between emotional intelligence and performance in Mathematics of secondary school students" is therefore rejected.

Hypothesis Two: There is no significant relationship between attitude of students and performance in mathematics.

Table 2: Relationship between student attitude and mathematics achievement of students. (N= 200)

Variables	Mean	SD	df	r-calc.	r-critical
Students' attitude	26.89				
		3.54	198	0.789	0.195
Mathematics Performance	23.78	3.70			

Significance level= 0.05: df = 198; r-critical = 0.195

Table 2 revealed that the average attitude of the student is 26.89 while average scores in Mathematics 23.78. The Table further reveals that the r calculated of 0.789 is significant at 0.05 level of significance. This implies that there is a significant relationship between students' attitude and mathematics performance. The null hypothesis is therefore rejected.

Hypothesis Three: Male and female students' Academic Achievement and Emotional Intelligence will not be significantly different.

Table 3: T-test showing gender difference in emotional intelligence and mathematics achievement

Variables	Group	Mean	SD	df	t-cal	t-crit
Emotional Intelligence	Male	22.16	2.66			
	Female	28.09	2.04	198	2.739	1.645
Mathematics Performance	Male	23.12	1.66			
	Female	21.10	1.04	198	3.167	1.645

Table 3 reveals that the average scores of male candidate in emotional intelligence of 22.16 is less than that of female of 28.09. The Table further shows that the calculated t of 2.739 is greater than critical t of 1.645 at a degree of freedom of 198, this is significant at 0.05 level of significance. This implies that gender difference exists in the emotional intelligence of the participants. Similarly, the average

score of male participants in mathematics of 23.12 is more than that of female of 21.10. This is also significance at 0.05 level of significance. This indicates that there is a significance difference in the mathematics achievement of male and female participants. The null hypothesis is therefore rejected.

Discussion of Findings

The first Hypothesis states that, "There is no significant relationship between Emotional Intelligence and Performance in mathematics of secondary school students". The hypothesis was rejected because finding as seen in table 1 shows there is a significant relationship. Thefinding revealed that academic performance positively and significantly correlated with attending to emotions, positiveexpressivity as well as gender but negatively correlated with negative expressivity. These significant positivecorrelations between Emotional Intelligence and Academic Achievement indicated that academic success does not onlydepend on cognitive aspects of intelligence rather it is also affected by emotional abilities. These results were expectedand a probable reason for this outcome among sample may be due to the fact that Emotional Intelligence isvery important in life accomplishments which according to Salovey and Mayer (1990) is a form of social intelligencethat involves the ability to monitor one's own and others' feelings and that the key skills and qualities needed to besuccessful came from within emotional rather than from cognitive intelligences (Snarey & Vaillant 1985).

The hypothesis two states that "there is no significant relationship between attitude of students and performance in mathematics." This hypothesis was rejected because table 2 revealed that there is a significant relationship between Students' Attitude and performance.

Fennema-Sherman (1998) posited that a positive attitude is a relationship of interest towards a particular desire. So therefore, achievement would be positively skewed when there is positive attitude from students or clients generally.

Mayer and Salovey (1990) found out that a learner with a positive attitude towards a subject performs better than those who lack interest. Those with higher positive attitude eventually performs better academically in their subject of interest.

The findings in hypothesis three of this study reveal that gender plays a significant role in both emotional intelligence and mathematics performance. Female students exhibited significantly higher emotional intelligence, while male students demonstrated significantly higher performance in mathematics. The rejection of the null hypothesis suggests that differences observed between male and female students are unlikely to be due to chance. These results imply that emotional and cognitive factors may vary by gender and should be considered when designing instructional strategies, interventions, and support systems in mathematics education.

Recommendations

The following recommendations are based on the findings

1. Teachers in Secondary Schools should be trained on how to handle a students' emotion and also how to handle behavioral crisis even in the absence of a school Guidance-Counsellor.
2. Motivational measures should be taken in order to direct the interest of learners to academic achievement. This is because research has shown that a negative attitude shown towards a subject will lead to poor achievement in that subject.
3. As gender has been found to be a significant factor in learning, there is need for curriculum developers, teachers and lecturers to take the gender of the learners into account when developing curriculum and designing instructions for the benefit of the students.

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