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Path Analysis Of The Relationship Between Examinees' Characteristics And Academic Achievement In Mathematics In Secondary Schools In North Central, Nigeria

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Abstract
The study determined the relationship between examinees' characteristics and academic achievements in Mathematics in secondary schools in North Central Nigeria using Path analysis. It was guided by five specific objectives. Also, five research questions were raised and answered by the study. Two hypotheses were formulated for the study and tested at 0.05 level of significance. The study adopted triangulated research design which comprised correlational survey and ex-post facto research designs. This study was carried out in North Central Zone of Nigeria which consist Benue, Kogi, Nasarawa, Kwara, Niger, Plateau and FCT. The population of the study is one hundred and fifty-one thousand, eight hundred and forty (151840) Senior Secondary two (SS2) Mathematics students in all the thirteen thousand, one hundred and forty-eight (13148) government owned Senior Secondary Schools in North Central Nigeria. The sample size for the study was three hundred and eighty-four (384) respondents. The sample size was obtained using Krejcie and Morgan table for sample size determination. A multi-stage sampling procedure was adopted for the study. Data for the study were collected using the following instruments developed by the researcher; Mathematics Anxiety Questionnaire (MAQ), Mathematics Test-Wiseness Questionnaire (MTWQ), Mathematics Students' Emotional Intelligence Scale (MSEIS), Mathematics Students' Self-Efficacy Scale (MSSES), Mathematics Students' Learned Helplessness Questionnaire (MSLHQ) and Mathematics Students' Profoma (MSP). To ensure that all the instruments measured what they were designed to measure, the instruments were given to three (3) experts for validation. To ensure that all the instruments were consistent in measuring what they were designed to measure, their internal consistencies were established as items of the instruments were trial-tested on fifty (50) Senior Secondary two (SS2) students in Plateau state. The MTAQ yielded a reliability coefficient of 0.81, MTWQ yielded a reliability coefficient of 0.67, MSEIS yielded a reliability coefficient of 0.77, MSSES yielded a reliability coefficient of 0.70 and MSLHQ yielded a reliability coefficient of 0.89. Data for this study were collected through the direct delivery and retrieval approach. Data collected were analyzed using Multiple Regression Analysis, Independent T-test and Analysis of Variance. The study found among others that 4.3% variation in students' academic achievement in Mathematics can be attributed to the combined influence of the five examinees' characteristics of anxiety, test-wiseness, emotional intelligence, self-efficacy and learned helplessness Based on the findings of this study, it was concluded that emotional intelligence and learned helplessness are significant predictors of students' academic achievement in Mathematics. The study recommended among others that Mathematics teachers should develop strategies to help students cope with anxiety, such as relaxation techniques, mindfulness exercises, and counseling services.

Keywords: *Path Analysis, Examinees' Characteristics, Academic Achievement*

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I. Introduction

Mathematics as a subject that deals with the logical and systematic analysis of numerical, geometric, and symbolic relationships. Without doubt, it remains one of the most critical subject to all disciplines and fields of human work. It is an indispensable subject in the field of education. Mathematics involves the use of abstract concepts, symbols, and language to study and understand patterns, structures, and relationships between quantities and objects in the natural and social sciences. It is an important subject because it has numerous practical applications in daily life and a wide range of fields, including science, engineering, finance, and technology. Mathematics provides students with critical thinking and problem-solving skills, which are essential for success in many areas of life. According to Adikwu and Chibabi (2018), it is a fundamental tool for scientific and technological advancement and has applications in a wide range of fields, including engineering, physics, economics, computer science, and many others. The usefulness of Mathematics in human activities cannot be underestimated because it is the precursor of scientific discoveries and inventions, of which any nation that overlooks the study of Mathematics and does not take interest in it may remain underdeveloped.

The knowledge of Mathematics is vital to national development. Stressing on the importance and usefulness of Mathematics, Pollak in Adikwu and Chibabi (2018) believed that the most fundamental reason why so much emphasis is placed on Mathematics is that it is an integral part of human life. The importance of sound knowledge of Mathematics to individuals in their daily activities is obvious as one cannot do without the use of fundamental principles of Mathematics like the principle of identity, non-contradiction, excluded middle among others. Students can learn to analyze problems, think logically, and develop strategies to find solutions through sound knowledge of Mathematics. It is one of the most important subjects in the secondary school curriculum because, as a fundamental part of human thought and logic, it helps in understanding the world and ourselves (James, 2017). The study of Mathematics is an effective way of building mental discipline and encouraging logical reasoning.

Despite the laudable importance of Mathematics, the academic achievement of students in the subject in the last 5 years is worrisome most especially in North central Nigeria. The result of students of SSSE Mathematics as shown by the Kogi State Ministry of Education (2019) and the West African Examination Council, WAEC (2019) revealed that the academic achievement of students especially in Mathematics has reduced drastically as merely 25% credit pass in Mathematics in the State. Also in North Central Nigeria, Musa and Dauda (2016) presented a trend of students' performance in Mathematics from 2015 – 2022 using Auto-Regressive Distributed Lag (ARDL) parameters to predict students' future outcomes in Mathematics from 2015 to 2022. From the results, it was depicted that the performance of students is very dismal as there was not up to a 50% credit pass recorded between 2015 and 2022. Using the trends of the seven years, the researchers predicted that the highest mean percentage credit pass from 2015 to 2022 would be 37.7% in 2016, decline to 35.34%, 33.81%, 32.82%, 32.18%, 31.77% and 31.50% in 2017, 2018, 2019, 2020, 2021, and 2022 respectively. Going by the evidence and predictions made, it is quite revealing that students' performance in Mathematics has been poor in North-central Nigeria and would continue to be poor given the prediction. Could this poor achievement be related to the challenges in the teaching and learning process? This is because the teaching and learning processes of Mathematics is critical and pivotal towards students' academic achievement in the subject.

The challenges in the teaching process deals more with how qualified the teacher is, the teacher's attitude, teaching methodology and instructional materials utilization. The challenges in the learning process deals with the students' characteristics which in some cases are psychological. Psychological characteristics such as anxiety, test-wiseness, self-efficacy, emotional intelligence and learned helplessness are often noticed in students when they learn Mathematics.

Anxiety is a feeling of unease, worry, or fear that can be mild or severe. It is a normal human emotion that is experienced by an individual from time to time. When the feeling of anxiety becomes persistent, overwhelming, and interferes with daily life, it can be considered an anxiety disorder (Olatoye & Oladele, 2017). Anxiety can manifest in a variety of physical and emotional symptoms, such as rapid heartbeat, sweating, trembling, muscle tension, restlessness, difficulty concentrating, and persistent worry or fear about everyday situations or activities. Anxiety as an examinee's characteristics is the non-productive overt and covert behaviours in an examinee that accompany learning Mathematics (Adebowale & Ogunmola, 2019). Mathematics anxiety is a type of anxiety that is experienced by individuals when they are about to learn or take a test or an examination in Mathematics. It is characterized by feelings of fear, nervousness, and apprehension, which can interfere with the examinee's ability to perform well in Mathematics (Okoye & Iheoma, 2020).

Anxiety can be caused by a variety of factors, including fear of failure, lack of preparation, and a tendency towards perfectionism. Anxiety as an experience, expresses itself in an examinee's mind and behaviour in form of fear of failure, negative self-evaluation in relation to ones previously established standard, self-blame for perceived shortcomings, social evaluation in relation to ones' estimate of how others are doing and negative prediction of what will be the outcome of a test (Chapell, Blanding, Takahashi, Silverstein, Newman, Gubi & McCann, 2015). Extreme level of anxiety could impede examinee's mental and physical health and also could have a negative effect on their personal, social, occupational and educational performance. Anxiety if high may constitute a universal cause of poor academic achievement among examinees and when moderate, may be useful in sustaining examinee's hard work (Donnelly, 2017). Could it be true to say that the anxiety exhibited by students during Mathematics class has a relationship with their academic achievement in Mathematics in States in North Central Nigeria? This study checked how true the statement is. Another examinee characteristic that could have a relationship with their academic achievement in Mathematics is Test-wiseness.

Test-wiseness is the ability of an examinee to understand and effectively use test-taking strategies and techniques to maximize performance in an examination. Test-wiseness skills according to Lee and Lawanto (2018) includes; knowing how to read and interpret questions, recognizing common distractors, managing time effectively, and selecting the most appropriate response. Test-wiseness may not be based on the individual's knowledge of the subject matter being tested, but rather on an understanding of the test format and structure. It is an important component of test-taking success, as even individuals with high levels of subject knowledge can struggle in an examination without strong test-wiseness skills (Durand-Guerrier & Boonen, 2016). Test-wiseness

can be developed through practice and guidance, and is often taught in test preparation courses or through tutoring. For an examinee to be test-wise, it means he or she must possess a quality that will enable him or her do well in a test, irrespective of whether he/she knows much about the test or not. Examinees who are test-wise according to Alonge cited in Mustapha (2014), know how to manipulate their time, speed and manner of answering questions in the test. They also understand instructions quickly and as a result of this, they usually score high marks in examinations. It can be inferred from these definitions that test-wiseness is the skill that the examinee possesses, which is different from skills that the test is intended to measure.

The need to make students test-wise by teaching them test-taking skills in Mathematics has been stressed by Mustapha (2017) who asserted that test-wiseness skills can help students to improve in their performances. In the same vein, Phyllis (2011) opined that test-wiseness can contribute significantly to students' academic achievement in Mathematics. Students with high level of test-wiseness improve in their academic achievement which is a sign of significant relationship between test-wiseness and students' academic achievement according to Phyllis (2011). Based on these, could it also be that test-wiseness has a significant relationship with the academic achievement in Mathematics of students in States in North Central Nigeria? Similarly, the researcher also unraveled if there could be a relationship between academic achievement in Mathematics and Emotional Intelligence.

Emotional Intelligence (EI) is a set of abilities and traits that allow individuals to recognize, understand, and manage their own emotions. It involves a range of skills, including empathy, self-awareness, self-regulation, motivation, and social skills. Students with high emotional intelligence are often more aware of their emotions, strengths, and weaknesses (Nwankwo, Ani & Odoemene, 2020). This self-awareness can help them identify areas where they struggle in Mathematics and take steps to address those challenges. They can recognize their frustration or anxiety when faced with difficult Mathematics problems and develop strategies to overcome them. Emotional intelligence enables students to regulate their emotions effectively. In the context of Mathematics, this means managing anxiety, staying focused, and persevering through challenging problems. According to Ajayi and Eresia-Eke (2019), students with strong self-regulation skills are less likely to give up easily or become overwhelmed by Mathematics difficulties. Students with high emotional intelligence tend to have a growth mindset, believing that their abilities can be developed through effort and practice (Adeoye & Abolarin, 2018). They are more likely to embrace challenges, persist in the face of setbacks, and view mistakes as opportunities for learning. According to Oladunjoye and Adelabu (2018), this mindset fosters a positive attitude towards Mathematics, leading to improved academic achievement.

Variations in Mathematics achievement can be predicted by students' self-perception, self-expression, interpersonal skills, decision making and stress management which are all components of emotional intelligence according to Cherniss (2010). Emotional intelligence may also be a factor that could affect students' academic achievement in Mathematics in States in North Central Nigeria where students' poor academic achievement has been a source of concern and worry to educational stakeholders. Another examinee characteristic that could have a relationship with their academic achievement in Mathematics is Learned Helplessness.

Learned helplessness is a psychological phenomenon in which an individual learns to feel helpless and passive in response to negative events or circumstances, even when such events are controllable or changeable. Learned helplessness occurs when individuals experience repeated failure or adversity, leading them to believe that they have no control over their situation, and subsequently giving up trying to change it (Adeyemi & Ajayi, 2020). Learned helplessness is behaviour exhibited by examinees after enduring repeated aversive stimuli beyond their control most especially when learning Mathematics. According to Suleiman (2015), it is a disruption in motivation and learning following exposure to non-contingent (uncontrollable) outcomes. Learned helplessness was initially thought to be caused from the examinee's acceptance of their powerlessness: discontinuing attempts to escape or avoid the aversive stimulus, even when such alternatives are unambiguously presented (Adebule & Atanda, 2019). Upon exhibiting such behaviour, the examinees are said to have acquired learned helplessness. Over the past few decades, neuroscience has provided insights into learned helplessness and these insights are that; the brain's default state is to assume that control is not present, and the presence of "helpfulness" is what is actually learned (Babatunde & Adeleke, 2018). Learned helpless students, who are identified by their tendency to attribute failure to external factors rather than effort, tend to show decrements in performance following failure (Adeniyi & Adesina, 2017). Learned helplessness is also viewed as a response pattern that retards learning, especially when learning involves material that is difficult for the child and thus, learned helplessness may influence academic achievement over time.

Relationship between learned helpless and students' academic achievement has been found to exists. Suleiman (2015) revealed that there are negative relationships between learned helplessness and academic performance of students. This implies that the component of learned helplessness as failure to initiate action means that examinees that experience learned helplessness tend not to try to learn new material. In view of this, what then is the relationship between learned helplessness and the poor academic achievement of students in Mathematics in States in North Central Nigeria? Furthermore, there may exist a significant relationship between

students' self-efficacy and their academic achievement in Mathematics.

Self-efficacy refers to an individual's belief in his or her ability to perform a particular task or accomplish a specific goal. It is based on an individual's assessment of his or her own skills, abilities, and past experiences (Adeyemo & Adeyemo, 2021). Self-efficacy can be influenced by factors such as feedback from others, level of preparation, and perceived difficulty of the task. According to Ayodele and Adekola (2020), self-efficacy is the beliefs in examinee's own capacity to organize and execute the courses of action required to manage prospective situation. It is an examinee's belief that he or she can accomplish a particular task. Self-efficacy helps students develop resilience and cope with failure in Mathematics. When faced with setbacks or mistakes, students with high self-efficacy are more likely to view them as temporary and controllable (Ogundokun & Oladunjoye, 2019). They are better equipped to bounce back from failures, learn from their mistakes, and persist in their efforts to improve their Mathematical abilities. Afolabi and Agbede (2018) asserted that self-efficacy influences students' cognitive processes and problem-solving skills in Mathematics.

Students with high self-efficacy are more likely to engage in effective problem-solving strategies, such as breaking down complex problems into manageable steps, seeking alternative solution paths, and utilizing available resources. Their belief in their abilities allows them to use their cognitive resources more effectively, leading to better performance in Mathematics. Students with high self-efficacy set higher goals for themselves and are more likely to persist in the face of setbacks or difficulties (Aremu & Sokan, 2017). The authors viewed obstacles as opportunities for learning rather than as indications of their incompetence. As a result, they are more likely to continue working on Mathematics problems, seek help when needed, and invest the necessary time and effort to achieve their goals. Students with high self-efficacy in Mathematics tend to be more motivated and willing to put in the effort required to succeed. They believe they have the necessary skills and capabilities to understand and solve Mathematical problems, which increases their motivation to engage in learning activities and persevere through challenges. According to Multon, Brown and Lent (2011), self-efficacy beliefs are positively related to students' academic performance. Generally, people with high self-efficacy approach difficult tasks as challenges to be mastered rather than as threats to be avoided. Therefore, self-efficacy belief in one's academic capability is a critical component of examinees' characteristics and their academic achievement.

Examinee characteristics may indeed explain a substantial portion of the variance in their academic achievement. This study is however, exploring this possibility through the use of path analysis in Structural Equation Modelling (SEM). Path analysis is a statistical technique used to examine the causal relationships between set of variables. It involves constructing a model of the hypothesized causal relationships between the variables and then testing this model using statistical methods (Kline, 2015). Path analysis allows researchers to examine both direct and indirect effects of variables on one another, as well as to control for other factors that may influence these relationships. Path analysis is a technique that examines the predictive association among variables over time (Byrne, 2012). It is an extension of multiple regressions as it involves various multiple regression models and equations that are estimated simultaneously. In path analysis, a variable can be a dependent variable in one relationship and an independent variable in another. These variables are referred to as endogenous variables while exogenous variables are those that are not affected by other variables in the model. This provides a more effective and direct way of modeling mediation, indirect effects, and other complex relationship among variables (anxiety, test-wiseness, self-efficacy, emotional intelligence, learned helplessness and academic achievement) which the researcher is interested in investigating.

Available evidence from literature shows that most studies in North Central Nigeria on factors that have relationship with students' academic achievement are centered on teachers' variables of teaching methodology, use of instructional materials among others, with no or few studies concerning the examinee characteristics. For the few studies on examinee characteristics, none was found to be conducted using path analysis. Also, from the few studies based on examinee characteristics, none was carried out in relation to Mathematics using path analysis. It is on this basis that this study intends to establish the relationship between examinee characteristics and their academic achievement in Mathematics in Secondary schools in North Central Nigeria using Path analysis.

Statement of the Problem

Mathematics is one of the core subjects in the school curriculum. It is one of the most important subjects offered in the school because of its wide range of applicability. At the secondary school level, it is a prerequisite to gaining admission to higher institution of learning. In view of this, the teaching and learning processes of Mathematics should be devoid of any factor that may hinder the students' learning and subsequently their academic achievement.

However, despite the importance of Mathematics, many problems seem to beset Mathematics education in Nigeria and most especially in North Central Nigeria. For instance, the National Examination Council (NECO) results of students in Nigeria showed that some students perform poorly. In the years 2018 to 2022, the percentage passes with credit and above in Nigeria were below 26.85%. Also, West Africa Examination Council (WAEC)

results released yearly by the examination body showed a trend of mass failure of students in Mathematics. In the year 2015 to 2022, less than 46.90% had credit level (A1- C6). In states in North Central Nigeria, out of 137, 836 students that took the 2022 May/June West Africa Senior School Certificate Examination (WASSCE), only 43, 115 which represents 31.28 % passed with the minimum requirement for admission into tertiary institutions. This however, is giving grave concern to educators, parents, students, school administrators and the general public and hence the need to identify the factors responsible for this poor achievement. This because, the poor achievement of students in Mathematics can limit students' opportunities for further education and future career prospects, as many fields, such as science, technology, engineering, and finance, require a solid understanding and knowledge of Mathematics. Also, the implication of this poor achievement of students in Mathematics is that, students who struggle or fail in Mathematics may be ineligible for certain academic programmes at higher institutions of learning and may face challenges in pursuing their desired career paths.

Some researchers (Njoku, 2019; Baanu, 2020) have looked into factors like teachers' qualifications, teaching methodology and knowledge of subject matters as some of the factors responsible for students' poor achievement in Mathematics. These factors are teacher's center and therefore, there is a need to look at some students' centered factors like their psychological state which may account for variation in their academic achievement. It is in the view of this that this study was carried out to find out the relationship between examinees' characteristics and their academic achievement in Mathematics in secondary schools in North Central Nigeria using Path analysis.

Objectives of the Study

The objective of this study was to determine the relationship between examinees' characteristics and their academic achievements in Mathematics in secondary schools in North Central Nigeria using Path analysis. Specifically, the study;

1. determined the extent to which the examinees' characteristics, when taken together would predict the academic achievement of students in Mathematics.
2. ascertained the relative contributions of each of the examinees' characteristics to the prediction of the students' academic achievement in Mathematics.
3. determined the directions and estimates of the strengths of causation (path coefficients) of the examinees' characteristics in the model.
4. ascertained the direct and indirect influences of the examinees' characteristics on the students' achievement in Mathematics
5. determined the proportion (%) of the total influence that is direct and indirect.

Statement of Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance.

1. Examinees' characteristics, when taken together would not significantly predict the academic achievement of students in Mathematics.
2. The relative contributions of each of the examinees' characteristics do not significantly predict students' academic achievement in Mathematics

II. Methodology

The study adopted triangulated research design. The triangulated research design comprised correlational survey and ex-post facto research designs. This study was carried out in states in North Central Zone of Nigeria which include: Benue, Kogi, Nasarawa, Plateau, Niger, Kwara and the Federal Capital Territory. The population of the study is one hundred and fifty-one thousand, eight hundred and forty (151840) Senior Secondary two (SS2) Mathematics students in all the thirteen thousand, one hundred and forty-eight (13148) government owned Senior Secondary Schools in States in North Central Nigeria. The sample size for the study is three hundred and eighty-four (384) respondents. Data for the study were collected using the following instruments developed by the researcher; Mathematics Anxiety Questionnaire (MAQ), Mathematics Test-Wiseness Questionnaire (MTWQ), Mathematics Students' Emotional Intelligence Scale (MSEIS), Mathematics Students' Self-Efficacy Scale (MSSES), Mathematics Students' Learned Helplessness Questionnaire (MSLHQ) and Mathematics Students' Profoma (MSP). The Mathematics Anxiety Questionnaire (MTAQ) yielded a reliability coefficient of 0.81, Mathematics Test-Wiseness Questionnaire (MTWQ) yielded a reliability coefficient of 0.67, Mathematics Students' Emotional Intelligence Scale (MSEIS) yielded a reliability coefficient of 0.77, Mathematics Students' Self-Efficacy Scale (MSSES) yielded a reliability coefficient of 0.70 and Mathematics Students' Learned Helplessness Questionnaire (MSLHQ) yielded a reliability coefficient of 0.89. Data for this study were collected through the direct delivery and retrieval approach. Data collected for the study were analyzed using Multiple Regression Analysis, Independent T-test and Analysis of Variance. These tools are built in MPlus and SPSS which are path analytic statistical software. Research question one was answered using Coefficient of

Determination (R-square) in Multiple Regression Analysis. Research question two and three answered using Regression Coefficient Estimates. Research question four was answered using parameter estimates of Multiple Regression. Research question five was answered using proportion estimates of Multiple Regression. Hypotheses one was tested using T-test of independent samples while hypothesis two was tested using Analysis of Variance (ANOVA). All the hypotheses were tested at 0.05 level of significance where P-value of 0.05 and below implies a significant difference while P-value above 0.05 implies no significant difference.

III. Results And Discussion

The results of the study are presented according to research questions answered and hypotheses tested as follows:

Research Question 1

To what extent would the examinees' characteristics, when taken together predict the academic achievement of students in Mathematics?

To answer this research question, multiple regression analysis of the academic achievement of students on the five examinees' characteristics was carried out. The total contribution of five examinees' characteristics to the prediction of academic achievement of students in Mathematics is shown in Table 1.

Table 1: Summary of Regression of Examinees' Characteristics and Academic Achievement in Mathematics

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.207[a]	.043	.030	12.03153

Results presented on Table 1 shows the regression analysis of the total contribution of the five examinees' characteristics (anxiety, test-wiseness, emotional intelligence, self-efficacy and learned helplessness) to the prediction of academic achievement of students in Mathematics. The result showed that the correlation coefficient between the five examinees' characteristics and academic achievement in Mathematics was 0.207 (R = 0.207) with a coefficient of determination of 0.043 (R Square = 0.043). This implies that 4.3% variation in students' academic achievement in Mathematics can be attributed to the combined influence of the five examinees' characteristics (anxiety, test-wiseness, emotional intelligence, self-efficacy and learned helplessness).

Research Hypothesis 1

Examinees' characteristics, when taken together would not significantly predict the academic achievement of students in Mathematics.

In testing to know if the examinees' characteristics, when taken together would not significantly predict the academic achievement of students in Mathematics, Analysis of Variance (ANOVA) was used and the result is presented in Table 3

Table 2: Analysis of Variance (ANOVA) of Examinees' Characteristics and Academic Achievement in Mathematics

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2437.840	5	487.568	3.368	.005[b]
	Residual	54718.400	378	144.758		
	Total	57156.240	383			

P<0.05

Results presented on Table 2 shows that the probability associated with the calculated value of F (3.368) for the examinees' characteristics, when taken together in predicting the academic achievement of students in Mathematics is 0.005. Since the probability value (P-value) of 0.005 is less than the 0.05 level of significance, the null hypothesis is rejected. This implies that, examinees' characteristics when taken together would significantly predict the academic achievement of students in Mathematics.

Research Question 2

What are the relative contributions of each of the examinees' characteristics to the prediction of the students' academic achievement in Mathematics?

Table 3: Regression coefficients summary showing the relative contributions of each of the examinees' characteristics to the prediction of the students' academic achievement in Mathematics

	Estimate	S.E.	T	P-Value
AA --- ANX	0.003	0.046	0.072	0.943
AA --- TW	0.007	0.045	0.167	0.867
AA --- EI	**-0.146**	**0.047**	**-3.078**	**0.002**

AA --- SE	-0.075	0.052	-1.430	0.153
AA --- LEH	**0.083**	**0.036**	**2.304**	**0.021**
TW --- ANX	0.071	0.050	1.393	0.164
TW --- EI	-0.057	0.048	-1.067	0.287
EI --- LEH	-0.007	0.067	-0.232	0.817
SE --- ANX	0.040	0.059	0.684	0.494
SE --- LE	0.033	0.074	0.589	0.556
SE --- EI	0.023	0.056	0.219	0.826

Key: AA = Academic Achievement, ANX= Anxiety, TW= Test-Wiseness, EI= Emotional Intelligence, SE= Self-Efficacy, LEH= Learned Helplessness, SE= Standard Error, Est=Estimate

Results presented on Table 3 shows the regression coefficient summary of the relative contributions of each of the examinees' characteristics to the prediction of the students' academic achievement in Mathematics. It reveals that with respect to the academic achievement of students in Mathematics, learned helplessness as one of the examinees' characteristics had the highest contribution to the prediction of the students' academic achievement in Mathematics with a path coefficient estimate of 0.083. This was followed by test-wiseness, anxiety, self-efficacy and emotional intelligence with path coefficient estimates of 0.007, 0.003, -0.075 and -0.146 respectively. Learned helplessness with a path coefficient estimate of 0.083 with students' academic achievement in Mathematics implies that when learned helplessness of the students change by 1 unit, their academic achievement in Mathematics increases by 0.083 units. Also, the path coefficient estimates of 0.007 and 0.003 for test-wisness and anxiety respectively implies that when both changes by 1 unit each, the academic achievement of students in Mathematics increases by 0.007 and 0.003 units for the test-wisness and anxiety respectively. The path coefficient estimates of -0.075 and -0.146 for self-efficacy and emotional intelligence respectively implies that when both change by 1 unit each, the academic achievement in Mathematics decrease by 0.075 and 0.146 units for the self-efficacy and emotional intelligence.

The result on the Table 3 also shows that some examinees' characteristics such as test-wiseness, emotional intelligence and self-efficacy have relationships or were being predicted by other examinees' characteristics. Test-wisness had path coefficient of 0.071 with anxiety implying that a 1 unit change in test-wiseness leads to 0.071 units increase in anxiety. Also, test-wisness had a path coefficient of -0.057 with emotional intelligence implying that as test-wiseness changes by 1 unit, emotional intelligence decrease by 0.057. Emotional intelligence had a path coefficient of -0.007 with learned helplessness implying that as emotional intelligence changes by 1 unit, learned helplessness decreases by 0.007 units. Self-efficacy had path coefficients of 0.040, 0.033 and 0.023 with anxiety, learned helplessness and emotional intelligence respectively. This implies that a 1 unit change in self-efficacy leads to 0.040, 0.033 and 0.023 units increase in anxiety, learned helplessness and emotional intelligence respectively. However, the relationship or predicting power of test-wiseness, emotional intelligence and self-efficacy with the other examinees' characteristics were not significant.

Research Hypothesis 2

The relative contributions of each of the examinees' characteristics do not significantly predict students' academic achievement in Mathematics

Table 4: T-test Analysis showing the relative contributions of each of the examinees' characteristics to the prediction of the students' academic achievement in Mathematics

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	60.236	5.364		11.230	.000
	ANX	.003	.046	.004	.071	.943
	TW	.007	.045	.008	.166	.868
	EI	-.146	.048	-.154	-3.054	.002
	SE	-.075	.053	-.072	-1.419	.157
	LEH	.083	.036	.115	2.286	.023

Key: Constant = Academic Achievement, ANX= Anxiety, TW= Test-Wiseness, EI= Emotional Intelligence, SE= Self-Efficacy, LEH= Learned Helplessness

Results presented on Table 4 shows that the t-values of emotional intelligence and learned helplessness in predicting students' academic achievement in Mathematics are -3.054 and 2.286 with associated probability values of 0.002 and 0.023 respectively. This implies that emotional intelligence and learned helplessness significantly predict students' academic achievement in Mathematics since their associated probability values are less than 0.05 level of significance. Also, the results on the Table 4 shows that the t-values of anxiety, test-wiseness and self-efficacy in predicting students' academic achievement in Mathematics are 0.071, 0.166 and -1.419 with associated probability values of 0.943, 0.868 and 0.157 respectively. Thus, anxiety, test-wiseness and self-efficacy were not included in the observed path diagram in Figure 3 because they neither had significant paths with students' academic achievement in Mathematics nor any other variable.

Research Question 3

What are the directions and estimates of the strengths of causation (path coefficients) of the examinees' characteristics in the observed model?

Table 5: Significant paths through which independent variables (emotional intelligence and learned helplessness) caused variation in dependent variable (academic achievement) ($p < 0.05$)

S/N	Variables	Direct Path	Indirect Path
1	AA----EI	P_{AAEI}(-0.146)	-0.001
2	AA----LH	P_{AALH}(0.083)	-------

Key: AA = Academic Achievement, EI= Emotional Intelligence, LH= Learned Helplessness

Results presented on Table 5 is an extraction of the results on Table 4 and it shows that the significant paths through which the independent variables (examinees' characteristics) caused variation in the dependent variable (academic achievement) are those of emotional intelligence and learned helplessness. This implies that emotional intelligence and learned helplessness were the only significant casual paths.

Research Question 4

What are the direct and indirect influences of the examinees' characteristics on the students' achievement in Mathematics?

Table 6a: Variables with direct paths

Variables	ANX	TW	EI	SE	LH
AA	0.003	0.007	-0.146	-0.075	0.083
ANX		0.071		0.040	
EI		-0.057		0.023	
LH			-0.007	0.033	

Key: AA = Academic Achievement, ANX= Anxiety, TW= Test-Wiseness, EI= Emotional Intelligence, SE= Self-Efficacy, LEH= Learned Helplessness

Results presented on Table 6a shows the variables that had direct paths with other variables. The result showed that Anxiety, test-wiseness, emotional intelligence, self-efficacy and learned helplessness all had direct paths with students' academic achievement in Mathematics. Out of these paths, emotional intelligence and learned helplessness had significant direct paths with students' academic achievement in Mathematics. Test-wiseness had direct path with anxiety and emotional intelligence. Similarly, emotional intelligence had direct path with learned helplessness. Self-efficacy had direct path with anxiety, learned helplessness and emotional intelligence. However, the paths were not significant.

Table 6b: Variables with indirect paths

Variables	TW	EI	SE
AA	0.000	-0.001	0.000
LEH	0.000		

Key: AA = Academic Achievement, TW= Test-Wiseness, EI= Emotional Intelligence, SE= Self-Efficacy, LEH= Learned Helplessness

Results presented on Table 6b shows the variables that had indirect paths with other variables. The results showed that Test-wiseness, emotional intelligence and self-efficacy had indirect paths with students' academic achievement in Mathematics. Test-wisness also had indirect path with learned helplessness. However, all the paths were not significant

Research Question 5

What proportion (%) of the total influence is direct and indirect?

Table 7: Proportions of the total influence that is direct and indirect

Criterion	Predictors	TI(a)	% (b)	DI(c)	% (d)	II (a-c)	% (e)
	ANX	0.014	-0.684	0.003	-0.147	0.011	-0.538
	TW	0.013	-0.635	0.007	-0.342	0.006	-0.293
AA	EI	-0.157	7.672	-0.146	7.134	-0.011	0.538
	SE	-0.072	3.518	-0.075	3.665	0.003	-0.147
	LE	0.114	-5.570	0.083	-4.056	0.031	-1.515
	Total	-0.088	4.301	-0.128	6.254	0.04	-1.955

Key: TI(a)= Total Influence, DI(c)= Direct Influence, II(a-c)= Indirect Influence. Note: b= a/ta X 4.3, d= c/ta X 4.3, e= (a-c)/ta X 4.3

The results presented on Table 7 shows the proportions of the total influence that are direct and indirect. The result reveals that the direct influence of anxiety on students' academic achievement is -0.147% while the indirect influence is -0.538%. Test-wisness had a direct influence of -0.342% and indirect influence of -0.293%. Also, Emotional intelligence had 7.134% direct influence and 0.538% indirect influence. Similarly, self-efficacy had 3.665% direct influence and -0.147% indirect influence. Also, learned helplessness had a direct influence of -4.056% and indirect influence of -1.515%. The result also shows that out of the 4.3% influence that the predictor variables (examinees' characteristics of anxiety, test-wisness, emotional intelligence, self-efficacy and learned helplessness) on criterion variable (students' academic achievement in Mathematics), 6.254% were direct while -1.955% were indirect. This implies that students' achievement in Mathematics is not only influenced by the variables that have direct paths with it but can also be influenced by other variables that do not have direct paths with it.

IV. Discussion Of Findings

The findings of this study based on research question one and hypothesis one revealed that 4.3% variation in students' academic achievement in Mathematics can be attributed to the combined influence of the five examinees' characteristics of anxiety, test-wiseness, emotional intelligence, self-efficacy and learned helplessness. The findings is in line with that of Maruff (2015) who also found that Socio-Psychological Variables accounted for 3% of the total variance in distance learners' academic performance. The study further found that examinees' characteristics of anxiety, test-wiseness, emotional intelligence, self-efficacy and learned helplessness when taken together would significantly predict the academic achievement of students in Mathematics. The findings of this study also conform to that of Francis and Oludipe (2013) who found that 7.60% of the variability in students' achievement in Chemistry was accounted for by all the seven predictor variables when taken together. The findings of this study also align with that of Rizwan and Nasir (2010); Yusuf (2014); Mehmet and Omer (2014); Taylor and Frances (2001); and Akomolafe (2013) who all found that academic achievement has a relationship with/and can be predicted by anxiety, test-wiseness, emotional intelligence, learned helplessness and self-efficacy respectively. The findings of this study could be due to the fact that academic achievement is a multifaceted outcome influenced by a wide range of factors, including teaching quality, curriculum design, home environment, and socio-economic status. So the five examinees' characteristics studied might only capture a small portion of the overall variation in Mathematics achievement.

The findings of this study based on research question two and hypothesis two revealed that in terms of the relative contributions of each of the examinees' characteristics to the prediction of the students' academic achievement in Mathematics, only emotional intelligence and learned helplessness would significantly predict students' academic achievement in Mathematics. This finding has revealed that students' emotional intelligence and learned helplessness are strong predictors of academic achievement in Mathematics. The findings of this study agreed with that of Razieh, Rahmani and Venkatesh (2016) who conducted a study on the Relationship between Emotional Intelligence and Academic Achievement and found significant relationship between some components of Emotional Intelligence and Academic Achievement. Also, the findings of this study agree with that of Suleiman (2016) who found that there is a statistical significant relationship between learned helplessness and academic performance. The finding of this study has shown that how students are able to manage their emotions and how helpless they feel when it comes to studying Mathematics can significantly predict how they excel in the subject.

The findings of this study based on research question three revealed that emotional intelligence and learned helplessness are the significant paths through which the independent variables (examinees' characteristics) caused variation in the dependent variable (academic achievement). The findings of this study conform with that of Nnaji, Eze and Madu (2020) who found that there was a significant positive correlation between the components of emotional intelligence and students' achievement in Mathematics and the components, singly and jointly, contributed significantly to the variation in students' achievement in Mathematics. This finding also conform to that of Cemalcilar, Canbeyli and Sunar, (2003) who found that students exhibiting high level of learned helplessness without therapy scored low in their academic grades when compared to those with learned helplessness therapy. The findings of this study could be due to the fact that Emotional intelligence empowers students with the necessary skills to manage their emotions, develop a positive mindset, and maintain motivation towards Mathematics, while learned helplessness is crucial for fostering a sense of efficacy and persistence in the face of challenges in Mathematics.

The findings of this study based on research question four revealed that there are 15 casual paths among the variables of examinees' characteristics and students' academic achievement in Mathematics. Out of the 15 paths, 11 are direct while 4 are indirect. The direct paths are those of anxiety with academic achievement; test-wiseness with academic achievement, emotional intelligence with academic achievement; self-efficacy with academic achievement; learned helplessness with academic achievement; test-wisness with anxiety and emotional intelligence; emotional intelligence with learned helplessness; self-efficacy with anxiety, emotional intelligence

and learned helplessness. The 4 indirect paths are those of test-wisness with academic achievement and learned helplessness; emotional intelligence and academic achievement; self-efficacy and academic achievement. The findings revealed that out of the 10 direct paths, only 2 were found to be significant (paths of emotional intelligence and learned helplessness with academic achievement). The study also found that out of the 4 indirect paths, none was found to be significant. This result is in concordance with the results of Mohamed, Al-Agili, Bin, Lazim and Hamdan (2012) and Akpo (2012) who all found significant direct and insignificant indirect paths among the predictor variables and the criterion variable.

The findings of this study based on research question five revealed that that out of the 4.3% influences that the predictor variables (examinees' characteristics of anxiety, test-wisness, emotional intelligence, self-efficacy and learned helplessness) had on criterion variable (students' academic achievement in Mathematics), 6.254% were direct while -1.955% were indirect. This result is consistent with the results of Akpo (2012), Mohamed, Al-Agili, Bin, Lazim and Hamdan (2012) who found that predictor variables had direct and indirect influence on the criterion variable. The findings of this study has shown that the proportion of the direct paths is greater than that of the indirect path and this could be due the fact that most students experience these psychological characteristics that have relationship with their academic achievement.

V. Conclusion

Based on the findings of this study, it was concluded that emotional intelligence and learned helplessness are significant predictors of students' academic achievement in Mathematics.

Recommendations

In view of the findings of the study, the following recommendations were made.

1. School management should organize training programs for students to enhance their test-taking skills like time management, effective study techniques, and examination preparation strategies.
2. Educational curriculum developers should integrate emotional intelligence training into the curriculum to help students develop self-awareness, self-regulation, empathy, and effective interpersonal skills.
3. Teachers should be encouraged by the school head to provide constructive feedback, recognize students' achievements, and set attainable goals. By promoting self-efficacy, students will develop a belief in their ability to succeed, leading to improved academic performance.
4. School authority through the school guidance and counselor should develop programs aimed at addressing learned helplessness, which is a belief that one has no control over their outcomes. This will encourage a growth mindset, resilience, and persistence among students by providing support, positive reinforcement, and emphasizing effort-based learning rather than focusing solely on outcomes.

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