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INFLUENCE OF COGNITIVE PERFORMANCE ON MATHEMATICS STUDENT'S LEVEL OF ACHIEVEMENT

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ABSTRACT

Teachers are the key factors in education system. It is a well-known fact that; their subject knowledge has an influence on students' learning in the classroom settings. The aim of the study is to investigate the influence of cognitive performance of Mathematics teachers in relations to students' level of performance in Mathematics. A sample size of n =80 was randomly selected from Senior Secondary Schools Keffi Local Government. The data was obtained through the use of questionnaire and subjected to analyses using SPSS 17. A pilot study was conducted to determine the reliability of the instrument, the Cronbach alpha coefficient yielded 0.75 which indicated that the instrument was reliability. The research hypotheses were analysed using frequency count and non-parametric chi-square, the result of the analysis shows that majority of the respondents agree that teachers have basic understanding in Mathematics which indicated that the teachers has excellent teaching skills and classroom management. The result also shows that the relationship between Mathematics teachers and students are poor. The hypotheses were all significant at α =0.05 showing that subject mastery, classroom management attitude and teachers teaching skills contributed significantly to student academic performance. It was therefore recommended that Government should evaluate Mathematics programme in the Universities and Colleges of Education and encourage teachers re-training programme and refresher courses to keep teachers abreast and inform of latest teaching methods.

Keywords: Teachers, Mathematics, Performance

1. INTRODUCTION

The issue of poor academic performance of students in Nigeria has been of much concern to all and sundry. The problem is so much that it has led to the widely acclaimed fallen standard of education in Nasarawa State and Nigeria at large. The quality of education depends on the teachers as reflected in the performance of their duties. Teacher effectiveness plays an important role in the teaching learning process. An effective teacher must have a current, thorough knowledge of the subject matter, show interest in teaching, and have an enthusiasm for the subject. Teaching is situational, and effective teaching depends upon human qualities inherent in the teacher. Over time pupils' academic performance in both internal and external examinations had been used to determine excellence in teachers and teaching (Adepoju, 2000). Teachers have been shown to have an important influence on students' academic achievement and they also play a crucial role in educational attainment because the teacher is ultimately responsible for translating policy into action and principles based on practice during interaction with the students (Adepoju, 2000). Both teaching and learning depends on teachers: no wonder an effective teacher has been conceptualized as one who produces desired results in the course of his duty as a teacher.

Considering governments' huge investment in public education, its output in terms of quality of students has been observed to be unequal with government expenditure. Consequently, upon the observed deterioration in the academic achievement, attitude and values of secondary school students in public secondary schools one wonders if the high failure rates and the poor quality of the students is not a reflection of the instructional quality in the schools. In other words the ineffectiveness of teachers in classroom interaction with the students could be responsible for the observed poor performance of students and the widely acclaimed fallen standard of education in Nigeria.

1.1 RESEARCH PROBLEM

Teachers are the key factors in education system. It is a well-known fact that; their subject knowledge has an influence on students' learning in the classroom settings; teacher effectiveness has been found as one of the major characteristic of effective teaching. Several factors have generally been identified as predictor of poor academic achievement. Agbebi (1999) reported that a teacher who doesn't have both the academic and the professional teaching qualification would undoubtedly have a negative influence on the teaching and learning of his/her subject. Apart from qualification, other teachers' variables still exit which can either positively or negatively predict pupils' mathematics performance. However, research particularly in the Nigeria context is being silent about them. It is against this background that this study critically examined the influence of teacher effectiveness on the academic performance in mathematics of students in public secondary schools in Nigeria.

1.2 THE PURPOSE OF THE STUDY

The cardinal objective of the study is to investigate the influence of cognitive performance of Mathematics teachers in relations to students' level of performance in Mathematics. The specific objectives therefore are to:

1. Determine the Mathematics teachers' mastery of subject matter vis-à-vis student achievement as perceived by the students.
2. Determine the perception of the students on Mathematics teachers' attitude in classroom as it affects student achievement.

1.3 RESEARCH QUESTIONS

The following questions will be answered at the end of the study.

1. Is there a significant relationship between secondary school students' academic performance and their perception of teachers' knowledge of subject matter?
2. Is there a significant relationship between students' perception of teachers' attitude in the classroom and students' academic performance?

1.4 RESEARCH HYPOTHESIS

The following formulated hypotheses would be tested:

1. There is no significant relationship between teachers' mastery of subject matter and students' academic performance.
2. There is no significant relationship between students perception of teachers classroom attitude and students academic performance.

2. LITERATURE REVIEW

Teaching effectiveness has been accepted as a multidimensional construct since it measures a variety of different aspects of teaching such as; subject mastery, effective communication, lesson preparation and presentation.

Poor academic performance of students in Nigeria has been linked to poor teachers' performance in terms of accomplishing the teaching task, negative attitude to work and poor teaching habits which have been attributed to poor motivation (Agbebi 1999). It has also been observed that conditions that would make for effective teaching such as resources available to teachers, general conditions of infrastructure as well as instructional materials in public secondary schools in Nigeria are poor. These prevailing conditions would definitely show a negative influence on the instructional quality in public schools, which may translate to poor academic performance, attitude and values of secondary school students.

Although teachers' strong effect would significantly influence students' academic achievement, other factors such as socio-economic background, family support, intellectual aptitude of student, personality of student, self

confidence, and previous instructional quality have been found to also influence students' examination score (Cantrell, 2011) either positively or negatively.

Since students' academic scores are not the only predictors of teachers' effectiveness, researchers have sought other fairer ways of evaluating teachers' effectiveness. Students, administrators, colleagues and the teachers' self evaluation have been used to evaluate teachers' effectiveness. Students' competence in the evaluation of the effectiveness of their teachers has been of great concern to researchers in education. However, studies have shown that students' ratings are valuable indicators of teachers' effectiveness (Cantrell, 2001)

3. METHOD

The target population of this study is the total numbers of teachers and students in the selected Secondary schools in Keffi Local Government of Nasarawa State, Nigeria. The sample size was selected using a simple random sampling technique. A total sample size of eighty (80) students was selected from the population of the selected Secondary Schools in Keffi Local Government Area. The instruments that will be used to collect data for this study are questionnaires, interview and observation. The questionnaire was designed using likert scale for data collection. Information on influence of cognitive performance of Mathematics teachers in relations to students' level of performance in Mathematics was gathered.

3.1 Pilot Study

The instrument developed for data collection was trial tested in school outside the target population schools. The result of the trial test was used to determine the reliability of the Index of the Instrument.

2.2 Validity and reliability of Indices

The questionnaires were pre-tested by administering 10 copies to teachers and students of Government Secondary School Kofar-Huasa. The reliability of responses to the items of the instruments was analyzed using the Cronbach Coefficient Alpha aided with the use of SPSS 17. The reliability coefficient shows that the questionnaire yielded 0.75, which is consideration perfectly reliable.

3. RESULTS

The results of the data set analysis using SPSS 17 are given below:

Table 1: Gender of Respondent

		Frequency	Percent
Valid	Male	39	48.7
	Female	41	51.3
	Total	80	100.0

The result of the analysis shows that about 48.7% of the respondents are Male while about 51.3% of the respondents are Female

Table 2: Class of Respondents

		Frequency	Percent
Valid	SS 1	22	27.5
	SS 2	16	20.0
	SS 3	42	52.5
	Total	80	100.0

The result in Table 2 above shows that 27.5% of the respondents are in SS 1, 20% in SS 2 while about 52.5% of the respondents are in SS 3.

Table 3: Frequency Analysis assessing cognitive teaching and academic performance

Responses (%)

	Items	Agree	Disagree
1	The teachers has basic understanding of Mathematics	96.7	3.3
2.	The teachers has excellent classroom management	73.5	26.5
3.	The teacher has excellent teaching skills in Mathematics	53.3	46.7
4.	The relationship between student and Mathematics teacher are poor.	79.4	20.6
5.	Time allocated to Mathematics classes are not sufficient	86.3	13.7
6.	Mathematics classes are always boring	62.3	37.7
7.	Teachers' classroom teaching attitude has effect on academic performance	56.7	43.3
8.	I perform better in Mathematics than other subjects	28.7	71.3
9.	I can choose a career in Mathematics	35.7	64.3
10.	Instructional materials helps in better understanding	67.0	33.0
11.	Poor performance in Mathematics can be attributed to poor teachers teaching skills.	51.7	48.3
12.	Mathematics teachers makes the subject difficult	76.7	23.3
13.	Mathematics teachers are well qualified	76.0	24.0
14.	Teachers relationship can help improve student academic performance.	87.2	12.8

Source: Researcher's Analysis Output from SPSS 17

From the table above, the analysis shows that 93.7% of the respondents agree that teachers has basic understanding in Mathematics which indicated that the teachers has excellent teaching skills (53.3%) while 3.3% of the respondents disagrees; 73.7% agrees that teachers has excellent classroom management while 26.5% disagrees; 46.7% of the respondents agrees that the relationship between Mathematics teachers and students are poor while 53.3% of the respondents disagrees. The result of the analysis also shows that the time allocated to mathematics classes are not sufficient and majority of student find the mathematics classes boring.

The classroom teaching attitude of Mathematics teachers has significant relationship on student academic performance. The result also indicate that student performance better in other subject than mathematics (71.3%) while 28.7% of the respondents can choose a career in Mathematics.

The result also shows that instructional material helps in better understanding of mathematical concept and that Mathematics teachers are well qualified to teach the subject.

4.1 Test of Hypotheses

To test the significant relationship between teachers' mastery of subject matter and students' academic performance

Table 4: Frequency Analysis

	Observed N	Expected N	Residual
Strongly Agree	37	18.3	18.7
Agree	18	11.3	6.7
Strongly Disagree	15	18.3	-3.3
Disagree	10	6.7	3.3
Total	80		

Table 5: Non-Parametric Chi-Square Table

Test Statistics

	Teacher has basic understanding of Mathematics concept
Chi-Square	24.627[a]
Df	3
Asymp. Sig.	.000

The result of analysis in Table 5 shows the frequency level of the respondent's responses to the question. From Table 5, the result gives the chi-square value = 26.627, df =3 and p-value = 0.001; therefore since the p-value (0.001) is less than the 0.05 (alpha level), we reject Ho and concluded that there significant relationship between teachers' mastery of subject matter and students' academic performance.

4.2 Analysis of Hypothesis Two

To test the significant relationship between students perception of teachers classroom attitude and students academic performance

Table 6: Frequency Analysis

	Observed N	Expected N	Residual
Strongly Agree	19	13.2	5.8
Agree	31	11.7	19.3
Strongly Disagree	21	12.9	-0.9
Disagree	09	13.2	-4.2
Total	80		

Table 7: Non-Parametric Chi-Square Table

Test Statistics

	Teachers classroom teaching has significant relationship to student academic performance
Chi-Square	4.789
Df	3
Asymp. Sig.	.021

The result of analysis in Table 6 shows the frequency level of the respondent's responses to the question. From Table 7, the result gives the chi-square value = 4.789, df =3 and p-value = 0.021; therefore since the p-value (0.001) is less than the 0.05 (alpha level), we reject Ho and concluded that there is significant relationship between students perception of teachers classroom attitude and students academic performance.

4. Summary of Findings

The cardinal objective of the study is to investigate the influence of cognitive performance of Mathematics teachers in relations to students' level of performance in Mathematics. The research findings show that majority of the respondents agree that teachers have basic understanding in Mathematics which indicated that the teachers has excellent teaching skills and classroom management.The results also shows that the relationship between Mathematics teachers and students are poor and time allocated to mathematics classes are not sufficient, while majority of student finds the mathematics classes boring.

The classroom teaching attitude of Mathematics teachers has significant relationship on student academic performance. The result also indicates that student performance better in other subject than mathematics and small percentage of the student can choose a career in Mathematics. The result also shows that instructional material helps in better understanding of mathematical concept and that Mathematics teachers are well qualified to teach the subject. The results of the tested hypotheses are all significant showing that subject mastery, classroom management attitude and teachers teaching skills contributed significantly to student academic performance.

5. CONCLUSION

In conclusion, it was deduced from the respondents' opinion that cognitive teaching: subject mastery, teaching and classroom management skills influence student academic performance. Teacher's relationship with student also enhances student behavior and performance in Mathematics. Based on the research findings, the following were recommended:

1. Government should evaluate Mathematics programme in the Universities and Colleges of Education, and provision of adequate manpower.
2. Government should encourage teachers re-training programme and refresher courses to keep the teacher abreast and inform of latest teaching methods.
3. Teachers should learn to understand their student and keep good relationship that will enhance their learning abilities.
4. Mathematics subject should only be taught by qualified and experienced teachers.

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