



## Teachers' Workload and Students' Attitude toward Mathematics in Senior Secondary Schools in Kogi State

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### ABSTRACT

*This study was prompted by the increasing workload size of secondary schools' teachers and the poor attitude exhibited by students towards mathematics. The study sought to find out and group the workloads of 30 mathematics teachers randomly selected from Kogi Central Senatorial District and compared with the attitude of their respective students to mathematics. There were three groups for teachers' workload utilized for the study namely High, Average and Low workloads to which the comparison of students' attitude was done. The study was guided by two research questions and two hypotheses. The design Ex- post facto was used for the study. The instruments used for data collection were Mathematics Teachers' Workload Inventory (MTWI) and Students' Mathematics Attitude Scale (SMAS). The research questions were answered by the attitudinal levels of the students while the research hypotheses were analyzed by Kruskal Wallis and Mann Whitney statistics at  $P \leq 0.05$  level of significance by the aid of computer software Statistical Packages for Social Sciences (SPSS version 21). The Kruskal Wallis statistics showed a significant difference between Mathematics Teachers' Workload and Attitudinal levels of students taught by teachers of High, Average and Low workloads and that students taught by the teachers with Low workload had the highest attitude level to mathematics among the three. Furthermore, the Mann Whitney statistics showed no significance difference in the attitude of students taught by Male and Female Mathematics Teachers of any workload rating. Based on these findings, it was recommended that a Low workload of a 10 hours maximum a week should be assigned to mathematics teachers. Consequent to this, it is recommended that more mathematics teachers should be recruited to cope with increasing number of students' population and school teachers' workload.*

### ARTICLE INFO

#### Article History

Received: January, 2019

Received in revised form: June, 2019

Accepted: August, 2019

Published online: September, 2019

### KEYWORDS

Workload, Attitude, Mathematics

### INTRODUCTION

Mathematics education has been adjudged by many scholars and authors to have a crucial impact on scientific, economic and technological development of a nation as it plays a multi-dimensional application in many academic and life endeavor - science, industry, technology, economic, humanity, art, social science, management, and government. It is demanded in all areas of learning and jobs where basic numeracy and qualitative skills are in increasing demand as in the world today - industry, budgeting and data handling inclusive. Its multi-dimensional application can be seen as in the wide range of application of the algebra of matrices for an instance to problems arising in mathematics, physics, chemistry, economics, sociology, psychology

and statistics. It is also relevant in solving problems facing humanity as in the building of models to eliminate or bound recession and inflation, selection of portfolio of stocks, planning of industrial capabilities, planning of transportation networks, and studies of compilation and effects of business rivalry, investigation of economics growth, population growth and formation of models. (Lassa, 2012; Norris, 2012). Mathematical skills and knowledge are needed in providing employments to the middle-range population group of tomorrow in contemporary major industries. Mathematics education is needed for improved scientific knowledge and availability of modern technology founded to increase economic productivity and viability. It is the bedrock, and an indispensable tool for scientific and economic



advancement of any nation. (Yusuf, 2002; Aguele & Usman, 2007; Amoo & Disu, 2012; Okoye, 2012; Umameh, 2013).

The understanding of this critical role of mathematics in world of increasing awareness of improved scientific, economic and technological advancement justifies its inclusion as a core subject among others in the various educational reforms done in Nigeria; and it should and must occupy a central position in the school curriculum, including the 6-3-3-4 system, 9-3-4 system even to the next yet reforms still in pipe line. Mathematics should be taught in its all-inclusive form - number and numeration, algebra, trigonometry, mensuration, geometry and statistics by subject teachers' specialists who have been trained for that purpose to realize the goal of the national educational reform.

It is however observed that mathematics teachers who are the engine rooms of the said scientific, economic and technological advancement of the nation are in fewer supply on the schools' rolls to cope with the rigorous demand of the school programmes. They were in short supply not because there were not many turn-out of the training institutions, but because many of such teachers used teaching service as stepping stones and are ready to sacrifice it for other available opportunities in politics, business, industries and other vocations with better pays. This migration is caused by brain – drained syndrome where a teacher's welfare is not paramount in the hearts of the Government as the teacher is paid peanut when compared to what counterparts of other ventures take and even the payment is not promptly. The migration effect of such teachers have meant increasing workload for the few available teachers coupled with increasing number of students' enrolment as a result of Universal Basic Education in 2005. Leithwood, Louis, Anderson & Wahlstrom, (2004) have suggested that mathematics teachers have been saddled with excessive workload in most schools owing to shortage of science and mathematics teachers in schools. Consequently, teachers have had to rationalize their work by attending classes without adequate preparations, teaching without students' center approaches, teaching without class evaluation and where given, without feedbacks thus teachers developing poor attitude to teaching. Attitude is viewed as the totality of an individual's inclination towards object, institution or idea. It is an organized predisposition to think, feel, perceive and behave towards a referent or cognitive object and could be learnt or formed and

acquired from members of the family, teachers and peer group. Attitude could be positive or negative and directly determines the direction of his performance. Students could change their attitude as they watch their mathematics teacher's disposition towards teaching in the classroom. Teachers are role models to the students because as they act, so do the students demonstrate and perfect such act or behavior (Shafer, Lesley, Wagner & Davis, 1997). Based on the above background, the researcher will attempt a comparative analysis of Teachers' Workload on Attitude to mathematics among secondary school students in Kogi State, Nigeria.

### **Statement of the Problem**

Teacher's workload refers to amount of work assigned to a teacher to do or accomplish within a particular period known as teacher workday. (Iliyasu, 2008). It includes such period of time a teacher specially is assigned duties as supervision of students, administrative duties, classroom instructions and scheduled preparation. It also includes such time the teacher is expected to undertake such voluntary assignments such as supervision after school events: coaching, guidance and counseling services of students to ensure propriety or restrict activities and excursion. Workload includes the time spent in planning, assessment and documentation. It is the amount and nature of what teacher does, (Galton, Macbeth, Page & Steward, 2012). The magnitude of a teacher's workload could affect his preparation and choice of teaching method. A teacher with overcrowded classrooms as in most Nigerian schools with inadequate infrastructure and facilities; (Agharuwhe & Ngborugbo, 2009), and saddled with extra duties compete with the finite time which the teacher had to teach have the tendency of compromising the quality of teaching. He may employ teachers' centre approaches, teach without teaching aids, teach without evaluation or feedback or even deny the learners the opportunity of active interaction both between the teacher and students on one hand, and between student and his peers on the other hand. Learning environment such as classroom over crowdedness makes students restive and uninterested in academic excellence. Mutai, (2010) opined that attitude are enhanced by interpersonal interaction and explains that attitude is either positive or negative depending on whether a person likes or dislikes something or someone. Most students have negative attitude towards

mathematics as a result of their inaccessibility to or unavailability of their teachers. The problem of this study is aimed at:

1. Comparing teachers' workloads – High, Average and Low with respective students' attitude to mathematics.
2. Comparing male and female teachers' workloads – High, Average and Low with their respective students to mathematics.

#### Research Questions

1. Which group of students taught by teachers of High, Average and Low Workloads has the highest attitude level to mathematics among the three?
2. Which group of students taught by male and female teachers of High, Average and Low Workloads has a higher attitude level to mathematics than the other?

#### Research Hypotheses

1. There is no significant difference in Students' Attitudinal level to Mathematics taught by Mathematics Teachers of High, Average and Low Workload.
2. There is no significant difference in Students' Attitudinal level to Mathematics taught by Male Teacher and Female Teacher.

#### METHODOLOGY

The design adopted for this study was an ex-post facto. It was a design used to compare workload of the mathematics teachers rated and designated High, Average and Low Workloads with the attitude of their respective students to mathematics. Taking the 10 hours' maximum weekly workload recommended by the National Council of Colleges of Education for Mathematics teachers of NCE category, 16 hours recommended by Federal Inspectorate of Education for the first degree holders' category and the maximum of 40 students per class of the Federal Ministry of Education, the teachers were rated and designated High, Average and Low;  $\leq 10$  hours and with  $\leq 120$  students is rated and designated Low Workload. Between 10 hours and 16 hours with students between 120 and 156 is designated Average Workload while  $\geq 16$  hours and students  $\geq 156$  was designated High Workload.

Thirty (30) Mathematics Teachers selected and grouped into High Workload (HWL), Average Workload (AWL) and Low Workload (LWL) were used as samples for this study by simple random sampling Central Limit Theorem (CLT) which recommends a minimum of 30 ( $N \geq 30$ ). (Tuckman, 1965; Dantani, 2006).

**Table 1:** Summary of Workload Distribution

Workload Distribution	No of Male	No of Female	Total
High Workload	9	1	10
Average Workload	12	1	13
Low Workload	7	-	7
Total	28	2	30

The researcher used two instruments for data collection namely Mathematics Teachers' Workload Inventory (MTWI) and Students' Mathematics Attitude Scale (SMAS). The Inventory was adopted from (Iliyasu, 2008), reconstructed and re-validated. The inventory consists Schools Demographic Data and Sources of Teachers' Workload. The Attitude Scale was adopted from Student Attitude Inventory prepared by (Shafer, Wagner & Davis, 1997 and it consisted of items - attitude of students manifested in the classroom when the mathematics teacher attitude affected them as a result of his workload. Five Likert was employed in construction it. The Instruments were validated by experts in the fields of mathematics and

science education from Ahmadu Bello University, Zaria and Federal College of Education, Okene. They all made valuable inputs in face and content validity of the instruments. The validity was also done to ensure that all form of ambiguity that may be associated with the instruments were removed. The instrument Students' Mathematics Attitude Scale was subjected to a test of reliability using Split-half reliability test and Pearson Product Moment Correlation (PPMC. The coefficient of reliability was found to be 0.89.

The research questions were answered by the attitudinal levels of the students to mathematics while the hypotheses were tested by the statistics Kruscal Wallis and Mann –Whitney.

## RESULT

**Table 2:** Attitudinal level of Students taught by Mathematics Teachers of High, Average and Low Workloads

Groups	N	Attitude Level	Attitude Difference
HWLA	276	289.22	
AWLA	237	348.58	59.36
LWLA	220	484.42	135.84
Total	733		

The table showed the attitude level of students taught mathematics by teachers of High Workload (HWLA), Average Workload (AWLA) and Low Workload (LWLA). Students taught by teachers of High, Average and Low workloads had respective Attitude levels of 289.22, 348.58 and 484.42. It also shows the Attitude Difference of 59.36 between students of teachers of High Workload and those of

Average Workload. Also, there is Attitude Difference of 135.84 between students of teachers of Average Workload and those of Low Workload. Comparing the mean rank of the groups, the students of the teachers with High workload with 484.42 had the highest mean rank; which means the students of the teachers with Low Workload had the best attitude to mathematics among the three.

**Table 3:** Attitudinal level of Students taught by Male and Female Mathematics Teachers of High, Average and Low Workloads

Group	N	Attitude Level	Attitude Difference
MTWLA	576	364.49	
FTWLA	157	376.21	11.72
Total	733		

The table presented the mean attitude level of students taught by Male Teachers of any workload (MTWLA) and Female Teachers of any Workload (FTWLA). Students taught by male teachers had an attitude level of 364.49 while those of female

teachers had 376.21. The attitude differences between the two groups was  $(376.21 - 364.49) = 11.72$ . This implies students taught by female teachers has a better attitude to mathematics than those taught by male teachers.

**Table 4:** Kruscal Wallis Test for Mean Attitude Scores of Students taught by Mathematics Teacher of High, Average and Low Workload.

Group	N	Mean Rank	df	H-value	p-value	Remark
HWLA	276	289.22				
AWLA	237	348.58	2	106.93	0.001*	Reject $H_{01}$
LWLA	220	484.42				

- Significant at  $\alpha = 0.05$

Table 4.5 showed that an H - value of 106.93 at 2 degree gave a P – value of 0.001. This value is significant at  $P \leq 0.005$ . Hence, the null hypothesis  $H_{01}$  is rejected. It was therefore concluded that there was

a significance difference in the Mean Attitude Scores of students taught by teachers of High, Average and Low Workloads.

**Table 5:** Dunn – Bonferroni Post Hoc Test Pairwise Comparison

Group Comparison	Test Statistic	Std. Error	Std. Test Statistic	P-value	Remark
HWLA – AWLA	-59.361	18.730	-3.169	0.002	S
HWLA - LWLA	-195.197	19.115	-10.211	0.001	S
AWLA - LWLA	-135.836	19.801	-6.860	0.001	S

The table 4.6 showed three pairwise comparisons namely High Workload - Average, High



Workload - Low Workload and Average Workload - Low Workload – all in students’ attitude. All pairwise comparisons were found to be significant.

**Table 6:** Mann Whitney Test for Mean Attitude Scores of Students taught by Male and Female Mathematics Teachers

Group	N	Mean Rank	Sum of Ranks	U-value	Z-value	Sig.	Remark
MTWLA	576	364.49	209946.50	43770.500	-0.615	0.538	Retain H <sub>02</sub>
TWLA	157	376.21	59064.50				

Table 4.7 revealed that a U –value of 43770 is corresponding to a Z- value of -0.615 and is significant at  $0.538 \geq 0.005$ . Hence, the null hypothesis H<sub>02</sub> is retained.

### DISCUSSION OF THE RESULTS

The result of the findings indicated that students taught by teachers of high workload had an Attitude level of 289.22. Those taught by teachers of average workload had 348.58 while those taught by teachers of low workload had 484.42 showing that the students taught by teachers of low workload had the highest Attitude level. The Kruskal Wallis Test for the Attitude level which the data were subjected to indicated a significance value of  $0.001 \leq 0.005$  in the scores. This agrees with (Mutai, 2007; Atomatofa et al, 2012 Gbore et al, 2013)) who observed that a teacher with heavy teaching workload had a potential to compromise the quality of teaching since overworked, the teacher may not have time to plan for his lessons, may fail to attend classes, attend classes late or even fail to mark students work. This resultant poor teaching methods and strategies enhance negative attitudes towards learning.

Also the findings showed that students by male teachers had a mean rank of 364.49 while those of female teachers had 376.21 indicating that students taught by female teachers had better attitude to mathematics than those taught by the male counterparts. However, the Mann Whitney test for attitudinal level of students taught by male and female mathematics teachers indicated a no significant difference. However, (Mutai, 2007) had indicated situations where female mathematics teachers had done better in mathematics teaching than their male counterparts. Female teachers were observed to teach at a pace that allows students to grasp the mathematical concepts; whereas male mathematics teachers on the other hand were described as arrogant and always in a hurry. They were said to even assume don’t care attitude and tend to concentrate on students who prove to be good in mathematics. This attitude can damage students’ attitude to mathematics.

### CONCLUSION

On the basis of the findings, the study concluded that students taught mathematics by teacher with low workload had highest attitude level among others. This finding has some implications that aid teaching and learning mathematics. Most secondary schools are understaffed and that could account for why teachers’ workload are on the increase which in turn affect the attitude of students to learning. (Ingersoll & Perda, 2009; Adeyemi, 2011). Furthermore, the school understaffed and increasing school enrolment situations have resulted in heavy workload for teachers and unprofitable classroom teaching procedures. A teacher with low or average workload had a better chance of increasing the teacher – student interactional ratio and consequently prohibit negative attitude from students that may likely affect their studies. Based upon this findings, students taught by mathematics teachers of low and average workloads develop better attitude than those taught by teachers whose workload are high.

### RECOMMENDATIONS

On the basis of the findings of chapter four and the conclusion of this study, the following recommendations are stated:

1. Mathematics teacher should be assigned the minimum workload of not more than ten (10) hours maximum weekly.
2. A mathematics class should not be more than 40 students to increase teacher - students contact and interactional ratio to enable the teacher pay peculiar attention to the needs of the individual student.
3. Since mathematics is every day school business and is compulsory for every student, the government should seek to improve on school manpower to enable the mathematics teachers minimize distraction to his professional



commitment to teaching and utilize effective mathematics classroom pedagogy that will allow for students' positive attitude to the subject.

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