

# Comparative Effects of Having Mathematics Lessons Three and Five Periods A Week on Senior School Science Students Achievements in Mathematics

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## Abstract

This study sought to find out the impact of Senior School Science Students having mathematics lessons three times a week as against the usual five times a week in the school time – table in Nigeria. The research design adopted was Pre-Test-post-test Quasi-experimental. The population of the study was 1,092 Senior School Three (SS3) Science Student from 26 public Senior Schools from Oshimili North and South Local Government Areas of Delta State, Nigeria. The sample of the study was 252 Schools Science Students in Oshimili North and South local government Areas of Delta State, Nigeria. Two research questions and one null hypothesis were posted to guide the study. A validated and reliable (0.85) instrument, Mathematic Assessment Test item (MATI), was used to collect data, which was analyzed with z-test statistic. It was found that students who had mathematics lesson five times a week in the time-table had higher Mean Percentage Score (76.1) than those who had mathematics lesson three times a week in the school time-table with a Mean Percentage Score of 74.7. However, the difference in Mean Percentage Score was not, statistically, significant. It was, therefore, among other things recommended that the school principals can use the time-table of three mathematics periods a week, with adequate assignments for science based students, at the senior school Level.

**Keywords:** Mathematics; three and five periods of mathematics in school time table; senior school, Academic Achievements.

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## INTRODUCTION

It is a common knowledge in Nigeria that one of the ways through which any school, be it at the primary or secondary or tertiary level is assessed, is on how mathematics education is handled [1]. This is because of the key position mathematics occupies in the Nigerian educational system and its application in developmental processes [2]. Posit that mathematics, occupies a key position in the Nigerian educational system, because of the vital role it plays in the advancement of science and technology in contemporary society [3]. Prigsheim and Kline in [4] admit that mathematics occupies a central position in the school curriculum and has become a requirement of most disciplines in higher institutions of learning. [5] Assert that mathematics is the bedrock of all science subjects and is, therefore, needed for scientific and technological advancement of science and technology of any nation. Supporting this assertion [6, 7], in their separate studies, confirm that any society which aspires to be scientifically and technologically developed must be ready to take mathematics education very serious, since mathematics has ingredients for the effective

articulation of the abstract elements of science that gives impetus to the development of technology. Aligning to this statement, Abiodun in [8], avers that while science is the bedrock that provide spring board for technology, mathematics is the gate and key to science and that any nation seeking scientific and technological development, must, also, address the issue of mathematics. [9] Describes mathematics as the pivot of all civilization and technological development. Also, [10] Opine that mathematics is a key factor in the development of any nation. Summarizing the importance of mathematics, [11] states that mathematics is the precursor and the Queen of science and technology and the indispensable single element in modern societal development. According to [11], that without mathematics, there is no Science, without Science, there is no modern technology and without modern technology, there is no society.

Mathematics concepts and symbols are used in expressing the physical laws of nature [12]. Therefore, mathematical concepts and methods provide scientists with insight into and about natural phenomena [13].

[14] Indicates that algebra, trigonometry, graph and calculus are the mathematical concepts used in physics. [15] identifies ratio, charts, proportions, measurement and statistics as the mathematical concepts required in biology. [16, 17] opine that chemical kinetics, chemical equilibrium, stoichiometry, mole concepts, solubility, electrolysis, redox reactions and ionic equations are areas in chemistry that require a good knowledge of mathematics. [13] recognizes simple equation, substitution, simple proportion, subject formula, graph, etc as the mathematical concept needed in Senior School Certificate Chemistry.

Realizing the views of the aforementioned researchers on the importance of mathematics in national development and its position in the school system, the (18) is continuously emphasizing the importance of mathematics in national development by making the subject compulsory for both pupils and students in Primary and Secondary Schools, respectively. In agreement with [18, 3], assert that for a nation such as ours, aspiring for scientific and technological take off, the need to pay adequate attention to mathematics education cannot be over-emphasized.

A school time-table is a table that contains the subjects taught in a school. Time is allocated to each subject in the time-table. In Nigeria secondary schools, the time allocated to a subject is minimum of 35 minutes or a maximum of 40 minutes per period. A sample of time-table in both primary and secondary schools in Nigeria in 1970-1999 shows that mathematics, as a subject, was taught every day. That is five times/periods per week. This was possible because there were fewer subjects in the school curriculum, at that time, when compared to the present school curriculum. In this 21<sup>st</sup> century, subjects like data processing, Fishery, Civic Education, computer studies and many others are, presently, listed in our school curriculum. It is a known fact that daily study time period in Nigeria is from 8:00AM to 2:00PM from Monday to Friday.

Students achievement in school is regarded as the score or grade a student obtains after sitting for an examination or test; the score could be from an internal or external or formal or informal examination [19]. The academic achievement of a student is a measure of the extent a student has attain the behavioural objectives of a given lesson/concept.

Secondary school, in Nigeria, is the school where the students go to acquire additional knowledge after their primary school education (18). The secondary school is of six years duration. The first three years, known as the junior school, is compulsory for all students. At the end of the Junior School, the students enroll for the Basic Education Certificate Examination which is the least certificate obtainable by a Nigerian.

The last three years of the secondary school is called Senior School. The students in the said school are called Senior School Students (SSS).

The problem a school administrator is facing in Nigeria is whether to reduce the number of periods of mathematics for science inclined students, in order, to create rooms for other subjects to be listed in the time table. This singular problem, arouse the interest of the researchers. The problem of this study is stated thus, what is the effect of teaching science inclined students mathematics three periods per week vis-à-vis five periods per week on mathematics achievements in the senior school.

### Research Questions

Two research questions were raised to guide this study.

1. What is the Mean Percentage Score (MPS) of the Senior School Science Students that had Mathematics lesson three periods a week in the school time table for three weeks?
2. What is the Mean Percentage Score (MPS) of the Senior School science Students that had Mathematics lesson five periods a week in the school time table for three weeks?

### Null Hypothesis

One null hypothesis, as shown below, was posted and tested as  $p < 0.05$  level of significance on a 2-tailed test.

$H_0$ : there is no significant difference in MPS of Senior School Science Students that had mathematics lesson three and five times a week in the school time table for three weeks.

## MATERIALS AND METHODS

The study adopted quasi-experimental research design. This was because the researchers could not randomly sample and assign his subjects. Therefore, the subjects were used as groups, already in existence as intact classes, which were randomly assigned to experimental and control groups. The population comprised 1,092 Senior School Three (SS3) Science Students from 26 Public Senior Secondary Schools in Oshimili North and Oshimili South Local Government Areas of Delta State, Nigeria. This implies an average of 42 students per school. Six schools (3 from Oshimili North and 3 from Oshimili South Local Government Areas) were selected from the 26 Public Senior Secondary Schools using proportionate random sampling techniques. These six schools, consisted of 252 Senior School Science Students which formed the sample of the study. Three schools (two from Oshimili North and one from Oshimili South) with 126 (90 males and 36 females) Senior School Three Science Students were randomly assigned to experimental group, while another three schools (two from oshimili North and one from oshimili North) with 126 (74 males and 52 females) Senior School Three Science Students

were randomly assigned to control group. The experimental group comprised the SS3 Science Students taught mathematics lessons three periods a week, while the control group consisted of SS3 science students taught mathematics lesson five periods a week. Each period was of 40 minutes duration.

The instrument for data collection was Mathematics Achievement Test Items (MATI) made by the researchers. The instrument had two parts; A and B. Part A consisted of the bio-data of the students, such as gender, class, e.t.c, while part B comprised 20 multiple choice objective mathematics questions from the concept, trigonometry. This instrument was validated by three experts in mathematics, science education and measurement and evaluation. The contributions of these experts gave birth to the final version of MATI. The reliability index of MATI was calculated using Kunder-Richardson 21 (K-R-21) statistic as 0.85. This was judged as good enough and very reliable.

Before the commencement of 2017/2018 academic session, the researchers visited the six sampled schools and organized weekend mathematics lesson of two weeks for the mathematics teachers who participated in teaching the students. Mathematics teachers who had the same qualification (B.Sc. Ed. Mathematics) and the same number of years of experience taught the students. Also, uniform lesson

notes were prepared by the researchers for the teachers to use throughout the lesson periods, on the concepts of trigonometry. The teachers were advised to strictly adhere to the lesson note throughout the period of this research.

Prior to the commencement of teaching, the researchers gave the students of the two groups pre-test, using the MATI, in order, to know if they were comparable. Thereafter, it was observed that both groups were comparable with Mean Percentage Scores (MPS) of 53.2 and 53.8 for experimental and control groups, respectively. The two sample groups were, therefore, reported to be comparable. The students from the groups had their mathematics lessons for three weeks, after which they were subjected to post-test with MATI. The questions in the post-test were re-arranged in a different sequence in such a way as to remove students easy recall of what they did in the pre-test. MPS and Standard Deviation of the students in each group were computed and compared using z-test in a 2-tailed test at  $P < 0.05$  level of significance, in order, to test  $H_{01}$ .

### Data Analysis and Results

The post-test analysis of science students in the experimental and control groups is as shown in Table-1.

**Table-1: z-test of post-tested MPS difference between Experimental and Control Groups students in Senior School Mathematics**

| Group        | N   | MPS  | SD   | df  | $Z_{cal}$ | $Z_{crit}$ | P    |
|--------------|-----|------|------|-----|-----------|------------|------|
| Experimental | 126 | 74.7 | 10.1 | 250 | 0.91      | 1.96       | 0.05 |
| Control      | 126 | 76.1 | 9.8  |     |           |            |      |

#### Research Question 1

What is the Mean Percentage Score (MPS) of the Senior School Science Students that had mathematics lesson three periods a week in the school time-table for three weeks?

#### Answer to Research Question 1

The senior school science students had 74.7 mean percentage score as shown in table after having mathematics lesson three times per week in the school time-table for three weeks.

#### Research Question 2

What is the Mean Percentage Score (MPS) of the Senior School Science Students that had mathematics lesson five periods a week in the school time-table for three weeks?

#### Answer to Research Question 2

The Senior School Science Students had 76.1 mean percentage score, as shown in Table-1, after having mathematics lesson five periods a week in the school time-table for three weeks.

### Testing of Null Hypothesis

$H_{01}$ : there is no significant difference in the MPS of Senior School Science Students that had mathematics lesson three and five period a week in the school time-table for three weeks.

Data in Table-1 show that  $z_{cal} = 0.91 < z_{crit} = 1.96$ . Based on the decision rule,  $H_0$ , which states that there is no significant difference in the MPS of Senior School Science Students that had mathematics lesson three and five periods a week in the school time-table for three weeks was retained.

### DISCUSSION

The finding in this study that the MPS = 76.1 of Senior School Science Students (control group) that had mathematics lesson five periods a week in the school time-table for three weeks which is greater than the MPS = 74.7 of their counterparts (experimental group) that had mathematics lesson three periods a week in the school time-table for three weeks justifies [18] decision to ensure that mathematics is taught everyday or five times a week in the primary and secondary schools. The higher MPS by the control group is probably due to the continuous teaching and learning by teachers and learners, respectively on daily

basis. This makes the students logically fit into the sequence of teaching and learning processes.

Another vital finding of this study is that the difference in the MPS of the experimental and control groups/samples is not significant. This finding disagrees with [18] aim of ensuring that students/pupils have mathematics lesson five periods a week in the school time-table in the primary and secondary schools, for a sustainable high grade in both internal and external examinations. This might, probably, be due to the fact that the students who had mathematics lesson three periods a week in the school time-table were given more assignments and had more self-study time than their counterparts that had mathematics lesson five periods a week in the school time-table.

## CONCLUSION

The Senior School Three Science Students that had mathematics lesson five periods a week in the school time-table had higher Mean Percentage Score than their counterparts who had mathematics lesson three periods a week in the school time-table. The difference in MPS between the Senior School Three Science Students that had mathematics lesson five periods a week in the school time-table and the Senior School Three Science Students that had mathematics lesson three periods a week in the school time-table was not significant.

## RECOMMENDATION

Three periods of mathematics lessons in the school time-table per week backed with more assignments for science students, is recommended to school administrators in secondary schools in Nigeria. The remaining two periods in the school time-table should be used for self-study or independent study by students.

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