

Chapter 4

Impact of Time Factor in Teaching and Learning Mathematics in Post-Primary Mathematics Education

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ABSTRACT

This research investigated the influence of time on the teaching and learning of mathematics in post-primary education within selected secondary schools in Ondo West Local Government, Ondo. The study utilized a descriptive survey design. Data were gathered through a well-structured questionnaire distributed to two hundred and fifty students for analysis. Descriptive statistics, specifically mean and standard deviation, were employed to address the research questions, while Analysis of Variance (ANOVA) was applied to test the hypothesis. The findings indicate that the time factor significantly affects students' performance. However, the participants concurred that extended hours spent on school activities adversely impact mathematics learning. Notably, they believed that self-study would be more beneficial than spending additional time at school. The study recommends allocating sufficient time to the teaching and learning of mathematics to create a conducive learning environment and enhance students' performance in the subject.

INTRODUCTION

Mathematics is often described as the foundation and science of reasoning, skills, and computations, playing a crucial role in our daily lives. It enables learners to comprehend the world around them by uncovering hidden patterns and abstract concepts (Kumari, 2015). Fajemidagba (2015) highlighted that Mathematics is a compulsory subject for every secondary school student and is required for obtaining a school certificate. This

stipulation also applies to Teacher Training Colleges and Tertiary institutions. Due to its fundamental nature, Mathematics demands a significant amount of time to learn and absorb effectively during teaching sessions.

Despite its importance, Mathematics is frequently perceived as a challenging subject. This perception is often attributed to various factors, including time constraints. Students commonly express frustration over the insufficient time allocated for learning specific mathematical concepts. Learning involves the acquisition of new knowledge and skills, but without retention, the effectiveness of teaching is compromised, and this process is highly time-dependent. Students often complain about not having enough time to complete mathematical or statistical tasks, class work, assignments, or even tests and exams, believing that these time constraints negatively affect their performance, especially in Mathematics.

The significance of time extends to the lives of students, particularly those in higher education institutions where parental and teacher supervision is minimal (Necati, 2010). Razali et al. (2018) referred to time as a priceless resource that continually passes without return. Time constitutes life, and all educational programmes operate within time constraints.

Historical studies investigating whether factory workers could perform their jobs accurately at different times of the day have laid the groundwork for understanding how the body and brain function at various times. This understanding may reveal why some tasks are performed better at certain times of the day.

Applying these findings to classroom practice could enhance the teaching and learning of Mathematics. This study, therefore, examined the impact of the time factor on teaching and learning Mathematics in post-primary education within selected secondary schools in Ondo West Local Government, Ondo.

METHODOLOGY

Research Design

A descriptive research design was employed in this study to analyze data collected from selected secondary schools in Ondo West Local Government Area, based on the opinions of the respondents. The study's population included all Junior and Senior Secondary School students within the Local Government Area. A sample of 250 students was selected, with 50 respondents chosen from each school through a stratified random sampling technique.

Research Instrument

Data collection was conducted using a well-structured questionnaire, which comprised four sections: Section A gathered demographic data of the respondents, while Sections B, C, and D contained items related to the research questions.

Reliability of Research Instrument

To ensure the reliability of the instrument, the test-retest reliability method was applied. This process was crucial to ascertain the instrument's consistency and usefulness for the intended research purposes.

Aims of the Study

The primary goal of this study is to explore the impact of the time factor on the academic achievement of post-primary school students in the teaching and learning of mathematics.

The specific objectives are to:

1. Determine, based on respondents' opinions, if there are differences in students' performance in relation to the time factor.
2. Assess the impact of the time factor on students' academic achievement in acquiring mathematical skills.

Research Questions

To guide this research, the following research questions were formulated:

- i. Does the time factor have an influence on students' performance in Mathematics?
- ii. How does the Mathematics teacher impact the teaching and learning process with respect to the time factor?
- iii. How does the time factor influence students' performance in Mathematics?
- iv. What are the beneficial effects of the time factor on teaching and learning mathematics in post-primary mathematics education?

Research Hypothesis

- i. There is no significant impact of the time allocated for teaching and learning mathematics on the academic achievement of students.
- ii. There is no significant influence of school management on the time allocated for teaching and learning Mathematics in post-primary school education.
- iii. There is no significant difference between the effect of the time factor and student academic achievement.

ANALYSIS OF DATA AND RESULTS

Descriptive statistics, specifically mean and standard deviation, were employed to address the research questions posed in this study. Inferential statistics, using Analysis of Variance (ANOVA), were applied to test the hypotheses at a 0.05 level of significance. The decision rule for interpreting the findings was based on a mean score cutoff point of 2.50. Items with a mean score of 2.50 and above were considered as factors agreed upon by respondents, while those falling below 2.50 were deemed disagreed factors. The mean score was calculated using the following scale: Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2, and Strongly Disagree (SD) = 1. This methodology provided a clear framework for evaluating the impact of time on the academic achievement of post-primary school students in the context of mathematics education.

$$\text{Mean } (x) \frac{4+3+2+1}{4} = 2.50$$

The analyses were presented as follows:

Analysis of Research Questions

Research Question 1: Does the time factor have an influence on students' performance in Mathematics?

Table 4.1

S/N	ITEMS	\bar{x}	SD	Remark
1	Time allocated for teaching and learning mathematics has influence on the student performances	3.26	1.26	Agree
2	The total amount of time spent in class room has great impart in the students' academic achievement	3.288	2.288	Agree
3	Time used in teaching and learning Mathematics in the class is sufficient and enough for effective understanding of the students	2.976	1.976	Agree
4	Insufficient time can leads to poor performance of the learners in Test	3.604	1.604	Agree
5	Student disinterest and dislikes toward mathematics is as a result of having limited time to study on it	3.06	2.427	Agree
(\bar{x} = Mean, SD = Standard Deviation) Weighted Mean = 3.24				

Table 4.1 explores the influence of the time factor on students' performance in Mathematics. The findings from the respondents indicate: The time allocated for teaching and learning mathematics significantly affects student performance, with a mean score of 3.26. This suggests a general agreement among respondents that the amount of time dedicated to mathematics instruction is a critical factor influencing student outcomes. The total amount of time spent in the classroom has a substantial impact on students' academic achievement, evidenced by a mean score of 3.288. This highlights the importance of classroom time in facilitating students' understanding and mastery of mathematical concepts. The time utilized for teaching and learning Mathematics in the

class is deemed sufficient for effective student understanding, with a mean score of 2.976. This indicates a slightly lower level of agreement compared to the previous items, suggesting that while the allocated time is generally considered adequate, there may be room for improvement. Insufficient time can lead to poor performance in continuous assessment, as shown by a mean score of 3.604. This strongly agreed upon factor underscores the negative impact that time constraints can have on students' ability to perform well in assessments. Student disinterest and dislike towards mathematics result from having limited time to study it, with a mean score of 3.06. This indicates an agreement that restricted study time contributes to negative attitudes towards mathematics.

Research Question 2: How does the Mathematics teacher impact the teaching and learning process with respect to the time factor?

Table 4.2

S/N	ITEMS	\bar{x}	SD	Remark
1	Mathematics allocation as a first period subject on timetable help students' concentration in the class and gain more understandings especially when the period was doubled	3.512	3.0027	Agree
2	Mathematics is difficult but look interesting for students if the time provided is well used by the teacher	2.564	1.3008	Agree
Weighted Mean = 3.04 (\bar{x} = Mean, SD = Standard Deviation)				

Table 4.2 examine whether the scheduling of Mathematics as the first subject on the timetable influences students' concentration and understanding, particularly when the period is extended. The findings show: Respondents agreed that allocating Mathematics as the first subject on the timetable enhances students' concentration and understanding, especially when the period is doubled, as indicated by a mean score of 3.512. This suggests that the timing of Mathematics classes can significantly impact students' ability to engage with and comprehend the material. It was also agreed that while Mathematics is difficult, it becomes

more interesting for students if the allocated time is effectively utilized by the teacher, with a mean score of 2.564. This points to the critical role of teachers in maximizing the use of class time to make Mathematics more appealing to students. The weighted mean of 3.04 for Table 4.2 implies that Mathematics teachers can positively influence the teaching and learning of Mathematics with respect to the time factor, enhancing student learning outcomes.

Research Question 3: How does time factor influence student's performance in Mathematics?

Table 4.3

S/N	Statements	\bar{x}	SD	Remark
1	More time spent at school on activities has negative effect on mathematics	2.76	2.1910	Agree
2	Insufficient time causes students to be struggling with mathematics	3.644	3.1215	Agree
3	student with learning difficulties often benefit from having more time to understand a concept in mathematics	3.324	2.7503	Agree
Weighted Mean = 2.69 (\bar{x} = Mean, SD = Standard Deviation)				

Table 4.3 examines the effect of time spent on activities at school on students' performance in Mathematics: It was agreed, with a mean of 2.76, that spending more time on school activities has a negative impact on Mathematics performance, suggesting that excessive non-academic activities could detract from students' focus and achievement in Mathematics. With a mean score of 3.644, respondents agreed that insufficient time causes students to struggle with Mathematics, highlighting the need for adequate time allocation to support students' learning and understanding of mathematical concepts. Additionally, it was agreed, with a mean of 3.324, that students with learning difficulties benefit from having more time to grasp mathematical concepts, indicating the importance of flexible time management to cater to diverse learning needs. The weighted mean derived from Table 4.3 suggests that the time

factor significantly influences students' performance in Mathematics. This underscores the necessity for careful planning and allocation of instructional time to mitigate negative impacts and support all students, particularly those facing learning challenges, in mastering Mathematics.

Research Question 4: what are the beneficial effects of time factor on the teaching and learning mathematics in post-primary mathematics education?

Table 4.4

S/N	Statement	\bar{x}	SD	Remark
1	More time spent alone to study Mathematics can enhance the achievement scores of high-performing students	3.136	2.5892	Agree
2	The time factor determines the quality of studies	3.088	2.5745	Agree
3	The performance of students significantly increased with increased studying time in the school	3.296	2.8043	Agree
4	The use of extended learning time improved student academic performance	2.928	2.3774	Agree
5	Homework time has positive influence on the students achievement gain	3.416	2.8899	Agree
Weighted Mean = 3.17 (\bar{x} = Mean, SD = Standard Deviation)				

Table 4.4 sheds light on the relationship between time spent on studying Mathematics and students' academic achievement:

Respondents agreed, with a mean score of 3.136, that allocating more time for individual study in Mathematics can improve the achievement scores of high-performing students. This indicates a positive correlation between dedicated study time and students' academic success in Mathematics. It was also agreed, with a mean of 3.088, that the time factor plays a crucial role in determining the quality of studies. This suggests that not just the quantity, but also the effective utilization of time, is important in enhancing the quality of learning experiences.

Further, it was agreed, with a mean of 3.296, that students' performance significantly improves with increased study time in school. This highlights the benefits of providing adequate time within the school schedule for focused study and learning activities in Mathematics. With a mean score of 2.928, respondents concurred that the utilization of extended learning time improves students' academic performance. Although this mean score is slightly lower compared to other items, it still supports the notion that additional learning time, whether through extended class hours or additional sessions, can have a positive impact on academic outcomes. Lastly, it was agreed that homework time positively influences students' achievement gains, reinforcing the value of structured out-of-class learning activities in enhancing students' comprehension and performance in Mathematics. With a weighted mean of 3.17, the findings from Table 4.4 suggest that effectively managed and sufficiently allocated study time has positive effects on the teaching and learning of Mathematics in post-primary education. This underscores the importance of strategic time management and the provision of ample study opportunities to foster improved academic performance in Mathematics among students.

Analysis of Research Hypothesis

Statistics Analysis of variance (ANOVA) was conducted to test and analyze the formulated hypotheses as follows:

H₀ 1: There is no significant impact of time allocated in teaching and learning mathematics on the academic achievement of the students.

Table 4.5	SS	Df	MS	F-value	P-value	Remark
Between Groups	42582.6	3	14194.2	8.2487	0.0015	Significant
Within group	27532.4	16	1720.775			
Total	70115	19				

Table 4.5 presents the Analysis of Variance (ANOVA) results for the first hypothesis, indicating an F-statistic of $F(3, 16) = 8.2487$ with a probability value ($p = 0.0015$) at a 0.05 significance level. Given that the probability value is less than the alpha level, the null hypothesis is rejected. This suggests a significant impact of the time allocated to teaching and learning mathematics on the academic achievement of students, based on respondents' feedback.

H₀2: There is no significant influence of the school management on time allocated for the teaching and learning Mathematics in post-primary school education.

Table 4.6	SS	Df	MS	F	P-value	Remark
Between Groups	9352.333	3	3117.444	0.5845	0.6418	Not Significant
Within group	42670.67	8	5333.833			
Total	52023	11				

Table 4.6 reports an F-statistic of 0.5845 with degrees of freedom (3, 8) at a 0.05 significance level. Since the p-value is greater than the significance level (0.05), the null hypothesis is accepted. This indicates that there is no significant influence of school management on the time allocated for teaching and learning Mathematics in post-primary school education.

H₀ 3: There is no significant difference between the time factor effect and the student academic achievement.

Table 4.7	SS	Df	MS	F	P-value	Remark
Between Groups	80195.4	3	26731.8	30.1509	8.0927	Not Significant
Within group	14185.6	16	886.6			
Total	94381	19				

Table 4.7 presents the analysis to compare mean for whether the time factor effects is statistically significantly difference from the student academic achievement. The table revealed the F-Start (30.1509) but the

test is not significant. Thus, with the P-value (8.0927) greater than the significant level (0.05) then we accepted the null hypothesis. This implies increase in quality time factor increases the student academic achievement so there is no significant difference between the time factor effect and the student academic achievement.

DISCUSSION OF FINDINGS

Based on the findings from Table 4.1 and Table 4.5, the researchers observed that the time factor significantly influences students' performance in Mathematics, and that the time allocated to teaching and learning mathematics has a meaningful impact on the academic achievement of students. These results are in line with the observations of Nasrullah and Khan (2015) as well as Chaturvedi (2016), who posited that time allocation for students is crucial as it helps to enhance their productivity and grades. However, according to the responses from Table 4.6, students in the local government where the study was conducted agreed that school management's influence on the time allocated for teaching and learning Mathematics in post-primary school education is not significant.

Findings from Tables 4.2 and 4.3 suggest that students with learning difficulties often benefit from additional time dedicated to their learning, especially when the period is extended and efficiently utilized by the teacher. This supports Druker's (1994) argument from a student perspective, suggesting that effective time management skills lead to higher academic performance. However, it was noted that increased time spent on school activities negatively impacts Mathematics performance, with a mean of 2.76. This might indicate a preference among respondents for self-study over extended school hours, supporting the argument by Muhammad et al. (2020) that students' self-study has a significant and positive association with their academic performance.

Finally, Table 4.7 revealed no statistically significant difference between the time factor's effect and students' academic achievement, implying that as the quality time factor increases, students' academic achievement

also increases proportionately. This finding underscores the importance of quality time in education and its positive correlation with academic success in Mathematics.

CONCLUSION

Academic learning time refers to the duration during which students are actively, successfully, and productively engaged in learning relevant academic content. This study sought to explore the impact of time as a critical factor influencing the academic achievement of post-primary school students in the context of teaching and learning mathematics. The findings affirm that the time allocated for teaching and learning mathematics significantly influences student performance. Allocating insufficient time for these activities negatively affects students' performance, as it may hinder teachers' ability to effectively cover the subject matter.

RECOMMENDATION

The results of this study underscore the importance of the time factor, highlighting its significant impact on student performance. Therefore, it is imperative for school administrators and management to acknowledge and address the issue of time allocation in the school timetable for teaching and learning mathematics. School management should ensure that the time and periods designated for mathematics are well-designed and properly implemented to facilitate effective teaching and learning of the subject. This strategic approach to time management in the educational process is crucial for enhancing students' understanding, engagement, and overall academic achievement in mathematics.

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