Teacher's Use of Required Skills in the Teaching of Mathematics Contents in Osun State Public Secondary Schools

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DOI: https://doi.org/10.51584/IJRIAS.2026.11060031

Received: 16 May 2026; Accepted: 21 May 2026; Published: 18 June 2026

ABSTRACT

The study investigated the extent to which secondary school Mathematics teachers use teaching skills in teaching Mathematics contents to improve students' achievement in Osun State public secondary schools. It also examined the relationship between the use of required skills by secondary school teachers (experienced and non-experienced) and students' achievement in mathematics. These were with a view to improving students' academic performance in the schools. The study adopted survey research design. The population of the study comprised all the 4,856 secondary school teachers in the 387 public secondary schools in the State. The sample of the study consisted of 1,100 teachers. The selection of the teachers was based on proportionate stratified random sampling technique in the three education zones in Osun State. The instrument for data collection was titled "Teacher's Required Teaching Skills Questionnaire" (TRTSQ). The instrument was validated by group of experts and the reliability coefficient of 0.82 was obtained using Cronbach alpha technique. Data collected was analysed using mean score and standard deviation to answer the research question while Pearson-correlation was used to test the hypothesis at 0.05 level of significance. One research question and one null hypothesis were raised and formulated respectively to guide the study. The results showed that secondary school teachers do not employ teaching skills in teaching mathematics content. The result also showed that there is no significant relationship between the extent of use of skills by secondary school teachers (experienced and non-experienced) and students' achievement in mathematics (r-cal =1.29, r-crit = 3.85, P =0.47). The study concluded that secondary school education is an important stage of educational development in Nigeria and despite the importance of mathematics education to national development, the study of the subject in our schools in Nigeria is bedevilled with poor performance. The study therefore recommended government should continue to re-train the primary school teachers in their capacity building workshops especially in mathematics and sciences with a view to improving their level of competence in all areas of mathematics teaching in secondary schools across the state.

Keywords: Mathematics, content, teacher's teaching skills, requirement, secondary schools.

INTRODUCTION

Mathematics is one of the most useful subjects for study because of its ramifications in the activities of man (Okeke, 2008). According to Yusuf (2009), mathematics is not only considered as important in its own right as a field of study and research, but also essential to almost every field of intellectual endeavour. Mathematics is the chief source of most scientific discoveries and inventions; any nation that does not take great interest and precautions in studying it remain underdeveloped. Mathematics' knowledge is widely applied in the study of sciences, for instance, it is used in setting up scientific models or formulae, solving scientific problems and presenting scientific ideas. An application of mobile ICT is in the area of Telemedicine where health care delivery in Nigeria and other parts of the world can be enhanced by use of buses or boats equipped with satellite tracking facilities. The mobile ICT which is now used in the area of Telemedicine has its base in the mathematical sciences (Whitecomb, 2008).

In the area of physical sciences, for students to apply Newton's Law of cooling, there is need to perform the Mathematical Integration of K(O-T) dt which is a concept in calculus (Vogel, 2003). In the area of a chemistry, a good knowledge of Mathematics can be applied in solving problems in chemical equation as shown below;

$AgN0_3 + 2NaCN \quad N1(Ag(CN)_2 + NaNO_3$ in a complexometric titration.

In the field of agriculture education, agricultural economic and agricultural sciences, mathematics is needed for estimation and regression analysis for preparing farm records and management. Most research findings in the natural sciences, management sciences, social sciences, education and arts are based on statistics which is an aspect of mathematics. In fact, the importance of mathematics to life activities, national growth and development cannot be overemphasized.

However, the emphasis entails us that effective teaching of mathematics at all levels of education; especially the primary school which should not be neglected. This is to enable individuals understand its basic concepts and fit in all ventures and trades of human endeavour. It is good to note that the Nigerian education system is divided into different structures, the basic education, secondary education and higher education. The basic education which is made up of both primary and adult education is probably the most important of the three educational levels. This is because it prepares individual for basic or fundamental knowledge. Specifically, primary education makes adequate provisions for optimum development of individual's mental, physical and intellectual ability to adapt to changing environment.

In all levels of education, the primary school is still the first level of education ladder. It is a preparatory ground where the background knowledge is rooted and built up for other academic endeavours. This is the reason why the Federal Republic of Nigeria (2013), in her National Policy on Education stated that, "primary education is the foundation upon which the rest of the educational system is built". This type of education is given to children at age range of six to twelve years. The objectives of primary education among others, is inculcation of permanent literacy and numeracy, laying of foundation for national development and giving the child opportunities for developing manipulative and scientific skills that will enable him function effectively in the society (FRN, 2013). One can see that there is serious need to teach mathematics effectively in primary schools for a solid foundation for further education.

The current primary school curriculum emphasizes the use of activity techniques which engage teachers in the use of skills, innovative strategies, adequate instructional materials and pedagogical knowledge among others in order to improve learning. This study focuses mostly on the extent to which teachers use the required skills in teaching mathematics at primary schools' level. Teachers' effectiveness is a function of teachers' acquisition of the requisite knowledge skills and attitude for successful teaching. A mathematics educator that suits the present demand must have the required skills for teaching, so as to meet up with mathematical needs in the pursuit of national goals (Obienyem, 2009). According to Darling-Hammond (2009) in his findings, pupils performed poorly in the hands of lowly prepared teachers that are not qualified, and that most certified teachers, are not qualified in the use of teaching skills, methods and pedagogy.

Then what is skill? Skill simply means the ability to do something well; (expertise); to do a particular task well. It can also be explained as an ability and capacity acquired through training or practice, deliberate, systematic and sustained effort to smoothly and competently perform a task. Some of these skills required for the teaching and learning of mathematics are: thinking skills, communication skills, computational skills, manipulative skills and so on. When these skills are inculcated in the learners at the early stage of life, it will engender pupils' interest and enhance achievement, and may also lead to long lasting positive attitude in mathematics.

Statement of the Problem

The depressed state of mathematics education, especially at secondary schools in Nigeria has been so alarming for teachers, mathematicians, stakeholders, parents, pupils/students, government and all those who care about the subject in the society. In spite of the importance of mathematics to the society and national growth in scientific and technological advancement, reports and records have consistently indicated poor performance of learners both in internal and external examinations in the said subject. In other words, the study of the subject in our school is bedevilled with poor performance. For instance, the monitoring learning achievement for primary schools carried out between 1996 and & 2012 indicated poor performance of pupils in secondary school mathematics (Federal Ministry of Education, 2004, 2006, & 2012). It was noted in the study that the very poor national mean performance of secondary school children was found mostly in the concept of number and

numeration, geometry and mensuration. Also, the statistics unit, Osun State University Basic Education Board (2010; 2013) had recorded a very poor performance of pupils in mathematics both in schools' examination and in the state's common entrance examinations for the past years. The report from the records stated that the evaluation and assessment of teachers both in subject matter, knowledge of mathematics, required the relevant and lasting knowledge of mathematics and be exposed to correct skills, required knowledge, authentic practical activities in the teaching of the subject is needed by effective mathematics teachers hence, this study.

Purpose of the Study

The main objective of the study is to investigate the use of required skills in the teaching of mathematics contents in Osun state public secondary schools with a view to improving students' academic performance in the schools.

The specific objectives of the study are to:

a) investigate the extent to which secondary school Mathematics teachers use teaching skills in teaching Mathematics contents to improve students' achievement in Osun State public secondary schools.; and

b) examine the relationship between the use of required skills by secondary school teachers (experienced and non-experienced) and students' achievement in mathematics.

Research Question

1. To what extent do secondary school Mathematics teachers use teaching skills in teaching Mathematics contents to improve students' achievement?

Research Hypothesis

Ho_1: There is no significant relationship between the use of required skills by secondary school teachers (experienced and non-experienced) and students' achievement in mathematics.

METHODOLOGY

The study adopted survey research design. The population of the study comprised all the 4,856 secondary school teachers in the 387 public secondary schools in Osun State. The sample of the study consisted of 1,100 teachers. The selection of the teachers was based on proportionate stratified random sampling technique in the three education zones in Osun State. This technique allowed the researcher to examine each sub-group separately for adequate selection. The instrument used for data collected was developed by the researcher and titled "Teachers' Required Teaching Skills Questionnaire" (TRTSQ). The TRTSQ consists of 10-item and was used to obtain information on variables on teacher's skills in the teaching of mathematics contents. The instrument was validated by experts from the Department of Educational Foundations and Counselling, Obafemi Awolowo University, Ile-Ife. The reliability coefficient of 0.82 was obtained for the instrument using Cronbach alpha. Considering this measure, the instrument was found good enough for the study. Data collected were analysed using mean score and standard deviation to answer the research question while Pearson-correlation was used to test the hypothesis at 0.05 level of significance. Mean score of 3.00 and above was accepted as high level of ability of usage of mathematics teaching skills, while the mean score below 3.00 was accepted as low level of ability of usage of mathematics teaching skills.

RESULTS AND DISCUSSION

The results of data analysis were presented in Tables.

Research Question

1. To what extent do secondary school Mathematics teachers use teaching skills in teaching Mathematics contents to improve students' achievement?

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume XI Issue VI June 2026

In answering the question, mean score was employed and the results were presented using Table.

Table 1: Mathematics teachers' use of teaching skills in teaching Mathematics contents

S/N	ITEM	VHL	HL	ML	LL	VLL	N	X
1.	Ability to employ numeracy skill in teaching mathematics.	210	84	15	1132	466	1100	1.73
2.	Ability to employ computation skills in teaching mathematics concept.	297	78	12	1512	241	1100	1.95
3.	Ability to use basic mathematical operations to teach numeration and algebraic process.	550	200	15	1052	409	1100	2.02
4.	Inability to employ thinking skill to teach pupils simple algebraic problems and mental work.	225	208	6	866	478	1100	1.62
5.	Inability to employ good communicative skill (language skill) to teach mathematical concepts.	510	140	9	1198	359	1100	2.01
6.	Inability to engage students in problems solving skill.	210	180	3	1226	399	1100	1.83
7.	Inability to teach mathematical concept using teaching skills like discussion, questioning, feedback etc.	555	148	6	942	479	1100	1.94
8.	Ability to employ skills in models to teach mathematics.	200	80	10	1150	467	1100	1.73
9.	Ability to engage students in discovery skills.	198	78	5	1149	477	1100	1.73
10.	Ability to engage pupils in skills involved in games for teaching mathematics.	180	70	5	1170	482	1100	1.74

Note:

VHL - means very high level

HL - means very high level

ML - means very moderate level

LL - means low level

VLL - means very low level

Table 1 shows that of all the items in the questionnaire addressing the issue of teachers' level of use of skills in teaching mathematics, none measured up to average for acceptance. Their mean scores were found to be below average, indicating low level of teachers' usage of the required teaching skills in secondary schools.

Hypothesis Testing

Ho_1: There is no significant relationship between the extent of use of skills by secondary school teachers (experienced and non-experienced) and students' achievement in mathematics.

To test the hypothesis, Pearson-moment correlation was used.

Table 2: Relationship between two categories of teachers on the use of teaching skills in teaching mathematics and students' achievement.

Groups	No	(x)	(sd)	df	r-cal	r-crit	p
Experienced teachers	900	1.53	0.36				
Non- Experienced teachers	200	2.00	1098	1.29	3.85	0.92	0.47

* $P > 0.05$

Information in Table 2 indicated that both the experienced secondary school teachers and non-experienced teachers did not measure up to average in their mean scores. The first group is 1.53 while the second group is 2.00, with standard deviation 0.36 and 0.92 respectively. The r-cal for group mean interaction is 1.29 while the r-crit value is 3.85. The r-cal is less than the r-crit value. Therefore, the null hypothesis that predicted no significant difference was hereby accepted.

DISCUSSION AND IMPLICATION OF THE STUDY

The results of findings in Tables 1 and 2 generally indicated that secondary school teachers measured very low level in the use of required teaching skills to teach mathematics contents. Findings showed that most of them are not conversant with mathematical skills. It was also found that, some did not study mathematics as a course in higher institutions, so those skills are strange to them. The findings corroborate the finding of Darling-Hammond (2009) that, students performed poorly in the hands of lowly prepared teachers that are not qualified, and that most certified teachers are not qualified in the use of teaching skills. Even the experienced ones did not indicate adequate use of skills in teaching mathematics.

Based on the findings, it could be implied that teaching mathematics without involving the required skills for a particular concept is just encouraging rote learning, which is inadequate, learning without retention, and non-meaningful learning. This, on the other hand, shows that, in most secondary schools, the teachers are not competent to teach mathematics. A teacher who is not able to use intellectual and required communicative skills for effective delivery, will find it very difficult to inculcate mathematical knowledge on pupils. This will make the learners to have the impression that mathematics is a difficult and abstract subject. This will in turn lead to continuous poor performance of students in mathematics. There is need to improve secondary school teachers' competency by continually re-training them on the use of these required teaching skills identified by the researcher.

CONCLUSION AND RECOMMENDATIONS

The study concluded that secondary school education is an important stage of educational development in Nigeria and despite the importance of mathematics education to national development, the study of the subject in our schools in Nigeria is bedevilled with poor performance. Many factors such as poor teaching method, lack of pupils'/students' interest, lack of fund, inadequate qualified teachers, incompetency among teachers, lack of instructional materials and many others have been attributed to such alarming situation. Then, this study investigated the teachers' level of use of skills in teaching mathematics contents in secondary schools. From the findings, it was concluded that secondary school teachers do not employ required skills in teaching mathematics. Probably, this has been contributing to the trend of poor performance of students in mathematics in both internal and external examinations.

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume XI Issue VI June 2026

Subsequent to issues noted in this study, the following recommendations are provided in the study; Government should continue to re-train secondary school teachers in their capacity building workshops, especially in mathematics and sciences. Mathematics workshop modules for practicing teachers should be prepared in such a way that all mathematics teaching skills are included and finally, government should ensure that, only professionally trained teachers are recruited into the teaching profession especially at the secondary school levels, where there is need for strong foundation in mathematics.

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