



technology, engineering and industry. He further pointed out that every field of science and technology has substantial mathematical content through different degrees.

Ezurike (2018) affirmed that there can be no real technological development without a corresponding development and attitudinal change in teaching and learning of mathematics at various level of education in any nation. And for sustainable growth and development, ways of teaching and learning mathematics at primary school level needs to be enhanced.

Ezurike, (2008) observed that mathematics is a science subject in which pupils usually perform poorly in the First School Leaving Certificate Examinations and Senior Schools Certificate Examinations.

The wrong notion of some people about the abstractness of mathematics or the perception that mathematic is a difficult subject must be corrected.

This erroneous belief will not have its effect, if the effective ways of teaching and learning of the rudiments of mathematics in the primary schools are enhanced and continually improved upon.

The emphasis in the primary education by eminent scholars and Federal Republic of Nigeria, and the importance attached to it as the bedrock of our educational pyramid cannot be over emphasized.

Children are curious about nature and everything affecting them in life almost all time and on almost everything they encountered both in the classroom and outside. There is need to develop children's curiosity by making the teaching of primary mathematics pupil - centered or activity - oriented.

However, mathematics teaching in Nigerian primary and post primary schools has often been taken the Traditional approach. Several authors observed that the dominating approach to intuition has been expository which is often teacher-centered. Odili (1990) also reveals that the major problem that militates against pupils' understanding of mathematics and mathematical concept is the teaching approach adopted by most teachers. The Federal Republic of Nigeria advocates teaching method that is activity-oriented, exploratory and experimental.(FRN, 2004). If the citizens of this country will compete favorably with their counterparts in other parts of the world in this age of science, technology and mathematics, the teaching and learning of mathematics at the primary school level should be repositioned. Since primary education is the foundation upon which other levels in education are built, it becomes necessary that solid foundation in mathematics be laid by teaching effectively using activity-oriented methods which are pupil-centered.

However, the teaching of primary mathematics in the classroom today does not reflect pupil-centered approach. What predominates 'in our primary and post primary mathematics classrooms is the teacher-centered or traditional approach (Leghara, 2008). Nigerian public primary schools have 'no specialist course for each teacher or subject but they are meant to teach' all subjects for the class allocated to them. With this unhealthy situation in our primary Schools, primary mathematics teachers need to be specialist in mathematics to communicate mathematics effectively by making use of various instructional - strategies to enhance children's active participation in mathematics which will improve their understanding and retention of the mathematical concepts. With the improvement in their understanding and retention of mathematical concepts, one of the basis for millennium development goals; All boys and girls should complete a full course of primary schooling, will be realized. In other to achieve an effective ways of teaching and learning of the rudiments of mathematics in primary schools, as a matter of urgency, the implementation of national policy on education must be reviewed to enhance these methods.

### **1.1 STATEMENT OF PROBLEM**

Mathematics teaching in our primary schools is not encouraging. A lot has been written about under-achievement in mathematics education. The performance of pupils in mathematics and in fact in all subjects does not depend only on pupils' ability but also on other factors like availability of qualified teachers, teaching methods employed by teachers and methods of testing and evaluation (Odili, 1990). When the teacher is ill-equipped and does not use suitable teaching methods and strategies which are learner- centered, his teaching will be ineffective and this results in poor performance. Most students in post-primary schools disappear from classroom as soon as it is time for mathematics (Moore, 1993). This fear was carried over from primary schools stage where unqualified mathematics teachers used traditional method for instruction instead of activity-based methods, which are learner-centered. If the effective ways/ strategies which is activity-based methods are used, pupils will participate actively and the problem of poor achievement in mathematics in the school will be reduced. Therefore, there is need to investigate the strategies and effective ways that will enhance or improve the teaching and learning of the fundamentals of mathematics in primary schools.

### **1.2 PURPOSE OF STUDY**

The purpose of the study is to find;

- I. Ways of enhancing the effective teaching and learning of the fundamentals of mathematics in primary schools especially in Etsako West Local government Area of Edo State, Nigeria.
2. The extent to which primary school mathematics teachers make use of these effective methods and strategies during teaching in the classroom.
3. Factors that hinder the effective use of these methods or strategies in teaching and learning of the fundamentals of mathematics in primary schools.

### **1.3 RESEARCH QUESTIONS**

The following research questions guided the study:

1. What are the various effective ways/ strategies that will enhance the teaching and learning of the fundamentals of mathematics in primary schools?
2. To what extent do primary school mathematics teachers make use of these ways/ strategies effectively during teaching?
3. What factors hinder the effective ways of teaching and learning of the fundamentals of mathematics in primary schools?

### **1.4 HYPOTHESIS**

Location is not a significant ( $P < 0.05$ ) factor in determining the extent to which effective ways/ strategies of teaching and learning of the fundamentals of mathematics are implemented by primary school teachers.

### **1.5 SIGNIFICANCE OF STUDY**

Fundamentals of mathematics are thought in primary schools because it provides opportunities for developing important intellectual skills in children of primary school age especially in problem solving, deductive and inductive reasoning, creative thinking and communication (Ezurike, 2018)...But also learning mathematics, children tend to have more opportunities to look out for patterns.

However, teaching and learning of the fundamentals of mathematics in primary schools can therefore only be effective if there are proper ways/ strategies put in place for learning to occur. Pupils often describe mathematics as a difficult subject due to many factors such as perceived fear of the Fundamental principles and theories and wrong methods of teaching of mathematics. It is expected that this research work will bring out effective ways to enhance the teaching and learning the fundamentals of mathematics will address and proffer solution to the perceived fear of mathematics as a subject at the primary schools levels and other levels of school system in Nigeria.

Also, the findings from the research work will be of immense benefit to field of Education Training of Primary School teachers via The National Teachers Institute, Nigeria.

## **2 PRELIMINARIES OF MATHEMATICS**

### **2.1 Fundamental notions of mathematics**

Mathematics is the abstract study of topics encompassing quantity, structure, space, change and other properties; the study of mathematics as a subject on its own right begins in the 6<sup>th</sup> century BC with Pythagoras who coined the term ‘mathematics’ from the ancient Greek (Mathema) meaning “subject of instruction”. Mathematics and its application occupy very important position in this scientific age (Okeke and Anakpua, 2010). Mathematics as school subject is at the base of all scientific and environmental processions and there is hardly any field where mathematics is not useful (Ezurike, 2008). As observed by Ukeje (2006), mathematics is the core of any meaningful scientific and technological advancement which is the master key to the realization of the national potentials and development of capabilities and indeed national growth and development.

Mathematics reveals hidden patterns that help us understand the world around us. Now much more arithmetic and geometry, mathematics today is a diverse discipline that deals with data, measurement and observation from science; with inference, deduction and proof and with mathematical models of natural phenomena of human behavior and of social system. As a practical matter, mathematics is a science of pattern and order. Its domain is not molecules or cells , but numbers, chance, form, algorithms, and change. As a science of abstract objects, mathematics relies on logic rather than observation, as its standard of truth, yet employs observation, simulation and even experimentation as means of discovering truth.(Ezurike, 2018)

### **2.2 The Relevance of Mathematics at Primary Schools towards National Development**

Mathematics plays a very important role in the day to day activities. It quickens human awareness and trains the mind, the habit of accurate reasoning.

Mathematics is one of the core subjects recommended in the national policy on education at both the primary and secondary schools. These suggest the importance attached to mathematics whose knowledge is required by every member of the society in view of its usefulness in day to day activities business transactions, science and technology Ezurike, (2008).

Mathematics is therefore an important subject in the nation’s aspiration for scientific and technological development. The relevance of mathematics cannot be overemphasized and the usefulness can be observed in areas like application of numbers for measurement such as lengths, volumes, weights, density, temperature and speed and acceleration (Odili, 1990).

Mathematics is used throughout the whole world as an essential tool in many fields; including natural science, engineering, medicine, the social sciences, business and applied mathematics which of mathematics applying mathematical knowledge to other fields inspires and makes use of new mathematical discoveries which has led to the development of entirely new mathematical disciplines such as statistics.

### **2.3 Concept of effective ways to teaching and learning of the fundamentals of mathematics**

Mathematics as a core subject in primary schools as recommended by the National Policy of Education, is therefore an important subject which need a serious attention and planned strategies to achieve effective teaching and learning for pupils in primary schools, However, to achieve this effectiveness of teaching and learning of the fundamentals of mathematics in primary school, we present in this research work two kinds of strategies to enhance the effective teaching and learning of the fundamentals of mathematics at primary school levels namely;

- 1) Seven effective strategies for the teaching and learning of mathematics in primary schools.
- 2) Three pronged effective ways/strategies to improve teaching and learning of the fundamentals of mathematics in primary schools.

#### **Seven Effective Ways/Strategies for The Teaching And Learning Of Mathematics In Primary Schools (Mathseeds .com, 2018).**

- 1, Make it hands on – tools (manipulative hands –on tools; wooden blocks)
- 2, Use visuals and images
- 3, Find opportunities to differentiate learning
- 4, Asks pupils to explain their ideas (critical reasoning)
- 5, Incorporate story-telling to make connections to real world –scenarios...
- 6, Show and tell new concepts
- 7, Let your pupils regularly know how they are doing (activity base assessment).

#### **Three Pronged Ways/Strategies To Improve Teaching And Learning Of The fundamentals of Mathematics In Primary Schools.**

1. Creating a school specific framework for teaching and learning called the 12 pillars of learning.
2. Coaching – peer to peer leadership team to teaching staff, teacher to support staff.
3. Links to other schools group teachers the chance to see and share practice other than their own.

### **2.4 BENEFITS OF THE EFFECTIVE WAYS/STRATEGIES**

The effective ways/ strategies can be the major ways to enhance the proper teaching and learning of the fundamentals of mathematics in primary schools which is the essence of the study. It will destroy the fear of mathematics being a difficult subject as perceived by the pupils and open a mindset of new discoveries in the fundamental principles of mathematics as a powerful tool for development of young minds for creativity and intelligence.

An aspect of mathematics that enhances intellectual development is logic and in homes, offices, markets places, and playgrounds, people get involve in one argument or the other, this strategies enhances the teaching and learning of logic in mathematics which encourages the ability to reason logically is one of the essential marks of the educated (Ezurike, 2018).

These effective ways/strategies also makes teaching and learning interactive which builds bond between the teacher and the pupils, aiding the teacher to know and be acquainted with the ability of the individual pupils in a mathematics class regarding their development and assessment of psychomotor, cognitive, and affective domains.

In addition, the pupils will develop interest and there will be improved performance in mathematics examinations in primary schools paving way to a better understanding and achievement in post primary school level.

### **3. RESEARCH METHODOLOGY**

This section deals with the method and procedure used in carrying out the research. It is all about the case study area, the design of the study, development of research instrument, sampling procedure, data collection and the method of statistical analysis. The data collected would be discussed below.

#### **3.1 AREA OF STUDY:**

This study was carried out in Etsako West Local Government Area of Edo State.

#### **3.2 POPULATION OF THE STUDY:**

Population of the study consisted of all the one hundred and twenty (120) primary schools teachers in fifteen (15) primary schools within Etsako West Local Government Area of Edo State. Teachers were randomly selected from the randomly selected schools also.

#### **3.3 SAMPLE AND SAMPLING TECHNIQUES**

The sample of this study consisted of one hundred and twenty (120) primary schools teachers, drawn from fifteen (15) primary schools.

This was randomly selected from one hundred and thirty two (132) primary school teachers out of 27 public primary schools in Etsako west Local Government Area.

#### **3.4 THE INSTRUMENT FOR DATA COLLECTION.**

The instrument used for this study was a structured - questionnaire. It is divided into three sections. Section A contains ten (10) structured items directed towards identifying the various effective ways of enhancing children's active participation and learning of the fundamentals of primary mathematics. Section B contains eight (8) items, on the extent to which teachers make use of these ways/strategies and section C contains seven (7) items on factors that hinder the use of these effective ways/strategies. A total of twenty five (25) items, were structured on a four-point scale of strongly Agree (SA), Agree (A), Disagree (D) and Strongly-Disagree (SD).

#### **3.5 METHOD OF DATA COLLECTION**

A total of one hundred and twenty two (122) copies of questionnaire were personally distributed and administered to the respondents. The respondents were the one hundred and twenty two teachers randomly selected from the primary schools in Etsako West local Government Area of Edo State. They were also teachers handling primary one(1) to primary six(6) classes that have spent more than five years in the teaching profession. After filling, one hundred and twenty two copies were collected but two were wrongly filled and discarded.

#### **3.6 METHOD OF DATA ANALYSIS**

The research questions were analyzed using mean and standard deviation response ratings. A mean rating of 3.00 was used as a cut-off point. This was obtained by finding the mean of the values assigned to options whose upper limit of the point is  $2.50 + 0.5 = 3.00$ . Any item with a

mean of 3.00 or above was accepted while those less than 3.00 were rejected. The hypothesis was tested using the mean and standard deviation results on the under listed factors.

### 3.7 RESULT:

The results are presented and discussed according to the research questions and hypothesis that guided the study.

#### 3.7.1 Research Question One:

What are the effective ways/ strategies that will improve teaching and learning of the fundamentals of mathematics in primary schools?

**Table1: Mean and standard deviation Responses on the effective ways/strategies that enhance children's achievement in primary mathematics.**

N = 120

S/N	ITEM	$\bar{X}$	SD	REMARK
1	I always allow revision of previous lesson before starting a new one	3.38	1.84	Accepted
2	I always equip pupils with skills of independent learning under my close guidance	3.18	1.78	Accepted
3	I always vary the teaching-learning process by involving pupils to teach under close guidance.	3.16	1.78	Accepted
4	I allow pupils to participate actively (using activity-base methods) teaching learning process so as to make meaning out of a new experience.	3.28	1.81	Accepted
5	I always place pupils in a problem situation with suitable materials to solve the problem	3.06	1.75	Accepted

6	I use the child's school and home as the laboratory for instruction	3.22	1.79	Accepted
7	I use posters in the classroom to portray mathematics and mathematics related careers and discuss career opportunities with children	3.24	1.80	Accepted
8	I permit children to bring life experiences into the mathematics learning environment	3.07	1.75	Accepted
9	I involve children in concrete activities using real objects, diagrams, pictures and other teaching aids	3.54	1.88	Accepted
10	I use games, simulation, demonstration, inquiry and guided discovery methods in primary mathematics Teaching	3.01	1.73	Accepted
	Grand Mean $\bar{X}/SD$	3.21	1.79	

Table 1 shows the effective ways/ strategies that enhance children's active participation and achievement in primary mathematics. All the ten (10) items have mean mark above 3.00. It has the grand mean rating of 3.21 and standard deviation of 1.79. This indicates that the ten (10) items were accepted as the effective ways/strategies that enhance children active participation and achievement in learning the fundamentals of mathematics in primary mathematics.

### 3.7.2 Research Question Two:

To what extent do primary mathematics teachers make use of the effective ways/strategies during teaching?

**Table 2: Mean and standard deviation response of the respondents on the extent of use of these effective ways/ strategies by primary school mathematics teachers.**

N=120

S/N	ITEM		SD	REMARK
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		X		
11	Ability to involve pupils in the gathering of instructional materials or teaching aids such as real objects, diagrams, pictures etc and making use of them.	3.72	1.93	Accepted
12	Ability to use demonstration, inquiry and guided discovery methods in mathematics teaching	2.15	1.47	Rejected
13	Ability to organize quiz competition and debate in Mathematics	2.03	1.42	Rejected
14	Ability to ask children questions that will make them curious, think critically and objectively	2.24	1.50	Rejected
15	Ability to use games, and simulation methods in teaching mathematics	1.27	1.13	Rejected
16	Ability to use posters in the classroom to portray mathematics and mathematics related career opportunities with children	2.35	1.53	Rejected
17	Ability to place pupils in a problem situation with suitable learning materials	2.11	1.45	Rejected
18	Ability to vary the teaching-learning situation by involving the children to teach under my close Guidance	3.18	1.78	Accepted

	<b>Grand Mean/Standard Deviation</b>	<b>2.38</b>	<b>1.54</b>	

Table 2

Table 2 shows the extent to which primary mathematics teachers use the various effective ways/ strategies that enhance children's active participation and achievement during teaching of the fundamentals of mathematics. Grand mean ( $\bar{x}$ ) = 2.38 and standard deviation of 1.54 shows that primary mathematics teachers are yet to implement all the effective ways required to teach the fundamentals of mathematics in primary schools.

**3.7.3 Research Question 3:** What factors affect the proper use of these effective ways/strategies in the teaching and learning of the fundamentals of primary mathematics?

**Table 3:** Mean and standard deviation responses on the factors that hinder the proper implementation of these effective ways/ strategies in teaching and learning of the fundamentals of mathematics.

N= 120

S/N	ITEM	X	SD	REMARK
19	There is insufficient number of qualified primary school mathematics teachers	3.48	1.87	Accepted
20	Primary school teachers carry heavy work load with also a problem of large class (one teacher to teach all subjects in a class)	3.56	1.89	Accepted
21	There is poor funding and lack of equipment in most of the public schools	3.48	1.87	Accepted
22	There is poor working conditions and lack of incentives for primary school teachers.	3.57	1.89	Accepted

23	Most primary school teachers lack the skills and competences for using the various effective ways.	1.71	1.31	Rejected
24	Primary school teachers are not always allowed to attend in-service courses, seminars, conferences and workshops to update their knowledge.	3.27	1.81	Accepted
25	Most primary school teachers are not familiar with these effective ways/strategies	1.67	1.29	Rejected
<b>Grand Mean/Standard Deviation</b>		2.96	1.71	

Table 3 illustrates that factors which in the opinion of respondents are obstacles that affect the effective use of these strategies in primary mathematics teaching and learning. The table shows that items 19 (insufficient number of qualified primary mathematics teachers), 20, (primary school teachers carry heavy workloads and problem of large class), 21, (poor funding and lack of facilities and equipment), 22, (poor working conditions and lack of incentives for primary school teachers), 24, (primary schools teachers not always allowed to attend in-service courses) etc where the major problems. Their mean scores are 3.00 and above, while other items, 23 (most primary school teachers lack the skill and competence for using the various effective ways/ strategies) and 25, (most primary school teachers are not familiar with these effective ways/strategies) were identified as major problems. Their mean response score are below 3.00. However, the grand mean score ( $\bar{x}$ ) of 2.96 and standard deviation of 1.71 indicate that factors listed in table 3 above effect the proper implementation of these effective ways/ strategies.

### 3.8 HYPOTHESIS TEST:

Location is not a significant ( $P < 0.05$ ) factor in determining the extent to which effective ways/ strategies of teaching and learning of the fundamentals of mathematics are implemented by primary school teachers.

#### Table 4:

Mean standard deviation and t-test Responses on the extent to which location as a factor affects the effective ways / strategies of teaching and learning of the fundamentals of mathematics are implemented by primary school teachers.

Hypothesis	N	X	SD	Df	t-cal	t-crit	Decision
Urban	50	3.12	1.77				
Rural	70	3.26	1.81				
				118	1.34	1.96	H <sub>0</sub> Accepted

The table shows that the calculated t-value is 1.34 against t-critical value 1.96. Since the calculated t-value is less than t-crit, we accept the null hypothesis. That is, location is not a significant factor in determining the extent to which effective ways/strategies were implemented when teaching mathematics by primary school teachers.

### 3.9 RESEARCH FINDINGS

Based on the results of the study, the following findings were made:

1. The study shows that all the ten (10) effective ways/ strategies identified improved pupils' learning and achievement in primary mathematics.
2. Most primary school mathematics teachers do not implement these various effective ways/ strategies that improve pupils' learning and mathematics achievement in their lesson plans. FME (1981) revised (2004) emphasized the use of activity- oriented strategies which enhance children's achievement. They include: inability to allow pupils to gain knowledge by associating careful observation with new forms, ability to use games, simulation, inquiry and guided-discovery methods (child-centered method), organization of quiz competition and debate in mathematics, use of posters in the classroom to portray mathematics and mathematics related career opportunities to the children, and ability to bring life experience into the mathematics learning environment.
3. Notable problems affecting full implementation of these various effective ways/ strategies include; insufficient number of qualified primary school mathematics teachers, heavy work load, large class, poor funding and lack of facilities/equipment, poor working condition and lack of incentives and not giving opportunity to attend in-service courses, seminars, conferences and workshops to update their -knowledge.

### 3.10 DISCUSSION OF THE FINDINGS OF THE STUDY

The findings shows that all the ten (10) effective ways/ strategies identified improve pupils' learning and achievement in primary mathematics. This findings is in line with Ezurike (2018) that there is need to develop children's curiosity by making the teaching of primary mathematics

as a pupil - centered or activity - based and Attamah (2004) that science and mathematics teachers in primary schools should ensure that pupils be involved in a lot of activities as they learn science and mathematics.

From table 2; out of 8 items, only 2 items were accepted. This shows that primary school teachers do not make use of most of the effective ways/ strategies identified in this study. The teachers accepted that they can improvise instructional materials, pupils are involved in the gathering of instructional material such as real objects, and diagrams etc and make use of them, vary their teaching-learning situation by involving children to teach under their close guidance and are able to take into account children with learning difficulties while teaching. There is need to stress the child-centered teaching approaches whereby the teacher acts as the facilitator and coach while the pupils as the actors or doers. This agrees with Ezekannagha (1999) that children learn more when they are involved in concrete activities or using, real objects, pictures or aids.

Insufficient number of qualified mathematics teachers, heavy workload, lack of skills or competencies required for using the identified effective ways/ strategies, overcrowded classroom, lack of equipment/facilities and lack of incentives are the factors accepted by the primary mathematics teachers that hinder them for effective use of the identified effective ways/ strategies that will enhance children's active participation in mathematics lesson. This is in line with Emovon (1985) who stressed that adequate man power, adequate equipment, basic infrastructure, and adequate incentive aid in effective teaching and learning of science and mathematics in primary and post primary schools.

#### **4. CONCLUSION**

Teaching and learning of mathematics is not only concerned with the computational know-how of the subject but it also concerns the fundamental principles which require a demonstration inquiry and guided discovery methods of teaching the subject. Effective teaching methods, strategies, and pedagogical resources must be employed to enhance the teaching and learning of the fundamentals of mathematics in the primary schools.

Teaching and learning of the rudiments of mathematics is the core activity for the foundation knowledge of all sciences.

In order to achieve the purpose of the study which is to enhance the effective teaching and learning of the fundamentals of mathematics in the primary schools, Government should employ qualified and competent mathematics teachers, give in-service training, workshops, improve working conditions, decongest over-crowded classroom, fund primary education, monitor and supervise all schools and restore automatic scholarships and allowances

#### 4.1 RECOMMENDATIONS

Based on the findings, the following recommendations are made:

1. Nigeria Certificate in Education (NCE) in mathematics should made a basic qualification of primary mathematics teachers and be followed strictly.
2. The Federal and State Ministries of Education should employ qualified mathematics teachers to teach in the government primary schools and also ensure compliance in private own primary schools.
3. Government/school authorities should establish in-service mathematics training workshops to update the knowledge of primary school mathematics teachers.
4. Working condition of primary school teachers in general should be improved.
5. Over-crowded classroom should be decongested and discouraged.
6. The school heads should check the use of concrete objects from the learner's environment in teaching mathematics by primary school mathematics teachers and make use it so that pupils will show kin interest and eventually get involved in a lot of activities.
7. Government should fund primary school education heavily by providing pupils with learning materials and specialized teaching aids, especially now Universal Basic Education (UBE) is implemented in primary and junior secondary levels of education in Nigeria.
8. Parents should as a matter of serious effort, support and encourage their children to have interest in mathematics; science and technology as they are the bedrock of any nation.
9. Mathematics should be made compulsory for a teacher to offer during his college training and every subject he/she hopes to teach as well. Teachers should not be compelled to teach all subjects in primary schools for a better result. Government should allow every teacher to teach his/her subject of specialization in primary schools. This helps teaching effectiveness and high achievement to the core especially in mathematics as a subject and other science subject.
10. There should be close monitoring and supervision of all schools at very frequent intervals for a thorough adherence to the use of effective ways/ strategies as regards the teaching of the fundamentals of mathematics and other subjects which is an absolute necessity.
11. The dearth of mathematics should be revived by restoring the automatic scholarships, bursary allowances and incentives. This will enables students to study mathematics science.

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