ASSESSMENT OF EFFECTIVENESS OF QUALITATIVE-DESCRIPTIVE AND QUANTITATIVE EVALUATION METHODS ON MATHEMATICS ACHIEVEMENT IN PRIMARY SCHOOLS IN BENUE-STATE

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Abstract

The study assessed the effectiveness of qualitative-descriptive evaluation method and quantitative evaluation methods on Mathematics achievements of Primary Schools Pupils in Benue State. The Study adopted a Quasi-experimental research design, precisely; Non-randomized Control Group Pretest-posttest Design. The sample size of 201 primary five pupils out of the population of 5463 was used. Three research questions and one research hypothesis guided the study in which non randomized control group, pretest – posted research design was used. 5463 pupils of primary five formed the population while 201 pupils were sampled using intact class. Mathematics Achievement Test which consisted of number and numeration (MATNN) was the instrument used for collecting data. Data analysis was carried out using mean, standard deviation and ANCOVA statistics tool. The findings revealed that; there was significant difference in mean achievement scores ofpupils when qualitative-descriptive and quantitative evaluation methods were used for evaluation of the achievement with qualitative descriptive having higher mean score. The study concluded that; numerical evaluation does not reveal the pupils weakness and what they need to know for future performance and this hampers the pupils interest to perform better for learning unlike qualitative evaluation that give clear access to what is expected of the pupils. Since good words are sweet to hearing and this increase and improve Pupils interest to learning. Teachers are therefore encouraged to adopt this method of evaluation.

Keywords: Qualitative Descriptive Evaluation, Quantitative Evaluation, Achievement.

Introduction

Mathematics is a way of thinking and organizing logical proof. It can be used to determine whether an idea is true or not. As well, it gives insight into the power of human mind. Mathematics is fundamental to all sciences such as Physics, Chemistry and Biology among others. It is the science of quantity and space that deals with the

calculation and numerical aspect of human life and knowledge. According to Anyor and Mbalaha (2010), Mathematics is used in everyday life, be it social, economic, arts, science or technology. Mathematics as a school subject affects all aspects of human life at different degrees. It is also an international language that is essential in almost every field. Mathematics has different dimension and in the context of this study, one such dimension is number and numeration and this is the focus of this study.

Ali (2019) defines numeration as an act or instance of or the process or result of numbering or counting. Its content includes whole numbers, fractions, percentages and ratio. Mathematics plays' fundamental role in scientific and technological progress for any nation. As such, it is taught at all levels of education (Nwafor, 2012). According to Abdullahi (2013), greater demand for scientific and Technological knowledge in the Nigerian development programme has brought about the securing of excellent Mathematical knowledge at all levels of learning. Thus, increasing knowledge in Mathematics of the future Engineers, Physicists, Chemists, Sociologists, Industrial and Medical personnel, as well as other Sciences cannot be over emphasised.

Despite the importance of the Subject-Mathematics, it is the same subject that learners tend to respond to with fear among other subjects offered in schools; espoused by Akinoso (2011) Pupils tend to respond to it with less self-confidence and negative. This leads to pupils' poor achievement in the subject and in the higher level later. Thus, Mathematics test for Junior Secondary School has to do with mastering the Primary School level Mathematics.

Achievement in the context of this work refers to ones' relative accomplishment in Mathematics after instruction. According to Mcphee (2009) it is “knowledge obtained or skill that is developed in learners designed by test scores assigned by the teacher”. Chapman (2009) noted that pupils' academic achievement is mostly viewed with reference to pupils' involvement in educational activities. Consequently, the author defined academic achievement as the attainment of objectives, acquisition of skills and competencies. This accomplishment goes with the preparedness, teacher factors among others. However, this study focuses mainly on achievement. Several factors have been identified in literature as reasons that associates with poor achievement in Mathematics

An analysis of School Based Mathematics assessment carried out by the Junior Engineers and Technicians researchers (JETS) (2018) in Public Primary Schools in Makurdi showed that 65% of the pupils obtained scores below average, taking grades of D and below with 28% obtaining average scores taking grade of C, while a few number about 7% obtained grades B and above. Also, reports of the 2017 Federal Common Entrance into national Unity Schools showed that about 77,512 Nigerian pupils who registered and sat for the Common entrance examinations, less than 2.0% of the pupils obtained excellent grades, in all only 25.0% obtained the pass mark (Federal Ministry of Education, 2018). The Benue State Examination Certificate of Education (BECE)

reported that in year 2015, 2016, and 2017 the results showed that candidates that sat for the Mathematics in the BECE examinations, Pupils achievement at the credit level has not reached 50%. Also, Obayemi (2013) and Odum (2013) from their various studies found out that there was massive failure in the subject and achievement in Mathematics has been considerably low and unimpressive.

Ogunniyi (2009) asserted that one of the problems besetting achievement in Mathematics is poor quality of teaching. However, teaching without evaluation will create a gap in the educational process, and the teacher will not know the status of the pupils in relation to accomplishment of the content presented to them. Evaluation refers to a systematic process of collecting, analysing and interpreting data in order to determine if set goals are achieved, and to what extent they have been achieved. Emaikwu (2016) defined evaluation as systematic process of judging worth, desirability, effectiveness or adequacy of a thing according to definite criteria and purpose. According to the author it includes obtaining information either quantitatively or qualitatively for judging the worth of a programme. Adikwu, Aduloju and Agi (2016) defined evaluation as procedures that determine whether subject (that is the students) meets criteria set apriori such as qualifying for special education services. Thus element of how educational goals and expectations are achieved and giving feedback for improvement in the level of learning process is considered. It is such that, the results of evaluations should be applied in improving learning process and educational decision making. Hence without awareness of evaluation components such as understanding of educational goals and expectations and signs of the achievement of goals; it is practically impossible to collect and analyse data and judge the achievement of educational expectation and make decision for guidance of learning for the achievement of those goals (Hasani, 2009).

The feedback from teaching is obtained through proper evaluation which in turn improves quality of teaching and learning in varying subjects including Mathematics which revolves around Continuous Assessment Test and Final Examinations (traditionally reported in Quantitative form). If evaluation does not take place in a correct way, it will cause a lot of harm. Some consequences of this include loss of interest, increase in anxiety, negative behavior, increased rejection rate and repetition of grade, impaired emotional growth, loss in creativity, increase in unhealthy competition, creation of shame and frustration and neglect of individual differences (Ameh & Dantani, 2012). A well planned and delivered lesson may end up in a mess if assessment and evaluation were carried out the wrong way. Evaluation can be qualitatively or quantitatively done. It is qualitative when test scores are not involved or not basing its judgment on test score but when it involves test with solely scores it is quantitative.

Qualitative-descriptive evaluation pays attention to the comprehensive learning of Students; present Description of their learning status to modify, improve and develop knowledge, skills and attitudes of students. This type of evaluation is a plan in which one

of its features is announcing students' achievement or results in a descriptive manner. Based on this plan, the teacher seeks information using variety of tools and methods for decision making about improving students learning as well as optimising his teaching method (Hassani, 2009). In Qualitative-descriptive evaluation, if a student answers a question wrongly, the student is not merely given a negative score or low score, the wrong answer is also analysed. It uses descriptive feedback by applying a qualitative scale (very good, good, acceptable, requiring more effort) instead of quantitative scale or the grade points (0-20). Employing many instruments to obtain and organise needed information for judgment about the pupils academic achievement creates room for self-assessment and peer assessment. Research revealed that descriptive evaluation has effect on achievement to a large extent. Fakhrollah and Afsaneh (2012) revealed that there was a relationship between the pupils' mental health favoring those whose teachers' method of assessing is descriptive. Kobra and Alireza (2015) indicated that descriptive evaluation process is significantly effective on the teaching-learning, social education and mental health of Students. In another study carried out by Farnaz, Mohammad and Shahvarani (2015) it was revealed that teachers have a positive view towards descriptive evaluation. Kiyashmeshki in Ahmed and Taher (2012) outlined that descriptive evaluation reduces the pressure and stress in pupils caused by various examinations, removing the idea of superiority in terms of high or low score among the pupils, eliminating the sense of shyness among the pupils because of obtaining low scores, increasing teachers' understanding of other evaluation methods among others. This calls for the present study.

Quantitative evaluation on the other hand is an evaluation that reports pupil's results in figures, for instance 6/10, 3/5, 30% and 70%. The implication is that, when a student takes a test of ten items and he/she receives the score of 6/10 then it means he/she scored six (6) items correctly out of ten (10) and four (4) items wrongly. If he receives a mark of 30% then it implies thirty percent of the task presented to him/her was correctly completed and the rest of the task not correct or completed wrongly. When evaluation is in form of test scores it is quantitative. This form of evaluation is easy and faster to apply and also common among teachers. In Quantitative approach of evaluation, other factors are considered to be more important than the students in the process of learning and learner does not have active and effective role in the process (Seif, 2008).

The way an evaluation type ends up leaves the orientation to whether the evaluation is Quantitative or Qualitative-descriptive in nature. There exist types of evaluations as explained by several authors. These types of evaluation among others includes: Formative, Summative, Placement, and Diagnostic evaluation (Alonge, 2004). However, if any of these types of evaluation ends up in giving scores it is quantitative but when it does not reflect in scores but does so in words then it is qualitative-descriptive.

Pedagogical approaches have been undertaken over the years to trash out the menace of

low achievement in science subjects, Mathematics in particular. Almost every year, research based methods to improving achievement in Mathematics is carried out but the intensity of the outcry seems to remain constant. Most of such studies yielded results of improved achievement in favor of research based pedagogy. For instance, Bala and Musa (2009) in their study on effect of number base game on students' achievement revealed that children taught using number-based game develop interest in Mathematics and as such put up greater achievement in Mathematics. Obayemi (2013) and Odum (2013) in their various studies found out that there was massive failure in the subject and achievement in Mathematics has been consistently low and unimpressive. The cause of this could not be ascertained because there were a lot of works that have been carried out to unravel the cause of this problem and this is why the present study is focusing on assessment of qualitative-descriptive and quantitative evaluation methods to verify if there would be any improved academic achievement in mathematics in primary level of education. Specifically, the study;

i. determined the mean score of pupils' academic achievements in mathematics when qualitative-descriptive evaluation method is used;
ii. determined the mean score of pupils' academic achievements in mathematics when quantitative evaluation method is used; and
iii. compared the difference in scores of pupils when qualitative-descriptive and quantitative evaluation methods were used.

Research Questions

1. What is the mean score of pupils' academic achievements in mathematics when qualitative-descriptive evaluation method is used?
2. What is the mean score of pupils' academic achievements in mathematics when quantitative evaluation method is used?
3. What's the difference in the mean academic achievement scores of pupils when qualitative-descriptive and quantitative evaluation methods are used?

Hypothesis

There is no significant difference in the mean achievements of pupils in mathematics when qualitative-descriptive and quantitative evaluation methods are used.

Methodology

The study adopted a quasi-experimental research design; precisely, non-randomised Control Group Pretest-posttest Design. Quasi-experimental research design is a type of design that does not give room for random assignment of subjects to groups. Thus, it becomes necessary to use the groups as they already exist in the schools, hence intact Classes were used to avoid disruption of normal class lessons. The study was carried out in Benue State, precisely in Makurdi the capital City of the state, Benue is a middle belt States in Nigeria with a population of 4,253,641 (2006 Census). The population of the study comprises 5463 primary five pupils in the 68 Public Primary Schools in Makurdi. (Benue State Universal Basic Education Board, Makurdi 2017/2018 Annual School Summary). The sample size of 201 primary five pupils out of the population of 5463 was used. This sample was obtained as a result of the number of pupils found in the intact classes in the schools marked out for the study. To arrive at the sample, purposive sampling technique was used to select 4 schools from the 68 Public Primary Schools in Makurdi that met the criteria for selection. The instrument used for data collection was Mathematics Achievement Test on Number and Numeration (MATNN) developed by the researchers. The test measured pupils' achievement in Mathematics in number and numeration. This instrument had twenty (20) multiple choice items with four (4) options lettered A-D. These items were selected from the contents of Number and Numeration as specified. Each correct option on MATNN is given the score of 1 mark and the whole items summing up to 20 marks. The items in the instrument were constructed in accordance with Primary 5 Mathematics Module. A table of specification was employed with emphasis on a particular domain, the cognitive domain covering both higher and lower cognitive domains were adequately captured. This was made possible in line with the content chosen for the experiment. The MATNN was subjected to both face and content validation. The instruments were trial tested and the Cronbach Alpha which is suitable for both dichotomously scored and continuous items established the coefficient of 0.84. The data was collected with the assistance of the Pupils' teacher. The responses of the students were marked by the researcher with the help of research assistants.

The mean and standard deviation were used to answer the research questions while ANCOVA was employed to test the hypothesis at 5% significant level, Choice of mean was to know the corrective mean achievement score of each group to help answer the research questions. The standard deviation was used to know if there are deviations in the scores of the groups, while the ANCOVA tested if there were any significant differences in the means of the groups compared.

Results

Research Question One: What is the mean score of pupils' academic achievements in mathematics when qualitative-descriptive evaluation method is used?

Table 1: Mean and standard deviation of pupils' academic achievements in mathematics when qualitative-descriptive evaluation method is used

	N	Minimum Achievement score	Maximum Achievement score	Mean	Std. Deviation
Qualitative	103	10.00	20.00	17.1165	1.64079

Table 1 reveals that N = 103, minimum Achievement score = 10.00, maximum Achievement score = 20 marks, mean score = 17.1165 while the SD = 1.6407

Research Question Two: What is the mean score of pupils' academic achievements in mathematics when quantitative evaluation method is used?

Table 2: Mean and standard deviation of pupils' academic achievements in mathematics when quantitative evaluation method is used

	N	Minimum Achievement score	Maximum Achievement score	Mean	Std. Deviation
Quantitative	98	4.00	19.00	9.7245	2.99409

The results in Table 2 shows mean achievement score of 9.72 with standard deviation of 2.99, when quantitative evaluation method is used

Research Question Three: What's the difference in the mean academic achievement scores of pupils when qualitative-descriptive and quantitative evaluation methods are used?

Table 3 Difference in the Mean Academic Achievement scores of pupils when Qualitative-descriptive and Quantitative evaluation methods were used

	N	Mean	Std. Deviation
Qualitative-descriptive	103	17.1165	1.64079
Quantitative	98	9.7245	2.99409
Difference		**7.329**	

Table 3 revealed a difference of 7.329 in academic achievement scores of pupils. this is evident in that the mean value of the qualitative group is 17.1165 while that of the quantitative group is 9.7245.

Hypothesis One: There is no significant difference in the mean achievements of pupils in mathematics when qualitative-descriptive and quantitative evaluation methods are used.

Table 4: ANCOVA for Achievement Scores of Pupils in Mathematics when Qualitative-descriptive and Quantitative evaluation methods are used

Source	Type III sum of squares	df	Mean square	F	Sig.	Remark
Corrected Model	2747.67[a]	2	1373.84	238.45	.000	
Intercept	1345.84	1	1345.84	233.64	.000	
Pretest	3.62	1	3.62	.63	.429	
Groups	2722.04	1	2722.04	472.55	.000	Significant
Error	1140.55	198	5.76			
Total	40588.00	201				
Corrected Total	3888.22	200				

a. R Squared = .707 (Adjusted R Squared = .704)

Table 4 revealed a significant difference in the mean scores of pupils. since sig. value of .000is less than alpha at .05, thus the result is significant hence hypothesis is rejected. It therefore follows; there is a significant difference in mean achievement scores of pupils.

Discussion of Findings

The study revealed that the minimum scores in both methods were not the same. This is indicated on Table 1 that 10 marks was the minimum marks for the group evaluated using qualitative evaluation method while 4 marks when quantitative evaluation was used. The results in Table 1 is in agreement with Fakhrollah and Afsaneh (2012) who revealed a relationship between pupils' mental health favouring those assessed with a descriptive method. In line with the study of Kobra and Aliereza (2015) as well as, Farnaz, Mohammad and Shahvarani (2015), this study revealed a positive effectiveness of qualitative evaluation on achievement. This result may be due to the claim of Saeed (2015) whose study revealed that pupils suffered less anxiety when qualitative evaluation method was used compared to pupils that were evaluated using quantitative. Qualitative-descriptive evaluation uses words that encourages and give pupils hope that they can still do better and with this assurance the learning increases.

However, the result in Table 2 showed that the minimum mark was 4 compare to 10 in table 1. This result is in agreement with Akram (2015) who revealed that quantitative group has lower marks than qualitative group. This also affects the academic motivation. The result may be due the opinion of Havelka (2008) who stated that numerical evaluation does not give clear access to pupils to know what is expected of them in other to prepare very well for further learning this method weakens pupils and by so doing it may not encourage them to put in their best. The first two results in Tables 1 and 2 were buttressed with the result in 3 and 4.

Conclusion and Recommendation

Numerical evaluation does not reveal the pupils weakness and what they need to know for future performance, and this hampers the pupils interest to perform better for learning unlike qualitative evaluation that give clear access to what is expected of the pupils. It is therefore recommended that Teachers should imbibe this method of evaluation at least at the primary school level because pupils will discover the content as presented in the of the subject matter

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