INNOVATION IN THE ASSESSMENT OF PRIMARY SCHOOL MATHEMATICS: REMEDY TO COMMERCIALIZATION OF EDUCATION

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Abstract

The paper thrusts on remedying commercialization of education through Innovation in the Assessment of Primary School Mathematics. Assessment is a worthwhile decision making process in education as it relates principally to the overall performances of pupils in the three educational domains. The study was a quasi experiment involving two intact groups. The population was 60primary 5 pupils and the sample was 40 pupils, 20 for group A and 20 for group B. Group A was the innovative approach group, while group B was the traditional approach group. The items (10 in all) were validated by experts. The reliability of the instruments was done using K – R formula 21 and the index was 0.84. The two null hypotheses were rejected. The innovative approach group performed better than the traditional approach group. The researchers recommend that up to date, relevant and adequate instruments such as tests, assignments, projects, quizzes, practicals class works and home works should be used by teachers to ensure assessment effectiveness and records of assessments should be properly kept. Students should in turn ensure that they willingly lend themselves to assessment for national development.

Keywords: Innovation, Assessment, Commercialisation of Education.

Innovation deals with the introduction of new things, ideas or ways of doing things newly. Innovation as it relates to education seeks to bring into practice new strategies, approaches or methodologies which may not be conventional or conversant with most learners and teachers.

According to Obi (2015), the Mathematics teacher in his several effort to bring in innovation in his institutional procedures acquaints himself with new/original ideals emanating from thought – provoking inquiries geared towards mounting new strategies and concepts evolving into reorganized methodologies for proper mental functioning in the required/needed improvement.

The steps to the much expected innovations for problem solving and instructional delivery in primary school mathematics may be directed towards expression of facts and concepts that revolve around intuitive reasoning and mental articulation of such processes leading to suggested or already existing problems pertaining to the subject. The utilization of relevant tools or skills will lead to realization of expected behaviours in the teaching and learning of the subject. This will enable relevant stake holders in education to form a support base to assist both teachers and pupils acquire needed skills in the subject.

Commercialization of primary education as it affects mathematics implies making of profit in the subject especially in a way that may not receive approval by relevant stakeholders in education. Obi (2015) sees it as production of unstandardised instructional materials to make more profit, publication of content – deficient textbooks for faster and more sales resulting into poor quality teaching and understanding of the subject among others. Innovation in assessment in the subject will help to remedy these anomalies.

The motivation of pupils to learn involves actions exhibited by teachers and various educational stakeholders to stimulate the interest of the pupils to learn more effectively. Pupils at one time or the other are assessed based on such motional procedures delivered to them by their classroom teachers or National Examination bodies.

Pupils taking tests and examinations are being exposed to test climate" which is being currently used to describe the environment (both internal and external) within which the pupil takes a test. The internal environment includes the internal condition of his body: whether fed or starved, whether healthy or sick whether rested or tired, etc. The external environment includes the physical surroundings and facilities provided and state of the weather. Where the test climate is good, the pupil performs to the best of his ability; in agreement with desired objectives (Ogomaka, 2002). If this condition holds and none of the other factors so far described apply, then we should expect that in a second test the pupil will return the same or nearly the same marks as in the first. If however, the environment of the second test differs markedly from that of first, the chances are

that the mark obtained in the second will differ a great deal from that of the first. It is clear that taking an examination in the midday, tropical, humid heat, sitting on hard; narrow stools, near a busy main street or market will adversely affect the pupil and he will have lower marks than would otherwise have been the case. The same of adverse motivational conditions on the marker are therefore equally applicable to the pupil taking the examinations which affects objectivity of both pupils and teachers (Kpolovie, 2010).

Certainly, there are much loftier reasons for teaching pupils than the taking and passing examinations. The ideal situation is one in which a sufficient number of tests are given to encourage the pupils to study and pay attention, but not so many that they become excessively examination conscious. It is experienced and skillful teacher who knows when the right balance has been achieved. In practice, most teachers give too few rather than too many tests. Classes are so large that marking tests, in addition to all the other teaching duties, is a formidable task. The excessive examination consciousness is therefore, a result of the requirement of certificates for employment, rather than over - testing on the part of teachers. Children need an educational programme adapted to their abilities and interest (Ogwudire and Iro Egbu 1997).

It is crucial to make the important point that no two pupils in an examination hall are under the same test climate. They may be highly motivated because it is their favorite subject, they have had enough time for revision, they are in good health; or poorly motivated because it is a subject they dislike, they have had no time to revise, they have received bad news before examination, they have not had enough sleep, etc. the ideal test climate can only be achieved for a very small fraction of the pupils taking an examination. In public examination in African countries, the test climate is usually very poor. Generally there are too many candidates in the examination hall, ventilation is bad, invigilators are sometimes hostile arrogant and dictatorial (Nwana, 2007). Many candidates (pupils) arrive late for examinations because of transport problems and opportunities for study and revision before examination are usually very limited. Assessment should be school based and adequate guidelines for continuous assessment used to ensure maximum performance in the teaching - learning process (Iwuji: 1997). Thus, these assessments should be systematic, comprehensive, cumulative, guidance oriented and diagnostic (Nworgu, 1992). Teaching shall be by practical, exploratory and experimental methods (National Policy on Education 2014), geared towards national development.

People are usually assessed in Mathematics based on the various aspects such as arithmetic, algebra, etc. During assessment, they are required to perform some tasks based on stipulated rules or give feedback to already instructional deliveries previously provided by their teachers, for example they may be assessed in multiples of whole number for example, the multiples of a number are given by multiplying the

number starting from 1, (Adeniran 2007). Assessment in Mathematics should be done with set objectives (Ogbugh, 2004) and this calls for innovation.

Pupils could also be assessed in algebra using algebra puzzle. In algebra letters stand for numbers (Head Canon and Smith, 2007). The entitlement of children to education within their ability is provided for in the constitution, the laws of the land, the National Policy on Education, as well as the various international education accords to which the countries of Anglophone West Africa are signatories. There is however, a major risk involved in the use of tests for motivating pupils: If there are too many tests pupils (in their cognitive structure) begin to work solely in order to pass these tests (Ogoamaka, 2010). Many pupils when asked why they think they are in school promptly reply that they are there to pass examination. This unfortunately is a view shared by many teachers, especially those in charge of final year examination classes who teach with the prime purpose of giving their pupils better chance at public examinations. In most of Anglophone West Africa, the teachers and pupils are so examination conscious that some people have described the prevailing position as an "Examination System " rather than an "Educational System". This is an indication that we have adopted the extreme position of too testing. To solve this existing problem, continuous assessment was introduced which favors more instances for peoples assessment; the concept does not necessarily advocate education system dominated by tests and examinations. Assessment could be carried out through class work, homework, tests, projects etc. (Nwana, 2007).

The assessment of a pupil is the careful consideration of or judgment based on various aspects of educational performances. Various aspects of educational assessment have become topical from time to time and from place to place. Most recently, some attention are being given to a new type of assessment referred to as National assessment. The aim and use of National Assessment is to determine the level of achievement of countries in a variety of school subjects such as Mathematics. Whereas in the past, national performance of the pupils who take these examinations, the use of public examination for this purpose has been queried by Nwana (2007) on such grounds as:

(a) Public Examinations are taken not by pupils of that age but by those who opt for them.

(b) Public Examinations are beamed at differentiating between the most knowledgeable from the least knowledgeable in terms of their statistical characteristics.

(c) The syllabus/curriculum of public examinations may not reflect the Curriculum as taught in the classroom or locality. Nwana (2007).

These features of the Public Examinations and more have together made the case for monitoring learning achievement (at national level) outside the usual public examination results. Unique to National

Assessment is the fact that they collect such other data concurrently with the achievement tests which enable the determination of the relationship of performance.

Some educational system have so institutionalized that examinations have become their predominant activity. This is so much, so that some people have described the teaching - learning situation in Nigeria as more of an "examinational system" than that of an 'educational system". There is a lot of truth in the assertion aspects. For many pupils, their vocalized reason for going to school is to acquire not education, but to prepare and pass examinations and acquire a variety of certificates resulting from these examinations which will eventually guarantee jobs, wealth and well being of individuals on the whole (Nigerian Academy of Education 2009).

Innovation in the Assessment of Primary School Mathematics

Innovation in assessment calls for use of strategies by teachers which would throw away old ideas and develop new ways of looking at the same variables. This gives rise to flexibility of thought and novelty in concepts, Nwana (2007).

In order to carry out innovative strategies during instructional delivery in Primary school Mathematics, the teacher provides adequate and utility instructional base aimed at developing new ideas or ways in place of the already existing ones. Here, the teacher draws a sharp contrast from the usual and conventional approach, calling for originality of thought processes and then experiments on them. Inorder to have this done, manipulation of numbers for example may be carried out without the sequential arrangement and counting of digits, rather than that innovative reasonings such as raising such numbers to, powers of 10 and then factoring out numerical exponents using laws of indices are employed. This provides an easier and more understandable route to problem solving to the young learner of Mathematics than the clumsy old rote learning procedures/approaches of employing stress and dizziness in conventional counting method using unguided framework.

Having said this, the teacher is very much obliged to concretely help sensitize his pupils develop much accorded interest and strong desire which are determinate on the overall performance and behavioural change and of the young and nascent learner of Mathematics.

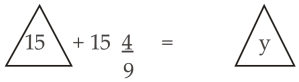
Simplify the following

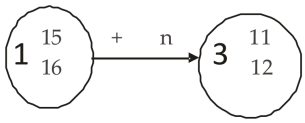
1. $\frac{5}{6}$ of $\left[1\frac{1\div 3}{2\ \ 4}\right] + 1\frac{2}{3}$

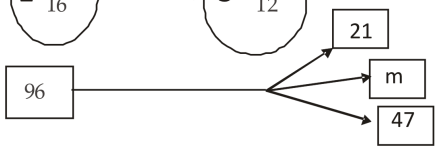
2. $\dfrac{7/8 \times 2/3 + 1/4}{2/5 \div 1/6}$

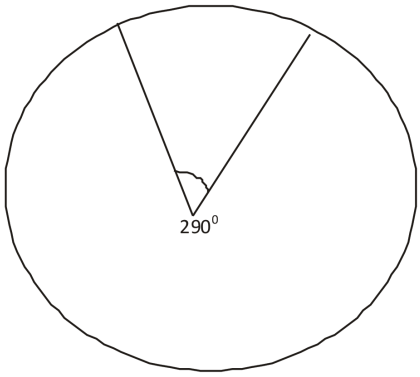
3. $\left[1\frac{5}{6} \div 2\frac{1}{3} + 1\right] - \left[2\frac{5}{3} \div 1\frac{1}{6}\right]$

4. $\boxed{X}$ of $5\frac{3}{16} = \boxed{\frac{7}{12}}$

5. 

6. 

7. 

1. Distribute 225 items among A, B and C in the ratio of 6:4:5 respectively.
2. The major sector of a circular object claims 300^0, what fraction is remaining
3. 

Find the percentage of the space occupied by θ in the above figure.

Statement of the Problem

Routine thinking and approaches have over the years been used by Mathematics teachers in problem solving. This has gone a long way to form boredom in pupils seeking to learn the subject of Mathematics.

Could the utility and utilization of innovation in problem solving and assessment in primary school Mathematics offer better articulation among pupils and teachers?

Scope of the Study

The areas of Mathematics in which 10 essay type quantitative reasoning (Etqr) are set arithmetic and geometry of senior primary school (basic) Mathematics.

Purpose of the Study

Generally, this study aims at ascertaining which of the traditional/ routine/conventional approach or innovative approach to evaluate primary school pupils in Mathematics will produce better results as regards cognitive performances in arithmetic and geometry.

Specifically the Researchers

i. Ascertained the mean cognitive performance scores in primary school arithmetic and geometry of two groups of pupils.

ii. Tested if the mean scores (x) of the two groups of peoples differ significantly.

iii. Ascertained the variance of cognitive performance scores in primary school arithmetic and geometry of the two groups of pupils.

iv. Tested if the variances of the scores of the two groups of pupils differ significantly.

Research Questions

The researchers formulated the following research questions to guide the study:

1. What are the Mean Cognitive Performance scores (X) of the two groups of pupils evaluated based on traditional approach and innovative approach of solving primary school mathematics?
2. What are the variances of the cognitive performance scores of the two groups of pupils evaluated based on traditional approach and innovative approach of solving primary school mathematics?

Hypotheses

The researchers formulated the following hypotheses to guide the study:

$H0_1$: The mean cognitive performance scores (X) of the two groups of pupils do not differ significantly at α – level of 0.05.

$H0_2$: The variances of the cognitive performance scores of the two groups of pupils do not differ significantly at α – level of 0.05.

Significance of the Study

The study is considered significantly because; the result of the study will add to the existing body of knowledge on the need and importance of innovation to problem solving in the evaluation of primary school mathematics. The study highlights the main effects of innovation in the evaluation of primary school mathematics. The study would help evaluators give required consideration to innovation during school and programme evaluation. Education authorities such as school supervisors will realize the importance of innovation in teaching and learning.

Mathematics teachers will see the need to bring in teaching and learning to enhance better understanding.

The study will help evaluators give consideration to innovation during school and programme assessment.

Design

The study is a quasi experiment. It involves manipulation of independent variable and watching its effect on the dependent variable without controlling all the intervening variables of the intact groups.

$Intgrp_1 \quad X_1 \quad 0$

$Intgrp_2 \quad X_2 \quad 0$

Where intgrp = Intact group
X = treatment
O = Post test

Population

The population was made up of 60 primary 5 pupils in Ehime Mbano in Imo State, Nigeria.

Sample and Sampling Technique

The sample was 40 pupils, 20 for group A and 20 for group B. The sample consisted two intact groups.

Instrument for Data Collection

Essay type test items ($Etti_s$) were used. There were two sections, section 1 and 2. There were 10 items in all.

Validation of Instrument

The items were validated by five experts of educational Mathematics, Measurement and Evaluation. The experts read through the items to ensure the correctness of expressions, the appropriateness of tasks/exercises and the correctness of the solutions. A test blue print was developed to ensure content validity.

Reliability of the Instrument

The reliability of the instrument was done using Kudder-Richardson (K-R) formula 21 and the index obtained was 0.84.

This was to ensure that they exhibit the degree of consistency they are expected to.

					Total	**Mean X**
Intact group A	77	63	80	60	1400	70
	90	50	85	55		
	45	95	75	65		
	47	93	72	68		
	49	91	69	71		
Intact group B	48	54	53	49	1020	51
	47	55	50	52		
	45	57	45	57		
	41	61	40	62		
	40	62	42	60		

Mean score X for group A

$= \frac{1400}{20} = 70$

Mean score X for group B

$= \frac{1020}{20} = 51$

$S^2_A = 127, S^2_B = 43$

$n_A = 20, n_B = 20$

$$\text{Zeal} = \frac{70 - 51}{\sqrt{\frac{127}{20} + \frac{43}{20}}} = \mathbf{5.89}$$

Results

Table 1: Z – Test Statistics Summary Table

Random Group	**Sample Size (n)**	**Mean (x)**	**Variance (S^2)**	**Z cal**	**Z tab**	**Decision**
Innovative A	20	70	127		2.02	Significant, $H0_1$ rejected
Traditional B	20	51	43			

The results of the table show that both groups have sample size of 20 each. The mean score for the innovative group was 70 while its variance was 141. While the mean score for the traditional group was 51 and its variance was 43. Null hypothesis was rejected because significant difference existed between the two groups. The innovative group

performed better than the traditional group.

Table 2: F – Test for Variance summary Table

	S^2_A	S^2_B	F_{tab}
S^2_A	1.00	2.07 Significant $H0_2$ rejected	1.69
S^2_B	2.07 significant, $H0_2$ rejected	1.00	1.69

The results of F – test for variances show that the tabulated result was lower than the calculated result, leading to the rejection of null hypothesis. Significant difference existed between the two groups. The innovative group performed better than the traditional group.

Discussion of Result

The results show that the mean performances and variance of the innovative approach group differ significantly from those of the traditional approach group. Null hypotheses were rejected showing that the innovative approach group with a mean score (x) of 70 and variance of 127 performed better than the traditional approach group with a mean score (x) of 51 and variance of 43.

Implication of the Study

The result of the finding show that some pupils can perform specific tasks more successfully using innovative ideas than when they use the routine (traditional) ways of problem solving in primary school mathematics.

Limitation

The result of this study was limited by some constraints. The researchers were unable to asses pupils in junior primary school and also could not assess pupils in other areas of Mathematics because the scope of this study is based on arithmetic and geometry of Senior Primary School Mathematics.

Thus a good knowledge of mathematics provides a good guide for qualitative reasoning and valid assessment provides adequate basis for this (Iwuji, Ijeoma and Ikediashi, 2000).

Conclusion

Much consideration should be given to innovation during instructional delivery and school programmes evaluation to enable pupils do well in primary school mathematics and as a necessary guild for further education. This is so because the results of this study show that the innovative group performed better than the traditional group.

Suggestions

As a result of the importance of innovation in the assessment of primary school mathematics education, the following recommendations were made to foster national development:

1. Teachers should be trained and retrained from time to time on the

need for proper assessment of pupils by relevant agencies.

2. Pupils should endeavour to do their home works, assignments, tests, projects, practicals and other assessment techniques as required by their teachers and various assessment agencies.
3. Teachers should as a matter of fact keep good records of their assessment procedures and be ready to provide feedbacks on assessment performances when required by relevant agencies and other stakeholders in education.
4. Teachers should ensure that assessment items are not ambiguous but have clear instructions and guidelines.
5. Assessment should be based on instructions delivered to pupils by their teachers. On no account should pupils be assessed in areas beyond their scope.
6. Up-to-date, relevant and adequate instruments should be used by primary school mathematics teachers during instructional delivery.

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