

Effect of Teaching with Local Instructional Materials on Primary School Pupils' Achievement in Mathematics, Eganyi District of Ebiraland-Ajaokuta, Kogi State-Nigeria

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Abstract

Quasi-experimental design was used for the study. A purposive sampling technique was used to select two primary schools out of fifteen in Eganyi District of Ajaokuta local government area, Kogi State. Two intact classes from each of the schools, making four classes comprising 180 pupils were used for the study. Two research questions and a null hypothesis guided the study. Teacher made Mathematics Achievement Test with reliability coefficient of 0.796 established using Kuder-Richardson formula 20 (K-R₂₀). Means, standard deviations and analysis of covariance (ANCOVA) were used to analyse data. The results revealed that the use of Ebira cultural practices in teaching selected mathematics contents at the primary school level increases pupils' achievement in mathematics. Pupils in rural schools achieve higher than pupils in urban schools. Based on the findings, it was recommended that provision be made in the primary school curriculum for the use of cultural practices and relevant local materials in teaching as a strategy.

Keywords: Cultural practices, Primary school, and Location

Introduction

Mathematics is one of the most important but the least understood school subject. Knowledge of Mathematics has often been cited as crucial for several disciplines in the environment and in higher education, including technical fields, engineering, economics and finance, as well as agriculture, medicine, apprentices, petty trading, vocational, entrepreneurs, farmers, and so forth. Knowledge of Mathematics has often been cited as crucial for several disciplines in higher education, including technical fields, engineering, economics and finance, as well as agriculture, medicine, apprentices, petty trading, vocational, entrepreneurs, farmers, and so forth (Alenka, et al, 2020 and Maidabo, 2020). Shwan, et.al (2019), maintained that mathematics is everywhere, all around us and in everything we do. In spite of the importance of mathematics as the life-wire of any nation; and as the key to science and technological base courses, achievement in mathematics by pupils in schools is poor. Chukwu (2001) cited in Usman and Momozoku (2005) stated that poor achievement has been observed in mathematics among primary school pupils specifically in basic operations, algebra, mensurations. Statistics and geometry. WAEC (2018) Chief examiner's report show that the inability of most students to solve geometry questions dealing

with bearings and distance; misunderstanding of concepts, terms, and symbols; poor sketching of diagrams; and construction problems; drawing and labeling diagrams; and poor interpretation of results. Mathematical knowledge offers widespread applications in every aspect of human endeavour as such; there is an urgent need to investigate the factors that have contributed to poor performance in mathematics at primary school level. Maidabo (2020) and Owen (2012) observed that failure rates in internal and external examinations have been distressingly high through primary to higher and achievement at every level of education has continue to be low. Teachers are mostly blamed for pupils' poor achievement by parents, students and some educators (Usman & Momozoku, 2005). Chukwu (2001) cited in Usman and Momozoku (2005), most primary school teachers use poor teaching methods involving lectures and direct information dissemination. They stressed that, although pupils' poor achievement in mathematics may be related to their lack of commitment to their studies and inadequate support from their parents and even the government; all that the teachers are used to, is the conventional, task or lecture method rather than strategies that involve pupils' participation in the classroom. Because of the importance of mathematics and the poor achievement in it, especially in

mensuration and geometry (WAEC, 2018) there is the need to teach it in an interesting manner. The way pupils interact with their teachers during the process of teaching may influence their attitude towards the subject taught by the teacher. As such, teachers can help pupils achieve better in mathematics by the use of strategy such as the use of cultural practices in the teaching of mathematics. Akinsola (2003) cited in Usman and Momozoku (2005) pointed out that cultural practices could be used to teach social studies, English language and mathematics among others especially in the primary schools.

Primary (school) education according to Federal Republic of Nigeria (FRN, 2004), is not only the foundation but also a major link to secondary education. It is at this stage that the fundamental principle of mathematics of numeracy, statistics, geometry, algebra and menstruation are inculcated.

There has been a common view that mathematics can be taught effectively and meaningfully without relating to culture of the learners (Leomarich, Maria, Camulte & Darwin, 2020). This view is erroneous because we have a branch of mathematics called ethno-mathematics. D'Ambrosio first used this term ethno-mathematics in 1985 to describe the mathematical practices of identifiable cultural groups (Akinsola, 2003). Usman and Momozoku (2005), viewed ethno-mathematics as the study of mathematics that takes into consideration, the culture in which mathematics arises. Mathematics is man's creation out of his day-to-day relationship and activities with his neighbours. All societies develop mathematical practices appropriate to their daily lives and their cultures. Usman and Momozoku (2005); Xiang, Frederick and Yuan (2018) and Leomarich, et al (2020) maintained that mathematics comes alive when people study measurements and numeration systems, the patterns in arts and architecture, the games and games of chance of various cultures (Ebira inclusive).

Usman and Momozoku (2005) stated that, cultural mathematical related practices have been an effective teaching strategy and have been used extensively, though not in Nigeria. Available literature has shown that there are varieties of cultural practices that are mathematically inclined that can be used for effective teaching of mathematics in primary schools. In their contributions, Umuhzo and Uworwabayeho (2021); and Pino (2019) accepted that, local instructional materials makes the teaching and learning of Mathematics easier, more interesting, more

enjoyable, and more closely connected to real life applications with use of local instructional materials because of the acceptability of the local instructional materials by the learners. They maintained that, the use of localized instructional materials in teaching mathematics promote critical thinking, higher-level learning and improve solving ability.

Unfortunately, many teachers are not used to the use of cultural practices in the teaching especially of mensuration and geometry for the primary school level. The Ebira people are known to have some cultural practices that can be used to enhance the teaching and learning of mathematics especially at primary school level. We Ebira people see this in wall decoration, hairstyles, method of building, numeracy, farming methods, weaving, measurements, carving, molding, trading, celebration of festival and applications of basic operations in problem solving and fractions (Usman & Momozoku, 2005).

In the study conducted by Organization for Economic Cooperation and Development (OECD, 2018); Isa (2018), Pino (2019) and Ramus, Duque, and Nieto (2016), showed that society affects schools purely as schools affects society. As such location of school affects mathematics achievement. In another submission, Izuwah and Harbor-Peters cited in Usman and Momozoku (2005) examined the academic achievement of rural and urban primary six pupils in the Eastern zone of Nigeria at distinction, credit, pass and failure levels. They concluded that primary six pupils in urban areas obtain more credits and failure level than rural primary six pupils while there was no significant difference between urban and rural pupils at pass level.

Studies revealed that, the majority of the students especially teenagers are not interested in academic knowledge and are not able to develop mathematical literacy skills at all. Localize instructional materials is an attractive source of learning for pupils at any level and it can provide an effective atmosphere for understanding mathematics (Pino, 2019). It will benefit pupils to realize the importance of mathematics and to develop committed relationships, social competence, and self-esteem as they use more towards improving performance in Mathematics, which can be of great values to them. It is in view of this/facts that the researchers want to appraise the effects teaching with local instructional materials on primary school pupils in some selected mathematics content with a view of improving achievement in

Mathematics in the primary schools in Eganyi District of Kogi State.

Based on the problem of the study, the purpose of the study is to investigate the effect of teaching with Local instructional materials on primary school pupils' achievement in mathematics in Eganyi District of Kogi State. Specifically, the work seeks to:

1. Determine the effects of the teaching with Local instructional materials has on achievement of the pupil in mathematics
2. Find out the influence of school location on the achievement of pupil taught mathematics with Local instructional materials.

Based on the purpose of the study, the following research questions guided the study:

1. What is the effect of Local instructional materials on pupils' achievement in mathematics?
2. What is the influence of location of school on achievement of pupils taught mathematics using Local instructional materials?

In line with purpose of the study, the following hypotheses were posed and tested at 0.05 level of significance

1. There is no significant difference between the mean achievement scores of the pupils taught mathematics using Local instructional materials and those taught without
2. School location has no significant influence on the achievement of students taught using Local instructional materials and those taught without

Method

The design for the study is quasi-experimental. It is a non-equivalent control group design. The study was conducted at Eganyi District of Eburaland, Kogi State. The population consist of all primary three (3) pupils in Eganyi District. There are fifteen primary schools in the district of which four (4) are located in the urban area while the remaining eleven (11) were located in the rural area. A purposive sampling technique was used to select two primary schools in the district due to location. One primary school was selected each from urban (LGEA Adogo) having 123 pupils of which 60 were in control group while 63 were in experimental group; and rural (LGEA Inayere) having 57 pupils of which 27 were in control

group while 30 were in experimental group. A total of 180 pupils were involved in the study. Two intact classes from each of the schools, making a total of four classes were used for the study. Both locations were assigned experimental and control group respectively. The experimental group was taught mathematics using the available local resource/materials while in the control group, mathematics was taught using conventional method of instruction. The same lesson plan was developed for the two groups. The only difference had been that the plan for the experimental group included the list of the resources/materials to be used while that of the cultural group has no such list of materials.

The instruments for data collection are the Teacher Made Mathematics Achievement Test (TMMAT), which comprises of thirty (34) items and two sections. Section A is made-up of twenty-nine (29) items with them accompany option from which the respondents were to select the correct option while Section B consists of five (5) pairs of items from which the respondents were expected to compare and respond. Items that assess knowledge and comprehensive were classified under lower order while those items on application, analysis, synthesis and evaluation were classified under higher order of the cognitive domain. The Teacher Made Mathematics Achievement Test (TMMAT) was validated by experts in mathematics education and measurement and evaluation. Table of specification was used to achieved the content validity of TMMAT. Kuder-Richardson formula 20 (K-20) was used to obtained an internal consistency coefficient of 0.796 which shows a high reliability of the instrument. A pre-test of Teacher Made Mathematics Achievement Test (TMMAT) was conducted and recorded. Extraneous variables like treatment meant for the experimental classes did not leak to the control classes. After teaching which lasted three weeks, the post-test of Teacher Made Mathematics Achievement Test (TMMAT) was also conducted. The effect of pre-test on post-test were avoided by retrieving the number of question papers given out to pupils back from them. The research questions were answered using means and standard deviation while the hypothesis was tested using Analysis of Covariance (ANCOVA) to test the differences in the mean values of three or more dependent variables that are related to the effect of the controlled independent variables.

Results

Data collected through achievement test were analysed as presented in tables below. Table 1-2 were

analysed using means and standard deviations to answer the research questions while ANCOVA was used to answer the null hypothesis as presented in table 3.

Table 1: The means and standard deviations of pupils scores in Teacher Made Mathematics Achievement Test items (group and location).

| Location | Group | Number of pupils | Mean | Meas Diff. | Standard deviation |
|----------|--------------|------------------|-------|------------|--------------------|
| Rural | Control | 27 | 13.69 | 0.86 | 9.18 |
| | Experimental | 30 | 14.55 | | 9.29 |
| | Total | 57 | 14.14 | | 9.20 |
| Urban | Control | 60 | 12.97 | 3.35 | 8.05 |
| | Experimental | 63 | 16.32 | | 8.56 |
| | Total | 123 | 14.68 | | 8.45 |
| Combined | Control | 87 | 13.19 | 1.18 | 8.38 |
| | Experimental | 93 | 15.75 | | 8.81 |
| | Total | 180 | 14.57 | | 8.69 |

The above Table 1, shows that the combined mean achievement score and standard deviation of pupils taught mathematics Local instructional materials is higher than the combined control group means achievement score and standard deviation of pupil taught using other method of teaching. The combined experimental group has a mean achievement score of

15.75 with standard deviation of 8.81 while the combined control group has a mean achievement score of 13.19 with a mean difference of 1.18 and standard deviation of 8.81. This is an indication that the experimental group achieved higher than the control group in mathematics using Local instructional materials as a teaching strategy.

Table 2: The mean and standard deviation of pupils' scores in Teacher Made Mathematics Achievement Test (group and location)

| Location | Type | Number of pupils | Group | Mean | Mean Diff. | Standard deviation |
|----------|-----------|------------------|--------------|-------|------------|--------------------|
| Rural | Pre-test | 27 | Control | 14.70 | 2.03 | 9.57 |
| | Post-test | 27 | Control | 12.67 | | 8.82 |
| | Pre-test | 30 | Experimental | 10.43 | 8.24 | 6.88 |
| | Post-test | 30 | Experimental | 18.67 | | 9.64 |
| | Pre-test | 60 | Control | 13.90 | 1.87 | 8.15 |
| | Post-test | 60 | Control | 12.03 | | 7.84 |
| Urban | Pre-test | 63 | Experimental | 15.22 | 2.19 | 8.89 |
| | Post-test | 63 | Experimental | 17.41 | | 8.13 |

In table 2, the post-test mean achievement score for the control group in Rural school is 12.67 with a mean difference of 2.03 and standard deviation of 8.82 while the post-test means achievement score for the control group in Urban school is 12.03 with a mean difference of 1.87 and standard deviation of 7.84. Also, the post-test mean achievement score for the experimental group in Rural school is 18.67 with a mean difference of 8.24 and standard deviation of

9.64 while the post-test mean achievement score for the experimental group in Urban school is 17.41 with a mean difference of 2.19 and standard deviation of 8.13 is observed. From the above information, one can conclude that pupil in Rural school achieve higher than the pupils in Urban school in selected mathematics topics using Local instructional materials as a teaching strategy.

Table 3: Analysis of Covariance (ANCOVA) of pupil scores in Teacher Made Mathematics Achievement Test and location.

| Location | Variation | Sum of | Degree of | Mean square | Type | F.cal | F-crit |
|----------|-----------|--------|-----------|-------------|------|-------|--------|
|----------|-----------|--------|-----------|-------------|------|-------|--------|

| | | squares(SS) | freedom | | | | |
|----------|---------|-------------|---------|--------|--------|-------|------|
| Rural | Btw grp | 415.07 | 1 | 415.07 | ANCOVA | 5.02 | 4.00 |
| | Wtn grp | 4461.55 | 54 | 82.62 | | | |
| Urban | Btw grp | 936.10 | 1 | 936.46 | ANCOVA | 14.80 | 3.92 |
| | Wtn grp | 7593.10 | 120 | 63.28 | | | |
| Combined | Btw grp | 1442.68 | 3 | 480.89 | ANCOVA | 6.80 | 2.60 |
| | Wtn grp | 12443.87 | 176 | 70.70 | | | |

The summary in table 3 show that F_s -calculated values in respect of teaching with Local instructional materials on the pupils' achievement in mathematics are higher than the critical F-values. In the Rural school, the calculated Analysis of Variance (ANCOVA) F-value of 5.02 as against the critical F-values of 4.00 at 0.05 level of significance is observed. As for the Urban school, the calculated Analysis of Covariance (ANCOVA) F-value of 14.80 as against the critical F-values of 3.92 at 0.05 level of significance is recorded. The combined effect showed a calculated ANCOVA F-value of 6.80 as against the critical F-value of 2.60 at 0.05 level of significance. Since the calculated F-values are greater than the critical F-values, it shows that they are significant. Therefore, the hypothesis of no significant difference in mean achievement scores of pupils due to location is rejected. It means that there is a significant difference in the achievement of pupils in Rural and Urban school locations taught mathematics using Local instructional materials as a teaching strategy.

Discussion

The relevant data has revealed that the use of local instructional materials in teaching mathematics at the primary level enhances pupils' achievement better than using other method of teaching. It makes the teaching and learning of Mathematics easier, more interesting, more enjoyable, and more closely connected to real life applications with use of local instructional materials because of the acceptability of the local instructional materials by the learners (Umuhoza & Uworwabaye, 2021). Pino (2019) stated that, the use of localized instructional materials in teaching mathematics promotes critical thinking, higher-level learning and improve solving ability. This study is to help in upgrading the achievement of pupils in mathematics. This finding is in line with Ohuche cited in Usman and Momozoku (2005) which expresses surprise that Africans with endowment of cultural practice that are mathematically inclined do not seem to be doing much in mathematics. Leomarich, et al (2020), revealed that primary three

pupils taught mathematics using ethno-mathematics teaching performed and retained mathematical concepts better than those taught using conventional method. Xiang; et al (2018), stated that national culture played an important role in shaping mathematics achievement as it accounted for 23.8% of country difference in mathematics performance after controlling extraneous variables. It is obvious that the inability to do well is due to the fact that culture is not linked to mathematics. When, culture is linked to mathematics, pupil will be able to see a more human face of mathematics, which may enhance their achievement.

It was showed that the standard deviation of achievement scores of pupils in Rural school is higher than the standard deviation of achievement scores of pupils in Urban school taught mathematics using local instructional materials as a teaching strategy. This is supported by Chukwu (2001) cited in Usman and Momozoku (2005), who also reported that pupils from rural schools achieve better than pupils from urban school. Isah (2018) and Ramus, et al (2016) maintained that there is linear relationship between school location and academic achievement as schools in rural area has a significant difference in mathematics score. In another study by Izuwah and Harbor-Peters as cited in Usman and Momozoku (2005) both stated that there is no significant difference in pupils' performance due to location. Based on the above submissions, it is observed that the issue of location and achievement is not for closure.

The significant effect of teaching with local instructional materials on primary school pupils' achievement in mathematics due to location where pupils in rural schools were found to achieve higher than pupils in urban school is a reality for, they are more used to the cultural practices than their urban counterparts. We therefore, need to familiarize the urban pupils with those cultural practices and their relevant related local mathematics, which are mathematically inclined and utilized them effectively

in teaching of mathematics at the lower primary stage of schooling.

Conclusion

The richness of Ebira Cultural practices and material resources is apparent in the number and diversity of them found in the surrounding environment. Creativity in using them can help pupils relate mathematics contents with application in the locality as well as helping pupils better learn basic concepts. If pupils begin to see the link between the mathematics in their environment and the school mathematics, their interest in the subject will improve. Children learn mathematics from many sources and for a variety of purpose. Changing the educational experience of pupils by moving beyond the classroom walls can diversify the array of learning opportunities and connect school lessons with daily lives real problems. Exposing pupils to innovative materials is a way to increase their learning experience.

Recommendations

The following recommendations were provided that:

1. Government and curriculum planners should select and include the endless list of local resources in the primary school curriculum, which constitute the elements of cultural practices during teaching to enhance both pupils in rural and urban school locations achievement.
2. Bodies responsible for primary education and curriculum planners should organize series of seminars and workshops for primary school teachers on the adoption of the use of local materials related to cultural practices in teaching mathematics especially mensuration and geometry to primary school pupils.

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