

Effects of Demonstration and Play Way Methods on Academic Achievement of Primary Three Pupils in Basic Science in Aguata Local Government Area

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ABSTRACT

The study investigated the effects of demonstration and play way methods on academic achievement of primary three pupils in Basic Science in Aguata Local Government Area (L.G.A) of Anambra State, Nigeria. Two research questions and two null hypotheses guided the study. Relevant literatures were reviewed. The study was carried out in only private primary schools in Aguata (L.G.A) of Anambra State. Quasi-experimental research design was used for the study. Specifically the population of the study comprised all 1,260 primary three pupils in private primary schools in Aguata L.G.A. Through simple random sampling (balloting method with replacement) a total of 99 pupils were selected - experimental group 1, had 33 pupils (17 males and 16 females); experimental group 2, had 31 pupils (15 males and 16 females) and control group, had 35 pupils (15 male and 20 females) A 20- item Basic Science Achievement Test (BSAT) was used as instrument for data collection. The instrument was validated by three experts and the internal consistency was established using Kuder-Richardson Formular 20 (KR-20) and reliability coefficient was found to be 0.89. Data collected were analyzed using mean and ANCOVA. The findings showed among others difference in the mean achievement scores of primary three pupils taught basic science with demonstration, play way and traditional methods of instruction. However, the analysis of ANCOVA to find out the level of significance of difference of the three groups showed no significant difference in the achievement scores of experimental group1 and 2. However there was significant difference in the achievement scores of experimental group1, 2 and control group. Based on the findings, it was recommended that primary three teachers should adopt demonstration and play way methods in basic science classrooms.

Keywords: Demonstration, play way, Basic Science, Academic Achievement and Primary Schools.

INTRODUCTION

Primary education is a period of critical brain development and the foundation for a child's learning and development. According to the Federal Republic of Nigeria (FRN, 2013) in the National Policy on Education (NPE), it is that level of education given to children aged 6-12, prior to entering secondary school. In the same vein, [1] defined primary education as education given to children aged 6-12 prior to transition into secondary school in Nigeria.

The importance of primary education was stressed when the Nigerian government

(FRN, 2013) judged it as the key to success or failure of the whole system of education. This level of education provides the child for the physical, motor, health, nutritional, intellectual, aesthetic, emotional and social development. The primary education can either be given by private or government schools. According to [2] primary schools that are managed and established by individuals, organizations, groups and missionary bodies are called private primary schools. It has the following characteristics; the schools are supported by private

organizations or individual rather than government and they retain the right to select their pupils [3]. The primary school whether private or government has a lot of functions to perform. It was in recognition of the functions/importance of primary education that the government has continued to make serious efforts towards providing her citizens with qualitative and quantitative primary education for social, moral, emotional, economic and political development. That is the reason National Policy on Education (FRN 2013) outlined the goals of primary education as, preparing the child for secondary level of education including preparing for trade and crafts, laying of a sound basis for scientific and reflective thinking and developing in the child, the ability to adapt to his changing environment. Primary education shall pursue these goals through teaching, research and development-staff development programme, generation and dissemination knowledge, maintenance of minimum education standard through appropriate agencies and good basic science teaching.

Basic science is an intellectual search involving inquiry for scientific explanations which is necessary for the current technological and industrial development (FGN 2013). In view of these, [4] observed that, the worldwide innovative changes have shown that the future is unpredictable especially as it concerns education, science, technology and skill acquisition which were considered the bedrock of any country's economic and political mobility. The foundation of science is normally laid in basic science classrooms at the primary school level. This is to enable the citizens acquire the knowledge of their environment; develop problem solving skills and desirable scientific attitude. Regrettably, [5] [6] observed that, children normally had poor academic achievement in basic science. The poor scientific base will make pupils to be afraid of science. This affects the level of economic, social and technological development. In line with this view, National Council for

Colleges of Education (NCCE) (2003) noted that basic science skills enables the child to acquire the knowledge of their environment, develop problem solving skills, desirable scientific attitudes and its application in everyday life.

[7] opined that basic science classrooms are not expected to be classroom chalk-board and talk affairs, but discovery, field trip, value clarification, enter-educate approach, problem solving, concept mapping, human, material and natural resources, using simulation, games and individual set experiments. This allows for creativity, self-reliance, entrepreneurial skills, innovations and national development. Emphasizing on the method to be used for a meaningful learning to occur, [8] earlier observed that, learning basic science needs satisfying and enjoyable experiences. This view was supported by [9] who believed that learning by discovery via demonstration and play way tend to capture the attention of the learners and sustain their interest for a long period of time in basic science classrooms. This is because, pupils remember things they learn through demonstration, discovery, and play in basic science longer and can recall the result faster through association of facilities used in doing the demonstration and play.

Also considering the fact that these methods (demonstration and play way methods) are specified in the ASUBEB (2014) and NERDC (2012) to be used in teaching and learning, it disheartens to note that, the method that is in use in primary schools in basic science classrooms as revealed by literature is traditional method of instruction [10]; [11]; [12] [13]. This makes the teaching and learning of basic science in our primary schools to have a weak foundation [14]; [15] [16]. Also, [17] opined that ASUBEB basic science results in our schools have been persistently poor for the past three years. In his own words this to a great extent could be attributed to poor methodology.

Regrettably, [18] observed that, the method that is in use in our primary

schools in basic science classrooms is traditional method of instruction. Supporting this, several studies; [19]; [20]; [21] [22] have shown that the method that is mostly used in teaching and learning of basic science in schools is traditional method. Traditional method of instruction is a method of teaching where the teacher teaches pupils without pupils making much contribution in the teaching and learning process.

The method is based on talking, explaining and writing on the chalk board by the teacher. This on the long-run produces citizens who cannot in anyway help in the technological development of the nation. These problems inherent in the method demands that there is need to use other methods of instruction that may take care of all these problems. In this direction, a science curriculum was developed in 1985. Among other recommendations, the curriculum recommended that basic science teachers should adopt pupils'-activity based method in teaching basic science. One of such activity based methods of instruction is demonstration method.

Demonstration method, according to [23] is a method which involves the combination of oral explanation with the handling or manipulation of real objects, equipment or materials. Despite the fact that the method is teacher-centered and may be too stressful on the part of the teacher in the sense that it involves illustration and performing experiment by the teacher, however, it involves various senses which help in making learning more permanent and palatable. It develops interest in the learner and helps them participate actively in the lesson.

It helps them to focus more on acquisition of practical skills which will enhance poverty alleviation and wealth creation. Even Frobel, one of the early philosophers and pioneers of primary education was of the view that primary school pupils should be taught basic science with demonstration method. Despite these advantages and the views of an early philosopher about demonstration method of teaching basic science, in

primary schools, the teacher can also use child-centered method of instruction. One of the child-centered method of instruction is 'play way method'.

[24] opined that, play way method is a teaching strategy that concretizes instructions. Not only does it pave the way for imparting effective and enduring education; it helps in realizing the broader aims of education. It helps to bring the harmonious development of the personality of children by taking care of their physical, mental, emotional, social, and moral development. In one study, two hours a day of play with objects produced changes in the brain weight and efficiency of experimental animals [25].

In Nigerian circumstances, demonstration and play way method, if used in teaching and learning of basic science in primary schools, may lead to better understanding of basic science, on the long-run gives room for acquisition of practical skills, which encourages entrepreneurial skills, wealth creation, poverty alleviation, employment opportunities, national development and creativity. Creativity is very necessary in science teaching because, the summary of whatever we are doing in science classrooms revolve around being creative. Ability to use a piece of information gathered in science classrooms to solve our problems at both individual and societal level. Thus in revised Bloom's Taxonomy of Education Objective; [26] emphasized 'creativity' as the last level of intelligence. Emphasizing on the need to make learning more meaningful, to the child, the community and the nation at large United Nations Educational Scientific and Cultural Organisation (UNESCO) (2004); NCCE (2003); [27] [28] pointed out that the instructional processes in our basic science classes today are devoid of relevant practices from around us and are full of foreign theoretical ideas, principles and use of traditional method in teaching that makes it impossible for the possessor of basic science knowledge to apply it to everyday life.

This becomes a worrisome situation when one recalls that if the academic

achievement of pupils in basic science is weak, it will affect the child's scientific knowledge and invariably technological advancement of the nation. If these are true, it is imperative that, the academic achievement of these primary school pupils be assessed.

In the words of [29] academic achievement in children in a learning situation refers to one who attain a set standard of achievement in a given evaluation exercise, such as test, examination or series of continuous assessment. This means that a candidate who scores up to a given standard is regarded as achieving better academically. The good academic achievement could be in English language, mathematics, social studies, basic science or any discipline. A great impact is done if it is in any of the subject like basic science-a subject that will enhance later scientific skills of the children which gives way for technological advancement of the nation. However, the problem we have in basic science teaching is from methodology. As revealed by literature, the present method of instruction used in basic science teaching is not yielding the desired result. Children if given good foundation it will carry them all through education career. It becomes necessary that we start early enough to curb the problem of poor methodology.

Many strategies have been experimented on to determine the effective ways of teaching school subjects generally and basic science teaching in particular. Among these are; Practical approach [29]; mentoring [30]; Out-of class learning environment [31] human recourse [32];concept-mapping and constructionist-based instructional model [33], yet the problem of poor academic achievement in basic science persisted. Presently, the world is going technologically higher in all aspects of life, this eminent problem-poor methodology of teaching basic science, if not checked our country Nigeria may be left out of technological world. Thus, the

problem of this study is to find out which method of instruction will the basic science teacher use to guarantee a better academic achievement among primary three pupils in basic science in Aguata Local Government Area of Anambra State, Nigeria?

Purpose of the Study

The main purpose of this study is to find out the effects of demonstration and play way methods on achievement of primary three pupils in basic science in Aguata Local Government Area of Anambra State, Nigeria. In specific terms this study aims to determine:

1. The mean achievement scores of primary three pupils taught basic science with demonstration and traditional methods of instruction respectively.
2. The mean achievement scores of primary three pupils taught basic science with play way and traditional methods of instruction respectively.

Research Questions

The following research questions guided the study:

1. What are the mean achievement scores of primary three pupils taught basic science with Demonstration and traditional methods of instruction.
2. What are the mean achievement scores of primary three pupils taught basic science with play way and traditional methods of instruction.

Hypotheses

The following null hypotheses were tested at 0.05level of significance.

1. There is no significant difference in the mean achievement scores of primary three pupils taught basic science with demonstration and traditional methods of instruction.
2. There is no significant difference in the mean achievement scores of primary three pupils taught basic science with play way and traditional methods of instruction.

METHODS

A quasi-experimental design was used to determine the effect of demonstration and play way methods of instruction on academic achievement of primary three pupils' in primary schools. The study was done in Aguata Local Government Area of Anambra State Nigeria. The population comprised of one thousand two hundred and sixty (1,260) pupils in private primary schools in Aguata L. G. A. Using simple random method balloting by replacement ninety nine (99) pupils were selected as the sample for study. The instrument titled Basic Science Achievement Test (BSAT) had twenty (20) items. Face validity of the item was determined by three experts, one from the department of early childhood and primary education, one from science education all from faculty of education Nnamdi Azikiwe University Awka and the primary three class teacher. It was administered for six weeks including one week of training. Each correct answer in BSAT was scored 5 marks (5x20=100) while zero was allocated for questions not answered

correctly. Questions not attempted at all were scored zero point. The maximum score for all the 20 questions were 100% and the minimum score was 0. The coefficient was calculated using the Kuder-Richardson Formula 20 (KR-20). The coefficient of stability was found to be 0.89. The research questions were answered using mean. Analysis of covariate (ANCOVA) was used to test the hypotheses at 0.05 level of significant. In taking decision, methods that gave a posttest mean score of 60% and above are considered effective. The method that has more mean gain when compared to the other method is considered more effective. If the probability value (P-value) was less than or equal to the significant value of 0.05, the null hypothesis was rejected, otherwise, the null hypothesis was not rejected.

Research question 1

What are the Mean Achievement Scores of Primary Three Pupils Taught Basic Science with Demonstration and Traditional Methods of Instruction.

Table 1: Mean Achievement Scores of Primary Three Pupils Taught Basic Science Using Demonstration and Traditional Methods.

| Source of Variation | N | Mean Pretest | Mean Posttest | Gained Mean |
|---------------------|----|--------------|---------------|-------------|
| Demonstration | 33 | 29.24 | 74.58 | 45.33 |
| Traditional | 35 | 27.74 | 40.29 | 12.54 |

Table 1 above showed that demonstration method has a mean pretest score of 29.24 and traditional method 27.74. After the treatment, (table 1) demonstration method had a mean posttest score of 74.5758 with gained mean of 45.33 and traditional method had

a mean posttest of 40.2857 with gained mean of 12.54.

Research question 2

What are the Mean achievement scores of primary three pupils taught basic science with playway and traditional methods of instruction.

Table 2: Mean Achievement Scores of Primary Three Pupils Taught Basic Science Using Playway and Traditional Methods.

| Source of Variation | N | Mean Pretest | Mean Posttest | Gained Mean |
|---------------------|----|--------------|---------------|-------------|
| Play way | 31 | 29.03 | 77.19 | 48.16 |
| Traditional | 35 | 27.74 | 40.28 | 12.54 |

Table 2 above showed that play way method has a mean pretest of 29.0323 and traditional method 27.7429. After the treatment, a posttest was conducted, it was observed that there were differences in achievement scores of pupils as a result of the treatment as shown in (table 2) play way method had a mean posttest score of 77.1935 with

gained mean of 48.16 and traditional method had a mean posttest of 40.2857 with gained mean of 12.54.

Null Hypothesis 1

There is no Significance Difference in the Mean Achievement Scores of Primary Three Pupils Taught Basic Science with Demonstration and Traditional Methods of Instruction.

Table 3: ANCOVA Test of Significance of Difference in Achievement Scores of Pupils Taught Basic Science with Demonstration and Traditional Methods.

| Source of Variation | Sum of Squares | df | Mean Square | F Cal. | Pvalue | Remark |
|---------------------|----------------|----|-------------|--------|--------|--------|
| Corrected Model | 27154.214 | 2 | 13577.107 | | | |
| Intercept | 1270.637 | 1 | 1270.637 | | | |
| Pretest | 7182.785 | 1 | 7182.785 | | | |
| Groups | 17409.165 | 1 | 17409.165 | 347.7 | .000 | S |
| Error | 3254.418 | 65 | 50.068 | | | |
| Total | 250771.000 | 68 | | | | |
| Corrected Total | 30408.632 | 67 | | | | |

Table 3 showed that a hypothesis test on significance of difference in mean achievement scores of pupils taught basic science with demonstration and traditional methods were significant p (dfs=1;68; F=347.711=P-value=.000. Thus null hypothesis 1 was rejected.

Null Hypothesis 2

There is no Significance Difference in the Mean Achievement Scores of Primary Three Pupils Taught Basic Science with Play way and Traditional Methods of Instruction.

Table 4: ANCOVA Test of Significance of Difference in Achievement Scores of Pupils Taught Basic Science with Play way and Traditional Methods of Instruction.

| Source of Variation | Sum of Squares | df | Mean Square | F Cal. | Pvalue | Remark |
|---------------------|----------------|----|-------------|---------|--------|--------|
| Corrected Model | 29376.427a | 2 | 14688.214 | | | |
| Intercept | 1403.052 | 1 | 1403.052 | | | |
| pretest | 6982.879 | 1 | 6982.879 | | | |
| groups | 20077.647 | 1 | 20077.647 | 402.947 | .000 | S |
| Error | 3139.103 | 63 | 49.827 | | | |
| Total | 251649.000 | 66 | | | | |
| Corrected Total | 32515.530 | 65 | | | | |

Table 4 showed that a hypothesis test on significance of difference in mean achievement scores of pupils taught basic science with playway and traditional methods was significant (dfs=1;66; F=402.947=P-value=.000. Thus null hypothesis 2 was rejected.

SUMMARY OF FINDINGS

From the analysis, the following findings were made:

1. Demonstration and play way methods of instruction were effective in terms of academic achievement among primary three pupils in basic science.
2. The achievement scores of those pupils taught basic science with demonstration and play way methods revealed that, those taught with play way method

achieved better than those taught with demonstration in all the groups.

1. 5. There were significant difference in the mean achievement scores of those pupils taught basic science with demonstration and traditional method and those taught with play way and traditional methods. Thus null hypothesis 1 and 2 were rejected.

DISCUSSION OF FINDINGS

The result in table 1 revealed that primary three pupils who were taught with demonstration method of instructions achieved higher in posttest than pretest than those taught with traditional method of instruction. This is in line with the earlier findings of [34]; [35]; [36]; [37]. For these researchers, the use of demonstration method of instruction allows for better academic achievement.

Test of hypothesis 1 in table 3 showed that the difference in the achievement was significant (dfs=1;68; $F=347.711=P\text{-value}=0.000$). This means that there is a significant difference in the achievement scores of pupils taught basic science with demonstration and traditional methods of instruction. Thus, null hypothesis 1 was rejected.

The result in table 2 revealed that those pupils taught with play way achieved better than those taught with traditional method of instruction in posttest. This is in line with the earlier findings of [38]; [7] [8]. For these researchers, the use of playway method of instruction allows for better academic achievement.

Test of hypothesis 2 in table 4 revealed that the use of playway method of instruction in teaching and learning was significant (dfs=1;66; $F=402.947=P\text{-value}=0.000$). This means that there is a significant difference in the achievement scores of pupils taught with playway and traditional methods of instruction. Thus, the null hypothesis 2 was rejected.

In line with this findings, (FRN 2013) in their National Policy on Education, gives the guide line for the methodology to be used in basic science teaching as the one that will de-emphasis memorization and regurgitation of facts. Supporting these views, Convention on the Right of the Child (CRC) in it's Article 6 'Right to leisure and play' as cited in [23] observed that leisure and play are necessary for a more active and productive life either in school or at home. That was why Pestalozzi and Comenius-great philosophers and pioneers of primary education opined that, children at primary school stage will be taught basic science through demonstration, experimentation and teaching should be done through experiences respectively.

CONCLUSION

Demonstration and Play way methods of instruction are effective in teaching and learning basic science concepts in primary three classrooms.

Recommendations

Basic science teachers can use the two methods in teaching and learning of basic science among primary three pupils.

Educational Implication of the Study

The findings of this study have some implications in education. It was observed that, demonstration and play way methods of instruction improved the academic achievement of primary three pupils in basic science in our primary schools. This implies that pupils' academic achievement in basic science will improve if teachers use

demonstration and play way methods of instruction in basic science classrooms as teaching methods.

Limitation of the Study

The major limitation of this study is non-randomization of the research control.

Suggestions for Further Research

There is need to carry out the same research in other Local Government Areas of Anambra State of Nigeria.

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