EFFECT OF ACTIVITY-BASED TEACHING STRATEGY ON PRIMARY SCHOOL PUPILS' ACADEMIC ACHIEVEMENT IN BASIC SCIENCE IN EDU LOCAL GOVERNMENT AREA OF KWARA STATE

Abdulkadir Y. ABUBAKAR
Hafees T. SULYMAN
&
Abbas G. ALIYU
Department of Early Childhood and Primary Education
Faculty of Education
Kwara State University, Malete

Abstract
This study investigated the effect of activity-based teaching strategy on Primary School Pupils' Academic Achievement in Basic Science in Edu Local Government Area, Kwara State. The population comprised all pupils in Edu Local Government Area. Samples of 80 primary five pupils were used for this study, 42 male and 38 female. Simple random sampling technique was used in this study to select the samples. Pre-test, Post-test, Quasi Experimental design was adopted in the study. Four hypotheses were raised and tested at 0.05 level of significance. The instruments used for this study were Activity-based instructional package (r = 0.79) and Basic Science Achievement Test. The descriptive statistics (frequency count, mean and percentage) and inferential statistics (ANCOVA) were used to analyse the data collected. The finding revealed that pupils exposed to activity-based teaching strategy (Experimental group) achieved significantly higher than their counterparts taught using conventional method. Based on the findings, recommendations were made, one of which is that teachers of Basic Science should use activity-based instructional strategy in their teaching as it enhances better achievement.

Keyword: Activity-based strategy, Academic achievement, Basic science

Introduction

Science is an activity embarked on by man in search of basic needs for survival on the planet, such as food, shelter and clothing. It is as old as man himself and was meant for him to practice. There are variations in the definitions and nature of science. The way a scientist views the nature of science determines its definition. Some view the nature of science in terms of its contents, such as biology, chemistry, physics, and agriculture, which are made up of facts, theories and principles. Others view it in terms of its process (procedures and methods) and some view it as its products (technology). Raimi, Bolaji and Babajide (2003) view science as human activity in search of food, shelter, clothing and basic human needs for survival. In another dimension, Okeke (2007) asserted that science is a systematic investigation of nature with a view to understanding and harnessing its forces to serve human needs, while Erinosho (2009) views science as an organised body of knowledge about a set of logical and empirical methods for the investigation and understanding of natural phenomena and an enterprise for the application of scientific knowledge. Bichi (2002) defines science as "intellectual activities carried out by

scientists designed to discover information about the natural world in which we live and to discover ways in which this information can be organized to benefit the human race." In this respect, the primary focus of science is to collect data and the ultimate purpose is to discern the order that exists in natural phenomena and happenings around us.

The National Policy on Education (NPE) emphasized the importance of science and technology education at all levels; at the primary school level, the objective of science education is to lay a sound knowledge base in scientific and reflective thinking (FRN 1989). There was inculcation of literacy and numeracy, the study of science and introductory technology. The government planned to provide materials and teachers for the teaching of science and technology. At the secondary school level, the aim is to prepare pupils for useful living in society and for higher education. The objective of the science policy is to equip pupils with adequate scientific knowledge to live effectively in the modern age of science and technology. To this end, integrated science is offered as a core subject at the primary and the Junior Secondary School (JSS) level and science subjects (physics, chemistry biology) as parts of core and technical subjects at the Senior Secondary School (SSS) level.

Activity-based teaching has been accepted as a paradigm for science education and is also reflected in some measure in the textbooks developed at the national and state levels, but it has hardly been translated to actual classroom practice. Activities still tend to be regarded as a way to verify the ideas and principles given in the text rather than as a means for open-ended investigations. There is a general feeling that activity-based teaching is expensive, takes more time that could be otherwise "fruitfully" used for "text-based" teaching, and does not prepare the child for examinations and competitive tests. The concern about expenditures involved in activities and experiments could not be dismissed. Most schools cannot afford well-equipped science laboratories. However, it is certainly possible to design low-cost activities and experiments using easily available materials. Thus, cost should not be allowed to become an excuse for neglecting the very foundation of learning science. According to Inekwe (2002), Activity-Based Teaching Strategy is the method that enables pupils to learn with the same vigour that marks their natural activity. The method of teaching and learning used must be appropriate for the pupils' age and mental ability, as well as the social norms and available resources in the environment.

The approach must be less of burden to learning and increasing the eagerness and happiness of school life. The teaching-learning process conducted in different approaches like inductive and deduction analysis and synthesis. Child centred approach, lecture method and activity-based approach. The primary school children are in operational and concrete operational stages where cognitive development is very important. So, at this stage joyful learning should be important to the pupils. Keeping this mind activity-based learning is very useful. If the activities are well selected, planned and organized in education. It influences the student learning capacity. Activity-based approach in education was emphasized by different educationists like Rousseau, Devey etc. David (2007) said it introduces element of joy, team spirit, respect for each other's opinions and it reduces the abstractness in science concepts. Activity-based teaching strategy is in-line with Piagetian tasks as it affords the pupils a variety of activities and experiences that involve the use of concrete objects. This hastens the learners' ability to order events through application, knowledge and predict changes.

According to Mari (2003), adequate and appropriate use of this method through a rich variety of stimulating experiences, progress from concrete to abstract and then a powerful

conceptualization maybe achieved. As a result, the learner will now reason or form hypotheses using symbols or ideas rather than physical objects as the basis for thought. According to him, the learner can use a hypothetical, deductive procedure that no longer ties his thought to existing reality but allows him to consider all possible explanations for the problem and evaluate alternative explanations or solutions.

In the Activity-Based teaching strategies, local resources are effectively utilized in the teaching process. Activity-Based is a type of research-oriented teaching technique recommended for Basic Science instruction by the National Policy on Education, Federal Ministry of Education (2004). Activity-Based instructional strategy promotes instruction in the three domains of knowledge. Activity-Based teaching enables pupils to handle concrete materials which reduce the abstract nature of the concept learned. This makes learning more meaningful and heightens pupils' performance and achievement. Pupils' mental horizons are broadened by the activities provided to them.). Pupils begin to see that many other matters, besides those of purely scientific interest are involved when scientific knowledge is used to benefit a community.

The Activity-Based Strategy of teaching science encourages group interactions among pupils, and if properly used, the spirit of teamwork, exchange of ideas and respect for each other's point of view will be enhanced at the early stages of learning. Another feature of an Activity-Based teaching strategy is that local resources can be effectively utilized in the teaching process. In typical pupils' Activities, costly scientific equipment is often substituted with locally available teaching aids. According to Lowenstein (2002), Activity-Based Teaching Strategies makes pupils active participants, aid identification of materials learned, build confidence, help pupils maximize their potential and favour intrinsic motivation. This, according to him, is fundamental to academic achievement and the effective teaching and learning of sciences in schools. Adeniyi (1997) in David (2007) agreed that though science teaching facilities are necessary, many science teachers are ill-equipped and ill-prepared to guide pupils towards inquiry. They seem to find activity-oriented instruction difficult to manage. However, Usman (2000) attributed the poor performance of pupils in science concepts to rote learning. This, according to him, is a result of non-exposure of pupils to activities in their classes due to a lack of science teaching facilities.

Oakley (1993) defined gender as the amount of masculinity and femininity found in a person and obviously while there are mixtures of both in most human beings, the normal male has a preponderance of masculinity and the normal female has a preponderance of femininity. For instance, based on social expectation and orientation, women are socialized in preparation for their role as wife and mother and they are expected to fulfil this role effectively while males are socialized and oriented in manner that stand them in a good position to fulfil their social and cultural roles as fathers and husbands. Furthermore, males are socialized and oriented to pursue masculine jobs with high prestige, high skills, and high pay. According to Stanley (2008), most girls choose to be successful in subjects considered appropriate for females in order to be high achievers while maintaining their femininity. Several researchers reported gender differences in subject choice and also in achievement within the subjects. School subjects according to investigations are sex–stereotypes.

Science is to be viewed and practised in a practical way; instead, teachers teach pupils to memorize facts and give them no room to do science. This has affected the performance of pupils in the subject. Pupils not only perform poorly, but they also show little interest in the subject. Activity-Based teaching strategy allows pupils to independently plan, investigate, collect data,

analyze, and draw conclusions and generalizations. The use of activities makes learning learners-centred and could lead to meaningful learning and the acquisition of science process skills. The pupils also have ample opportunity to make plausible hypotheses and test them to generate ideas, which are expected in their own language.

In Nigeria, basic science is one of the core subjects offers in primary schools which makes it a requirement. Parents and other stakeholders in education have condemned the high rate of poor academic achievement of students in external examinations. Researchers have found reasons to range from poor teaching strategies, poor teaching personnel, non-availability of school facilities, outdated strategies, and the use of method that limits pupils' participation in the classroom. There is need for teachers to employ strategies that would allow active participation or interaction between the teachers' and pupils' or among pupils' themselves. Different studies have been conducted on strategies that can encourage more participation of pupils in the teaching and learning process but special attention has not been given to the activity-based teaching strategy, particularly at the primary level of education. To the best knowledge of the researchers, this kind of study is yet to be conducted in this location hence the justification for conducting this study. This study measured the effect of activity-based teaching strategy on primary school pupils' academic achievement in basic science in Edu Local Government Area of Kwara State.

Research Hypotheses

Ho1: There is no significant effect of activity-based teaching strategy on the academic achievement of primary school pupils in Edu local government, Kwara State.

Ho2: There is no significance effect of school type on primary school pupil's academic achievement in Edu Local Government, Kwara State.

Ho3: There is no significance effect of gender on primary school pupil's academic achievement in Edu local government, Kwara state.

Ho4: There is no significance interactive effect of activity-based teaching strategy, gender, and school type on primary school pupils' academic achievement in Edu local government, Kwara State.

Methodology

The study adopted a pre-test, post-test and control quasi experimental design. In the design, both the experimental and the control groups were pre-tested to ensure group equivalence, then exposed to treatment for 2 weeks, at the end of which post-test was administered to determine pupils' achievement. The population for this study consisted of all primary 5 pupils registered in the school in question, which is located in Edu local government area. They are government owned primary schools and private schools; they operate same academic calendar and the same curriculum. The total student population is 1,189, consisting of 581 males and 608 females. All schools offer courses in Basic science with particular reference to measurement, which is relevant to this study. The pupils in the study population have an average age of 9 years. A random sampling technique was used in this study to select four schools and primary 5 of the selected schools participated in the study.

The instruments used for this study were Activity-based instructional package and Basic Science Achievement Test. The topic (Measurement) was derived from the National Curriculum for primary 5 elementary Science. The topic was selected because it features in primary 5 Basic Science curriculums and can be taught using Activity-Based as well as conventional teaching

strategies. In order to determine the validity of the instruments, the questionnaire and instructional package were designed by the researchers, and given to experts and teachers in the department of early childhood and primary education for face and content validity. The instrument was modified in line with the suggestions. To achieve the reliability test in this research work, the split-half method was used. This test is divided into two parts, odd and even, and then the test was administered to the same set of pupils at the same time using Pearson Product Moment Correlation (PPMC). A reliability coefficient of 0.79 was determined. To analyze the data, descriptive statistics (frequency count, mean and percentage) and inferential statistics (ANCOVA) were used.

Result

Table 1: Distribution of the Pupils Based on Gender

Gender	Frequency	Percentage
Male	39	48.7
Female	41	51.3
Total	80	100.0

Table 1 shows the distribution of pupils based on gender. Thirty nine39 of the respondents representing 48.7% were male while 41 of them who represent 51.3% were female. It is apparent that female respondents were more in number than male pupils respondents.

Table 2: Distribution of the Pupils Based on School Type

Gender	Frequency	Percentage
Public	43	53.8
Private	37	46.2
Total	80	100.0

Table 2 shows the distribution of pupils based on school type. 43 of the respondents representing 53.8% were public while 37 of them who represent 46.2% were private. It is apparent that public school pupils were more in number than private pupils.

Ho1: There is no significant effect of Activity-based teaching strategies on the academic achievement of primary school pupils in Edu Local Government Kwara state

Table 3: Summary of Analysis of Covariance (ANCOVA) Showing significant effect of Activity-based teaching strategies on the academic achievement of primary school pupils in Edu Local Government Kwara State

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	3623.034[a]	8	452.879	1.783	.095	.169
Intercept	97087.620	1	97087.620	382.198	.000	.845
PRE TEST	594.366	1	594.366	2.340	.131	.032
TREATMENT	315.342	1	315.342	1.241	.043	.017
GENDER	760.282	1	760.282	2.993	.088	.041
School Type	551.781	1	551.781	2.172	.145	.030
treatment * gender	506.393	1	506.393	1.993	.162	.028
treatment* School Type	128.574	1	128.574	.506	.479	.007
Gender * School Type	17.858	1	17.858	.070	.792	.001
GROUP * GENDER * SCHOOL TYPE	134.261	1	134.261	.529	.470	.007
Error	17781.725	70	254.025			
Total	468183.000	79				
Corrected Total	21404.759	78				

Table 3 shows significant effect of Activity-based teaching strategies on the academic achievement of primary school pupils in Edu. The finding revealed that there is a significant effect of Activity-based teaching strategies on the academic achievement of primary school pupils in Edu Local Government Kwara State ($F(1,79) = 1.241$; $p < 0.05$; $\eta 2 = 0.17$). The effect size is 1.7%. Therefore, hypothesis 1 is rejected. In order to determine the magnitude of treatment size, table 4 presents the estimated marginal mean score.

Table 4:Estimated Marginal Mean Score Of effect of Activity-based teaching strategies on the academic achievement of primary school pupils in Edu

GROUP TYPE	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
CONTROL	73.457a	3.298	66.880	80.035
EXPERIMENTAL	78.111a	2.547	73.032	83.190

Table 4 shows that children taught with Activity-based teaching strategies had higher mean scores (mean = 78.111) than children exposed to the conventional group (mean = 73.457).

Ho2: There is no significant effect of school type on the academic achievement of primary school pupils in Edu Local government Kwara State

Table 3 shows significant effect of school type on the academic achievement of primary school pupils in Edu Local Government Kwara State. The finding revealed that there is no significant effect of school type on the academic achievement of primary school pupils in Edu local Government Kwara State($F(1,79) = 2.172$; $p > 0.05$; $\eta 2 = 0.030$). Therefore hypothesis 2 is not rejected.

Ho3: There is no significant effect of gender on the academic achievement of primary school pupils in Edu Local Government Kwara State

Table 3 shows significant effect of gender on the academic achievement of primary school pupils in Edu government Kwara State. The finding revealed that there is no significant effect of gender on the academic achievement of primary school pupils in Edu Government Kwara State ($F(1, 79) = 2.993$; $p > 0.05$; $\eta 2 = 0.041$). Therefore hypothesis 3 is not rejected.

Ho4: There is no significant interactive effect of Activity-based teaching strategies, school type, and gender on the academic achievement of primary school pupils in Edu Local Government Kwara State

Table 3 shows significant interactive effect of Activity-based teaching strategies, school type, and gender on the academic achievement of primary school pupils in Edu Local Government Kwara State. The finding revealed that there is a significant interactive effect of Activity-based teaching strategies, school type, and gender on the academic achievement of primary school pupils in Edu Local Government ($F(1,79) = .529$; $p > 0.05$; $\eta 2 = 0.07$). Therefore hypothesis 4 is not rejected.

Discussion of the Findings

The result of hypothesis one showed that the pupils in the experimental group who were taught Basic Science Concepts using the Activity-Based Teaching Strategy performed significantly better and achieved higher than their counterparts in the control group, with a significant difference in mean scores of 78.111 and 73.457 in favour of the experimental group which reveals a greater effectiveness of the Activity-Based teaching strategy over the lecture (talk and chalk) as a teaching strategy. This demonstrated the existence of a connection or link between teaching-learning, achievement, and methodology in shaping science learners (Brekke, 2005).)

According to Abdullahi (2005), Activity-based teaching strategy makes the learner to construct his own knowledge to be used in later age, so teachers should pick from the science curriculum topic that involves activities for the learners to discover solution themselves and teachers are expected to guide them. In Activity-Based teaching strategy, pupils have the opportunity to work with concrete materials and engaged in activities, which enhanced meaningful learning and reduces abstract nature from concepts and provide a motivating

environment for learning (Mari, 2002). Earlier in the literature it was stated in Stanley (2008) that science is intellectual activity carried on by human that is designed to discover information about the natural world in which we live and to discover the way in which this information can be organized to benefit human race.

The finding revealed that there is no significant effect of school type on the academic achievement of primary school pupils in Edu local Government Kwara State ($F(1,79) = 2.172$; $p > 0.05$; $\eta 2 = 0.030$). This finding agreed with that of Abdullahi (2005) and Usman (2000) who reported that no school is inferior to another, the only difference between them is how they are taught, and what they are taught. The conventional lecture method used by most teachers is inferior in promoting effective learning. Teachers use it only for easy coverage of the school syllabus, teacher being active while pupils are always passive learners. It is further characterized by one – way flow of information and encourages rote learning and yields little achievement.

The result of testing hypothesis three showed that there is no statistically significant difference between the posttest mean scores of the male and the female in the experimental group. This result agreed with the finding of Bichi (2002) and Stanley (2007) who said understanding are products of meaningful learning, when teaching is effective and meaningful to the pupils whether male or female. Also, this finding was similar to that of Abimbola in Stanley (2008) who observed that the type of teaching strategy used does not discriminate between male or female. This implies that the level of achievement of the male pupils exposed to Activity-Based teaching experiences is the same with their female counterparts. The result indicated that the Activity-Based teaching strategy is gender friendly.

Conclusion

From the findings of this study, the following conclusions were drawn: Teaching strategy that teachers employ in science teaching has significant effects on student's achievement, Activity-Based teaching strategy facilitates effective learning of Basic science, pupils that were taught Basic Science using Activity-Based Teaching the learned concepts significantly better than those taught the same concepts using conventional lecture teaching strategy. Neither the male nor the female pupils performed significantly better than the other when Basic Science were taught to them using either the activity-based teaching strategy or the conventional lecture method. Both teaching methods appear to be gender friendly. Conventional method of teaching science appeared to be inferior to activity-based teaching strategy in the teaching of Basic science as they affect negatively the pupils' academic achievement.

Recommendations

On the basis of the findings and conclusions reached in this study, the following recommendations are made: The teaching of Basic Science should be conducted in such a way that pupils effectively learn the subject presented to them. The use of the activity-based teaching strategy seems to be relevant in achieving this goal. It should therefore be incorporated into the teaching of Basic Science at the primary school level. In service training programmes for Basic science teachers in form of seminars, workshops and conferences should be conducted on how to use activity-based teaching strategy in teaching of Basic Science. During this study, it was discovered that gender did not have a significant in the learning of Basic science concepts using both the activity-based teaching strategy and lecture method of instruction. Curriculum planners should take this into consideration in curriculum planning.

References

Cecilia, O. and Dorothy C. (2015). The impact of hands-on-approach on students' academic performance in basic science and mathematics. Retrieved Nov. 03, 2019 from https://files.eric.ed.gov/fulltext/EJ1086006.pdf

Federal Republic of Nigeria (2005). National Policy on Education.

Felder, R.M. (2010). Learning and teaching science in Colleges Science Education. *Journal of College Science Teaching*, 23 (5): 285 – 295.

Felder, R.M. and Brent, R. (2012). No.5 The intellectual development of science and engineering pupils: In modes challenges. *Journal of Engineering Education*, vol. 93. No. 4, 2004, P. 269 – 278.

Felder, R.M. and Brent, R. (2012). Understanding pupils' differences. *Journal of Engineering Education*. 94(1): 57 – 72.

Fisher, J.A. (2009). The demise of fieldwork as an integral part of science education in schools: A victim of cultural change and political pressure. *Pedagogy, Culture and Society* 9(1), 75-96.

Inekwe, I.O. (2012). Sensitizing pupils learning of mathematics through affective means: A focus on the universal Basic Education. Nigeria Education forum. *A Journal of Institute of Education,* Ahmadu Bello University, Zaria. 16(7): 76 – 81.

James, F. (2010). Essentials of Physics: Lagos, Akinde Publisher (Ltd.).

James, T. and Shuaibu, A.A. (2008). The relative effects of inquiry and lecture methods on the performance of high and low achievers in senior secondary school biology". *Journal of the Science Teacher Association of Nigeria*. 32 (1 & 2). 58 – 65.

Jebson, S.R. (2000). The predictive validity of JSCE integrated science. A case study of Federal Government College, Maiduguri.

Jebson, S.R. (2001). Validity of JSCE integrated science of 1998. Seminar Paper, Faculty of Education, University of Maiduguri.

Kajuru, Y.K. and Popoola, F.R. (2010). Pedagogical Strategies for improving the teaching and learning of mathematics at the Colleges of Agriculture, Nigeria. *Journal of Studies in Science and Mathematics Education.* Department of Education, ABU, Zaria. 1(1): 41-69

Kaure, B. (2012). Girls and mathematics in Singapore. A case study of G.C.E. O-Level Maths in Arbogast, E.D. Effect of gender on the choice of physic in tertiary institution in Zaria. Unpublished PGDE Thesis A.B.U.

Klaves, A. (2010). "Learning style programme boosts achievement and test scores" clearing house, 67(3): 149 – 151. (Online abstract) Eric document available ht/ericaenet/ ericdb/ htm.

Lentz, I 1992 in Arbogast, E.D (2009) Effect of gender on the choice of physics in tertiary institutions in Zaria; Unpublished PGDE Thesis, A.B.U Zaria.

Lowestein, D (2002). Best practice in facilitating school reform*: Best Practice in School Psychology.* 1(1): 235 – 253.

Mari, J.S. (2009). The understanding of science process and its relation to achievement Basic Science. Unpublished M.Ed Thesis of Faculty of Education, Ahmadu Bello University, Zaria.

Mari, J.S. (2001). The effect of process skills instruction on reasoning ability among senior secondary school pupils in Kaduna state. Unpublished Ph.D Thesis, Department of Education, Ahmadu Bello University, Zaria.

Martins, O.O (2009). The effect of inquiry and lecture teaching approaches on the cognitive preferences of integrated science pupils. Unpublished Ph.D. Thesis, Ahmadu Bello University, Zaria.

Oakley, Ann (2007). Sex, gender and society: Great Britain. Redwood Book Ltd.

Obeka, S.S. (2010). Effect of enquiry and demonstration methods on pupils' achievement and retention in some environmental concept of Geography. *Journal of Studies in Science and Mathematics Education*. Department of Education, Ahmadu Bello University, Zaria, 1(1): 52-58.

Sharp, S. (2010). Just like a girl. Harmondsworth Penguin Books.

Shuaibu, A.A.M. (2005). Lecture Note EDSE 701 foundation of science education. Faculty of Education (Science section), A.B.U., Zaria.

Stanley, M. (2008). Indoor and outdoor laboratory experiences on secondary school pupils' academic achievement and retention in Ecology in Kaduna state. Unpublished M.Ed. Thesis, Department of Education, A.B.U., Zaria.

Tuckman, B.W. (2016). Measuring educational outcome. New York, Harcourt Brace Haugwick.

Ukeje, B.O. (2013). The future of teacher education in Nigeria. *Journal of Department of Education,* Ahmadu Bello University, Zaria. 1(1): 74 – 81.

Usman, I.A. (2010). The relationship between pupils' performance in practical activities and their academic achievement in Basic Science using NISTEP Mode of Teaching. Unpublished Ph.D Thesis, Ahmadu Bello University, Zaria.

Usman, I.A. (2008). Relationship between pupils' performances in practical activity and their academic achievements in senior secondary school Biology using NISTEP mode of teaching. *Journals of Education Research and Development*, 2(3) 240 – 244, Faculty of Education, Ahmadu Bello University, Zaria.

Watts, M. and Bantly, D. (2009). Learning and teaching in school science practical's alternatives. Milton Kegnes Open University Press.