EFFECT OF HANDS-ON ACTIVITIES ON PUPILS' ACADEMIC PERFORMANCE IN BASIC SCIENCE IN ILORIN EAST LOCAL GOVERNMENT AREA, KWARA STATE

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ABSTRACT

This study examined the effect of hands-on activities on pupils' academic performance in Basic Science in Ilorin East Local Government Area, Kwara State. The study adopts a pre-test post-test control group quasi-experimental design due to the suitability in establishing possible cause-effect relationship. The study was limited to four schools and factorial design of 2x2x2 was adopted to test the null hypotheses for this study. The research instrument used for data collection were Instructional Package for Basic Science titled (IPBS) and Basic Science Achievement Test which is specifically titled (BSAT) with reliability index of r=0.87. Data were analyzed using descriptive statistic (frequency count, mean and percentage) for demographic data and inferential statistics (ANCOVA) was used to test the formulated hypotheses which were all tested at 0.05 level of significance. The findings revealed that there was significant main effect of hands-on activities on pupils' academic performance in Basic Science ($F_{(1; 72)} = 10.253$, $P< 0.05$). There was significant interaction effect of treatment and school type on pupils' academic performance in Basic Science ($F_{(1; 72)} = 6.100$; $P < 0.05$). Based on these findings the following conclusions were drawn from this study, it is evident that Hands-on activities has main effect on the academic performance of pupils in Basic Science. It was highly recommended that Nigerian Teachers in general and Basic Science teachers in Particular should adopt it in their classroom interaction. Through this, they will be equipped with more knowledge that will improve pupils' academic performance in Basic Science.

Key words: *Hands-on Activities, Basic Science, Academic Performance*

Introduction

Over the years, there has been a continuing reform effort for improvement in the quality of science education in different countries. The quality of science instruction requires the active participation and involvement of learners, instead of simply listening to a teacher about a given subject, the pupils' engages with the subject matter to solve a problem or create something, but reverse is the case; the traditional "chalk and talk" method of teaching is still being used up to this moment in some schools in Nigeria especially in Kwara State.

O'Connor (2012) identified the use of inappropriate teaching methods as one of the factors that contribute to the low participation and performance of pupils' in science. The teaching methods used are not practical enough, and that teachers make little effort to relate the concepts learnt and their examples or illustrations to real life situations, especially within the context of the pupils' own lives and environment. This has a negative effect on pupils' interest and motivation to study science, technology, engineering and mathematics (STEM) subjects.

Danso (2010) indicates that teachers favour teacher-centered, knowledge-based teaching methods that leave little room for learners' participation. The most commonly used teaching methods at both basic and secondary levels have been found to be lecturing, question and answer, explanations of procedures, and notes giving, in that order (O'Connor, 2012). Teachers' expect pupils' to understand basic science concepts without making the pupils' to be involved in their learning by making use of "Hands-on" learning activities that pupils' can interact with to make learning more interesting and permanent.

Hands-on in general means learning by experience; pupils' handle scientific instruments and manipulate the objects they are studying (Nina, 2009). Franklin and Peat (2005), suggest that working in a hands-on way provides a more realistic and exciting experience of the content. Hands-on activity is a method of instruction where pupils' are guided to gain knowledge by experience. Hands-on means giving the pupils' the opportunity to manipulate the objects they are studying, for instance, plants, insects, rocks, water magnetic field, scientific instruments, calculators, rulers, mathematical set,

and shapes, it is a process of doing science where pupils' become active participants in the classroom (Franklin and Peat, 2005).

According to Merriam-Webster Dictionary (2021) defines "hands-on" as "relating to, being, or providing direct practical experience in the operation or function of something; involving or allowing use of or touching with the hands; characterized by active personal involvement; gained by actually doing something rather than learning about it from books. Hands-on activities brings so many benefits to pupils', by providing a more engaging way for pupils' to learn, which helps to increase retention as a result of involving in practice of problem solving and critical thinking which also often results in a physical creation.

Hands-on activities allow children to use their senses while learning, they see, touch, and move real objects to complete tasks. This means that letters, numbers, shapes, colors, and more are brought to life! pupils' begin to understand the meaning behind what they are doing, pupils' get excited and engaged because they are having fun and helps them increasing their attention span, this helps them to build knowledge and increase their long-term memory and also strengthen their fine motor development by learning to control, communicate, concentrate and dedicate to finishing tasks and problem solving skills (Fun Early Learning, 2021).

Hands-on activities allows pupils' to learn through experience and can give them an opportunity to immerse themselves in a learning environment, while putting their acquired skills to use and building new skills. This type of learning is best suited for kinesthetic learners, who learn from examples kinesthetic learners more effectively retain information when they can move their bodies and interact with their environments. They prefer to be active participants rather than passive observers and typically work problems out through trial and error rather than accepting information presented to them, hands-on activity is another term for experiential learning, where individuals immerse themselves in a subject to learn, pupils' learn from partaking in activities rather than passively reading a book or attending a classes (Tophat, 2021).

Hands-on activities let the pupils' minds grow and learn based on the experiences and the environment they are exposed to learn while discussing, investigating, creating, and discovering with other pupils', as pupils' become familiar with the subject they are

learning, they begin to make decisions, requiring less teacher support and allowing more interactive learning experiences to occur (Cooperstein and Kocevar-Weidinger, 2004).

Basic science is a subject that introduces pupils' to the basic rudiments of technology. At inception of the 6-3-3-4 system of education, it was called "introductory technology" but currently in the 9-3-4 system of education it is called Basic science and Technology. The National Policy on Education (2013) defined it as the aspect of education which leads to acquisition of practical and applied skills as well as basic scientific knowledge. However, Ibe and Abonyi (2014) notes that a serious aberration on quality of science in Nigeria is due to the over-emphasis on mastery of subject content, theory and excessive examination consciousness against practical orientation toward science based disciplines. This according to them led to the failure of the science education program in developing countries and Nigeria in particular. There is an increase in the percentage of pupils' who failed Basic science in Junior Secondary School Certification examination from 2006 to 2012 in Nigeria (Mohammed, 2012). Fakomogbon (2012) also shows that Basic science pupils' in Nigeria have poor attitude and retention towards the subject.

Science education is the bedrock of any civilization and it's expected to produce individuals that are capable of solving their problems as well as that of their society. However, pupils' are taught memorize science and not giving room to do science by interacting with learning resources. This has affected the performance of pupils' in the subject, pupils' do not only perform poorly, but have very low interest for Science, pupils' are expected to be autonomous, confident and self-reliant after graduation from school. In recent times, applicability of what one learns in school to real life situation is very low. According to West African Examination Council (2007-2014) reports also indicated that most pupils' performance in science subjects in Senior School Certificate Examination (SSCE) are very low and so many factors are responsible for this poor performance, of which lack of good teaching method that involves pupils' active participation. It has been observed that many schools in Nigeria lack so many infrastructures most commonly Hands-on activities resources for teaching.

Basic Science is a critical subject for pupils' to learn while they are in school because it plays such an essential role in everyday life and leads to many possible career choices. This has always been the case, but it is even more important in the high-tech age we live in. The world today demands of pupils' at least a rudimentary knowledge of both the principles of science as well as how to apply them to solve real-life problems. But teaching science in a way that allows pupils' to learn the various aspects of the topic effectively is a real challenge for teachers. For pupils' to learn science properly, they must be engaged both mentally and physically as much as possible in the tasks involved. That's where techniques such as hands-on and minds-on learning come into play (Nextstepu, 2021). 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 human race. In this respect, the primary focus of science is to collect data and the ultimate purpose is to discern order that exists in natural phenomena and happenings around us.

National Policy on Education (NPE, 2013) emphasized the importance of science education at all levels, at the primary school level the objective of science education is to lay a sound knowledge in scientific and reflective thinking. There was inculcation of literacy and numeracy and the study of science and introductory technology. Government planned to provide materials and teachers for the teaching of science and technology. At the secondary school level, the aim is for the preparation of pupils' for useful living in the society and for higher education. The objective of the science policy is to equip pupils' with adequate scientific knowledge to live effectively in modern age of science and technology.

Several studies in the literature show that hands-on activities help pupils' to outperform pupils' who follow traditional, text-based programs (Bilgin, 2006), emphasizes that children learn better when they can touch, feel, measure, manipulate, draw, make charts, record data and when they find answers for themselves rather than being given the answer in a textbook or lecture. For pupils' to truly learn science concepts, they both need practical opportunities to apply knowledge and also need help in integrating or exchanging the knowledge they gain. Furthermore it is often based on demonstrations

which give pupils' ideas on how something works; it does not place emphasis on details. Pupils' may feel after learning the basics that they do not need to do anymore study with regard to the hands-on activities. Also there are some hands-on activities that private schools are more likely to be able to afford compared to public schools. No doubt actively involving pupils' in using hands-on activities enhances their education, but it must be said that it will be more effective if it is combined with traditional learning from books in sum, it is very good in providing a foundation for knowledge and understanding.

Though from the foregoing, many researchers had investigated Hands-on activities in different fields, none has worked on effect of hands-on activities on pupils' academic performance in Basic Science specifically in Ilorin East Local Government Area of Kwara State. Hence, this creates a researchable gap in knowledge which the researcher intends to fill by investigating the effect of hands-on activities on pupils' academic performance in Basic Science in Ilorin East Local Government Area, Kwara State.

However, it has been observed by different researchers may have carried out studies on hands-on activities are alongside learning strategies and academic performance while few have studied the effectiveness of hands-on activity on pupils' social skills and in art subject which may not have examined in Basic Science as a subject and also in Ilorin East Local Government Area of Kwara State. Hence, this justifies the need to conduct this study. Therefore, this study would examine the effect of hands-on activities on pupils' academic performance in Basic Science in Ilorin East Local Government, Kwara State.

Research Hypotheses

The following null hypotheses were formulated for the purpose of this study; the decision was taken at 0.05 level of significance:

Ho1: There is no significant main effect of treatment on pupils' academic performance in Basic Science in Ilorin East Local Government, Kwara State.

Ho2: There is no significant main effect of gender on academic pupils' performance in Basic Science in Ilorin East Local Government, Kwara State.

Ho3: There is no significant main effect of school type on pupils' academic performance in Basic Science in Ilorin East Local Government, Kwara State.

Ho4: There is no significant interactive effect of treatment and gender on pupils' academic performance in Basic Science in Ilorin East Local Government, Kwara State.

Ho5: There is no significant interactive effect of treatment and school type on pupils' academic performance in Basic Science in Ilorin East Local Government, Kwara State.

Ho6: There is no significant interactive effect of gender and school type on pupils' academic performance in Basic Science in Ilorin East Local Government, Kwara State.

Ho7: There is no significant interactive effect of treatment, gender and school type on pupils' academic performance in Basic Science in Ilorin East Local Government, Kwara State.

Theoretical Review

Learning by Doing Theory by John Dewey

Dewey (1938) described progressive education as "a product of discontent with traditional education" which imposes adult standards, subject matter, and methodologies (no page number). He believed that traditional education as just described, was beyond the scope of young learners. Progressive education as described by Dewey should include socially engaging learning experiences that are developmentally appropriate for young children (Dewey, 1938).

Dewey thought that effective education came primarily through social interactions and that the school setting should be considered a social institution (Flinders and Thornton, 2013). He considered education to be a "process of living and not a preparation for future living" (Flinders and Thornton, 2013; Gutek, 2014). This set of beliefs set Dewey apart from philosophers that supported traditional classroom settings. In contrast to traditional classrooms, Dewey thought that schools and classrooms should be representative of real life situations, allowing children to participate in learning activities interchangeably and flexibly in a variety of social settings (Dewey, 1938; Gutek, 2014). He was of the idea that abruptly introducing too much academic content, out of context with children's social lives, bordered on unethical teaching behavior (Flinders and Thornton, 2013). This notion would be a point of conflict in education today, as it is

vastly different from what is happening in classrooms with the strong emphasis on implementing the Common Core standards.

The strong focus on increasing academic achievement through the use of Common Core standards in today's classrooms makes finding evidence of John Dewey's philosophies in classrooms less common than it used to be (Theobald, 2009). Learner-centered educators believe that Dewey's work is supportive of many of their beliefs about how Pupils' learn (Schiro, 2013). In learner-centered classrooms, one can see much of John Dewey's social learning theory and educational beliefs in action. He viewed the classroom as a social entity for children to learn and problem-solve together as a community. In these classrooms children are viewed as unique individuals; Pupils' can be found busy at work constructing their own knowledge through personal meaning, rather than teacher-imposed knowledge and teacher-directed activities (Schiro, 2013).

Children will be seen learning-by-doing in these classrooms and they will be solving problems through hands-on approaches. When teachers plan for instruction, student interests will be taken into consideration and curricular subjects will be integrated with an emphasis on project learning. The educational experience encompasses the intellectual, social, emotional, physical, and spiritual growth of the whole child, not just academic growth (Schiro, 2013). John Dewey and other pragmatists are convinced that Pupils' or other persons who are learning must experience reality as it is. From John Dewey's educational point of view, this means that Pupils' must adapt to their environment in order to learn. His view of the ideal classroom had many similarities with democratic ideals. Dewey posits that it isn't just the student who learns, but rather the experience of Pupils' and teachers together that yields extra value for both (Janse, 2019).

Concept of Hands-on Activities

Hands-on activity is a form of education in which children learn by doing. Instead of simply listening to a teacher or instructor lecture about a given subject, the pupil engages with the subject matter to solve a problem or create something. Hands-on activities let the pupils' minds grow and learn based on the experiences and the environment they are exposed to learning while discussing, investigating, creating, and

discovering with other pupils'. As the pupils' become familiar with the subject they are learning, they begin to make decisions, requiring less teacher support and allowing more interactive learning experiences to occur (Cooperstein and Kocevar-Weidinger, 2004).

Pupils' should be encouraged to be creative and to think outside the box, let them know that there is more than one way to get their message across. This teaching method will bring pride and ownership to their learning experience. During hands-on activities, teachers do not direct pupils' at every step. Therefore, at the introduction of the project, teachers should provide pupils' with rubrics on how their project or presentation will be graded, as well as the requirements for each level of performance. By providing clear expectations on what you expect pupils' to know, and do can become active learners and gain expertise on the subject as they meet their learning goals. This learning modality builds on social interaction and therefore allows them to have an opportunity to provide input as they learn new, important language and grammatical skills. As stated in the article by Copperstein and Kocevar-Wiedinger (2004), when explaining the benefits of hands-on activities, "abstract concepts become meaningful, transferable, and retained because they are attached to performance of an activity". In other words, when pupils' have the opportunity to take learning into their own hands, they become proud and motivated to continue to grow and learn.

Methodology

The study adopted pretest-posttest control group quasi-experimental design due to the suitability in establishing possible effect relationship. The population for this study comprises of all private and public school pupils' registered in schools in Ilorin East Local Government, Kwara State. There are sixty-one (61) public schools and two hundred and sixty-six (266) private schools making a total of three hundred and twenty-seven schools (327) public and private schools (Annual School Census Report, 2018-2019). The researcher adopted simple random sampling technique to select the schools that was used for the experimental and control group respectively, two (2) schools was picked for the experimental group and another two (2) schools was picked for the control group. Purposefully, intact classes of primary four pupils was sampled from the

four primary schools selected for the study. The instruments that were used for this study are Basic Science Achievement Test which is specifically titled (BSAT) which was developed by the researcher on the topics “Measurement” and “Weather” as well as Instructional Package for Basic Science titled (IPBS). The two instruments were given to experts in Early Childhood and Primary Education for validity, the corrections and observations were strictly adhered to before administration. To achieve the reliability of pupils’ Basic Science Achievement Test the researcher administered the (BSAT) to a school in the location but not be part of the sample, split half method of reliability was adopted, the test were divided into two, odd and even, the reliability index was calculated using Pearson Product Moment Correlation (PPMC) and the reliability index of r=0.87 was derived. To analyze the data inferential statistics (ANCOVA) was adopted. The decision was taken at 0.05 level of significance.

Results

This section is concerned with data analysis and the result of the study. Inferential statistics of Analysis of Covariance (ANCOVA) was adopted to analyze the research hypotheses generated at 0.05 alpha level of significance and also discussion of findings.

Testing of the Hypotheses

Ho1: There is no significant main effect of treatment on pupils’ academic performance in Basic Science in Ilorin East Local Government Area, Kwara State.

Table 1: Summary of Analysis of Covariance (ANCOVA) showing the Main Effect of Treatment on Pupils Academic performance in Basic Science

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1242.509[a]	8	155.314	16.148	.000
Intercept	696.310	1	696.310	72.394	.000
Pre_Test	309.660	1	309.660	32.195	.000
Treatment	98.618	1	98.618	10.253	.002
School_Type	29.205	1	29.205	3.036	.086
Gender	23.188	1	23.188	2.411	.125

Treatment * School_Type	58.671	1	58.671	6.100	.016
Treatment * Gender	.156	1	.156	.016	.899
School_Type * Gender	9.072	1	9.072	.943	.335
Treatment * School_Type * Gender	3.512	1	3.512	.365	.548
Error	615.573	64	9.618		
Total	24092.000	73			
Corrected Total	1858.082	72			

a. R Squared = .669 (Adjusted R Squared = .627)

Table 1 shows the effect of treatment on pupils' academic performance in Basic science in Ilorin East Local Government Area, Kwara state. There was significant main effect of treatment on pupils' academic performance in Basic science in Ilorin East Local Government Area, Kwara state ($F_{(1; 72)} = 10.253$, $P< 0.05$). The hypothesis is therefore rejected. This implies that treatment had significant effect on pupils' academic performance in Basic science in Ilorin East Local Government Area, Kwara State.

Table 2: Summary of Bonferroni's Poc Hoc Pairwise Comparison of the scores within the two groups

Treatment	**Mean Difference**	**Hands on**	**Conventional**
Hands-On	19.205[a]		*
Conventional	16.205[a]	*	

Table 2 revealed that the significant main effect exposed by table 3 is as a result the significant difference between Hands-on activities and conventional method. Hands-on Activities refers to the experimental group, while conventional method is known as control group. This implies that those exposed to Hands-on activities (19.205) performed significantly higher than those exposed to conventional method (16.205).

Research Hypothesis Two: There is no significant effect of gender on pupils' academic performance in Basic Science in Ilorin East Local Government Area, Kwara state

Table 2 revealed the effect of gender on pupils' academic performance in Basic Science in Ilorin East Local Government Area, Kwara state. There was no significant effect of gender on pupils' academic performance in Basic Science in Kwara State ($F_{(1; 72)}$=2.411; P > 0.05). The hypothesis is therefore not rejected. This implies that gender had no significant effect on pupils' academic achievement in Basic Science in Ilorin East Local Government Area, Kwara State.

Research Hypothesis Three: There is no significant effect of school type on pupils' Academic performance in Basic Science in Ilorin East Local Government Area, Kwara State.

Table 1 also revealed the effect of school type on pupils' academic performance in Basic Science in Ilorin East Local Government Area, Kwara State. There was no significant effect of school type on pupils' academic performance in Basic Science in Ilorin East Local Government Area, Kwara State ($F_{(1; 72)}$ = 3.036; P > 0.05). The hypothesis is therefore not rejected. This implies that school type had no significant effect on pupils' academic achievement in Basic Science in Ilorin East Local Government Area, Kwara State.

Research Hypothesis Four: There is no significant interaction effect of treatment and school type on pupils' academic performance in Basic Science in Ilorin East Local Government Area, Kwara State

Table 1 also revealed the interaction effect of treatment and gender on pupils' academic performance in Basic Science in Ilorin East Local Government Area, Kwara state. There was significant interaction effect of treatment and school type on pupils' academic performance in Basic Science in Ilorin East Local Government Area, Kwara state ($F_{(1; 72)}$ = 6.100; P < 0.05). The hypothesis is therefore rejected. This implies that interaction of treatment and school type had significant effect on pupils' academic achievement in Basic Science in Ilorin East Local Government Area, Kwara State.

Table 3: Summary of Bonferroni's Poc Hoc Pairwise Comparison of the scores within the two groups

Treatment	Mean Difference	Experimental	Control Group
Public	16.745	*	
Private	18.735	*	

Table 3 revealed that the significant main effect exposed by table 3 is as a result the significant difference between treatment in public and treatment in private schools. This implies that those exposed to Hands-on Activities in Private schools (18.735) performed significantly higher than those exposed to Hands-on Activities in Public schools (16.745).

Research Hypothesis Five: There is no significant interaction effect of treatment and gender on pupils' academic performance in Basic Science in Ilorin East Local Government Area, Kwara State.

Table 1 also revealed the interaction effect of treatment and gender type on pupils' academic performance in Basic Science in Ilorin East Local Government Area, Kwara State. There was no significant interaction effect of treatment and gender on pupils' academic performance in Basic Science in Ilorin East Local Government Area, Kwara State ($F_{(1; 72)} = .016$; $P > 0.05$). The hypothesis is therefore not rejected in light of the result since the significant value (.899) is greater than 0.05. This implies that treatment and gender had no significant effect on pupils' academic achievement in Basic Science in Ilorin East Local Government Area, Kwara State.

Research Hypothesis Six: There is no significant interaction effect of gender and school type on pupils' academic performance in Basic Science in Kwara State

Table 1 also revealed the interaction effect of gender and school type on pupils' academic performance in Basic Science in Ilorin East Local Government Area, Kwara State. There was no significant interaction effect of gender and school type on pupils' academic performance in Basic Science in Ilorin East Local Government Area ($F_{(1; 72)} = .943$; $P > 0.05$). The hypothesis is therefore not rejected in the light of the result since the significant value (.335) is greater than 0.05. This implies that the interaction of

gender and school type had no significant effect on pupils' academic achievement in Basic Science in Ilorin East Local Government Area, Kwara State.

Research Hypothesis Seven: There is no significant interaction effect of treatment gender and school type on pupils' academic performance in Basic Science in Ilorin East Local Government Area, Kwara State.

Table 1 also revealed the interaction effect of treatment, gender and school type on pupils' academic performance in Basic Science in Ilorin East Local Government Area, Kwara State. There was no significant interaction effect of treatment, gender and school type on pupils' academic performance in Basic Science in Ilorin East Local Government Area, Kwara State ($F_{(1; 72)} = .365$; $P > 0.05$). The hypothesis is therefore not rejected in light of the result since the significant value (.548) is greater than 0.05. This implies that treatment, gender and school type had no significant effect on pupils' academic achievement in Basic Science in Ilorin East Local Government Area, Kwara State.

Discussion of Findings

This study examines the effect of hands-on activities on pupils' academic performance in Basic Science in Ilorin East Local Government, Kwara State. The findings revealed that treatment had significant effect on pupils' academic performance in Basic science in Ilorin East Local Government Area, Kwara State. This is in line with Josiah and Victor (2016) study revealed that pupils' taught using hands-on activities had significantly higher mean achievement scores than those taught using other method. It was recommended that since hands-on activities method was found to be an effective method for improving pupils' achievement and retention; teacher's trainee should be trained on the use of hands-on activities and serving teachers should be encourage to use it.

This study also examines the effect of gender on academic pupils' performance in Basic Science in Ilorin East Local Government, Kwara State. The findings revealed that Gender had no significant effect on pupils' academic achievement in Basic Science in Ilorin East Local Government Area, Kwara state. This study is in line with Ogunkola and Bilesanmi-Awoderu (2000) study which revealed that pupils' achievement in Biology

was not sensitive to the sex of pupils'. Bilesanmi-Awoderu (2002) study also revealed that there was no significant main effect of gender on pupils' achievement in Science subjects.

This study also examines the effect of school type on pupils' academic performance in Basic Science in Ilorin East Local Government, Kwara State. The finding is in line with Latisha (2016) study which revealed privately managed public primary schools (assisted schools) relative to traditional public schools (government schools). The analysis finds no meaningful difference in academic achievement between students in assisted schools versus students in government schools.

This study furthermore examines interactive effect of hands-on activities and gender on pupils' academic performance in Basic Science in Ilorin East Local Government, Kwara State. The findings revealed that Treatment (Hands-on Activities) and gender had no significant effect on pupils' academic achievement in Basic Science in Ilorin East Local Government Area, Kwara State. This study negates Munir and Mumtaz (2013) study which indicated that there was a significant difference between the means of the pupils' science achievement in favor of the experimental group.

This study also examines interactive effect of hands-on activities and school type on pupils' academic performance in Basic Science in Ilorin East Local Government, Kwara State. The findings revealed that Interaction of treatment and school type had significant effect on pupils' academic achievement in Basic Science in Ilorin East Local Government Area, Kwara State**.** This study negates with Olatunji ~~&~~and Gabriel (2012) study revealed no significant difference in academic performance of students in the two types (public and private) of secondary schools. Suggestions for the procurement of more facilities in public secondary schools were made in order to enhance students' academic performance.

This study also examines interactive effect of gender and school type on pupils' academic performance in Basic Science in Ilorin East Local Government, Kwara State. The findings revealed that Interaction of gender and school type had no significant effect on pupils' academic achievement in Basic Science in Ilorin East Local Government Area, Kwara State. This finding negates with Babagana and Babakura (2017) study which revealed that there were significance difference in students'

academic performance in West African examination council (WASSCE) due to school Characteristics, school location, school ownership, and school organization in Maiduguri education zone, Borno Sate, Nigeria. The study is significant to educational planners and administrators in planning for the needed types of schools by the community.

This study also finally examines interactive effect of hands-on activities, gender and school type on pupils' academic performance in Basic Science in Ilorin East Local Government, Kwara State. The findings revealed that Treatment, gender and school type had no significant effect on pupils' academic achievement in Basic Science in Ilorin East Local Government Area, Kwara State. The finding supported Rafiu (2018) study which unfolded that gender had no significant effect on the academic performance of pupils in numeracy in Ilorin West Local Government Area of Kwara State. Similarly, Tijani (2017) unfolds that the type of school attended by pupils did not affect their academic performance in mathematics. On the contrary, this finding negated the finding of Newhouse and Beegle (2005) which revealed that was significant difference in the academic performance of pupils based on school type.

Conclusions

Based on the findings of the study, it is evident that hands-on activities has effect on the academic performance of pupils in Basic Science. Hands-on activities can bring about improvement in the academic performance of pupils in Basic Science regardless of gender. Those exposed to hands-on activities in private schools performed significantly higher than those exposed to hands-on activities in public schools. Interaction of gender and school type had no significant effect on pupils' academic achievement in Basic Science.

Recommendations

On the basis of the findings and conclusions reached in this study, the following recommendations are made:

i. Since hands-on activities is a teaching techniques that provides a more realistic and exciting experience of the subject matter and also allows pupils' to learn through experience that gives the pupils' opportunity to immerse themselves in a learning environment, while putting their acquired skills to use and building new

skills. It is highly recommended that teachers should be encouraged to use hands-on activities in the classroom.

ii. Teachers should not limit their knowledge to what they were taught while in training they should be current and updated by sourcing for information on the internet to find out various methods to improve individual pupils' performance in the classrooms. Through this, they will be equipped with more knowledge that will improve pupils' academic performance in Basic Science. Since most teachers may not be conversant with the use of hands-on activities as a teaching method. Seminars, workshops and conferences should be organized for teachers to get acquainted with the use of the method.

iii. There is need for the Ministry of Education to mount periodic training sessions for teachers who are already in the field to be retrained on recent discovery regarding the use of hands-on activities in teaching Basic Science in primary schools. The Government should encourage the use of hands-on activities in the curriculum of Basic Science.

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