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EFFECTS OF MODERN TEACHING APPROACH ON ACADEMIC ACHIEVEMENT IN BASIC SCIENCE AMONG JUNIOR SECONDARY SCHOOL STUDENTS IN ILARA-MAKIN AKURE NORTH, ONDO STATE, NIGERIA

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Abstract

The study investigated the effects of Modern Teaching Approach (MTA) on academic achievement in Basic Sciences among Junior Secondary School students in Ilara-Makin Akure North, Ondo State, Nigeria. The objective of the study was to find out how effective is MTA in teaching of science in junior secondary schools. Research design used was quasi-experimental of pre-testand post-test. Population of the study comprised of all JSS II students of Government Secondary School in Ilara-Makin Akure North, Ondo State, Nigeria. The objective of the study was to find out how effectiveis MTA in teaching of science. The sample of 150 students, comprised 66 male and 84 female, were selected randomly from Community High School Ilara-Makin Akure North, Ondo State. The objective of the study was to find out how effective is MTA in teaching of science. The instrument for data collection was Energy Achievement Test (EAT) which was validated by the experts in the Department of Science and Environmental Education, Mathematics unit and Measurement and Evaluation in the Department of Educational Foundations all in the Faculty of Education. There liability of the EAT using the Cronbach Alpha technique fielded 0.88. Meanand standard deviation were used to analyse research questions and Analysiso f Covariance (ANCOVA) was used to test the null hypotheses at 0.05 level of significance. Result of the analysis revealed that there was significant difference in the mean achievement scores of the students taught Energyu sing Modern Teaching Approach (MTA) and those taught using the traditional method in favour of experimental group and there was no significant difference in the mean achievement scores of male and female students taught Energy using MTA in Ilara-

Keywords: Academic Achievement, Basic Science, Modern Teaching Approach, Gender

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Makin Akure North public Junior Secondary Schools. Based on the findings, it was recommended among others that the use of Modern Teaching Approach (MTA) should be encouraged by Basic science teachers and other teachers in junior secondary schools, Stakeholders in education should, from time to time, organize seminars and workshops on Modern Teaching Approach (MTA) for teachers in order to meet with 21st century instructional delivery.

Introduction

Basic science is the foundation on which other sciences build on, because with full knowledge of basic science other sciences find their roots, form their stands, create an venue and activities to function and develop easily. It is one of the core subject in the school curriculum. Basic science subject is the foundation for all Science, Engineering, and Technological studies (Belhu, 2017). Basic science knowledge skills and competence are critical determinants for post-school and career options available to our youth (Kurniawan et.al., 2020). Also, Basic science can be seen as a branch of science which deals with the study of manipulation of physical materials and that Basic science is the gateand key to all sciences. The systematic study of the structure and behavior of the physical and natural world through observation, experimentation and the testing of theories against evidence obtained (https://colabresearchgoogle.com).

Science is the knowledge of consequences and dependence of one fact upon another (https://www/nature.com). It helps us recognize value of people and understand the world around us. It was affirmed that selection of Basic science as one of the core subject offered in primary and secondary schools in Nigeria (Habu,*et.al,*2021). Its status as part of mandatory requirement for admission into post-secondary institutions in the country are clear indications of the importance of the subject in Nigeria education system. Despite of its importance, Basic science is being considered as the most difficult and boring subjects among school students (Habu, *et.al,* 2021).

Basic-science knowledge plays important role in enhancing Nigeria technological development and advancement. Many stakeholders in the field of Basic science have identified various factors affecting teaching and learning of Basic science. Among the factors are environmental (either home or school), physiological, social and pedagogical in nature (Dahunsi, 2021). Out of these factors, pedagogical factor is the critical area that mostly concerned Basic science teachers because it involves teaching methodologies used by the teachers for lesson delivery. The instructional method employed by the teacher plays a significant role in the acquisition of skill and meaningful understanding of the concepts. If the teaching methods employed by Basic science teacher are not student friendly, then the aim of teaching and learning is defeated. Therefore method of teaching

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chosen by mathematics teachers determine how comprehensive the students will understand the concepts.

Musa (2000) observes that one of the best ways for learners to learn and remember concepts is to individually construct knowledge rather than to be lectured. There are several pedagogies which can be employed for teaching Basic science. Prominent among them used in teaching and learning process are laboratory method, discovery method, integrated strategies, demonstration method, field trip, project method, lecture method, Modern Teaching Approach (MTA). MTA is the use of technology based study like LCD projector, Computers or Laptops with Wi-Fi Connection, Interactive White boards. Modern Teaching Approach (MTA) is an approach which provides an entirely different angle of teaching and learning because MTA do no treat all students at the same level of their understanding ability, unlike the conventional method of teaching. Rather than the only teacher-based, MTA focuses more on questioning, demonstration, explaining, practical, collaboration methods, and are more activity-based. The MTA is a learner-centred and activity-based teaching method which is used to get learners fully involved in the teaching and learning processes. This approach recognizes the learner as the primary reason for curriculum planning andt eaching. In the MTA, curriculum teaching and planning are done keeping the learner as the primary target. Through this,l earners actively participate in the whole process to build their knowledge and sharpen their skills,t his is also termed as a constructivist approach.

Namitha (2018) affirms that the use of innovative methods in educational institutions has the potential not only to improve education, but also to empower people, strengthen governance and galvanize the effort to achieve the human development goal for the country. Astudy conducted by Cobra, Mojtaba and Ebrhaim (2013) in Iran on the effect of the active teaching method on the academic achievement in the Religious concepts found that the educational achievement of the students who are taught with the active method is higher than that of the students who are taught with the traditional method. Also, Iyamuremye, Ndayanbaje and Muwonge (2021) carried out a study on the influence of teaching approaches on students' performance in Mathematics: A meta-analysis of Quasi-Experimental studies in Africa. They found that teaching approaches have an overall large significant effect on students' performance. Specifically, the teaching approach that used concrete manipulative showed a larger significant effect size than any other type of teaching approach. In another study conducted by Abdelkarim and Abuiyada (2016) on the effect of peer teaching on Basic science academic achievement of the Undergraduate students in Oman, researchers discovered that peer teaching strategy is an active tool to increase the Basics cience academic achievement. In a study conducted by Ganyaupfu (2013) on teaching methods and students' academic

achievement found that teacher-student interactive method was the most effective teaching method.

Researchers have divergent views on students' gender has it affects their academic achievement. Freud (2011) suggested that the difference in academic achievement of male and female anatomy has bearing and indeed account for the difference observed between the personalities of men and women. Alordiah, Akpadaka and Oviogboda (2015) investigated the influence of gender on students' academic achievement and it was found that students have an average achievement academically; the result also showed that male students performed better than female students. Gustavsen (2019) investigated the extent to which prior social skills and academic achievement as well as the teachers' gender and the gender ratio of classes explained boys' and girls' teacher-assessed academic achievement in Norwegian. The study found that previous academic achievement at the classroom level explained variance in boys' and girls' individual lacademic achievements of students'.

AjaiandImoko (2015) assessed gender differences in academic achievement and retention by using Problem-Based Learning (PBL). The study revealed that male and female students taught algebra using PBL did not significantly differin achievement and retention scores, there by revealing that male and female students are capable of competing and collaborating in the class. The finding showed that performance is a function of orientation, not gender. Abubakar and Dokubo (2011) examined the correlates between age and gender on academic achievement (Cumulative Grade Point Average-CGPA) of Basic science education and other science related subject in secondary school. The finding shows that there was no significant gender difference in academic achievement of the basic science study and science related subject in secondary school. Oribhabor (2019) on the study conducted on influence of gender on academic achievement in Mathematics among senior secondary school students in Bayelsa state and found that gender does significantly influence academic achievement of students in basic science in favour of the males.

In recent years, the scope of knowledge in the field of science and technology has dramatically increased, and human's ability to adapt to new knowledge in science and technology has also increased. So, there is an immense need for innovative and creative minds to explore unknown and unrevealed areas of different fields. To cope with the modern world and the knowledge-driven era of technology, adopting modern ways are the only means to survive (Sujata, 2023). So, students should be taught in a manner to challenge the 21st century, which is technology-driven era and which requires creative and innovative minds for the progress of individuals, society, and the nation. Students should be introduced with MTA and are provided sufficient basic science knowledge skills so that they can create opportunities for themselves and others. If teachers teach with MTA

instead of traditional impractical methods and present mathematics lessons in a more proper conceptual way, then many problems, including unemployment, can be over come because students will be creative and beself-reliance. All this can be achieved by providing a strong pillar to the secondary school system and other level of education. This paper looks into the effects of Modern Teaching Approach (MTA) on academic achievement in basic science among Junior Secondary School students in community Comprehensive High School in Ilara-Makin, Akure North, Ondo State, Nigeria.

Research Questions

The following are the research questions generated to guide this study:

1. Is there any significant difference in the mean achievement scores of the students taught Energy using Modern Teaching Approach (MTA) and those taught using the traditional method?
2. Is there any significant difference in the mean achievement scores of male and female students taught Energy using MTA in community Comprehensive High School in Ilara-Makin Akure North, Ondo State?

Research Hypotheses

The following null hypotheses were formulated to guide this study:

Ho_1: There is no significant difference in the mean achievement scores of the students taught Energy using Modern Teaching Approach (MTA) and those taught using the traditional method.

Ho_2: There is no significant difference in the mean achievement scores of male and female students taught Energy using MTA in Ifedore local government Ondo State, junior secondary schools.

Methods

The study adopted aquasi-experimental design method because the researcher has no total control over the variables. The population of the study comprised of all Junior Secondary School students of public secondary schools in Ifedore local government in Ondo state. The sample size for this study was 152 JSSII students comprised of 68 male and 84 female from Ifedore local government in Ondo state using multistage sampling procedure. Firstly, the purposive sampling technique was used to select a school from Ifedore local government in Ondo state. Secondly, simple random sampling was used to assign one intact class to experimental groups and the other intact class to control groups. The groups for the study were coded group I and group II comprising one experimental class and one control class respectively. Experimental class (Group I) consists of 76 students (34 males and 42 females) and control classal so (Group II)

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consists of 76 students (34 males and 42 females). The two intact classes were taught separately by their teacher who had been trained by the researcher on MTA. The experimental group and control group were taught Energy using Modern Teaching Approach (MTA) and Traditional method respectively for a period of three weeks to enable the researcher to cover all aspect of the topics.

The instrument tagged Energy Achievement Test (EAT) was developed by there searcher to determine the students' achievement in Energy after exposure to treatments. The instrument was subjected to face and content validation by three experts, two in the Department of Science and Environmental Education, and an expert in Measurement and Evaluation in the Department of Educational Foundations, allinthe Faculty of Education, University of Abuja. The content validation was established using the table of specifications. The suggestions of the experts were applied in producing the final instrument used for the study. Pilot study was carried out in

A secondary school different from the study school and the result was subjected to reliability using Cronbach Alpha technique which gives a reliability index of 0.88.

The EAT comprised two sections: Section A indicated instruction and background information of the respondents while section B comprised of 35 questions drawn based on the Algebraic Fraction topics that were taught. EAT has 10 essay and 25 multiple choice items with option A-D. Each of the essay questions attracts 5 marks while multiple choice items attract 2 marks totaling 100. Mean and standard deviation were used to answer the research questions and Analysis of covariance (ANCOVA) was used to test the null hypotheses. The level of the significance that was adopted for the analysisis 0.05 level of significance. This level of significance formed the basis for accepting or rejecting each of the research hypotheses.

Results

Table1: Means and Standard Deviations of the Students Taught Energy using MTA and

Groups	N	Mean	Pretest	SD	Mean	Posttest SD
Experimental	76	26.8		7.73	63.67	13.26
Control	76	26.25		6.89	28.49	10.04
Mean Difference			0.55			35.18

Table 1 shows the difference in mean achievement of a group taught Energy using MTA and those taught with traditional method. The table shows that mean post test achievement in AFAT of the participants taught with MTA (63.67) was higher than the means in pretest achievement (26.80 and 26.25) and the post test achievement of those taught with traditional method (28.49). The difference in the mean achievement of the two groups was found to be 35.18 in favour of those taught with MTA. This answered the research question one.

Table 2: Means and Standard Deviations of Maleand Female Students Taught Energy using MTA

Gender	N	Mean	Pretest	SD	Mean	PosttestSD
Male	34	26.31		6.95	59.05	10.41
Female	42	25.94		5.26	58.28	10.72
Mean Difference			0.40			0.77

Table 2 shows the difference in mean achievement of male and female taught with MTA in EAT. The table shows that mean post test achievement in EAT of male taught with MTA (59.05) was higher than the means in pretest achievement (26.31 and 25.94) and the post test achievement of their female counterparts (58.28). The difference in the mean achievement of the two genders was found to be 0.77 in favour of male students. This answered the research question two.

Test of Hypotheses

Table 3: Analysis of Covariance (ANCOVA) of Respondents' Scores in EAT (Method Gender)

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	4350.633a	4	1254.145	30.014	.000	.435
Intercept	12165.058	1	12165.058	164.504	.000	.645
Pretest	3.867	1	3.867	.106	.632	.002
Method	4243.053	1	4243.053	106.122	.000	.451
Gender	.057	1	.057	.003	.862	.000
Method*Gender	44.306	1	44.306	1.000	.411	.020
Error	3421.124	71	44.325			
Total	316464.000	76				
CorrectedTotal	8783.647	75				

a. R Squared = .435 (Adjusted R Squared =.417)

Hypothesis One: There is no significant difference in the mean achievement scores of the students taught Energy using Modern Teaching Approach (MTA) and those taught using the traditional method.

Table 3 shows that teaching method a main effect has significant effect on students' achievement in Energy. This is because as seen from the table, method is significant at P-value of .000 and therefore at a higher p-value of 0.05. This leads to the rejection of the

null hypothesis of no significant difference in the mean mathematics achievement scores of the students taught Energy using Modern Teaching Approach (MTA) and those taught using the traditional method.

Hypothesis Two: There is no significant difference in the mean achievement scores of male and female students taught Energy using MTA in Ifedore local government secondarys chools. Table 3 also shows that the computed F-ratio for the effect of gender on achievement students in the EAT was 0.003 which was not significant a tP-value of 0.05. Accordingly, the null hypothesis of no significant difference in the mean achievement scores of male and female students taught Energy using MTA in Ifedore local government secondary schools was accepted.

Discussion

The result in hypothesis one revealed that there was significant difference in the mean achievement scores of the students taught Energy using Modern Teaching Approach (MTA) and those taught using the traditional method. This means that students taught Energy using Modern Teaching Approach (MTA) performed better than those taught with traditional method. In other words, MTA is an effective method of instruction that should be embraced for effective delivery. The result is inline with the findings of Iyamuremye, Ndayanbaje and Muwonge (2021) who found that teaching approaches have an overall large significant effect on students' achievement. Also, the result concurs with Cobra, Mojtaba and Ebrhaim (2013) findings that the educational achievement of the students who are taught with the active method is higher than that of the students who are taught with the traditional method. Ganyaupfu (2013) also found that teacher-student interactive method was the most effective teaching method. Active method and teacher-student interactive method are part of the attributes of Modern Teaching Approach (MTA). The result is not surprising because MTA seems to be an activity-based and student-centred method of teaching that is full of activities majorly carried out by the students under the guidance of the teacher.

The result in hypothesis two revealed that there was no significant difference in the mean achievement scores of male and female students taught Energy using MTA in Ifedore local government in Ondo state public junior secondary schools. This means that gender has nothing to do with mathematics achievement of students taught Energy using MTA Ifedore local government junior secondary schools. The result is inline with the findings of Ajaiand Imoko (2015) who found that male and female students taught Energy did not significantly differ in achievement and retention scores, there by revealing that male and female students are capable of competing and collaborating in Basic science. The finding showed that performance is a function of orientation, notgender. Moreso, Abubakar and

Dokubo (2011) reported that there was no significant gender difference in academic achievement of the students. Meanwhile, the finding is in disagreement with the findings of Oribhabor (2019) and Alordiah, Akpadaka and Oviogboda (2015) in a separate studies, who found that gender has significant influence on academic achievement of students in Basic science in favour of the males.

Conclusion

Based on the findings, the study concluded that Modern Teaching Approach (MTA) enhances the quality and understanding of Energy concept there by increasing the students' achievement in the concept more significantly. Gender has no significant difference in Basic science achievement of public junior secondary school students in Ifedore local government in Ondo state.

Recommendations

The following recommendations were made based on the findings:

a. The use of Modern Teaching Approach (MTA) should been courage by Basic Science teachers and other teachers in secondary schools.
b. Stakeholders in education should, from time to time, organize seminars and workshops for teachers on Modern Teaching Approach (MTA) in order to meet with 21st century instructional delivery.

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