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EFFECTS OF FLIPCHART INSTRUCTIONAL MATERIAL ON BIOLOGY ACHIEVEMENT AMONG SECONDARY SCHOOL STUDENTS IN MINNA METROPOLIS OF NIGER STATE

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ABSTRACT
This study determined the Effects of Flipchart Instructional Material on Biology Achievement among Secondary School Students in Minna Metropolis of, Niger State. Quasi experimental design was adopted for the study. Four coeducational secondary schools were randomly sampled and assigned to experimental and control groups. From each school, an intact class was also randomly selected and used for the study. A sample size of two hundred and one (204) Secondary School Two (SSII) students was used for the study. The instrument used for data collection were Achievement Test Questions (ATQ) which was developed by the researchers and validated by experts in the field of biology and test and measurement unit. A pilot test was conducted on the test instrument and reliability coefficient of 0.78 was obtained. Two research questions and corresponding null hypotheses guided the study. Findings of the study revealed a significant difference between the mean achievement score of students taught using Flipchart instructional material and those taught without the use of Flipchart. The study also revealed no significant difference in the achievement mean scores of male and female students taught using Flipchart instructional material. Based on these findings, it is therefore concluded that the use of Flipchart instructional material is effective in enhancing students' achievement in Biology. Recommendations were therefore made that Government should provide adequate and relevant Flipchart instructional materials to schools as it was observed to enhance achievement of students particularly at secondary school level of education.
Keywords: *Flipchart, biology, achievement, students*

INTRODUCTION
Biology has been defined in many ways by many authors. For instance, Akintola (2017) defined Biology as the study of living organisms and their relationship with their environments. In other words, Biology is concerned with study of microscopic and macroscopic plants and animals and

how they relate with their environments. This definition implies that Biology is concerned with the study of living things and their interactions with their environment. On the other hand, Ibrahim (2014) defined Biology as a branch of science concerned with the study of structure, function, growth, origin, evolution and distribution of living organism. This implies that study of Biology is centered on the composition, structure, function as well as the independent relationship between living organisms and their environment. Other researchers like Mohammed (2011) defined biology as a branch of science that studies the processes life of living organisms in relation to their environments. From the above and many other definitions of Biology, it has shown that knowledge Biology plays a pivotal role in the survival and satisfaction of living organisms in their environment. For instance, knowledge of Biology helps us understand the living world and the way many species of living organisms interact within a given environment. Knowledge of Biology helps man to know about the composition and structure of his environment as well as the reasons behind the sudden changes happening in body of living organisms and their environments. Therefore, it is because of the numerous importance of the knowledge of Biology, that it has been made a core and compulsory subject at senior secondary school level of education in Nigeria. This is because Biology offers students the opportunity to study the diversity of living organisms and their ecological niche. Study of Biology also provides man the opportunity to investigate and explore the living world. This implies that knowledge of Biology paves way for man to conduct scientific investigations which are very useful in discovering new things through scientific methods. The study of Biology in addition, trains man to be specialist in different professional careers such as medicine, pharmacists, food scientists, environmentalist among others.

Despite the numerous importance of the knowledge of biology, study of biology is faced with a number of challenges resulting to negative consequences on teaching as well as performance of students at their final Senior School Certificate Examinations (SSCE). Research studies have

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been conducted on the challenges responsible for causing the negative consequences. For instance, research study by Yelkpieri *et al* (2016) and Adeleye (2020) identified some challenges to include inadequate laboratory equipment, inadequate instructional materials, ineffective instructional strategies, lack of qualified and experienced biology teachers, over population or large class size to mention a few. The need to address the above challenges especially the challenges centered on inadequate instructional materials necessitated the need to conduct this study titled 'Effects of Flipchart Instructional Material on Biology Achievement among Secondary School Students in Minna Metropolis of Niger State'

Instructional material as defined by Abdullahi (2003) in Yelkpieri *et al* (2016) is a collection of materials animate or inanimate, human or non human resources that a teacher may use during instruction to help achieve desired learning objectives. On the other hand, Aiedele (2008) in Yusuf (2016) defined instructional materials as ways and means of making the teaching and learning process easy, meaningful and understandable. Furthermore, Adeleye (2020) asserted that instructional materials encompass all the materials and physical means an instructor can use to implement instruction and facilitate student achievement of instructional objectives.

Above definitions implies that, instructional materials are expected to play the role of an aid to teachers during instruction as they help bring about effective and meaningful teaching and learning to take place. Therefore, instructional materials are essential tools needed for teaching and learning to help promote teachers' efficiency as well as improve student performance. According to Wushishi (2001) in Koroka *et al* (2018) teaching without instructional materials brings about boredom thereby making learners lose interest in the learning process. This implies that the use of instructional materials makes teaching and learning more interesting, practical, realistic and appealing. In addition, it makes students participate actively during lesson. Yelkpieri *et al* (2016) asserted that instructional materials come in various forms such as audio, visual, print and audio visual. Visual instructional materials are those devices that appeal to the

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sense of sight such as motion pictures, flash cards, flip charts, charts, models. A picture is believed to be worth a thousand words and the instructional materials that fall into such category is visual instructional material which include flipchart.

A flip chart is a constructed visual instructional material consisting of a board standing on legs with large papers attached to the top that contain series of information that can be turned over periodically during instruction. This implies that, flipchart is a chart consisting of sheets hinged at the top that can be flipped over to represent information sequentially during teaching or presentation. On the other hand, Yusuf (2016) refers to a flipchart is a stationary item consisting of a pad of large paper sheets, supported on a tripod or four legged easel. From the foregoing, a flip chart is simply a feedback chart that represents information in parts with message to be taught written or outlined in separate sheets which are bounded into one.

The flexibility of the flipchart makes it easy to be used for teaching. During teaching, the teacher only needs to place the flipchart on an easel or hold it in such a way that students can have a clear view of it. The first page is to be turned or flipped over to the back to reveal the next page after explaining the information on the page to the students. The teacher should make sure that the information written on the pages are large and bold enough to the students. This will enable students to have a clear view of the information on the flipchart and will aid in bringing about easy assimilation by students thereby enhancing their academic achievement as well as their performance at the final Senior School Certificate Examinations (SSCE).

Another important variable of this study is Academic achievement. Academic achievement in this context refers to the extent or level to which students attains their learning goals. On the other hand, academic achievement can simply be referred to as students' scores in a test or examination at a particular time. Academic achievement is always measured through the use of some parameters and a time frame. Some of the commonly used parameters are tests, examinations and continuous assessments while time frame may be midterm, terminal or an

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academic session. Student score in a particular subject through the use of the outlined parameters determines his or her level of achievement (Hirschfeld, 2016). It is on the basis of the students' achievement score that he or she is classified as high, middle or low achiever in a particular subject at a time. When students' achievements are positive in a test, or examination, they tend to build interest in that particular subject thereby showing strong attraction to the subject. Students' positive achievement and high interest in a particular subject is determined by many factor most especially, the teachers' instructional strategy. By implication therefore, teachers' instructional strategy can affect students' achievement either positively or negatively irrespective of gender.

Gender is one of the factors which may or may not influence students' achievement. Studies on gender influence have been inconclusive as some researchers report that male students have a higher achievement than female students others reports that it is the opposite. Yet other researchers report no significant difference between male and female students' achievement. Research findings on gender achievement have shown that male and female students have equal tendencies to excel in science subjects (Udousoro, 2011). In order to ascertain the above deduction and reports, this research study was conducted to determine the effects of flipchart instructional material on Biology achievement among secondary school students in Minna metropolis of Niger State

Statement of the Problem

The used of instructional materials during biology teaching are meant to make classroom instruction easier and faster for the teacher as well as enhancing students' comprehension and achievement in the topic taught by the teacher. This implies that, availability and utilization of instructional materials helps in making learning of biology more concrete and consequently, improves students' achievement. However, this have not been the case, as the reoccurring low level achievement (performance) of secondary school Biology students in standardized biology examinations have been reported to be caused by lack of utilization of relevant and related

instructional materials by teachers during teaching as reported by WAEC (2019). This problem has become an issue of a great concern to all the stakeholders in education.

In order to address this problem, many research studies have been conducted on effectiveness of some instructional materials like charts, models as well as on improvisation of materials but, students' achievement has not been significantly improved (Hirschfeld, 2016). As a step to finding solution to this problem therefore, this research study was carried out to determining the effects of flipchart instructional material on Biology achievement among secondary school students in Minna metropolis of Niger State

Objectives of the study

This research study was aimed at determining the effects of flipchart instructional material on Biology achievement among secondary school students in Minna metropolis of Niger State. Specifically, the study objectives are to determine the;

1. difference in achievement score of Biology students taught using flipchart instructional material and those taught without flipchart instructional materials
2. difference in gender achievement score of Biology students taught using flipchart instructional material.

Research Question

Based on the above objectives, the following corresponding research questions were raised and answered using mean and standard deviation.

1. What is the mean difference in achievement scores between Biology students taught using flipchart instructional material and those taught without the use of flipchart instructional material?
2. What is the mean difference in gender achievement scores of Biology students taught using flipchart instructional material?

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Findings of the study would be significant to students, teachers, researchers, curriculum planners and school administrators. The study was conducted in Minna metropolis of Niger State using public coeducational secondary schools. Only senior School Students two (SSII) Biology students were used for the study.

On empirical studies, several studies were reviewed by the researchers and it has shown that instructional materials have played a significant role in enhancing the students' achievement. For instance, Olaniyan (2020) worked on the Effectiveness of Instructional Materials in Teaching of Arabic Language in Selected Secondary Schools in Ibadan North Local Government, Oyo State. Finding of the study revealed that Instructional materials significantly determine students' academic performance in the teaching and learning of Arabic studies in senior secondary schools. In addition, Sabina, et al., (2022) examined the impact of instructional materials in teaching and learning Biology in the Colleges of Education in the Central Region of Ghana. A case study research design was selected for the study. The population of the study consists of three Biology tutors in the three Colleges of Education in the Central Region. Purposive sampling technique was chosen to select all the three colleges and three Biology tutors for the study. The interview guide was the main instrument for the data collection. Data collected were analyzed and the result revealed that instructional materials boast students' cognitive abilities and arouse their interest in the lesson by helping them to reason critically during teaching and learning. It is recommended that Ghana Tertiary Education Commission (G-TEC), National Teaching Council (NTC), and universities should collaborate with the colleges to organize workshops and seminars for tutors teaching Biology to update their knowledge in the use of digital instructional materials in lesson presentation. Koroka, et al (2017) also conducted research study on Impact of Laboratory Instructional Strategy on Secondary School Biology Students' Achievement on the Concept of Diffusion in Minna Metropolis, Niger State. Their finding revealed that Laboratory Instructional Strategy is gender friendly. In addition, Koroka, M.

U. S. (2023) conducted a research study on Effects of Improvised Instructional Materials on Achievement in Biology among Senior Secondary School Students in Minna, Niger State. The result of the study also revealed no gender difference in achievement

METHODOLOGY

The research design employed for this study is Quasi Experimental Research design involving non equivalent, randomized, experimental and controlled group design. The target population of study is forty nine thousand and thirty one (49,031) comprising of twenty seven thousand, seven hundred and fifty seven (27,757) males and twenty one thousand, two hundred and seventy four (21,274) females Senior Secondary II (SSII) Biology students in all the public secondary schools in Minna metropolis. Simple random sampling technique by balloting was used to sample a total of four (4) co-educational public secondary schools which were used for the study. Two intact classes were randomly selected from each of the sampled schools and a sample size of two hundred and four (204) SSII biology students was obtained and used for the study. Treatment and Test instruments were used for teaching and data collection respectively during the study. Treatment instrument were the lesson plans for teaching experimental and control groups while Test instrument was used for data collection as pretest and posttest (achievement) from the students. Lesson plan for experimental group involved the use of flipchart instructional material which was not used on the control group. Both instruments were validated by experts in the field of biology education as well experts in the field of Test and Measurement unit. Observations, corrections, suggestions and contributions made by the experts were used to produce the final copies of the instruments used for the study.

A pilot test was conducted to determine the reliability coefficient of test instrument using test retest method involving a total of twenty (20) SSII Biology students. The data collected was analyzed using PPMC statistical tool and reliability of 0.78 was obtained indicating that the instrument is reliable and suitable for the research study. SPSS version 2023 was the package

used for the analysis. During data collection, researchers visited the sampled schools to seek the permission from the school authorities to use their school for the research study. Thereafter, the researchers were introduced to both Biology teachers and students of the sampled schools. The researchers later briefed them about the purpose of the study. Research assistants were appointed from the Biology teachers of each of the schools after which both the students and the research assistants were given orientation about the research study. The researchers sampled an intact class from each of the schools using random sampling technique. Pretest questions were administered to the students to determine their level of entry behavior before the treatment. After the treatment and one week revision, posttest instrument was administered**.** Data collected were analyzed using mean and standard deviation to answer the research questions raised.

Results and Discussion

Research Question One

What is the mean difference in achievement scores between Biology students taught using flipchart instructional material and those taught without the use of flipchart instructional material? To answer this research question, mean and standard deviation were used snd result is presented in Table 1.

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Table 1 **Mean, Standard Deviation and t-test Comparison of Achievement Scores of Experimental and Control Groups**

Group	N	Df	$\bar{X}$	SD	t-cal	P-value
Experimental group	101	202	73.55	2.54	8.730	0.000*
Control group	103		33.77	2.52		

*Significant at $p < 0.05$ alpha level

Table 1 Show Mean, Standard Deviation and t-test comparison between the mean achievement scores of the experimental and control groups. The table revealed the mean score and standard deviation of experimental group to be 73.55 and 2.54 while that of the control group is 33.77 and 2.52 respectively. This result indicated a mean difference of 39.78 in favor of the experimental group. This reveals a significant difference in the achievement mean score of Biology students taught using flipchart instructional material and those taught using conventional teaching method. This implies that the experimental group achieved higher than the control group. In addition, the p-value obtained is 0.000 which is less than 0.05 ($t = 8.730$, $df = 202$, $p < 0.05$). This also reveals a significant difference in the mean achievement score of experimental and control groups. Hence the null hypothesis which stated that, there is no significant difference in the achievement mean scores of secondary school Biology students taught using the flipchart instructional material and those taught with conventional methods was therefore rejected.

Research Question Two

What is the mean difference in gender achievement scores of Biology students taught using flipchart instructional material? To answer this research question, mean and standard deviation were used snd result is presented in Table 2.

Table 2 Mean, Standard Deviation and t-test Comparison of Gender Achievement Scores of the Experimental Group

Group	N	Df	$\bar{X}$	SD	t-cal	P-value
Male	57	99	58.93	2.49	1.220^{NS}	0.378
Female	44		58.26	2.57		

NS = Not significant at P > 0.05 alpha level

Table 2 shows the Mean, Standard Deviation and t-test comparison of gender achievement mean scores of the Biology students taught using flipchart instructional material. The Table revealed the mean score and standard deviation of the male students to as 58.93 and 2.49 respectively

while that of the female students are 58.26 and 2.57. The result indicates no significant difference in the mean achievement score of male and female biology students taught using flip chart instructional material. A very negligible mean difference of 0.67 was obtained indicating that no significant difference. In addition, the p-value obtained is 0.378 which is greater than 0.05 (t= 1.220, df = 99, 0.378 > p). This result indicates no significant difference in gender achievement. Hence the null hypothesis which stated that there is no significance difference in the achievement mean scores of male and female secondary school biology student taught using flipchart instructional material is thereby accepted. By implication, there is no significant gender difference between the Biology students taught using flipchart instructional material.

Discussion of Results

On achievement, the result showed the computed t-value to be less than the 0.05. The results therefore indicate that the experimental group achieved higher than the control group. This high achievement could be attributed to the use of flipchart instructional material which has enhanced achievement of the experimental group students. This finding is in line with the findings of (Olaniyan, 2020) who reported that Instructional materials significantly determine students' academic performance in the teaching and learning of Arabic studies in senior secondary schools in Ibadan North of Oyo State. In addition, this finding corroborate Sabina, *et al*., (2022) reported that instructional materials boast students' cognitive abilities and arouse their interest in the lesson by helping them to reason critically during teaching and learning.

On gender achievement, the computed t-value is greater than the 0.05. Therefore, the result indicated no significant gender difference in achievement of secondary school Biology students exposed to the use of flipchart instructional material. This means that flipchart instructional material if effectively utilized can enhance both the male and female academic achievement equally. The finding is also in agreement with the findings of Koroka (2023) who reported that there is no significant difference between male and female students in their achievement abilities

when taught chemistry using instructional material and guided discovery teaching strategies. This finding is in line with the findings of Koroka *et al* (2017) who found no significant difference in the performance of male and female students.

Findings of the Study

The followings are the findings of the study:

1. Students of the experimental group that were exposed to flipchart instructional material achieved significantly higher than the control group students taught using conventional method
2. Male and female students taught with flipchart instructional material achieved equally as there was no significant difference observed from the data collected and analyzed during this research study

Conclusions

The study has established that, the use of flipchart instructional material is very effective in teaching secondary school Biology students. This is because, students of the experimental group exposed to flipchart instructional material achieved significantly higher than the control group students. Male and female students taught with flipchart instructional material achieved equally as there was no significant difference observed.

Recommendations

From the foregoing findings of this study, the following recommendations are made:

1. Teachers especially Biology teachers should be sent on in- service training to be able to use flipchart instructional materials effectively during teaching.
2. School administrators should support and give necessary and fundamental backing to teachers for effective utilization of flipchart instructional materials during teaching.

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