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The impact of instructional aids on academic achievement of biology students in higher institutions of learning in Potiskum Local Government Area, Yobe State

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Abstract

In this study, attempts was made to examine the influence of audio-visual instructional aid on students' academic achievement in Biology in some selected higher institutions of learning in Yobe State. There is an urgent need to improve the quality of education to bridge the gap between developed and developing nations, and audio visual instruction is considered as a necessary tool for this purpose the objectives of the study was to identify the forms of instructional aids provided in higher institutions, to determine the utilization of instructional aids by teachers of higher institutions of learning, to determine the impact of instructional aids on academic achievement of Biology major students in higher institutions of learning to identify the challenges associated with instructional aids used by Biology teachers in higher institutions of learning in Potiskum Local government area Yobe state. The population of the study comprises of 500 Biology students' from the following schools, Federal College of Education (technical) Potiskum and College of administration Management and Technology (CAMTECH) Potiskum. Twenty (20) Biology teachers representing the entire population of biology teachers in the two institution was used in the study. The instrument for data collection was Biology achievement test (pat) and structured questionnaire. Fifteen (15) items Biology achievement test (pat) was constructed from topics in the Biology curriculum. The data collected was analyzed using mean, standard deviation. Scores of different groups was computed. Results of the experimentation was used to answer research question. The result shows that the schools lacks functional audio materials for teaching biology at efficient level, the mean and standard deviation of 3.48 and 1.65 is an indication that there is no functional audio materials for effective teaching and learning Biology in the selected institutions. Where there is poor or no available audio materials the rate of utilization is basically not feasible. Similarly audio visual materials are not in use. the use of instructional materials in teaching Biology in the selected higher institutions shows a positive result, it is obvious that electricity and access to the instructional aid is not a problem in the schools but the main challenges faced by the teachers are inadequate lecture period that will warrant the use of audio-visual materials in teaching, poor or no constant monitoring of the lesson by the school administrators, lack of instruction assistant to help the teachers in fixing this gadgets before and during the lecture has contributed immensely to poor academic performance of the students in the selected higher institutions respectively. Technical know-how is a factor of concern poor knowledge of the gadgets by the teachers and the assistant is also a point of concern.

Keywords: Instructional aids; Education technology; Academic Achievements; Biology; Students

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1. Background of the Study

The use of audio visual in education has been extensive, as it has been effective in increasing productivity and retention rates, where research has shown that people remember 20% of what they see, 40% of what they see and hear, but about 75% of what they see and hear and do simultaneously. Audio visual is now permeating the educational system as a tool for effective teaching and learning. With audio visual, the communication of information can be done in a more effective manner and it can be an effective instructional medium for delivering information. Audio visual access to knowledge is one of the possibilities of information and communication technology that has tremendous impact on learning. The instructional media have emerged in a variety of resources, and equipment, which can be used to supplement or complement the teachers' efforts in ensuring effective learning by students. It is recognized that conventional media technologies can no longer meet the needs of our teaching and learning processes; as a result they are being replaced by audio visual technology. This technology provides a learning environment that is self-paced, learner-controlled and individualized (Ogunbote and Adesoye, 2016).

Available evidence has revealed that students' performance in Biology has been quite discouraging since from secondary school level. This situation is particularly disheartening when we realize that the success of our nation in science and technology depends on a great extent on the mastery of this fundamental aspect of science, the college Biology candidates have a number of problems associated with both cognitive and motor skills which have culminated in the poor achievement of students in the certificate examinations. This stimulated several speculations and arguments at the science teachers association of Nigeria (Stan) workshops, meetings and seminars that prompted the introduction of the new science modules which are now operational at the national workshop levels and during the annual conferences. The target was to juxtapose methods and contents for improving the current state of achievement in Biology and other sciences. The concern has been on how to get science teachers depart from the traditional approach of science teaching to a new approach Judith et al (2014).

Poor use of instructional aids adopted by teachers at higher institutions level in Nigeria have been identified as one of the major factors contributing to poor performance of students in Biology Winarto et al., (2020). The conventional teaching method is classroom-based and consists of lectures and direct instructions conducted by the teacher. This teacher-centered method emphasizes learning through the teacher's guidance at all times. Students are expected to listen to lectures and learn from them. The teacher often talks at the students instead of encouraging them to interact, ask questions, or make them understand the lesson thoroughly. Most classes involve rote learning, where students depend on memorization without having a complete understanding of the subject. Just passing the tests, consisting of descriptions, matching, and other forms of indicators, is all that matters to complete the curriculum (Judith 2014). The persistent use of this method makes students passive rather than active learners. It does not promote insightful learning and long–term retention of some abstract concepts in Biology (Judith 2020). Aguillon, et al., (2020) observed that gender contributes to poor achievement of students in Biology. Gender according to Aguillon, et al., (2020) refers to the social attribute sand opportunities associated with being male and female and the relationships between women and men; girls and boys, as well as the relations between women and those between men. These attributes, opportunities and relationships are socially constructed and are learned through socialization processes. According to Bailey et al., (2020), female enrolment in Biology and science subjects in general is very poor. This is in line with the study by Walsh, (2020) which revealed that the number of females who study Biology in secondary and tertiary institutions is small compared to the number of boys. This difference in the number of females and males in the study of Biology has created gender disparity in the academic achievement of students in Biology and science subjects as a whole (Ashoori et al., 2020).

From research evidence, educators see the pressing need to reconsider the techniques and methods of instruction at senior secondary school level. To address these challenges, there is need for an instructional system that is supported by the use of instructional aids for meaningful learning. In this 21st century, a motivating and captivating approach should be encouraged to help students better learn, understand, and retain Biology concepts and promote their future involvement. One of the promising approaches, according to Mathew et al., (2013) involves multimedia presentations supported in visual and verbal formats supplemented with pictures, animations, texts, and narration. Gambari et al., (2014).

1.1. Statement of the Problem

There is an urgent need to improve the quality of education to bridge the gap between developed and developing nations, and audio visual instruction is considered as a necessary tool for this purpose. However, the presence of audio visual alone will not bring significant changes in a school. Teachers are important ingredient in the implementation of audio visual instruction. Without the involvement of teachers, most students may not take advantage of all the available potential benefits of audio visual learning on their own. Teachers need to actively participate in the

use of audio visual facilities for students. They have to be trained in the use of audio visual materials and in its integration in the classroom activities to enhance thinking and creativity among students. They must also learn to facilitate and encourage students by making them responsible for their own learning. Many of the current graduates were found to be lacking in creativity, communications skills, analytical and critical thinking and problem – solving skills Teo and Wong, (2000); tan, (2000).

In this study, attempts will be made to examine the influence of audio-visual instructional aid on students' academic achievement in Biology in some selected higher institutions of learning in Yobe State.

Objectives of the study

- To identify the forms of instructional aids provided in higher institutions of learning in Potiskum Local government area Yobe state.
- To determine the utilization of instructional aids by teachers of higher institutions of learning in Potiskum Local government area Yobe state.
- To determine the impact of instructional aids on academic achievement of Biology major students in higher institutions of learning in Potiskum Local government area Yobe state.
- To identify the challenges associated with instructional aids used by Biology teachers in higher institutions of learning in Potiskum Local government area Yobe state.

1.2. Research Questions

The following research questions were formulated to guide the study:

- What are the forms of instructional aids used in the higher institutions of learning in Potiskum local government area Yobe state?
- To what extent do teachers utilize instructional aids in higher institutions of learning in Potiskum Local government area, Yobe State?
- What are the impact of instructional materials on the academic achievement of Biology major students?
- What are the related challenges of instructional aids faced by Biology teachers in higher institution of learning in Potiskum Local government area, Yobe state?

1.3. Research design

Ogula (2005) describes research design as a plan, structure and strategy of investigation to obtain answers to research questions and control variables. The study employed quasi-experimental design. The design involved students from intact classes. The study used experimental group and the control group. The experimental group was taught with audio-visual instructional materials while the control group was taught without instructional materials.

1.4. Population of the Study

The population of this study comprises of 500 Biology students' from the following schools, Federal College of Education (technical) Potiskum and College of administration Management and Technology (CAMTECH) Potiskum. Twenty (20) Biology teachers representing the entire population of biology teachers in the two institution was used in the study.

1.5. Sample and Sampling Techniques

The sample of this study consists of two colleges of education and one federal polytechnic selected from the three geopolitical zones of the state (Zone A, B and C) students drawn from the three institutions using random sampling technique. The schools were made up of two (2) arms each that is a and b. Arm 'a' was assigned to be taught Biology with audio-visual aids, while arm 'b' was taught Biology without audio-visual aids. The assignment of classes to treatment and control group was through a simple random technique. In each of the groups and schools, one interact class were drawn for the study through a simple random sampling technique. There will be altogether four (4) interact classes that was used for the study, two (2) for the treatment and two (2) for the control. In addition to this experimentation, a structured questionnaire was distributed and sample data was obtained for further analysis on the impact of instructional aids in the institution.

1.6. Research Instrument

The instrument for data collection in this study was Biology achievement test (pat) and structured questionnaire. Fifteen (15) items Biology achievement test (pat) was constructed from topics in the Biology curriculum. The fifteen (15) items multiple choice questions were made up of four options lettered a-d. The questions measured the students' achievement on the major topics at this level. Sstructured questionnaire was also used to collect data for this study. The researcher design the questionnaire title "The Impact of Instructional Aids on Academic Achievement of Biology Students in Higher Institution of Learning in Potiskum Local Government Area, Yobe State". The questionnaire items was designed based on each stated research objectives for the respondents to response to using likert's scale type with four responses as Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD).

2. Validation of Research Instrument

The instruments for this study were given to two expert in the department of Biology Education Yobe State University respectively. In addition they were given the research topic, purpose of the study, significance of the study, research questions, and hypotheses.

They were requested to carry out content and face validity on the instrument. They were expected to look at the adequacy of the language and content to the level of the students, and appropriateness of the instrument for the study. The corrections and recommendations were built into the final draft of the instruments.

3. Method of Data Collection

The researcher draft the request letter to the school heads in order to obtained permission to carry out the experiment with their students in their respective schools and also to enable them to teach the particular group of students concepts of Biology for two weeks with the use of audio-visual aids and those without audio-visual aids. After the teaching the Biology achievement test (pat) was administered to the particular group of students sampled in the study.

3.1. Method of Data Analysis

The data collected for this study was analyzed using mean, standard deviation. Scores of different groups was computed. Results of the experimentation was used to answer research question 1 and the rest of the objectives of the study were answered using the result from the structured questionnaire respectively. In each case, mean and standard deviation were computed accordingly.

Demographic Data of the Respondent

School	Department	Gender M/F	Age	Level
FCE(T)	Chemistry	30/25	18-30	1-3
	Biology	35/20	18-30	1-3
	Integrated Science	25/15	18-30	1-3
CAMTECH	Public Health	25/20	25-40	2-5
	Community Health	15/10	25-40	2-5
	Environmental Health	20/10	25-40	2-5

4. Presentation of results

4.1. Research question: 1

What are the forms of instructional aids used in the higher institutions of learning in Potiskum local government area Yobe state?

Table 1 Means and standard deviation of the availability of visual instructional aids in higher institutions of learning in Potiskum local government area.

Variables	Mean	SD	Remark
Audio	3.48	1.65	Reject
Visual	3.68	1.56	Accept
Audio-visual	2.45	1.69	Reject
Improvised	3.89	1.43	Accept
Natural Objects	3.77	1.54	Accept

Source; Survey 2021

From the table above, the result shows that the schools lacks functional audio materials for teaching biology at efficient level, the mean and standard deviation of 3.48 and 1.65 is an indication that there is no functional audio materials for effective teaching and learning Biology in the selected institutions.

4.2. Research Question 2

To what extent do teachers utilize instructional aids in higher institutions of learning in Potiskum Local government area, Yobe State?

Table 2 Means and standard deviation of the utilization rate of each individual instructional aid in the higher institutions of learning in Potiskum Local government area, Yobe State

Variables	Mean	SD	Remark
Audio	3.47	1.65	Reject
Visual	3.77	1.46	Accept
Audio-visual	2.45	1.69	Reject
Improvised	3.88	1.42	Accept
Natural Objects	3.77	1.54	Accept

Source; Survey 2021

From the table above, the rate of utilization of the instructional aids is poor, which is in line with the result in table 1, where there is poor or no available audio materials the rate of utilization is basically not feasible. Similarly audio visual materials are not in use. With 2.45 and 1.69 mean and standard deviation shows that one of the major instructional aid necessary for effective teaching and learning is not put into practice in teaching Biology in the selected high institutions in the local government.

However, the result also shows that natural objectives, visual materials and many other improvised teaching aids such as white board and cardboard paper etc are frequently utilized in the schools.

4.3. Research question: 3

What are the impact of instructional materials on the academic achievement of Biology major students?

Table 3 Means and standard deviation of the academic achievement of the students taught using instructional aid and those taught using conventional method

Variables	Mean	Standard deviation	Remark
Experimental Group	3.77	1.45	Accept
Control Group	2.46	1.88	Reject

Source; Experimentation, 2021

From the table above, the use of instructional materials in teaching Biology in the selected higher institutions shows a positive result, with the mean of 3.77 and standard deviation of 1.45 shows that instructional aids has contributed positively in the performance of the students in the higher institutions. The control group where no instructional materials were used in teaching them performs poorly in the test compared to the rest of the group.

4.4. Research Question 4

What are the related challenges of instructional aids faced by Biology teachers in higher institution of learning in Potiskum Local government area, Yobe state?

Table 4 Means and standard deviation of the responses with regards to the challenges teachers faced in using instructional aids in teaching Biology in the selected schools

Variables	X	SD	Remark
Electricity	3.47	1.65	Reject
Instruction Assistant	3.33	1.68	Reject
Monitoring	2.45	1.69	Reject
Accessibility	3.88	1.42	Accept
Lecture Period	3.45	1.68	Reject
Technical Know How	3.33	1.76	Reject

Source; Survey 2021

From the table above, it is obvious that electricity and access to the instructional aid is not a problem in the schools but the main challenges faced by the teachers are inadequate lecture period that will warrant the use of audio-visual materials in teaching, poor or no constant monitoring of the lesson by the school administrators, lack of instruction assistant to help the teachers in fixing this gadgets before and during the lecture has contributed immensely to poor academic performance of the students in the selected higher institutions respectively. Technical know-how is a factor of concern poor knowledge of the gadgets by the teachers and the assistant is also a point of concern.

5. Summary of the findings

The result shows that, there is lack of instructional aids in the school and even the few materials available are barely used by the teachers, the teachers are faced with the challenge of technical know-how, lack of instruction assistant and poor monitoring by the school administrators.

The result in table 3, shows the mean score of the experimental group was 3.77 and a standard deviation of 1.44 while the mean scores for the control group was 24.6 and a standard deviation of 1.88. Is in favor of the experimental group. This shows that the experimental group had mean scores more than the control group. This implied that the effect of the treatment had impact on the experimental group.

Recommendations

Based on the findings of this study the following recommendations were made that:-

- There is urgent need for government and state holders to provide audio visual aids in the schools to facilitate teaching-learning process.
- There is compelling need to secure a stable source of power in the schools to ensure sustainable use the instructional materials particularly audio visual aids.
- The schools management and parents teachers association (pta) should look into the possibility of repairing broken down instructional materials (audio visual aids) in the schools with a view to reactivate them.
- There is the immediate need for ministry of education to organize seminars, conferences and workshops to sensitize biology teachers on how to use instructional aids aids in teaching-learning process.

6. Conclusion

Conclusively, the improvisations of instructional materials are presented as indispensable tasks in the scientific enterprise to enrich the teaching and learning of the subject. The teacher must improvise, produce and use both

materials and ideas to aid instruction at all times. Some issues which could aid adequate training of teachers in improvisation and utilization of available resources should be highlighted in the teacher education curriculum and instructions.

Compliance with ethical standards

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Disclosure of conflict of interest

There was no conflict of interest between the team however, traces of constructive argument were made on one procedure and the other but the research team finally agreed with all the outcome of the work.

Statement of Ethical standard

The team worked in agreement with the ethical standard of the institution and the general public, guidelines were followed accordingly.

Statement of informed consent

The team seek consent of the faculty deans, Head of departments and the management of Umar Suleiman College of Education gashua before data was collected for the departments.

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