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IMPACT OF INSTRUCTIONAL MEDIA ON ACADEMIC PERFORMANCE OF STUDENTS IN BASIC SCIENCE AND TECHNOLOGY IN JALINGO EDUCATION DISTRICT OF TARABA STATE

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Abstract

The use of instructional media is of vital importance in the teaching and learning of the basic sciences in primary and secondary schools as it drives home the lesson points of the subject being taught and reduces stress for both the teachers and students. The imaginative use of well-planned visual aids during classroom lessons does not boost academic performances of students learning physics, chemistry, biology, technology and mathematics. This research investigates the impact of instructional media or design usage on the learning outcomes of students in the basic sciences in Taraba State, Nigeria. The research design is Quasi Experimental. The sample population consists of an experimental and a control group. The experimental group is [redacted] taught with instructional media for a fortnight. The findings show that the use of instructional media positively impacted the learning outcomes of the students, thus highlighting then vital essence of using instructional media during lessons for enhancement of students' learning.

Keywords: Instructional Media, Academic Performance, Basic Science, Basic Technology, Jalingo Education District.

Introduction

Physics, chemistry, biology and mathematics and technical subjects constitute the foundation upon which science and technology is built. The Basic Sciences disciplines of physics, chemistry, biology, technology and mathematics are usually complex and abstract. Primary and secondary school

students need experienced teacher to enable them understand these abstract subjects by with explicit teaching and basic foundation as it concerns the concrete ideas.

However, the effective learning of Basic Sciences and Technology in primary and secondary schools remain a daunting and difficult task in Nigeria. Majority of the literature have linked poor learning outcomes in the Basic Sciences and technology to inadequate, inappropriate or poor instructional media or designs adopted during lessons in primary and secondary schools in Nigeria (Esiobu, 2005; Okonkwo, 2000; Familoni, 2013; NERDC, 2005). Instructional media is a broad term, which is often used interchangeably and synonymously with other terms such as educational design and educational technology. They are generally referred to as technological tools and include computer programmes, films, video-editing programmes, word-processing equipment and calculating instruments used for teaching and enhancing learning outcomes in students or learners (Hodges, 2006). Media refer to channels of communication. They are carriers of information between a source and a receiver (Smaldino, Russell, Heinich & Molena, {2005}). Media are very essential for good teaching and; to get the most from them, they must be selected properly and used effectively. Example of media includes PowerPoint, slides, videotapes, diagrams, printed materials, and computer software. These are considered as instructional media when they carry messages for instructional purposes. Accordingly, the use of instructional media is to facilitate communication as well as to enhance learning. Instructional media serve a variety of roles in education. Their primary role is to help students learn. One way they do this is by providing an information-rich environment (Newby et al., 2006). Instructional media provide stimulated experiences. For example, visuals give added meaning to words, and as such students can see what a new invention looks like, not just hear or read a verbal description of it. Video or a series of pictures are used to demonstrate a process; and this gives learners the best opportunity to see skill demonstrated before being asked to practice it. Hence, instructional media are used to reflect colours, sound and motion that promote students' interest and motivate them to learn.

Instructional media that are commonly used in the primary and secondary schools in Nigeria include texts such as study guides, manuals, work-sheets, textbooks and computer/internet displays; visuals such as verbal (text or word) elements as well as graphic (picture or picture-like) elements. Instructional media can be presented in either printed or projected form; audio, such as audiotapes and compact discs;

and real objects and models, such as coins, tools, plants, animals, three-dimensional representation of real objects, realia, et.c

The efficiency of instructional media in delivering subject points cum transfer of knowledge from the teacher to the learners cannot be over stated. Obviously, the instructional media used by the teacher further simplifies comprehension and activates significant knowledge transfer. This undoubtedly facilitates achievement of academic excellence of the learner in the subject area.

Instructional media are channels, which assist teachers to make their lessons explicit to learners. They are also used to transmit information, ideas and notes to learners (Ijaduola, 1997). These media serve as supplement as well as lubricant to the normal instruction process.

Besides, the importance and technicality of the various subjects taught in the secondary schools make it necessary that the relevant instructional media should be used to teach them. This fact is supported by scholars like Macaulay (1989) who asserted that, visual aids make lesson come alive and help students learn better. He further stated that adequate and inappropriate utilization of visual and general teaching aids is evidence of teachers' preparedness for the lesson. Ehizojie (1989) also summarized the importance of instructional media as one of the ways of relaxing in the classroom atmosphere, motivating the students and teaching a subject creatively and interactively.

Interestingly, due to technological development, computer is used to aid teaching and learning. Nowadays, in the developed countries, the micro-computer is seen as powerful equipment because it appears to be capable of keeping track of individual students and responding to them, or guiding them, in spite of independent variation ability, learning styles and learning rates (Scalon & O'Shea, 1987).

Computer Aided Instruction (CAI), which is an automated instructional technique is used to present an instructional programme to the learner through an interactive process on the computer and applied when computer is being used as teaching aid, or as a proxy for human tutor.

It is used in conjunction with its software obtained in the form of a written package that is rich in graphic representations to teach and present subject materials on screen.

Correct answers are also rewarded, usually by means of comment on the screen such as "welldone". Incorrect response triggers a beep or some other error signal. This type of programming is essentially a stimulus response sequence, providing

fast positive reinforcement for the right answer. According to Smaldino, et al, (2005) such feedback is an important factor in motivating students to learn. A well written programme according to Smaldino, et al., (2006) should lead the students to select the correct answer, ninety (90) percent of the time.

It is against this background that this study attempts to examine utilization of Instructional Media and Academic Performance of Students in Basic Science (case study: Jalingo Education District of Taraba State).

Statement of Problem

The act of teaching is fundamentally concerned with passing ideas, skills and attitude from the teacher to the learner. In Nigeria, for example, experience has shown that spoken words alone in the communication of ideas are rigorously ineffective and inefficient in producing desired learning outcomes. Every year, when results of Junior Secondary Certificate Examination otherwise known as Basic Education Certificate

Examination (BECE) are released, there has always been a high level of failure rate among public junior secondary school students in Basic Science and Technology. The reason for this is that there are topics in Basic Science and Technology that pose serious problem of comprehension to students. Some topics cannot be taught effectively without the use of relevant instructional media to make the learning practical. On the foregoing, scholars like Mutebi and Matora (1994) have emphasized the effect of instructional media utilization on teaching and learning. According to them, we learn and remember 10% of what we hear; 40% of what we discuss; and as high as 80% of what we experience directly or practice. However, the questions here are: Would the use of instructional media influence JSS students' performance in Basic Science? Is teaching enhanced by the use of instructional media? Could students' learning be enhanced by the use of instructional media? Finding answers to these questions and more summarizes the entire problem of this study.

Purpose of Study

The purpose of this study is to examine the impact of instructional media utilization on the academic performance of JSS II Basic Science and Technology students. In this regard, the study specifically sought to:

1. Ascertain the adequacy of available instructional media in public junior secondary schools in Jalingo Education District of Taraba State;

2. Determine the influence of instructional media on the academic performance of public junior secondary school students in Basic science Technology.

Research Questions

The following research questions were raised to guide the study.

1. How adequate is the availability of instructional media in public junior secondary schools in Jalingo Education District of Taraba State?
2. How do instructional media influence academic performance of public junior secondary school students in basic science and technology?

Research Hypothesis

There is no significant difference between the performances of students exposed to the use of instructional media and those who are not exposed to it.

Research Method

This section discusses the study design, study population, sample and sampling technique, the study instrument, validity of the instrument, data collection procedure and data analysis procedure employed in this study. The research design adopted for this study was the Quasi Experimental Design, which is pre-test and post-test. The students were tested before administering treatment to ascertain their level of knowledge without instructional media usage. Consequently, the names of all students sampled for the study were written on separate pieces of papers, folded and put in a bowl. These names were drawn out, one by one, alternatively putting them into piles. All the names of the students in the first pile were put in one group (A) called the experimental group, while all the names of students in the second pile formed another group (B) called the control group. Instructional media were used to teach the experimental group in Basic Science and Technology II for two weeks, after which a test (post-test) on Basic Science and Technology was administered on both groups.

This design was considered most appropriate for this study because it is one of the most relevant designs that would enable determination of the causes and effects relationships among the study's variables. Besides, the structure and rules of the design allows isolation of singles factors and examination of their associations and effects in a way that is difficult in clustered real life situations.

Population of the Study

The researcher covers Jalingo of Taraba State Education Board for junior secondary section. The district was made up of three zones and they are Jalingo, Ardo-kola and Lau.Table 1 represents the zones.

Table 1. Education Zones of Taraba State

Zones	No. of JSS Schools	No. of Teachers	No. of Students
Ardo Kola	16	345	6,807
Jalingo	18	913	12,273
Lau	13	191	2,944
Total	47	1449	

Source: TSTSB Schools Records 2021

Table 1 above clearly shows respective statistics as it relates number of junior secondary schools, subject teachers and students offering the subjects.
Lau zone has thirteen (13) junior secondary schools with as low as one hundred and ninety one (191) subject teachers to teach two thousand, nine hundred and forty-four (2, 944) students;
For Ardo Kola zone, sixteen (16) schools, three hundred and forty-five (345) teachers and six thousand, eight hundred and seven (6, 807) students;
Jalingo zone has the highest statistics with eighteen (18) schools, Nine hundred and thirteen (913) teachers and twelve thousand, two hundred and seventy three (12, 273) students.

Sample and Sampling Technique

The sample size used for the study comprised one hundred (100) respondents for the experimental group from one zone and six hundred (600) students from the three zones and two hundred (200) students from each zone. The experimental group was composed using the simple random sampling technique. First and foremost, one public secondary school was randomly considered from the public secondary schools in the zones. Out of the JSS II students of this secondary school, one hundred (100) students were randomly selected and divided into two groups of fifty (50) students for the control group and fifty (50) students for the experimental group.

Research Instrument

Two research instruments were designed and used for collecting data for this study. These instruments included a questionnaire structured by the researchers for the students as well as forty-item objective achievement tests on Basic Science and technology for the pre and pro tests. The questionnaire had two sections, A and B respectively. The section 'A' of the questionnaire contained questions

meant to generate data on the biographic characteristics of the respondents, while section 'B' contained questions meant to generate relevant data on the study's variables in line with the research questions raised in the study. Also, the forty-item objective achievement tests on Basic Science and Technology were administered to the sampled students before and after the experiment to the experimental group of students who were taught with audio-visual instructional media (projector and screen) in order to generate information on the academic performance of the two groups of students in Basic Science and Technology.

Validity of the Research Instruments

The samples of the instruments were shown to the other research colleagues and experts, an expert in instructional media/measurement and evaluation, and an expert in Measurement and Evaluation from the department of Educational foundation.

The researcher visited the secondary school sampled for the study and sought the permission of the school authority. The sampled teachers and students were then organized as required by the study. The students constituting the experimental class in the school were taught for two weeks, using JSS II syllabus on Basic Science and technology and relevant instructional media. The students in both the control and experimental groups were later merged and the forty-item objective achievement tests on Basic Science and Technology were administered on them. Also, the respondents for the questionnaire copies were allowed enough time to respond to the questionnaire items before instant retrieval. All the copies of questionnaire were retrieved from all the respondents immediately.

Data Analysis

Data collected on the demographic features of the respondents were analyzed and presented using frequency tables and means.

Bio-Data of Respondents

Table 2. Sex and age distribution of respondents

Variable	Frequency	Percentage (%)
Sex		
Male	**47**	**47**
Female	**53**	**53**
Total	**100**	**100**
Age (years)		

11 – 12	56	56
13 – 14	31	31
> 14	13	13
Total	100	100

Source: Field Survey, 2023

Table 2 shows that 47% of the students that participated in the study are males, while 53% are females. Also, 56% of the students involved in the study are between the ages of 11 and 12; 31% are between the ages of 13 and 14; while 13% are above 14 years old.

Pre-Test Result: The students were tested to know their level of understanding of the different topics that pose challenges in learning of basic science in junior secondary school in Taraba State. The result is represented in Table 3.

Table 3. Scores obtained from the achievement test given to students

Variable				Total
Score	20	15	30	
Percentage(%)	40	25	45	100

Source: Field Survey, 2023

The scores of students were calculated using percentage, 40% of the students got 20 marks, 25% scored 15 marks and 45% scored 30 and above.

Answers to Research Questions

Note: In analyzing data to answer the research questions raised in the study, strongly agree responses and agree responses were grouped as agreed, while strongly disagree and disagree were grouped as disagreed.

Research Question 1: How adequate is the availability of instructional media in public junior secondary schools in Education Zones of Taraba State?

The data collected in order to answer the question above is presented in the Table 4.

Table 4. **Perception of students on whether there is adequate availability of instructional media for enhancing the teaching and learning of Basic sciences in public junior secondary school in Taraba state.**

Item	Agree	Disagree	Remark
Instructional media are available in your school	25	75	Disagreed
You enjoy learning with available instructional media in your school.	81	19	Agreed
Your teacher involve the use of instructional media made available by the state government.	83	17	Agreed

Your teacher use available instructional media to facilitate teaching and learning of practical.	74	26	Agreed
I do not understand basic science any better when taught using instructional media.	67	33	Agreed
Using practical media to teach basic science makes the subject more understanding.	79	29	Agreed
Total	459	141	
Mean Response	76.5	23.5	

Source: Researcher computation, 2023.

Seventy five percent (75%) of the students disagreed that instructional media are adequately available in their schools for teaching and learning of Basic science and technology. Eighty one percent (81%) of the students further confirmed that they enjoyed learning with available instructional media in their schools. Also, eighty three percent (83%) of the students claimed that their teachers utilized instructional media in the teaching in the class and the media are provided by the state government. Students (74%) confirmed that teachers use available instructional media in the teaching of practical. Many students (79%) opined that the use of instructional media to teach in the class makes the subject more comprehensive.

Table 4 showed that, out of the responses gathered from the students on their perception about availability of instructional media for enhancing the teaching and learning of basic science in public junior secondary school. Majority of the students with a mean rate 76.5 agreed that the availability of instructional media in the public junior secondary schools enhanced teaching and learning of basic science; while the remaining students with a mean rate 23.5 on the contrary affirmed that the use of instructional media in the teaching of learning of Basic Science and Technology is not enhanced by the used instructional media.

Research Question 2: How does the use of instructional media influence the performance of Public Junior Secondary Schools students in basic science?

The data collected in order to answer is presented in Table 5.

Table 5. **Perception of students on whether the use of instructional media influences their performance in learning basic science in junior secondary schools or not.**

Item	Agree	Disagree	Remark
I perform better whenever I am taught with instructional media.	69	21	Agreed

I do my homework well and make high scores in my subjects whenever I am taught the subjects with appropriate instructional media.	63	37	Agreed
Teachers use appropriate instructional media to teach their subjects in order to enhance their students' understanding and performance in the subjects.	78	22	Agreed
Use of instructional media in teaching enhances students' performance.	65	35	Agreed
Total	285	115	
Mean Response	71.3	28.7	

Source: Researcher computation, 2023.

Sixty nine percent (69%) of the students believed that they perform better whenever they are taught using Instructional Media, while sixty three 63 percent (63%) concurred that they do their home work well and scored high scores in the subjects when taught by the teacher using appropriate instructional media. They were unanimous in their agreement (78%) that their teachers use appropriate instructional media to teach their subjects in order to enhance better understanding and performance in their students in their subjects.

Table 5 shows that out of the response gathered from the students on their perception of whether the use of instructional media influences their academic performance, majority of the students with a mean response of 71.3 agreed that the use of instructional media influences their academic performances; while the remaining students with a mean response of 28.7 on the contrary asserted that the use of instructional media does not influence their academic performance.

Hypothesis: There is no significant difference between performances of students taught with instructional media and those who are taught without instructional media (see Table 6 and 7).

Table 6. Questionnaire data

Zones in Jalingo District Of Taraba Education Board	No. of Questionnaire Distributed	Collected Questionnaire	Not Collected
Ardo – Kolla	200	193	07
Jalingo	200	195	05
Lau	200	190	10
Total	600	578	23

Source: Field Survey, 2023.

Table 7. **Result of chi-square analysis on the performance of students when taught with instructional media and when they are not thought with them.**

Chi –Square (χ^2)			
	Value	df	P-Value
Pearson Chi-Square	**174.85**	**4**	**.000**
Likelihood Ratio	**84.962**	**4**	**.000**
Linear-by-Linear Association	**42.007**	**1**	**.000**
N of Valid Cases	**660**		

Source: SPSS Output, 2023.

Table 7 shows the analysis of the Chi-square test done on SPSS version 27. From the test carried out, at 5% level of significance and a p-value less than our level of significance, we reject the null hypothesis and conclude there is dependence between instructional media and academic performance. This implies that the use of instructional media has positive impact on teaching and learning basic science in junior secondary schools in Taraba State Education Board.

Discussion of Finding

The hypothesis was the researchers' opinion that there is significant difference between the performances of students' taught with instructional media to those taught without. This showed that the use instructional media will facilitate learning of basic science in junior secondary schools of Taraba State if it is well utilized. The finding supports Ajelabi (2000) who noted that instructional media lend supports and authenticity to whatever the teacher says to the learner which the learner is able to confirm or refuse the teacher's assertions.

Recommendations

In line with the findings of this study, the following recommendations were made for necessary remediation.

1. Secondary School Administrators should provide enough instructional media to enable teachers' clarify their lesson. Adequate infrastructural facilities and conclusive atmosphere are sine qua non for effective learning and retention of what is learnt.
2. Secondary School Administrators should send their Basic Science teachers to seminars and workshops in order to update their knowledge and

acquired new methods of using instructional media. They should be encouraged to produce new ones through creativity.

3. Basic Science teachers should conduct the teaching and learning of the subject effectively, efficiently and interestingly. They should be resourceful, knowledgeable and vary their teaching methods at all times. They should also ensure appropriate use of instructional media in teaching their lessons as well as try their possible best to improvise these instructional media where necessary to really enable the students learn the subject properly and profoundly.
4. Students should read extensively worthwhile publications, journals and recommended books in Basic Science as well as listen to radio and television analysis on economic issues. This will widen their knowledge in Basic Science and drastically reduce mass failure of secondary school students in Basic Science.

Conclusion

In conclusion, teachers are at the centre of educational instruction. They should strive hard to make their teaching very effective. Undoubtedly, a teacher's role in the growth of an individual and the society is very pivotal. Then, the teacher of Basic Science and that of all other subjects should make imperative the use of instructional media during teaching so that learning will be positively influenced for results in building the right type of human capital for the desired growth and development of the nation.

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