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EFFECT OF PROJECTED INSTRUCTIONAL MEDIA ON STUDENTS ' ACADEMIC PERFORMANCE IN PHYSICS AMONG SECONDARY SCHOOLS IN KATSINA ZONAL EDUCATION QUALITY ASSURANCE

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Abstract

The study examined the effect of projected instructional media on students' academic performance in physics among secondary schools in Katsina Zonal Education Quality Assurance. The study developed two objectives, answered two research questions and tested two research hypotheses. The study adopted Quasi-experimental research design. The population of the study comprised of 12,853 students from 25 secondary schools in Katsina Zonal Education Quality Assurance. Two schools were selected purposively, and intact classes were used in each school with a sample size of 156 students. Validated Physics Performance Test (PPT) with a reliability coefficient of 0.80 was used for data collection. The Research questions were answered using mean and standard deviation, while null hypotheses were tested at $p<0.05$ level of 'significance using t-test independent sample. The findings revealed significant difference exists in the academic performance of the subjects exposed to projected instructional media and those taught using lecture method. Subject in the experimental group developed and obtained a significantly higher academic performance than subjects than in the control group. It was concluded that the students taught Physics using Projected Instructional Media perform significantly better than those taught using lecture method. It was recommended that Physics concepts should be taught using projected instructional media so as to improve students' academic performance.

Introduction

The search for a more innovative technological tools as an alternative to the traditional pedagogy in information dissemination in the present-day classroom has been mandatory on the part of teachers particularly at secondary level since learners of this world are born into the world of technology. The use of technology has made the process of teaching and learning more enjoyable through Information and Communication Technology (ICT) tools. Today, such tools provide both students and teachers with more opportunities in adapting learning and teaching to individual needs and the society at large (Mikre, 2011).

Using technology as a source of instructional material in teaching and learning of science will bring about great achievements in science in Nigeria. Therefore, the need to adopt the use of modern technology method in teaching and learning of Physics is necessary. Njoku, 2005; Adigun, Ajagun and Madu, 2019 lamented that despite the importance of Physics in our daily life and among other science related subjects, it has been observed that student's performance has been unimpressive.

In using instructional materials to solve some of these problems in education, teachers should be systematic in designing, carrying out and evaluating the total process of teaching and learning in terms of specific objectives to be achieved, which are based upon research in human learning and communication to bring about more effective instruction in the learning process (Abdu 2015).

Instructional materials are teaching aids which are used in teaching and learning process it can also be learning resources that are used by a teacher to bring about effective teaching and learning. Njoku (2005); Adigun, Ajagun and Madu (2019) revealed that if the achievement in Senior School certificate examination (SSCE) in physics is to be enhanced, more instructional strategies are needed to be adopted by teachers to facilitate the learning of difficult concepts.

Lokendra (2016) affirm that the traditional chalk and talk method could not help out to solve the problem of learner and hence the need of ICT as a tool can enhance the knowledge as well as learning experience. Abdu (2015) affirm that creative uses of a variety of media will increase the probability of students learning by helping them to retain what they learn, and improve their performance of skills they

are expected to develop. Alaba, (2013) reported that projected media generally have been found to aid the teacher and the learner by providing visual, audio information. Not all concepts in physics can be done in the senior secondary school level in the laboratory, but with the help of projected media this can be solved by displaying those reactions on the screen which will lead to better understanding.

Audiovisual media technologies can be implemented by educators on all educational levels and disciplines, either as tools they use themselves to convey knowledge through stimulating the senses as a vivid teaching environment is created, or as tools for the learners to use which correlate concepts with skills to reach more effective outcomes through creativity (Ezeaghasi, 2017). Ezeaghasi (2019), classified projected media into projected still / motionless media (slide, overhead projector, in focus, etc) and projected motion media (film, television, video, computer, etc). Projected media could be audio, visual or audio-visual in nature. Bork (2013) observed that Students learn to interact more effectively when learning take place through the use of projected still visual.

Projected instructional media are considered as one of the ICT tools available for teachers' use in the classroom during teaching and learning situations. Projected instructional media are seen as electronic forms of media which could be visual, audio, and audio-visual that require projection and electricity when using them in teaching and learning situations. They are a form of communication that promotes the effectiveness of instruction and helps the teacher to communicate ideas effectively to his students (Ali, 2012). More importantly with the advent of ICT, the use of computers and the projection of PowerPoint presentations has been made easier in the classroom situation. Information prepared on a computer could be better projected for larger students using a PowerPoint projector. PowerPoint presentations could be used in the classroom for supporting student learning by combining computers and a projector to display slides for illustrating a lesson Musingafi & chad'enanga (2014).

Abdu (2015); Alaba (2001) Overhead projectors are all those devices like, machines and materials which can be used by educators to present a complete body of information in the teaching and learning process for a more effective instruction. Abolade (2004) was cited by Abdu (2015) opined that the availability of

instructional projection to teach the students is likely to lead to effective learning outcomes and also affects the output.

Gambari, Kawu, and Folade (2018) Virtual environments allow students to observe the process in more detail, compared to talk-and-chalk method of the traditional classroom. Nicolaou, Matsiola and Kalliris (2019) concluded that the right selection of teaching methods utilizing audiovisual media technologies should be adjusted so as to accommodate the differences in learning needs of the distinctive levels and disciplines.

In the past, most researchers focused on the use of non-projected instructional media in teaching such as charts, photographs, drawings, graphs, or posters. For example in a research carried out by Abubakar (2015) that determines the effect of non-projected visuals on junior secondary school students' performance in Islamic studies and that of Hussain, Sultana, Ziauddin, Jamal, and Abdul-Rehman (2022) that determines the comparative effectiveness of projected and non-projected teaching aids and at the secondary school level.

Physics is among the major pillars of science and a core science in Nigerian senior secondary schools. Physics deals with the study of laws that determine the structure of the universe with reference to the matter and energy in the universe (Ike, 2002). Falalu (2014) opined that political, economic, social and military strength depend on technological strength and quality of science teaching. These show that Physics plays very important role in equipping students with the necessary scientific skills for a progressive society and forms bedrock for scientific knowledge because many of the tools on scientific and technological advancement depends on direct product of Physics.

Hence, Physics must be taught in a way students will perceive and understand it, retain what is learnt and reflect higher scores for meaningful application. Despite the importance of physics to individuals and national development, academic performance of students in the subject is not encouraging as is manifested in both internal and external examination within and outside the country and cause low patronage of the subject (Olusola & Omotade, 2014).

Related literature confirmed that Physics is not being taught the way it should in Nigerian secondary schools (Afolabi & Akinbobola, 2012 & Godwin & Okoronka 2015). This may be the reason why poor performance in Physics has persisted over the years.

Academic performance refers to the scores that student ts obtain in the cause of evaluation at the end of a program or an instruction. Academic performance is how well an individual is able to demonstrate desired abilities. Usman (2020) defined Academic performance as the extent to which students have learnt, acquired certain information and mastered skills usually as a result of planned instruction or training. The quality of scores on the part of students‟ academic performance in science is influenced by a number of factors which raise it or improve it to the desired level or standard. Performance measures the behaviours or an aspect of a feat that can be observed at a specific period (Sunday &Kola 2014). Academic performance occupies a very important place in continuing higher education as well as in the selection and placement in any organization and institution.

The success of any educational program depends largely on level of success in students‟ performance recorded Sunday and Kola, (2014). However, several factors have been attributed to poor academic performance among Nigerian secondary schools‟ students in science (Physics inclusive). Afolabi and Akinbobola (2012) and Okoronka and Wada (2014) opined that poor academic performance in our schools queries the methodology of instruction. Hence, the use of instructional Strategy is found to be significantly effective In a similar study, Mohammed (2006) found that the instructional media had given positive effect on students' Academic performance in visual art education. Bakac, Kartal-Taşoğlu and Akbay (2011) found that the projected media in science and physics increase the academic successes of students in the subject of "Electric Current". In another physics study, Kara (2008) reported that students taught Force and Pressure units in the physics topics using projected instruction performed and retained more information than those taught using traditional method.

Gender is another factor perceived to have contributed to poor academic performance in Physics which the present study is interested in investigating. Gender difference in science education has been a long-debated

issue. Various studies have found several observations relating to gender differences. However, the present study will contribute to the debate and examine the possible differential impact of Projected Instructional Media among male and female physics students. It is against this background of study that the researcher is set to investigate the impact of projected instructional media on perception, academic performance and retention in Physics among Secondary School Students in Katsina Zonal Education Quality Assurance.

Research Questions

The study is out to investigate the effect of projected instructional media on students' perception, performance and retention of physics among Secondary Schools in Katsina Zonal Education Quality Assurance. Therefore the study would attempt to answer the following Research questions, which are;

1. What is the difference between the mean academic performance of students taught physics using projected instructional media and those taught same concept using lecture method among Secondary Schools in Katsina ZEQA?
2. What is the difference between the performance of male and female students taught physics using projected instructional media among Secondary Schools in Katsina ZEQA?

Research Hypotheses

The following null hypotheses will guide the research;

Ho_1: There is no significant difference between the mean academic performance of students taught physics using projected instructional media and those taught same concept method among Secondary Schools in Katsina ZEQA.

Ho_2: There is no significant difference between the academic performance of male and female students taught physics using projected instructional media among Secondary Schools in Katsina ZEQA?

Methodology:

The research design for this study is quasi-experimental design, there are two groups in this study; the first group is the experimental group (EG) which was exposed to projected instructional media (X1), the second

is the control group which was exposed to Lecture Method (X2). All the two groups were pre-tested (O1) to ensure that selected participants will not be different significantly in terms of Academic Performance. The treatment and teaching periods lasted for six (6) weeks period. Immediately after the treatment, post-test (O2) was administered to both groups to determine the effect of treatment on Students' Performance.

The population of this study comprises of all the public senior secondary school students at year two (SSII) in Katsina Zonal Education Quality Assurance of Katsina State. The Zone consists of three Local Government Areas; Katsina, Kaita and Jibiya Local Government Area. Katsina Local Government has 12 schools, Kaita has seven and Jibiya has six schools making a total of 25 schools in the Zone. At the time of conducting this study, there are a total of twelve thousand eight hundred and fifty-three (12,853) students spread 25 secondary schools in the zone, out of which 6,774 (52.7%) are male and 6,079 (47.3%) are female. This cohort was chosen because they have get acquainted with the school environment unlike the year one (SS I) students who are still novice and year three (SS III) students who are preparing for exit exams. Two schools were purposively selected based on the availability of instructional media. The schools selected are co-educational. The schools selected are Family Support Programme and Government Day Secondary School Natsinta. The instrument for data EPT is a-20 item performance test developed by the researcher using contents of SSII electricity concept of physics. This instrument was used to determine students' performance in physics. The instrument was developed using Blooms taxonomy of educational objectives.

Result

The raw data collected was analysed with the help of SPSS v.23.0. Inferential statistics was employed in testing the hypotheses. The use of this statistics was based on the nature of the data collected. Moreover, and all the hypotheses were tested at 5% level of significance.

H_{O1}: There is no significant difference between the mean academic performance of students taught electricity using projected instructional media and those taught same concept using lecture method among Secondary Schools in Katsina ZEQA.

Table 1:

T-test Analysis of students' Academic Performance between Experimental and Control groups

Groups	N	Mean	Std. Dev.	Df	t value	P value	Remark
Experimental	66	35.20	2.88	154	19.39	0.00	Significant
Control	90	26.82	2.66				

Significant at $P \leq 0.05$

Table 1 shows that the t-value obtained for the difference between the mean academic performance of students taught electricity using projected instructional media and those taught same concept using lecture method among Secondary Schools in Katsina ZEQA is 19.39, the P value is 0.00 at degree of freedom 154. Since the p-value (0.00) is less than the alpha value (0.05), the null hypothesis which states that there is no significant difference between the mean academic performance of students taught electricity using projected instructional media and those taught same concept using lecture method among Secondary Schools in Katsina ZEQA is hereby rejected. Consequently, there is significant difference between the mean academic performance of students taught electricity using projected instructional media and those taught same concept using lecture method among Secondary Schools in Katsina ZEQA.

Ho_2: There is no significant difference between the academic performance of male and female students taught electricity using projected instructional media among Secondary Schools in Katsina ZEQA

Table 2

T-test Analysis of Male and Female Students Academic Performance

Groups	N	Mean	Std. Dev.	df	t value	P value	Remark
Female	27	34.48	3.04	64	1.71	0.093	Not Significant
Male	39	35.69	2.69				

Significant at $P \leq 0.05$

Table 2, shows the difference between the academic performance of male and female students taught electricity using projected instructional media among Secondary Schools in Katsina ZEQA. ($t = 1.17$, $df = 64$, and $P = 0.093$). Since the p-value (0.093) is greater than the alpha value (0.05), the null hypothesis is hereby retained. So, the researcher concluded that there is no significant difference between the academic

performance of male and female students taught electricity using projected instructional media among Secondary Schools in Katsina ZEQA

Discussion

The findings of this research reveals that there was a significant difference in the academic performance between those electricity using projected instructional media and those taught same concept using lecture method among public Secondary Schools in Katsina ZEQA, in favor of students of the former. This finding is in line with that of other researchers that reported PIM to have significant influence on students' academic performance.

Finding number one revealed significant difference between the mean academic performance of students taught electricity using projected instructional media and those taught same concept using lecture method among Secondary Schools in Katsina ZEQA. This finding is in contradiction to that of Suwaid (2013) which revealed that projected instructional media has no potential effect on acquisition of basic science process skills and ICT skills by school children as revealed by the insignificant difference between the performance of children exposed to projected media before school age and those that were not. Impliedly it proved that association with games (simple technology tools) has no effect on students' performance. However, the finding is in line with that of Adesina and Hanna (2016) whose results revealed that students taught with the use of PIM performed significantly better than those taught without PIM and that of Laleye (2019) whose results of the analysis revealed that students taught with PIM performed significantly better than their counterparts taught with the conventional method of instruction.

Gambari and Shittu (2016) reported that there was significant difference in the performance of the three groups in favor of Experimental group 1 (Blended learning) this shoes that blended model is more effective than PIM when teaching mathematics. Samaila, Makinde & Zambwa (2016), reported that results of the

study revealed that there was variation between the mean scores of students taught about the use of electrical and electronic devices using CAI and students taught using the lecture method. In line with this Yusuf and Afolabi (2015) reported that the performance of students exposed to CAI either individually or cooperatively were better than that of their counterparts who were exposed to the conventional classroom instruction. In a similar study by Neuman and Hood, (2011), The finding of the study revealed that the use of the projectors in the classroom had encouraged students‟ participation during learning, which is an indication of Science Process Skills acquisition.

Similarly, finding number two revealed that no significant difference exist between the academic performance of male and female students taught electricity using projected instructional media among Secondary Schools in Katsina ZEQA. The difference is in favor of PIM group as revealed in their mean score and the p-value. This finding is in agreement with the findings of of Geddes and Goraset (2010) which revealed that Technology-Assisted Instruction enhanced Retention and is Gender friendly. Similarly, the finding also agrees with that of Vick (2018) and Ibrahim (2014), reported that 7E's constructivist approach strategy is gender friendly, as both male and female students performed equally and also had no difference in their performance.

Conclusions

1. The use of projected instructional media had positive impact on students' academic performance irrespective of gender and ability levels. Thus the use of projected instructional media should be seen as an essential in the teaching and learning of science particularly Physics subject in schools.
2. Projected instructional media has been put to test and proved to be effective. Consequently, it is concluded that all the stake holders in education should embrace the act of the usage of projected instructional media in Nigerian schools as a way forward towards solving the problems of inadequate or lack of instructional media in schools.

3. The use of lecture method in teaching should be greatly minimized in the teaching and learning process especially in the sciences. This is because the students' achievement scores when taught with lecture method were very low as compared to that of others taught with media materials.

Recommendations

The following are the recommendations made based on the findings of this study.

1. Teachers should be encouraged on the use of overhead projectors in teaching and learning Physics concept in Senior secondary schools.
2. Qualified teachers who are already in the field and are not knowledgeable in the use of projected instructional media should be re-trained through seminars, workshops, conferences and in-service programmes. The teachers who are still on training in various teacher training institutions should be exposed to I.C.T courses to equip them with skills needed to face the challenges of inadequate or lack of instructional media prevalent in Nigerian schools.
3. The school management should in collaboration with Parent-Teachers Associations of their school to endeavour and provide (since there is no other choice) an alternate power supply, which is the generator or Solar power). This is necessitated by the epileptic nature of the PHCN and to provide enabling environment for the smooth use of electronic media in the teaching and learning process.
4. The use of lecture method alone in teaching Physics should completely be minimized and if possible discouraged in schools.
5. Students should be encouraged to be actively involved in the learning of Physics.
6. As it is proven that the use of projected instructional media in enhancing the academic performance of secondary students is gender-friendly. Physics teachers should focus on using technology-enhanced instructional materials such as the projected instructional media and ensure both male and female students are equally taught using projected instructional media at all levels of education.

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